

DS #: 5220

APN: 137.14.401-006, 137.23-101.002

PROJECT: Summerlin West v22 - Clowder Pass Way (Street H)

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		December 23, 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:	COPIES TO:
	Summerlin West V22 - Clowder Pass Way (Street H) (from Desert Foothill Drive to Kettle Ridge Drive <Street J>)	Atkins
Cross Streets:	Desert Foothill Drive & Clowder Pass Way	Howard Hughes Company, LLC
File Number:	F:\Depot\DSMemos\DS5220A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	137-14-401-006, 137-23-101-002	
Zoning Action:	N/A	
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	11/20/2019	12/23/2019	See Comments Below	\$400.00	3652616: \$400
TOTAL FEES (LDDRS):				\$400.00	----

REMARKS:

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

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

1. The subject street improvement of *Clowder Pass Way* is premised on the existence of *Kettle Ridge Drive* on the west for flood cut-off protection. The subject drainage study will not be approved prior to the final approval of the technical drainage study of "*Summerlin West V22 - Kettle Ridge Drive (Street J) and Scurry Bend Drive (Street N) Street Improvements (Lake Mead Blvd. to Fleet Wing Ave.)*".
2. The project proposes to build temporary drainage facilities, ie, berms/swales along the north and south sides of *Clowder Pass Way* and two interim berms in *Parcel G* and *Parcel J* for interim flood protection. Prior to final plan approval the developer must complete a maintenance and liability agreement for the interim drainage improvements (berms or channels) and post a minimum maintenance bond of \$50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facility and an exhibit that adequately shows the location and limits of the drainage facility to *City of Las Vegas Flood Control* for approval. Once the drainage study is conditionally approved, the engineer should contact the *City's Land Development Section* (229-6371) to begin the agreement process.

In order for the maintenance bond to be released in the future, a drainage update / letter will be required to justify that the offsite berms / channels are no longer necessary and can be removed.

3. Provide a soils map or soils reference to verify the soils used in the CN Calculation Summary.
4. The precipitation values in the HEC-1 do not match the precipitation values provided in precipitation map. For example the HEC-1 uses 3.42 for all basins however, on the basin map denotes that STH is 3.41 and W14 (which looks like Parcel J) is 3.41. Revise accordingly.
5. SDDI #1 and SDDI #2 are analyzed in Flowmaster with the appropriate flows (2 cfs from STH-1 basin + 0.46 bypass flow from inlets #3 and #4), however Figure 4: Hydraulic Workmap indicates 2.3 cfs going toward the inlets as surface flow. Either explain this further or update accordingly.
6. Provide bypass information for the upstream inlet at *Kettle Ridge Drive*.
7. Portion of the mainline storm drain in *Clowder Pass Way* is too close to the curb & gutter of the street. Maintain a minimum of 3'-clearance between the edge of the pipe and the lip of the curb. Review and revise accordingly.
8. On all pertinent *Roadway Grading Plans* and *Plan & Profile* sheets, specify the minimum clearance distance between the lip of the curb and gutter of the street and the edge of the proposed storm drain.
9. **Sheet 15/27** and **Sheet 16/27**: It is assumed that the sequence of construction is that the storm drain system at the intersection of *Desert Foothills Drive* and *Clowder Pass Way* to be installed prior to the subject improvements. Therefore the storm drains downstream of SDMH #1 should be existing in regard to the subject project. Revise the line type of the storm drains in *Desert Foothill Drive* to broken line to reflect "Existing" status and revise the word "FUTURE" Desert Foothill Drive to "EXISTING" in the next submittal.
10. *Storm Drain Construction Note #7* proposes Type "A" drop inlet. Delete this construction note as *City of Las Vegas* does not allow Type "A" drop inlet anymore.

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

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



Sample Letter to
certify CD.pdf

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

END OF REMARKS
HDR/AYS

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

Summerlin West Village 22
Clowder Pass Way (Street H)
Desert Foothills Drive to Kettle Ridge Drive
(Street J)
November 20, 2019

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Clowder Pass Way (Street H): Desert Foothills Drive to Kettle Ridge Drive (Street J) Date: November 20, 2019

Location of Development: a) Descriptive (Cross Streets) North/South: Desert Foothills Drive

East/West: Lake Mead Boulevard

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: 1.21 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: None

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Update #2 to the Master Conceptual Drainage Study for Summerlin West Village 22

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

 Engineer's Seal	Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.									
	*New Required Field **Review and concurrence of the Clark County Regional Flood Control District is required.									
REFERENCE:	Local Entity File No.	<table border="1"><thead><tr><th>Revision</th><th>Date</th></tr></thead><tbody><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></tbody></table>	Revision	Date						
	Revision	Date								

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Clowder Pass Way: 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.

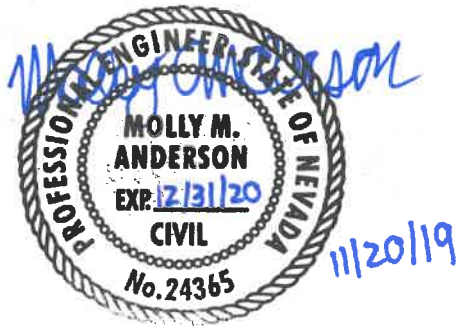
- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

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 Clowder Pass Way (Street H): 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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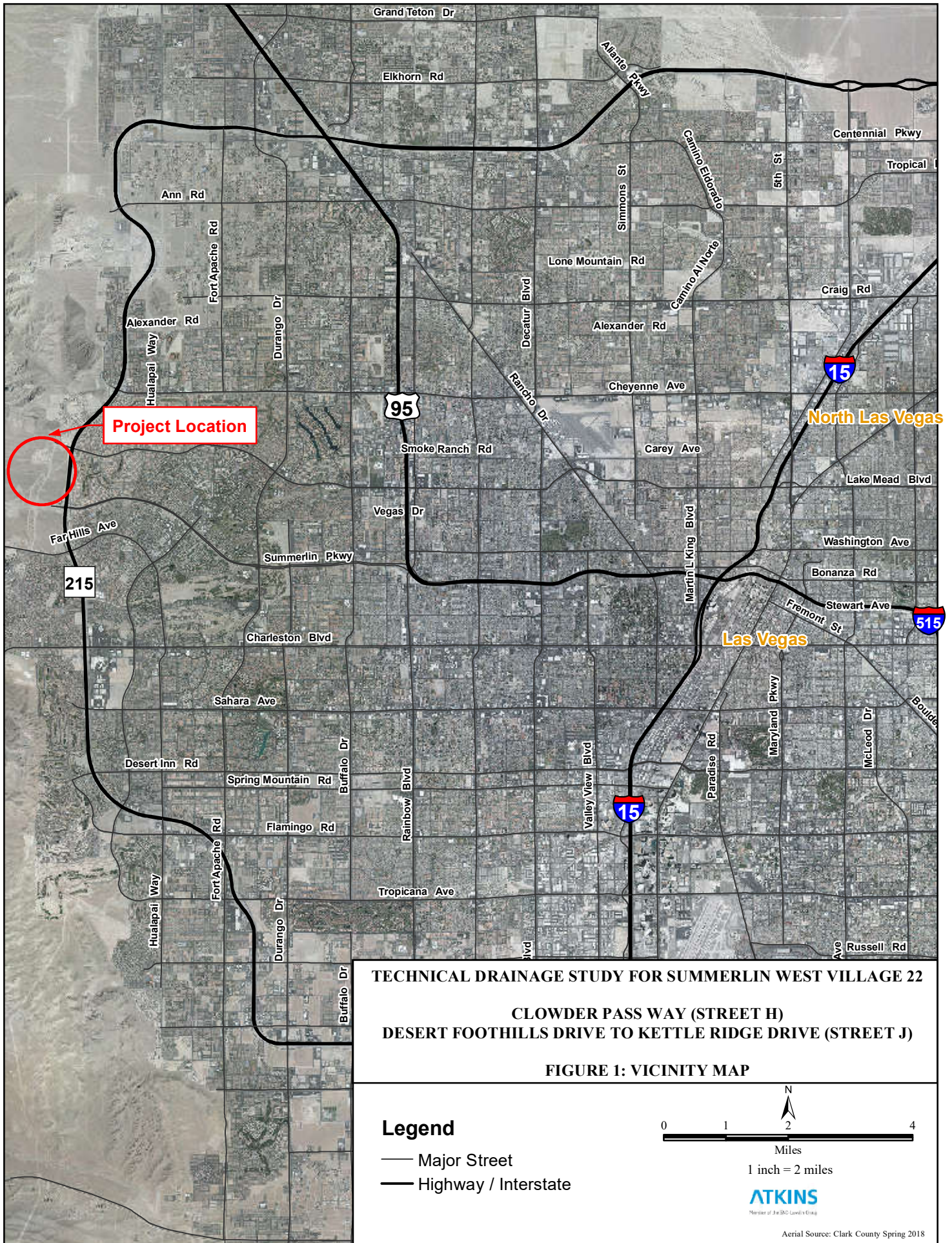
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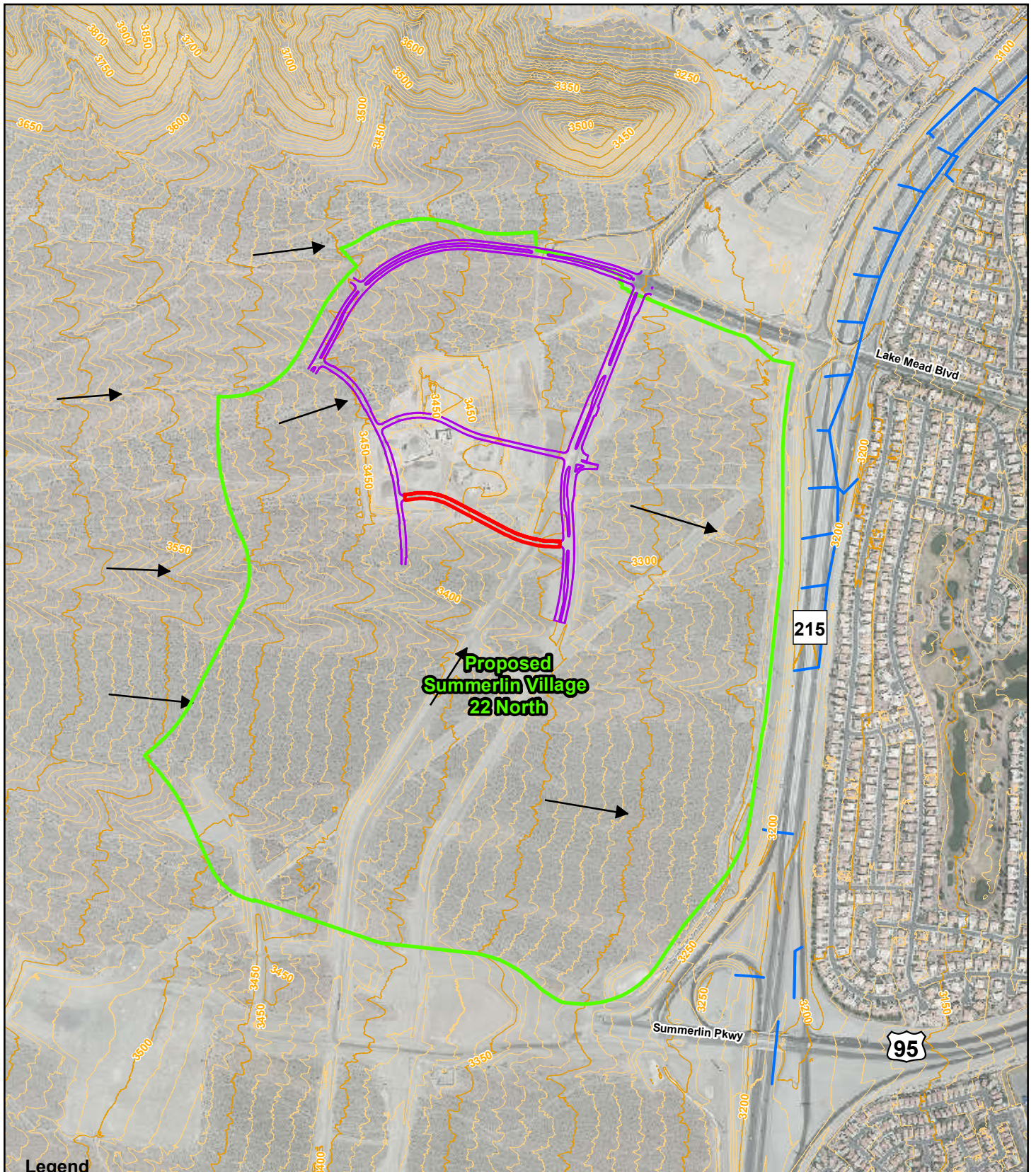
Executive Summary

This Technical Drainage Study (TDS), prepared on behalf of Howard Hughes Company, LLC represents the hydrologic and hydraulic analysis for the Clowder Pass Way (Street H) 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. The Clowder Pass Way is located between Desert Foothills Drive and Kettle Ridge Drive (Street J) and is 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.

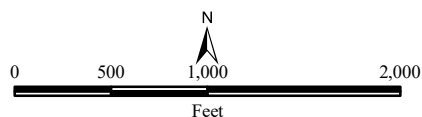






Legend

- Proposed Road H
- Existing Roadway
- Existing Storm Water Facilities
- Summerlin Village 22 Boundary
- ➔ Existing Flow Direction
- 10-ft Contours
- 50-ft Contours



ATKINS

Member of the SNC-Lavalin Group

Aerial Source: Clark County Spring 2018

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

**CLOWDER PASS WAY (STREET H)
DESERT FOOTHILLS DRIVE TO
KETTLE RIDGE DRIVE (STREET J)**

FIGURE 2: EXISTING CONDITIONS SITE MAP

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 H 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 “Clowder Pass Way” in this study and on the plans. The MCDS refers to the proposed roadway by a letter name, “Street H”. 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.

Table 1 – Village 22 MCDS and TDS Street 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

The proposed Clowder Pass Way improvements will be constructed prior to the development of adjacent onsite parcels (G, H, J, and K). 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 H 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 (Street J) is to be completed prior to the interim conditions of Clowder Pass Way. Drainage basins to the west of the newly constructed Kettle Ridge Drive will be intercepted before entering Clowder Pass Way in the interim and ultimate conditions. There are no offsite flows tributary to Clowder Pass Way in the interim or ultimate conditions. There are several drainage basins on the north and south side of Clowder Pass Way 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 drain onto Clowder Pass Way. Interim subbasins INT-H1 and INT-H2 (Figure 3) collect flows in the interim swales to the south of Clowder Pass Way, which drain into the proposed Clowder Pass Way storm drains.

The hydrologic conditions for 10-year and 100-year storm events for the interim and ultimate conditions were modeled using HEC-1. The results are summarized in Table 2 and Figure 3.

The proposed Clowder Pass Way storm drain discharges east to the 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 associated TDS (DS #5170). The plan sheets that reference the HGL information is included in the reference information in Appendix A.

Table 2 – Interim Condition HEC-1 Model Results

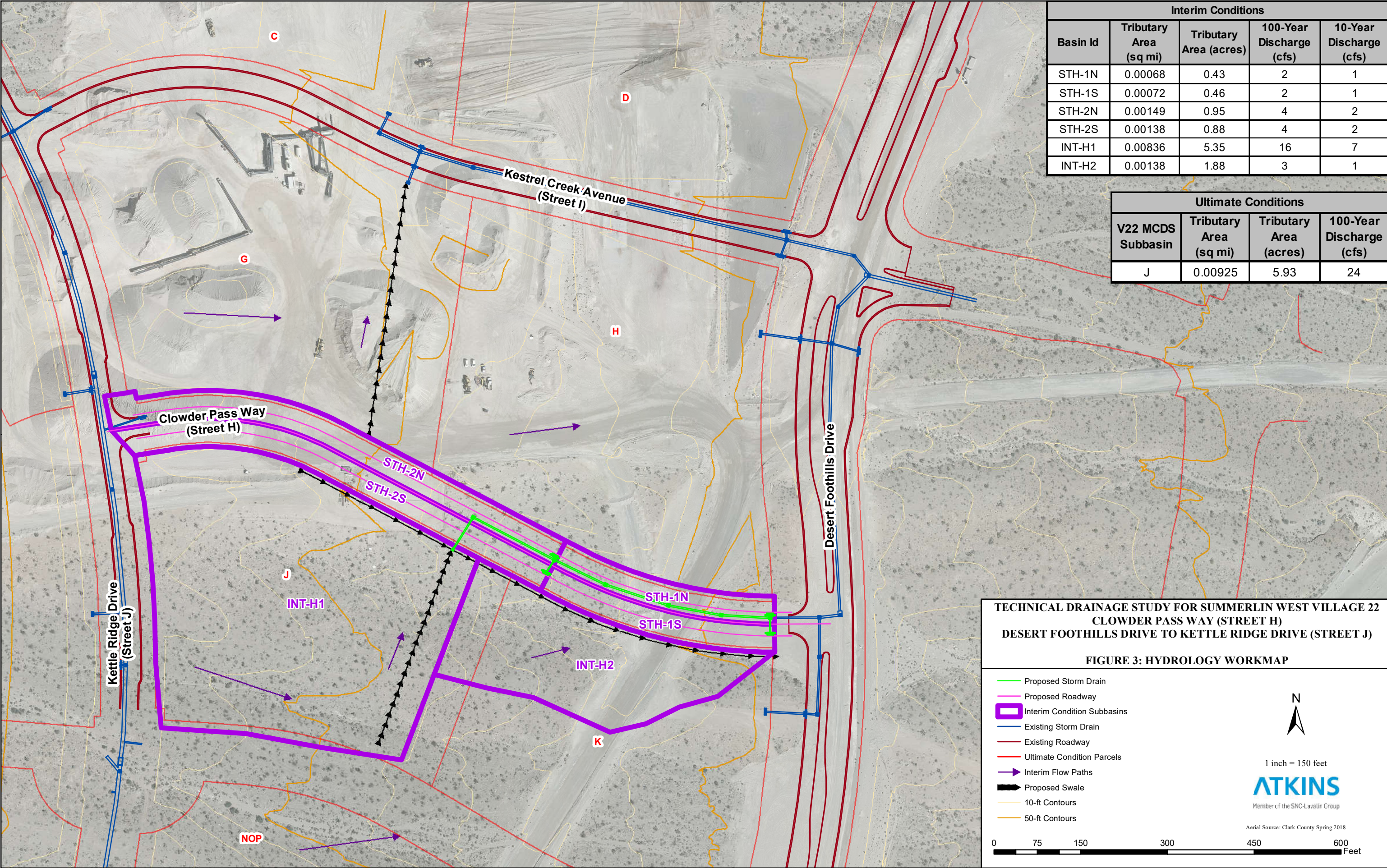
Basin ID	Tributary Area (sq mi)	Tributary Area (ac)	100-year Flow (cfs)	10-year Flow (cfs)
STH-1N	0.00068	0.43	2	1
STH-1S	0.00072	0.46	2	1
STH-2N	0.00149	0.95	4	2
STH-2S	0.00138	0.88	4	2
INT-H1	0.00836	5.35	16	7
INT-H2	0.00138	1.88	3	1

1.3. Ultimate Condition

The ultimate condition flows were directly referenced from Update #2 to the Village 22 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 Clowder Pass Way 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)
J	0.00925	5.93	24



2. Hydraulic Analysis

2.1. Drop Inlet Calculations

The computer program Bentley FlowMaster V10.2 was utilized to perform calculations for the five proposed drop inlets along Clowder Pass Way. SDDI #1, SDDI #2, SDDI #3, and SDDI #4 are located along the proposed Clowder Pass Way roadway. SDDI #5 is in the proposed ditch to the south of Clowder Pass Way. Drop inlet calculations are provided in Appendix C. Table 4 provides a summary of the drop inlet calculation results. Drop inlet locations and calculation results are also shown on Figure 4. The ultimate condition flow is equal to or higher than the interim condition flow for all locations as shown in the figures, so only the ultimate condition was analyzed for all drop inlets.

Table 4 – Drop Inlet Calculations

ID	Total Flow (cfs)	Discharge Source	Intercepted Flow (cfs)	Bypass Flow (cfs)
SDDI #1	2.46	STH-1S + Bypass SDDI #3	2.41	0.05
SDDI #2	2.46	STH-1N + Bypass SDDI #4	2.41	0.05
SDDI #3	4.00	STH 2S	3.54	0.46
SDDI #4	4.00	STH 2N	3.54	0.46
SDDI #5	24.00	Parcel J	24.00	0.00

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.

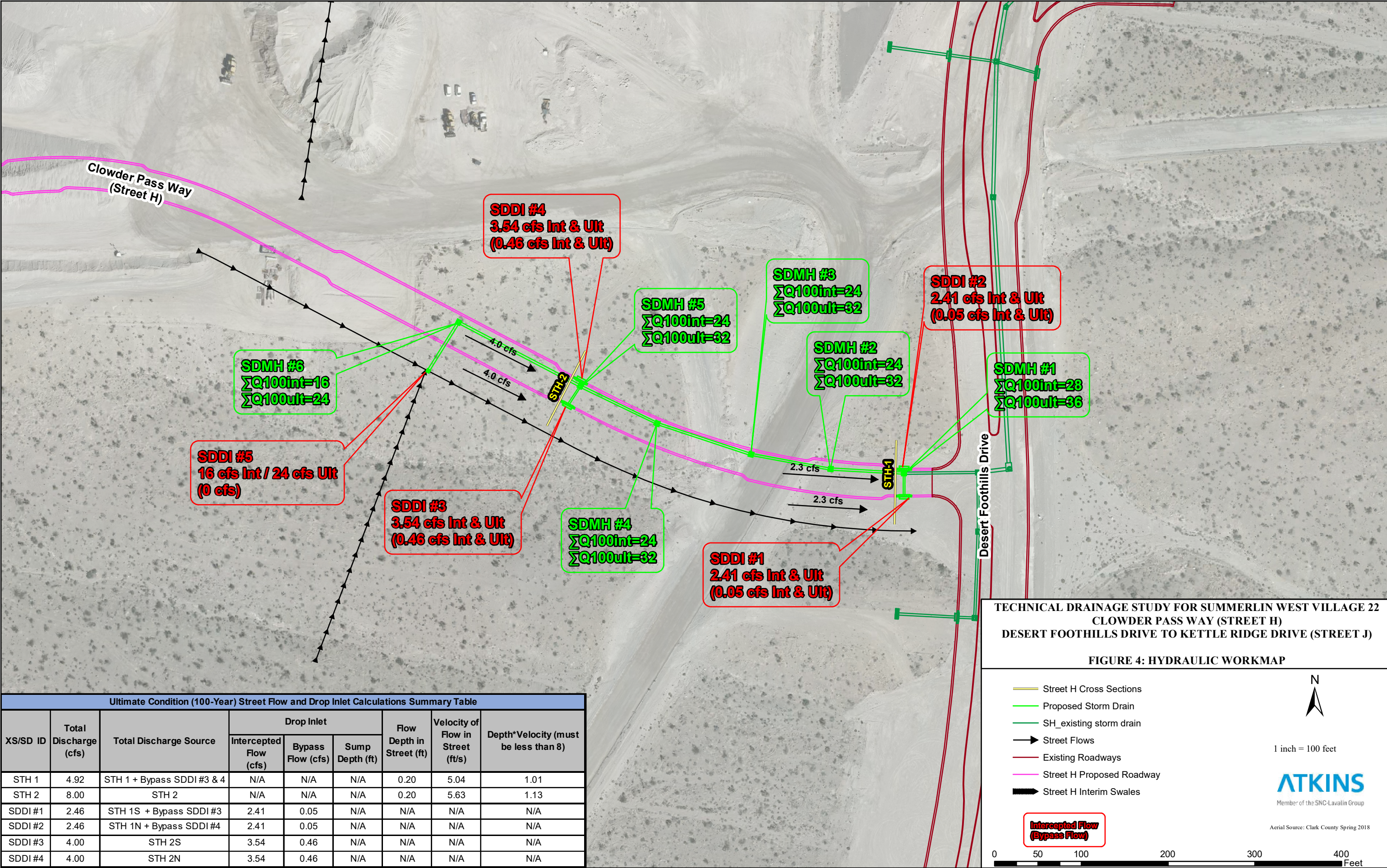
Two full street cross-sections were analyzed as roadway flow and storm drain capture were equal on north and south sides of the street. The cross-section locations were specified based on the flow patterns and utilized the worst-case slope or roadway width when applicable for the calculations.

Table 5 summarizes the normal depth calculations for 100-year interim and ultimate storm events. Depth*Velocity must be less than 8 for the 100-year event and less than 6 for the 10-year event. Since the street conditions in the interim and ultimate 100-yr events meet the roadway criteria for the 10-year event as well, the computations for the 10-yr events are not shown in tables and figures.

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 Ultimate Condition						
STH-1	4.92	STH-1 + Bypass SDDI #3 & 4	8.00	0.20	5.04	1.01
STH-2	8.00	STH-2	8.00	0.20	5.63	1.13



Ultimate Condition (100-Year) Street Flow and Drop Inlet Calculations Summary Table								
XS/SD ID	Total Discharge (cfs)	Total Discharge Source	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)	Sump Depth (ft)			
STH 1	4.92	STH 1 + Bypass SDDI #3 & 4	N/A	N/A	N/A	0.20	5.04	1.01
STH 2	8.00	STH 2	N/A	N/A	N/A	0.20	5.63	1.13
SDDI #1	2.46	STH 1S + Bypass SDDI #3	2.41	0.05	N/A	N/A	N/A	N/A
SDDI #2	2.46	STH 1N + Bypass SDDI #4	2.41	0.05	N/A	N/A	N/A	N/A
SDDI #3	4.00	STH 2S	3.54	0.46	N/A	N/A	N/A	N/A
SDDI #4	4.00	STH 2N	3.54	0.46	N/A	N/A	N/A	N/A

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 for ultimate condition is provided in Appendix C. The Q_{100} and hydraulic grade lines are shown on the included improvement plans. Table 6 summarizes the WSPG-W model at the mainline manholes for interim and ultimate conditions. All HGLs modeled are greater than 1 foot below the proposed surface.

Table 6 – WSPG Mainline Summary Table

SDMH#	Plans and WSPG-W Station	Q100	$\Sigma Q100$	HGL (ft)
100-Ultimate Condition				
Outlet	2103.34	-	36.00	3337.06
#1	2106.34	4.00	36.00	3336.91
#2	2192.21	-	32.00	3340.23
#3	2286.92	-	32.00	3344.53
#4	2402.53	-	32.00	3353.60
#5	2501.90	8.00	32.00	3361.27
#6	2660.41	-	24.00	3374.17
SDDI#5	2726.04	24.00	24.00	3375.90

2.4. Riprap Calculations

Normal depth calculations for the north-south oriented berms separating the ultimate parcels show that average velocities are less than 2.5 ft/s and riprap is not needed for the temporary interim condition. For the interim swale oriented west-east just south of the proposed Clowder Pass Way roadway normal depth calculations determined that channel velocities would require riprap. The riprap sizing calculations were performed utilizing shear stress calculations based on HCDDM Section 705 using HEC-11 methodology. These calculations determined that a median riprap particle size (D_{50}) of 10 inches is required to resist the average channel shear stress for the channel velocities along the swale. Results of the riprap calculations 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 Clowder Pass Way. 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. Hydrology Appendix

- A.1. Village 22 Master Conceptual Drainage Study Reference
- A.2. Approved Plans Reference

A.1 Village 22 Master Conceptual Drainage Study Reference

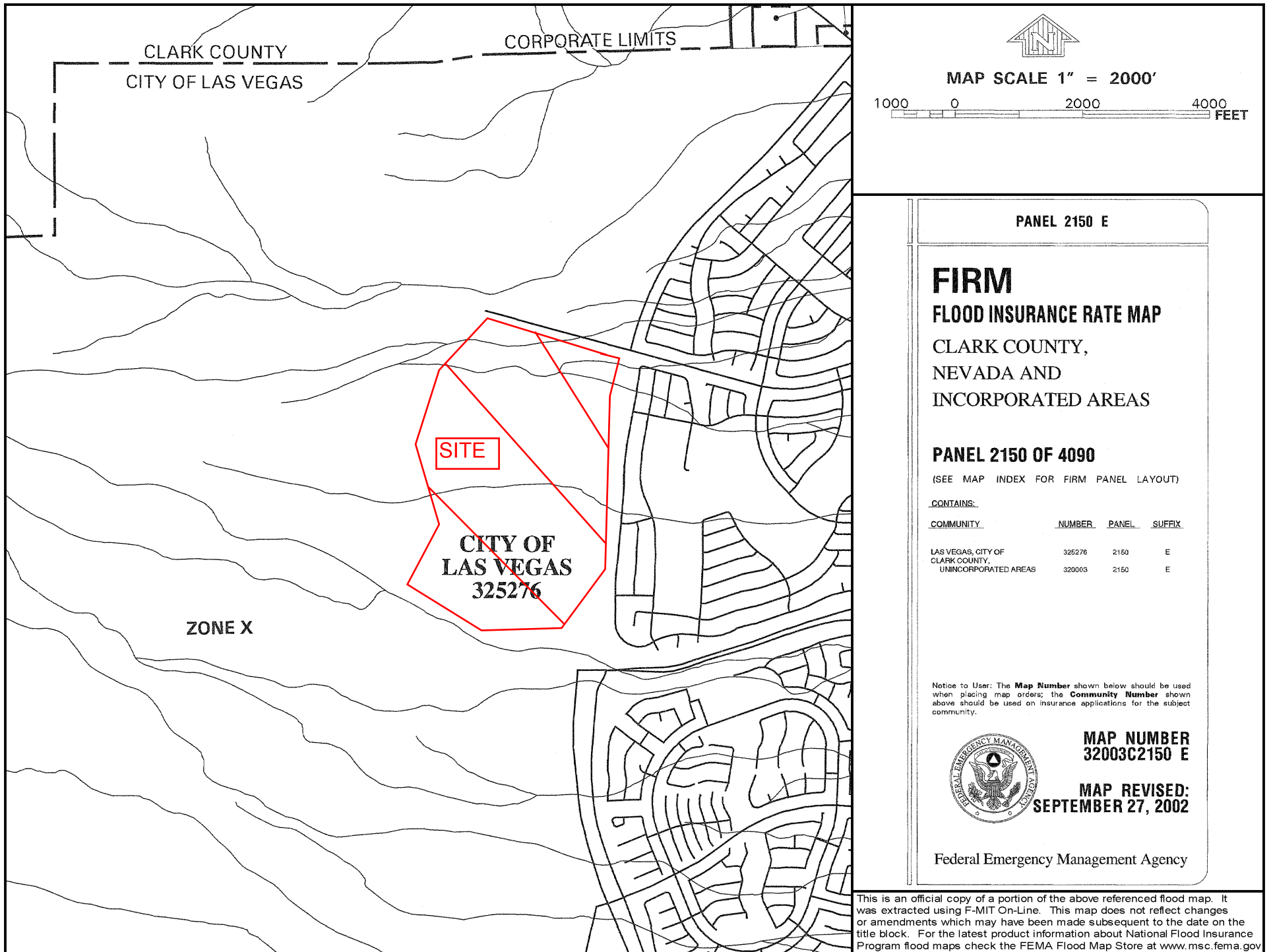


FIGURE 3

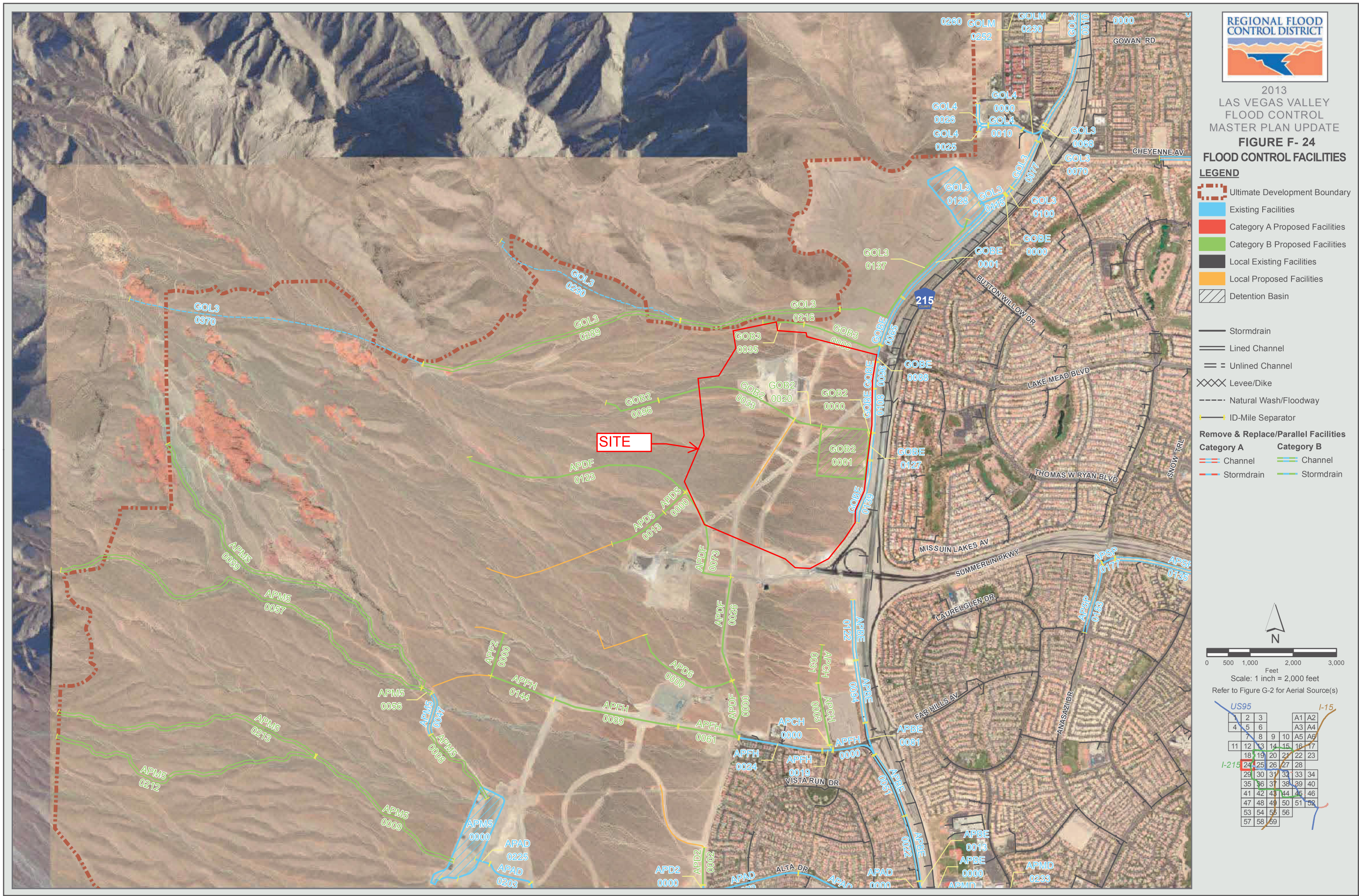


FIGURE 4A - MPU Facilities

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

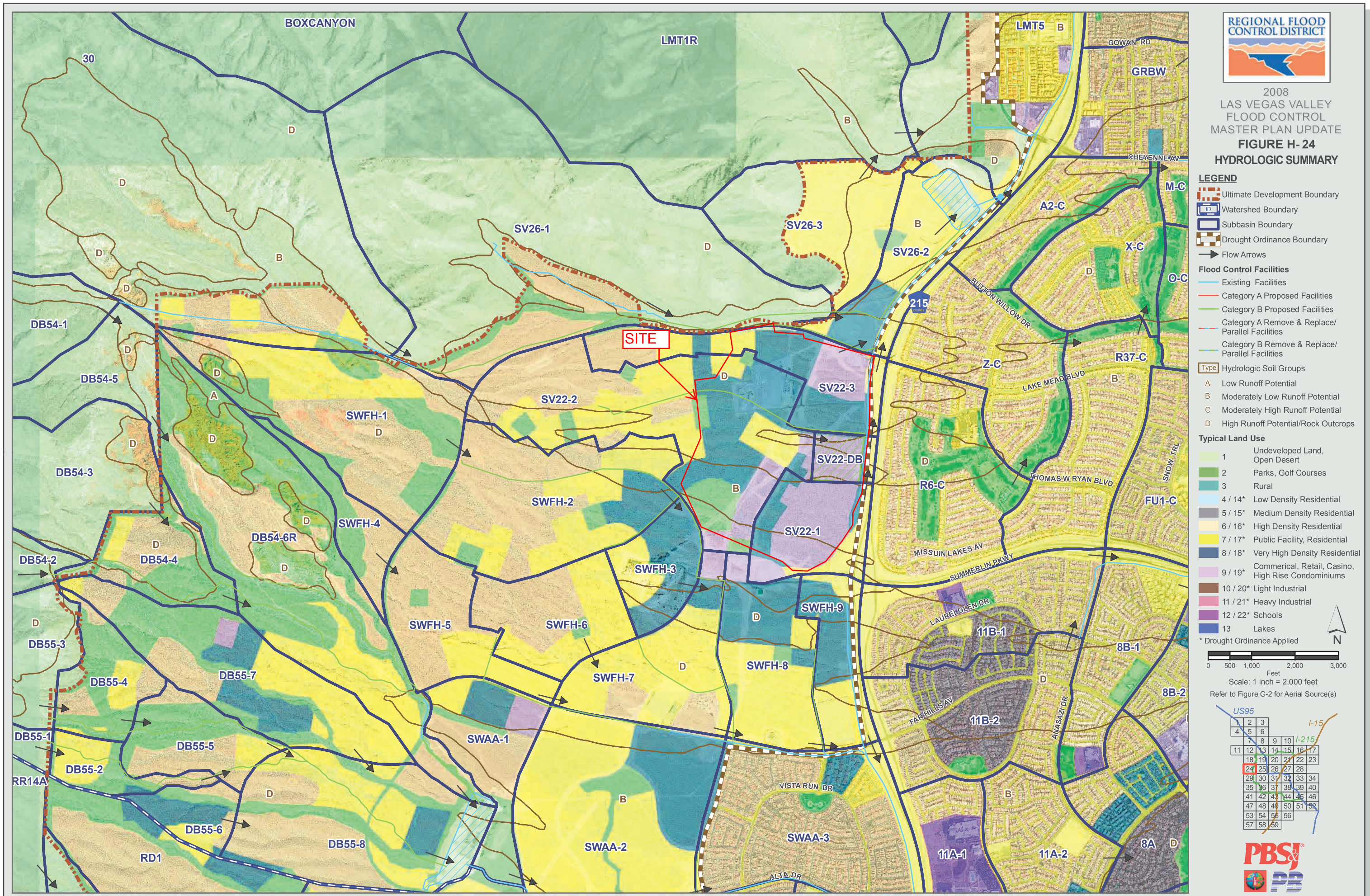


FIGURE 4B - MPU HYDROLOGIC SUMMARY

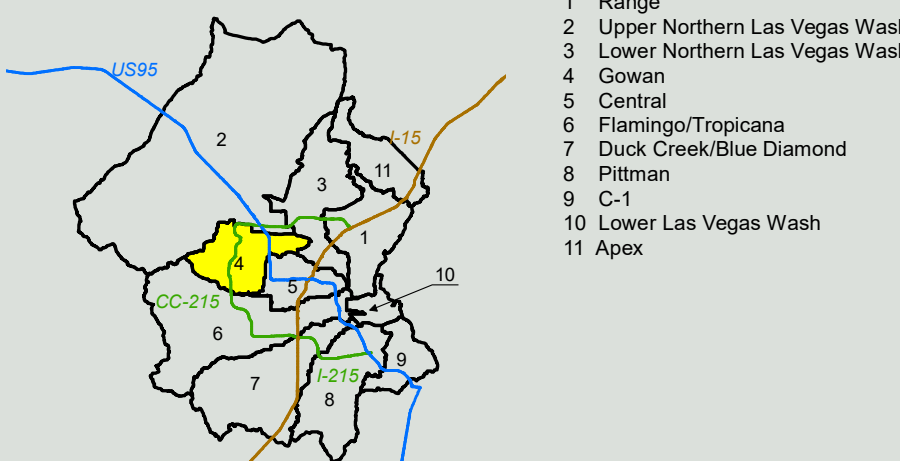


2018 Las Vegas Valley Master Plan Update

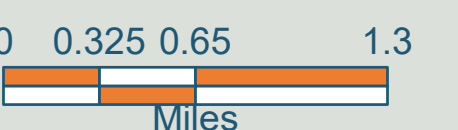
Figure W-4
Gowan Watershed

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

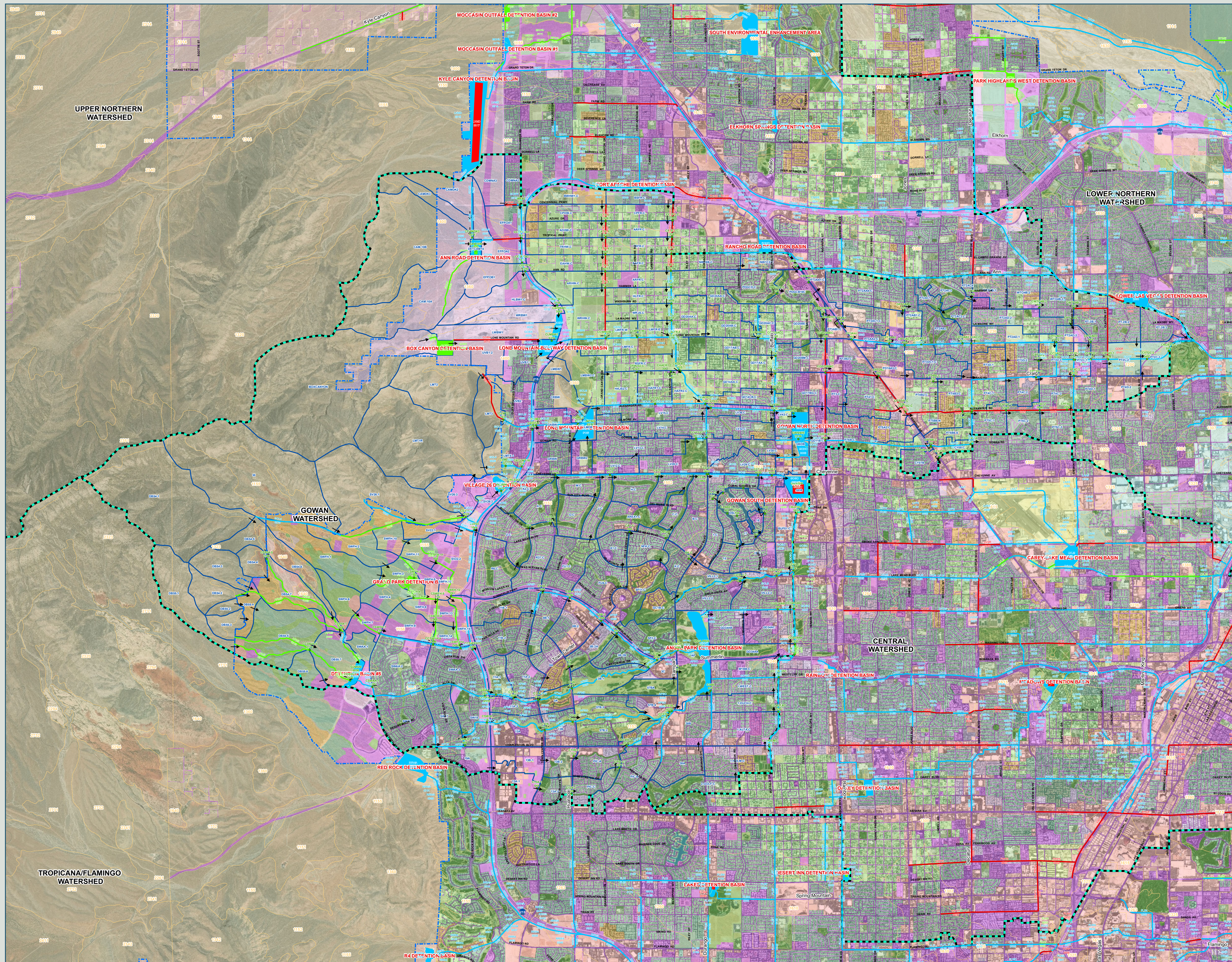


Scale: 1 inch = 0.65 mile



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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	CRCLMT1R	GOW3A	7.31	2.78
	E	TRANSITION STRUCTURE	100	3277	CRCLMT1R	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
Proposed or Modified Facility.....P
Contingency Level
Category A.....P
Category B.....P0

Bottom Width.....W

Depth.....D

Side Slope, H:V.....SS

Cast in Place Concrete Pipe.....CIPCP
Corrugated Metal Arch Pipe Culvert.....CMAP
Corrugated Metal Pipe Culvert.....CMPC
High Density Polyethylene.....HDPE
Horizontal Elliptical Reinforced Concrete Pipe.....HERCP
Reinforced Concrete Arch Pipe.....RCAP

Construction Features

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





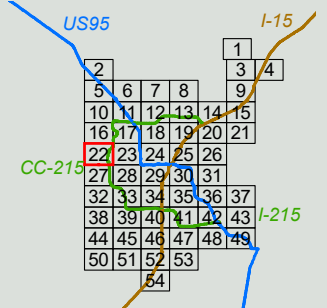
2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

**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 |

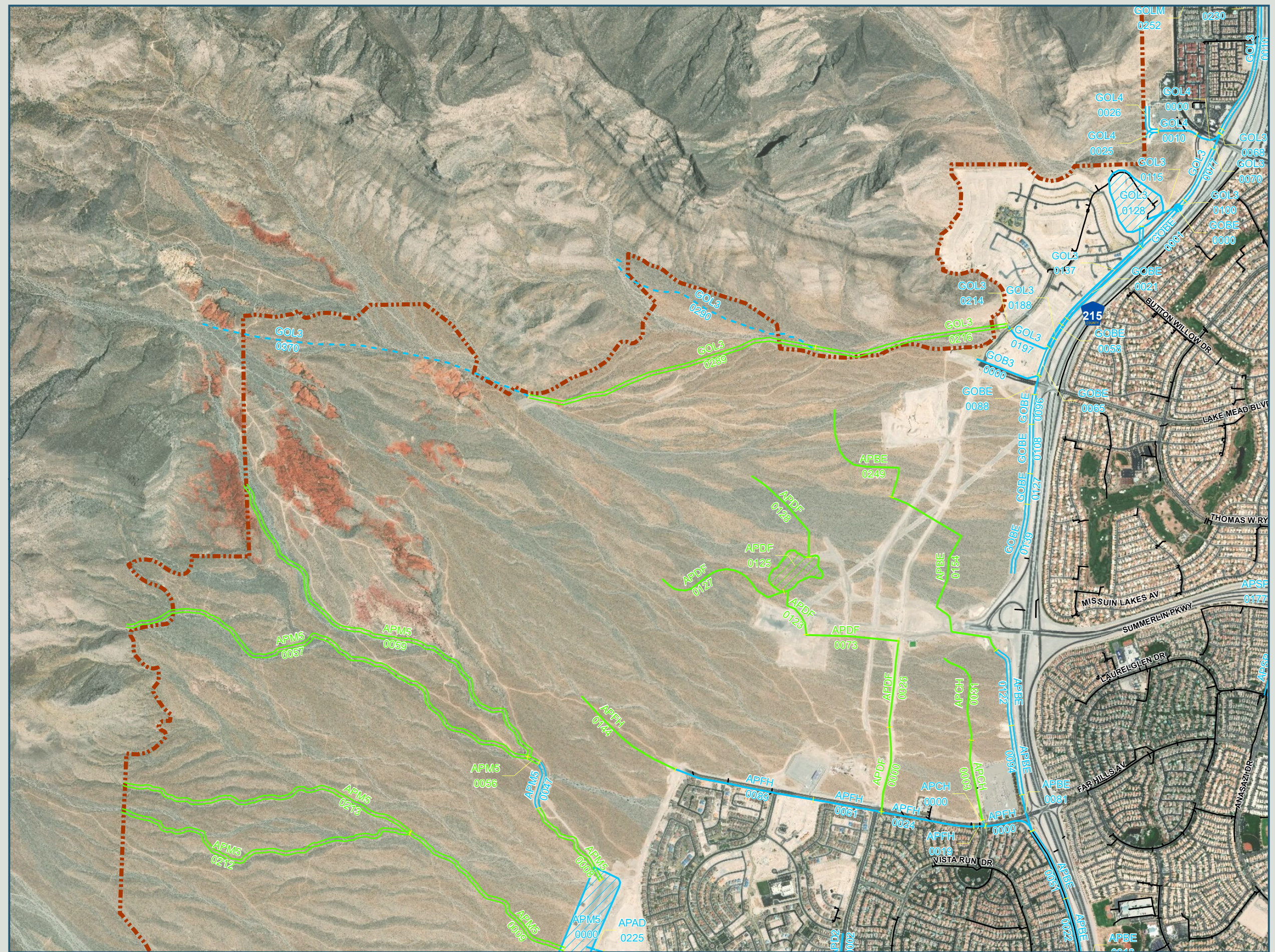


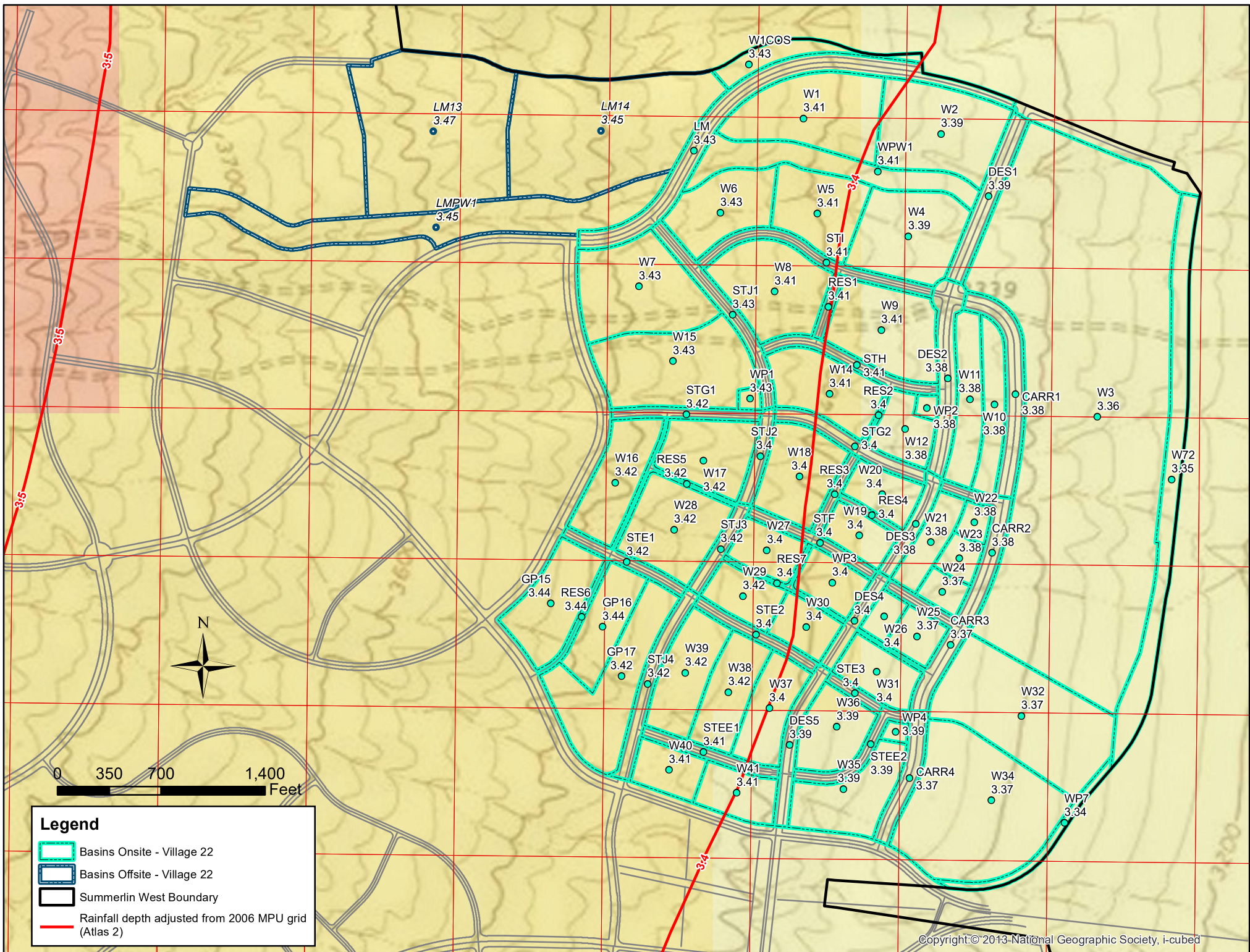
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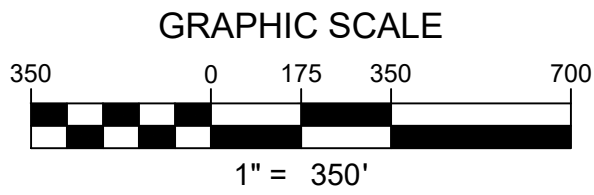
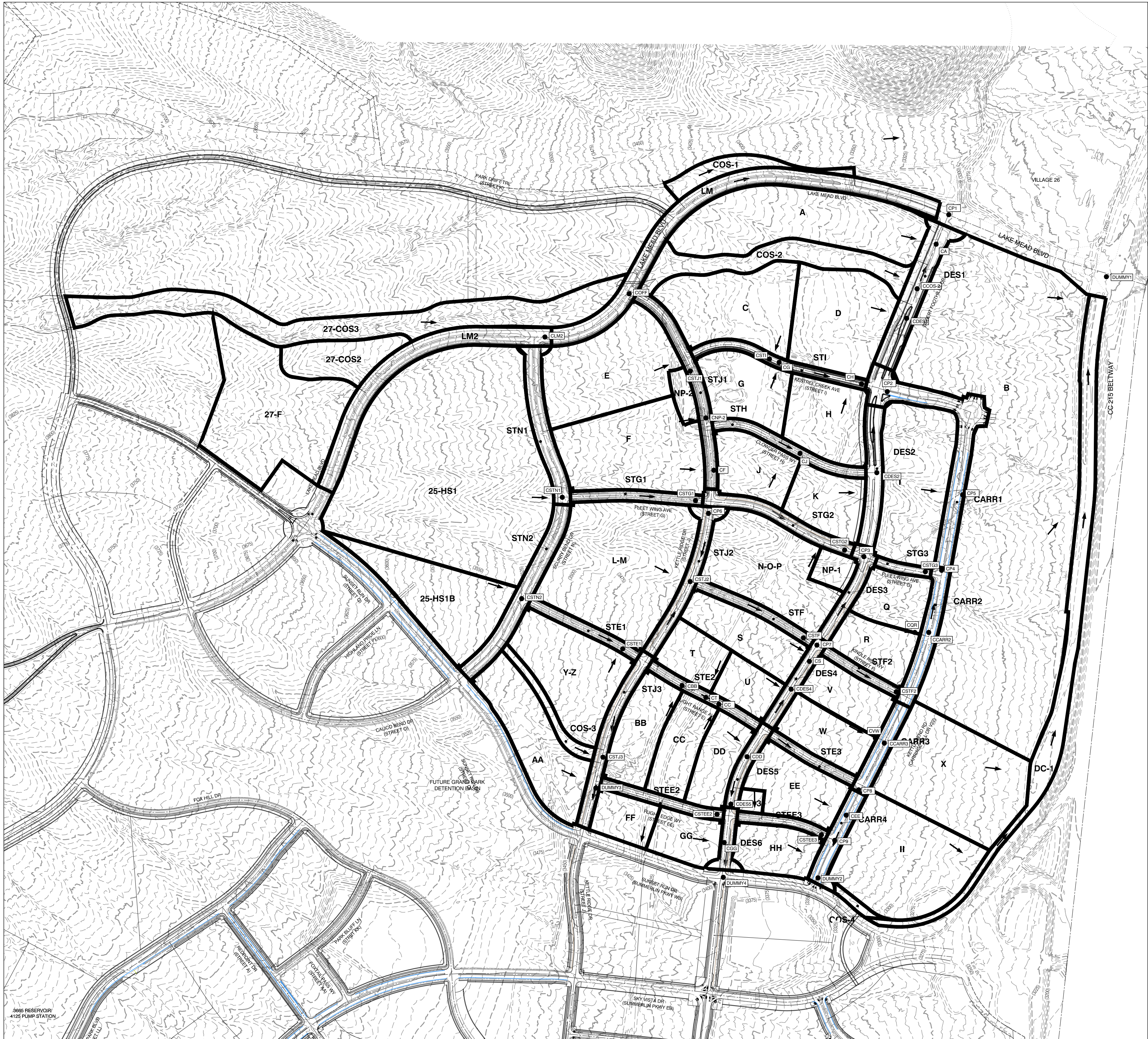


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LEGEND

- 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	10.04	36	STN1	3.61	13
D	11.96	50	CSTN1	-	244
DES1	4.46	20	STG1	1.85	8
CDES1	-	70	CSTG1	-	229
COS-2	7.51	22	CP6	-	532
CCOS-2	-	89	LM	21.14	81
A	17.39	68	STJ2	3.10	13
CA	-	156	CSTJ2	-	612
CP1	-	191	STF	1.84	8
STI	2.42	11	CSTF	-	610
C	12.05	51	U	3.49	11
CSTI	-	62	DES4	1.77	8
G	7.05	30	CDES4	-	19
CG	-	92	S	3.01	10
H	7.64	33	CS	-	29
CH	-	124	CP7	-	639
STH	2.29	10	STF2	1.21	5
J	5.93	24	CSTF2	-	637
CJ	-	34	V	5.01	17
K	5.28	22	W	5.28	19
DES2	3.09	13	CVW	-	36
CDES2	-	68	CARR3	2.14	8
CP2	-	189	CCARR3	-	667
CARR1	6.95	29	STE3	1.36	6
I	13.44	38	CP8	-	673
N-O-P	14.52	49	EE	6.80	25
NP-1	1.73	6	CEE	-	689
STG2	2.86	13	NP3	0.70	2
CSTG2	-	68	STEE3	1.23	5
DES3	2.00	9	CSTEE3	-	7
CP3	-	77	CP9	-	205
STG3	0.72	3	HH	4.85	20
CSTG3	-	79	CARR4	-	10
Q	4.58	17	25-HS1B	-	48
R	4.97	20	STN2	-	19
CQR	-	37	CSTN2	-	67
CARR2	3.58	15	Y-Z	11.28	42
CCARR2	-	52	STE1	1.75	8
CP4	-	131	CSTE1	-	115
CP5	-	379	COS-3	1.70	4
II	16.03	61	STJ3	3.22	14
X	17.45	60	CSTJ3	-	126
B	80.77	304	AA	10.13	33
DC-1	12.59	36	STE2	-	8
COS-4	0.57	2	BB	6.29	23
COS-1	2.87	6	CBB	-	31
V27-F	19.13	83	T	4.02	13
V27-COS2	5.25	20	CT	-	44
LM2	7.23	28	CC	5.34	19
CLM2	-	132	CCC	-	63
27-COS3	17.46	53	DD	4.76	17
COFF	-	185	DDD	-	77
E	13.91	58	DES5	1.57	7
STJ1	3.52	15	CDES5	-	81
CSTJ1	-	255	STEE2	1.79	8
NP-2	1.34	5	CSTEE2	-	88
CNP-2	-	255	GG	4.98	21
F	14.22	59	CGG	-	109
CF	-	309	FF	3.49	15
25-HS1	49.49	211			

THE HOWARD HUGHES COMPANY, LLC
10801 WEST CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NEVADA 89135

FIGURE 6
ULTIMATE CONDITION BASIN MAP
SUMMERLIN WEST VILLAGE 22

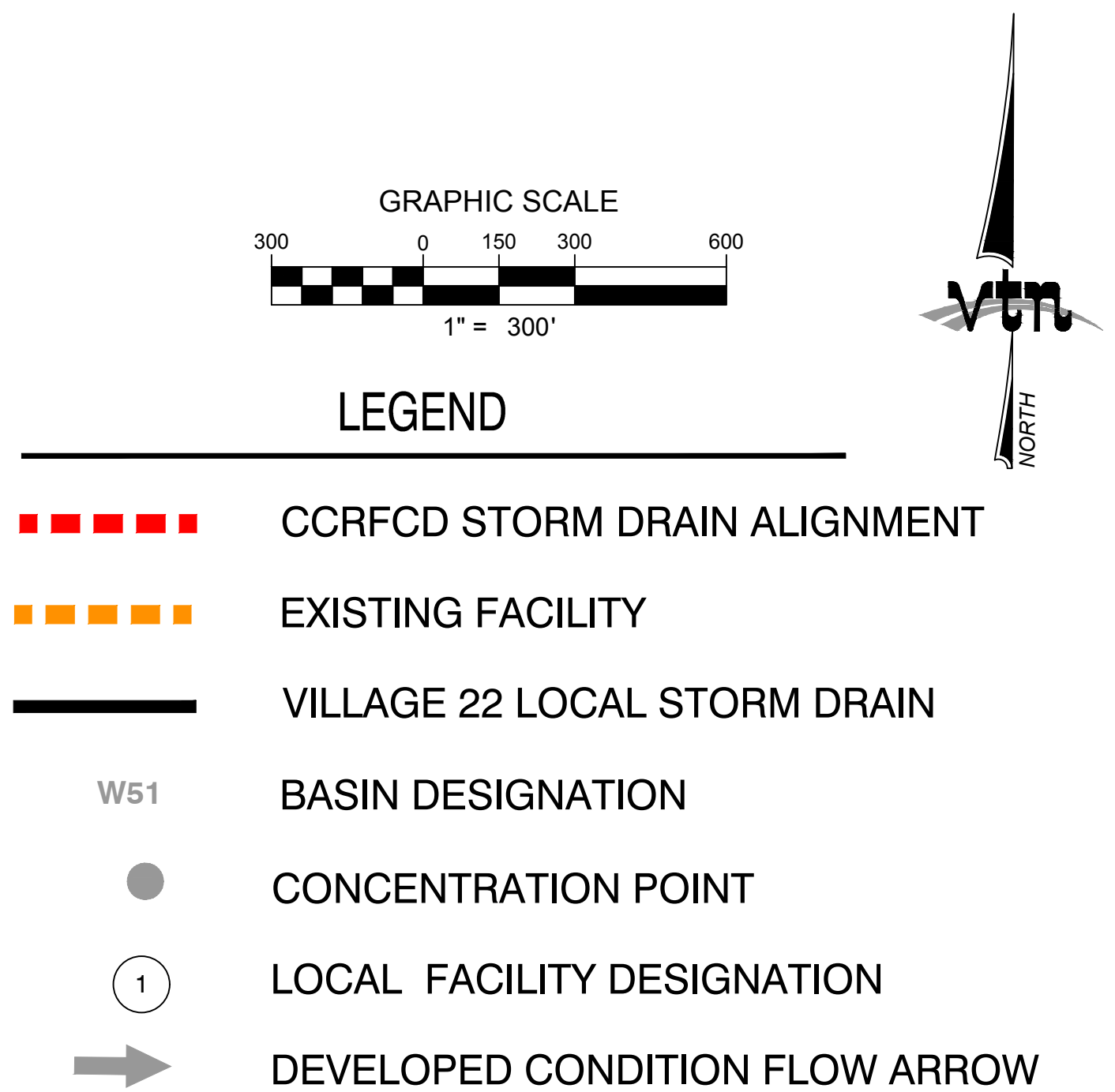
DRAWN BY: JYA
DESIGNED BY: OCT 2019
CHECKED BY: N/A
PROJECT NO: 2801
SCALE: 1" = 350' HORIZ. N/A VERT.

SHEET
OF SHEETS
DRAWING NO.

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 893-7500 FAX: (702) 362-2897 WEB: WWW.VTNV.COM
CONSULTING ENGINEERS & PLANNERS & LAND SURVEYORS



H:\17861 Village 22 Master\Drawings\6. UP2A_Figures\Figure 6 - Village 22 Drainage Basin Map.dwg



VILLAGE 22 LOCAL FLOOD PROTECTION FACILITIES											
Design Slope		Q100	Tributary Basin/CP	Velocity	Facility	Design Slope		Q100	Tributary Basin/CP	Velocity	Facility
Facility #	%	cfs		ft/s		%	cfs	ft/s			
4	5.4	36	LM	18.02	24" RCP	61	6.6	379	CP5	29.52	6x6 RCB
5	1.0	50	D	13.29	30" RCP	64	1.0	81	L-M	11.63	42" RCP
6	2.7	70	CDES1	15.60	30" RCP	65	6.9	31	CBB	18.97	30" RCP
7	2.0	22	COS-2	11.00	30" RCP	66	4.3	44	CT	17.48	30" RCP
8	2.9	89	CCOS-2	17.76	36" RCP	67	8.0	63	CCC	24.12	30" RCP
9	5.0	68	A	20.48	30" RCP	68	1.0	10	S	6.90	30" RCP
10	3.0	156	CA	20.48	42" RCP	69	1.0	11	U	7.08	30" RCP
11	N/A	191	CP1	N/A	EX 66" RCP**	70	2.1	19	CDES4	10.77	30" RCP
12A	1.6	53	V27-COS3	12.61	48" RCP	72	6.1	36	CVW	18.89	30" RCP
12B	2.6	185	COFF	20.31	54" RCP	74	7.7	6	STE3	12.27	30" RCP
13	2.0	58	E	13.47	30" RCP	77A	1.0	67	CSTN2	10.75	36" RCP
19	1.0	51	C	10.49	42" RCP	77B	5.0	244	CSTN1	28.12	48" RCP
20	6.0	62	CSTI	21.33	42" RCP	78	1.0	42	Y-Z	9.51	30" RCP
21	1.0	30	G	9.19	36" RCP	79	4.5	115	CSTE1	22.30	36" RCP
22	8.0	92	CG	26.39	42" RCP	79B	0.5	115	CSTE1	8.38	5X5 RCB
23	1.0	33	H	9.29	30" RCP	80	8.0	4	COS-3	11.01	30" RCP
24	8.0	124	CH	28.56	42" RCP	81	0.5	126	CSTJ3	8.56	5X5 RCB
25	1.5	5	NP-2	6.39	36" RCP	82	1.0	33	AA	9.29	30" RCP
27	1.0	59	F	10.65	36" RCP	83	1.0	23	BB	8.60	30" RCP
29	1.0	24	J	8.68	30" RCP	84	1.0	13	T	7.41	30" RCP
30	7.0	34	CJ	19.55	30" RCP	85	1.0	19	CC	8.19	30" RCP
35	1.0	22	K	8.50	30" RCP	86	1.0	17	DD	7.96	30" RCP
36	1.4	68	CDES2	12.78	42" RCP	87	1.0	77	CDD	11.52	42" RCP
37	3.9	189	CP2	24.25	54" RCP	88	1.0	15	FF	7.70	30" RCP
40	1.0	38	I	9.49	30" RCP	92	2.7	21	GG	12.13	30" RCP
41	3.5	131	CP4	21.14	42" RCP	93	1.0	25	EE	8.77	30" RCP
43	1.0	49	N-O-P	10.31	36" RCP	94	1.0	20	HH	8.30	30" RCP
44	6.8	68	CSTG2	23.10	36" RCP	95	1.0	61	II	10.96	42" RCP
45	1.0	6	NP-1	5.97	30" RCP	96	1.0	60	X	10.68	36" RCP
52	8.0	79	CSTG3	25.51	36" RCP	97	1.5	304	B	18.49	60" RCP
55	1.0	37	CQR	9.46	30" RCP	98	N/A	138	N/A	N/A	EX 48" RCP***
58	3.3	52	CCARR2	16.49	30" RCP	99	1.0	2	NP-3	8.55	30" 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


```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 23OCT19 TIME 13:10:22 *
*
*****

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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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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 = OCTOBER 2019
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 #2 - 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 0.0157
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 0.118
*
35 KK D
36 BA 0.0187
37 PB 3.39
38 LS 0 95.0
39 UD 0.058
*
40 KK DES1
41 BA 0.0070
42 PB 3.39
43 LS 0 98.0
44 UD 0.058
*

```


[illegible]

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
76	KK STI
77	KM KESTREL CREEK AVE
78	BA 0.0038
79	PB 3.41
80	LS 0 98.0
81	UD 0.050
	*
82	KK C
83	BA 0.0188
84	PB 3.41
85	LS 0 95.0
86	UD 0.054
	*
87	KK CSTI
88	KM COMBINE C AND STI
89	HC 2
	*
90	KK G
91	BA 0.0110
92	PB 3.41
93	LS 0 95.0
94	UD 0.056
	*
95	KK CG
96	KM COMBINE CSTI AND CG
97	HC 2
	*
98	KK RCG

99 KM ROUTE CG TO CH
100 RD 556 0.081 0.013 0 CIRC 3.5
*

101 KK H
102 BA 0.0119
103 PB 3.41
104 LS 0 95.0
105 UD 0.053
*

106 KK CH
107 KM COMBINE CG AND CH
108 HC 2
*

1

HEC-1 INPUT

PAGE 4

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

109 KK RCH
110 KM ROUTE CH TO CP2
111 RD 255 0.093 0.013 0 CIRC 3.5
*

112 KK STH
113 KM CLOWDER PASS WAY
114 BA 0.0036
115 PB 3.41
116 LS 0 98.0
117 UD 0.050
*

118 KK J
119 BA 0.0093
120 PB 3.41
121 LS 0 92.0
122 UD 0.058
*

123 KK CJ
124 KM COMBINE J AND STH
125 HC 2
*

126 KK RCJ
127 KM ROUTE CJ TO CDES2
128 RD 637 0.080 0.013 0 CIRC 2.5
*

129 KK K
130 BA 0.0081
131 PB 3.40
132 LS 0 95.0
133 UD 0.050
*

134 KK DES2
135 BA 0.0048
136 PB 3.38
137 LS 0 98.0
138 UD 0.071
*

139 KK CDES2
140 KM COMBINE DES2, CJ, AND K
141 HC 3
*

1

HEC-1 INPUT

PAGE 5

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

142 KK RCDES2
143 KM ROUTE CDES2 TO CP2
144 RD 643 0.014 0.013 0 CIRC 3.5
*

145 KK CP2
146 KM COMBINE CDES2 & CH
147 HC 2
*

148 KK RCP2
149 KM ROUTE CP2 TO CP5
150 RD 1226 0.039 0.013 0 CIRC 4.5
*

151 KK CARR1
152 BA 0.0109
153 PB 3.38

154 LS 0 98.0
155 UD 0.070
*

156 KK I
157 BA 0.0165
158 PB 3.38
159 LS 0 92.0
160 UD 0.083
*

161 KK N-O-P
162 BA 0.0227
163 PB 3.40
164 LS 0 90.3
165 UD 0.090
*

166 KK NP-1
167 BA 0.0027
168 PB 3.40
169 LS 0 89.0
170 UD 0.059
*

171 KK STG2
172 KM FLEET WING AVE
173 BA 0.0045
174 PB 3.40
175 LS 0 98.0
176 UD 0.050
*

1

HEC-1 INPUT

PAGE 6

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

177 KK CSTG2
178 KM COMBINE N-O-P, NP-1 AND STG2
179 HC 3
*

180 KK DES3
181 BA 0.0031
182 PB 3.38
183 LS 0 98.0
184 UD 0.050
*

185 KK CP3
186 KM COMBINES CSTG2 & DES3
187 HC 2
*

188 KK RCP3
189 KM ROUTE CP3 TO CSTG3
190 RD 513 0.080 0.013 0 CIRC 3.0
*

191 KK STG3
192 BA 0.0011
193 PB 3.38
194 LS 0 98.0
195 UD 0.050
*

196 KK CSTG3
197 KM COMBINES CP3 AND STG
198 HC 2
*

199 KK Q
200 BA 0.0072
201 PB 3.38
202 LS 0 92.2
203 UD 0.069
*

204 KK R
205 BA 0.0078
206 PB 3.37
207 LS 0 93.2
208 UD 0.065
*

209 KK CQR
210 KM COMBINE R AND Q
211 HC 2
*

1

HEC-1 INPUT

PAGE 7

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
212	KK CARR2
213	BA 0.0056
214	PB 3.37
215	LS 0 98.0
216	UD 0.064
	*
217	KK CCARR2
218	KM COMBINE CQR AND CARR2
219	HC 2
	*
220	KK RCCARR2
221	KM ROUTE CCARR2 TO CP4
222	RD 414 0.033 0.013 0 CIRC 2.5
	*
223	KK CP4
224	KM COMBINE CP3 AND CCARR2
225	HC 2
	*
226	KK RCP4
227	KM ROUTE CP4 TO CP5
228	RD 582 0.010 0.013 0 CIRC 3.5
	*
229	KK CP5
230	KM COMBINE CARR1, I, CP2 AND CP4
231	HC 4
	*
232	KK II
233	BA 0.0250
234	PB 3.37
235	LS 0 93.2
236	UD 0.072
	*
237	KK X
238	BA 0.0273
239	PB 3.37
240	LS 0 90.0
241	UD 0.080
	*
242	KK B
243	BA 0.1262
244	PB 3.36
245	LS 0 93.5
246	UD 0.077
	*

1

HEC-1 INPUT

PAGE 8

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
247	KK DC-1
248	BA 0.0197
249	PB 3.35
250	LS 0 98
251	UD 0.257
	*
252	KK COS-4
253	BA 0.0009
254	PB 3.35
255	LS 0 88.0
256	UD 0.077
	*
257	KK DUMMY1A
258	KM REGIONAL FACILITY - BELTWAY CHANNEL NORTH
259	KM COMBINE II, X, B, DC1, AND COS-4
260	HC 5
	*
261	KK COS-1
262	BA 0.0045
263	PB 3.41
264	LS 0 79.8
265	UD 0.118
	*
266	KK DUMMY1
267	KM REGIONAL FACILITY - BELTWAY CHANNEL NORTH
268	KM COMBINE CP1, CP5, DUMMY1A, AND COS-1
269	HC 4

*
 270 KK 27-F
 271 BA 0.0299
 272 PB 3.48
 273 LS 0 94.2
 274 UD 0.050
 *

275 KK 27-COS2
 276 BA 0.0082
 277 PB 3.46
 278 LS 0 89.0
 279 UD 0.052
 *

280 KK LM2
 281 BA 0.0113
 282 PB 3.41
 283 LS 0 98.0
 284 UD 0.093
 *

1

HEC-1 INPUT

PAGE 9

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

285 KK CLM2
 286 KM COMBINES OFFSITE V27 BASINS 27-F, V27-COS2, AND LM2
 287 HC 3
 *

288 KK 27-COS3
 289 BA 0.0273
 290 PB 3.47
 291 LS 0 89.0
 292 UD 0.113
 *

293 KK COFF
 294 KM COMBINES OFFSITE V27 BASINS
 295 KM COMBINE CLM2 AND V27-COS3
 296 HC 2
 *

297 KK RCOFF
 298 KM ROUTE COFF TO CSTJ1
 299 RD 744 0.058 0.013 0 CIRC 4.5
 *

300 KK E
 301 BA 0.0217
 302 PB 3.43
 303 LS 0 95.0
 304 UD 0.062
 *

305 KK STJ1
 306 KM KETTLE RIDGE
 307 BA 0.0055
 308 PB 3.43
 309 LS 0 98.0
 310 UD 0.069
 *

311 KK CSTJ1
 312 KM COMBINE COFF, E, AND STJ1
 313 HC 3
 *

314 KK RCSTJ1
 315 KM ROUTE COFF TO CSTJ1
 316 RD 380 0.005 0.013 0 CIRC 5
 *

317 KK NP-2
 318 BA 0.0021
 319 PB 3.43
 320 LS 0 89.0
 321 UD 0.058
 *

1

HEC-1 INPUT

PAGE 10

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

322 KK CNP-2
 323 KM COMBINE CSTJ1 AND CNP-2
 324 HC 2
 *

325 KK RCNP-2
 326 KM ROUTE CNP-2 TO CF
 327 RD 390 0.005 0.013 0 DEEP 6
 *

328 KK F
 329 BA 0.0222
 330 PB 3.43
 331 LS 0 95.0
 332 UD 0.063
 *

333 KK CF
 334 KM COMBINE CNP-1 AND CF
 335 HC 2
 *

336 KK RCF
 337 KM ROUTE CF TO CP6
 338 RD 320 0.005 0.013 0 DEEP 6
 *

339 KK 25-HS1
 340 BA 0.0773
 341 PB 3.44
 342 LS 0 94.8
 343 UD 0.056
 *

344 KK STN1
 345 KM SCURRY BEND
 346 BA 0.0056
 347 PB 3.44
 348 LS 0 98.0
 349 UD 0.125
 *

350 KK CSTN1
 351 KM COMBINE 25-HS1 AND STN1
 352 HC 2
 *

353 KK RCSTN1
 354 KM ROUTE CSTN1 TO CSTG1
 355 RD 1010 0.000 0.013 0 CIRC 4.5
 *

1

HEC-1 INPUT

PAGE 11

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

356 KK STG1
 357 BA 0.0029
 358 PB 3.42
 359 LS 0 98.0
 360 UD 0.050
 *

361 KK CSTG1
 362 KM COMBINE CSTN1 AND STG1
 363 HC 2
 *

364 KK CP6
 365 KM COMBINE CF AND CSTG1
 366 HC 2
 *

367 KK RCP6
 368 KM ROUTE CP6 TO CSTJ2
 369 RD 530 0.005 0.013 0 DEEP 6 0
 *

370 KK L-M
 371 BA 0.0330
 372 PB 3.42
 373 LS 0 94.4
 374 UD 0.084
 *

375 KK STJ2
 376 BA 0.0048
 377 PB 3.42
 378 LS 0 98.0
 379 UD 0.058
 *

380 KK CSTJ2
 381 KM COMBINE CP6, L-M AND STJ2
 382 HC 3
 *

383 KK RCSTJ2
 384 KM ROUTE CSTJ2 TO CSTF
 385 RD 1000 0.069 0.015 0 DEEP 6 0
 *
 386 KK STF
 387 BA 0.0029
 388 PB 3.40
 389 LS 0 98.0
 390 UD 0.050
 *

1

HEC-1 INPUT

PAGE 12

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

391 KK CSTF
 392 KM COMBINE CSTJ2 AND CSTF
 393 HC 2
 *

394 KK U
 395 BA 0.0055
 396 PB 3.40
 397 LS 0 86.3
 398 UD 0.069
 *

399 KK DES4
 400 BA 0.0028
 401 PB 3.40
 402 LS 0 98.0
 403 UD 0.050
 *

404 KK CDES4
 405 KM COMBINE U AND DES4
 406 HC 2
 *

407 KK S
 408 BA 0.0047
 409 PB 3.40
 410 LS 0 87.9
 411 UD 0.088
 *

412 KK CS
 413 KM CDES4 AND S
 414 HC 2
 *

415 KK CP7
 416 KM COMBINE CSTF AND CS
 417 HC 2
 *

418 KK RCP7
 419 KM ROUTE CP7 TO CSTF2
 420 RD 710 0.066 0.015 0 DEEP 6 0
 *

421 KK STF2
 422 BA 0.0019
 423 PB 3.37
 424 LS 0 98.0
 425 UD 0.050
 *

1

HEC-1 INPUT

PAGE 13

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

426 KK CSTF2
 427 KM COMBINE CP7 AND STF2
 428 HC 2
 *

429 KK RCSTF2
 430 KM ROUTE CSTF2 TO CCARR3
 431 RD 420 0.005 0.015 0 DEEP 8 0
 *

432 KK V
 433 BA 0.0078
 434 PB 3.37
 435 LS 0 90.0
 436 UD 0.075
 *

437 KK W
 438 BA 0.0083
 439 PB 3.40
 440 LS 0 90.0
 441 UD 0.074
 *
 442 KK CVW
 443 KM COMBINE W AND V
 444 HC 2
 *
 445 KK CARR3
 446 BA 0.0033
 447 PB 3.37
 448 LS 0 98.0
 449 UD 0.101
 *
 450 KK RCARR3
 451 KM ROUTE CCARR3 TO CP8
 452 RD 360 0.005 0.015 0 DEEP 8 0
 *
 453 KK CCARR3
 454 KM COMBINE STF2, CVW AND CARR3
 455 HC 3
 *
 456 KK STE3
 457 BA 0.0021
 458 PB 3.40
 459 LS 0 98.0
 460 UD 0.050
 *

1

HEC-1 INPUT

PAGE 14

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

461 KK CP8
 462 KM COMBINE STE3 AND CCARR3
 463 HC 2
 *
 464 KK RCP8
 465 KM ROUTE CP8 TO CEE
 466 RD 240 0.005 0.015 0 DEEP 8 0
 *
 467 KK EE
 468 BA 0.0106
 469 PB 3.39
 470 LS 0 90.2
 471 UD 0.068
 *
 472 KK CEE
 473 KM COMBINES CP8 AND EE
 474 HC 2
 *
 475 KK RCP8
 476 KM ROUTE CEE TO CP9
 477 RD 220 0.005 0.015 0 DEEP 8 0
 *
 478 KK NP-3
 479 BA 0.0011
 480 PB 3.39
 481 LS 0 80.5
 482 UD 0.080
 *
 483 KK STEE3
 484 BA 0.0019
 485 PB 3.39
 486 LS 0 98.0
 487 UD 0.050
 *
 488 KK CSTEE3
 489 KM COMBINES NP-3 AND CSTEE3
 490 HC 2
 *
 491 KK CP9
 492 KM COMBINES CSTEE3 AND CEE
 493 HC 2
 *

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HEC-1 INPUT

PAGE 15

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

494 KK RCP9
495 KM ROUTE CP9 TO DUMMY2
496 RD 281 0.005 0.015 0 DEEP 8 0
*

497 KK HH
498 BA 0.0076
499 PB 3.39
500 LS 0 94.2
501 UD 0.058
*

502 KK CARR4
503 BA 0.0036
504 PB 3.37
505 LS 0 98.0
506 UD 0.059
*

507 KK DUMMY2
508 KM REGIONAL FACILITY - BELTWAY CHANNEL SOUTH
509 HC 3
*

510 KK 25-HS1B
511 BA 0.0182
512 PB 3.44
513 LS 0 92.2
514 UD 0.050
*

515 KK STN2
516 BA 0.0068
517 PB 3.44
518 LS 0 98.0
519 UD 0.065
*

520 KK CSTN2
521 KM COMBINE 25-HS1B AND STN2
522 HC 2
*

523 KK RCSTN2
524 KM ROUTE CSTN2 TO CSTE1
525 RD 1000 0.067 0.015 0 CIRC 3
*

526 KK Y-Z
527 BA 0.0176
528 PB 3.42
529 LS 0 92.2
530 UD 0.075
*

1

HEC-1 INPUT

PAGE 16

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

531 KK STE1
532 BA 0.0027
533 PB 3.42
534 LS 0 98.0
535 UD 0.050
*

536 KK CSTE1
537 KM COMBINE CSTN2, Y-Z AND STE1
538 HC 3
*

539 KK RCSTE1
540 KM ROUTE CSTE1 TO CSTJ3
541 RD 980 0.005 0.015 0 DEEP 5 0
*

542 KK COS-3
543 BA 0.0027
544 PB 3.42
545 LS 0 83.2
546 UD 0.105
*

547 KK STJ3
548 BA 0.0050
549 PB 3.42
550 LS 0 98.0

551	UD	0.059	
	*		
552	KK	CSTJ3	
553	KM	COMBINE CSTE1, COS-3 AND STJ3	
554	HC	3	
	*		
555	KK	AA	
556	BA	0.0158	
557	PB	3.44	
558	LS	0	88.4
559	UD	0.088	
	*		
560	KK	DUMMY3	
561	KM	COMBINE CSTJ3 AND AA	
562	HC	2	
	*		
563	KK	STE2	
564	BA	0.0028	
565	PB	3.40	
566	LS	0	98.0
567	UD	0.050	
	*		

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HEC-1 INPUT

PAGE 17

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

568	KK	BB	
569	BA	0.0098	
570	PB	3.42	
571	LS	0	91.1
572	UD	0.074	
	*		
573	KK	CBB	
574	HC	2	
	*		
575	KK	T	
576	BA	0.0063	
577	PB	3.42	
578	LS	0	86.3
579	UD	0.069	
	*		
580	KK	CT	
581	HC	2	
	*		
582	KK	CC	
583	BA	0.0083	
584	PB	3.42	
585	LS	0	90.7
586	UD	0.079	
	*		
587	KK	CCC	
588	HC	2	
	*		
589	KK	RCCC	
590	KM	ROUTE CCC TO CDD	
591	RD	570 0.005 0.015 0 CIRC 3	
	*		
592	KK	DD	
593	BA	0.0074	
594	PB	3.40	
595	LS	0	90.5
596	UD	0.075	
	*		
597	KK	CDD	
598	HC	2	
	*		

1

HEC-1 INPUT

PAGE 18

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

599	KK	RCDD	
600	KM	ROUTE CCDD TO CDE55	
601	RD	390 0.005 0.015 0 CIRC 3.5	
	*		
602	KK	DE55	
603	BA	0.0025	

604	PB	3.40							
605	LS	0	98.0						
606	UD	0.053							
	*								
607	KK	CDES5							
608	HC	2							
	*								
609	KK	RCDES5							
610	KM	ROUTE CDES5 TO CGG							
611	RD	280 0.005 0.015 0 CIRC 3.5							
	*								
612	KK	STEE2							
613	BA	0.0028							
614	PB	3.41							
615	LS	0	98.0						
616	UD	0.050							
	*								
617	KK	CSTEE2							
618	HC	2							
	*								
619	KK	GG							
620	BA	0.0078							
621	PB	3.41							
622	LS	0	94.2						
623	UD	0.055							
	*								
624	KK	CGG							
625	HC	2							
	*								
626	KK	FF							
627	BA	0.0055							
628	PB	3.41							
629	LS	0	94.2						
630	UD	0.050							
	*								

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HEC-1 INPUT

PAGE 19

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

631	KK	DUMMY4							
632	KM	COMBINE DUMMY3, FF, AND CGG							
633	HC	3							
	*								
634	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.....
	.	V
	.	V
48	.	RCDES1
	.	
	.	
51	.	COS-2
	.	
	.	
56	.	CCOS-2.....
	.	V
	.	V
59	.	RCCOS-2
	.	
	.	
62	.	A
	.	
	.	
67	.	CA.....
	.	V
	.	V
70	.	RCA
	.	

73	CP1.....				
76		STI			
82				C	
87		CSTI.....			
90				G	
95		CG.....			
		V			
		V			
98		RCG			
101				H	
106		CH.....			
		V			
		V			
109		RCH			
112			STH		
118				J	
123			CJ.....		
			V		
			V		
126			RCJ		
129				K	
134					DES2
139			CDES2.....		
			V		
			V		
142			RCDES2		
145		CP2.....			
		V			
		V			
148		RCP2			
151			CARR1		
156				I	
161					N-O-P
166					NP-1
171					STG2
177					CSTG2.....
180					DES3
185					CP3.....
					V
					V
188					RCP3
191					STG3

196	.	.	.	.	CSTG3.....			
	.	.	.	.	.			
199	.	.	.	.	.	Q		
	.	.	.	.	.	.		
204	.	.	.	.	.	.	R	
	.	.	.	.	.	.	.	
209	.	.	.	.	.	CQR.....		
	.	.	.	.	.	.		
212	.	.	.	.	.	.	CARR2	
	.	.	.	.	.	.	.	
217	.	.	.	.	.	CCARR2.....		
	.	.	.	.	.	V		
	.	.	.	.	.	V		
220	.	.	.	.	.	RCCARR2		
	.	.	.	.	.	.		
223	.	.	.	.	.	CP4.....		
	.	.	.	.	.	V		
	.	.	.	.	.	V		
226	.	.	.	.	.	RCP4		
	.	.	.	.	.	.		
229	.	.	.	.	.	.		
	.	.	.	.	.	CP5.....		
	.	.	.	.	.	.		
232	.	.	.	.	.	II		
	.	.	.	.	.	.		
237	.	.	.	.	.	X		
	.	.	.	.	.	.		
242	.	.	.	.	.	B		
	.	.	.	.	.	.		
247	.	.	.	.	.	DC-1		
	.	.	.	.	.	.		
252	.	.	.	.	.	.	COS-4	
	.	.	.	.	.	.	.	
257	.	.	.	.	.	DUMMY1A.....		
	.	.	.	.	.	.		
261	.	.	.	.	.	COS-1		
	.	.	.	.	.	.		
266	.	.	.	.	.	DUMMY1.....		
	.	.	.	.	.	.		
270	.	.	.	.	.	27-F		
	.	.	.	.	.	.		
275	.	.	.	.	.	27-COS2		
	.	.	.	.	.	.		
280	.	.	.	.	.	LM2		
	.	.	.	.	.	.		
285	.	.	.	.	.	CLM2.....		
	.	.	.	.	.	.		
288	.	.	.	.	.	27-COS3		
	.	.	.	.	.	.		
293	.	.	.	.	.	COFF.....		
	.	.	.	.	.	V		
	.	.	.	.	.	V		
297	.	.	.	.	.	RCOFF		
	.	.	.	.	.	.		
300	.	.	.	.	.	E		
	.	.	.	.	.	.		
305	.	.	.	.	.	STJ1		
	.	.	.	.	.	.		
311	.	.	.	.	.	CSTJ1.....		
	.	.	.	.	.	V		
	.	.	.	.	.	V		
314	.	.	.	.	.	RCSTJ1		
	.	.	.	.	.	.		
317	.	.	.	.	.	NP-2		
	.	.	.	.	.	.		
322	.	.	.	.	.	CNP-2.....		

	.	V	
	.	V	
325	.	RCNP-2	
	.	.	
	.	.	
328	.	.	F
	.	.	
	.	.	
333	.	CF.....	
	.	V	
	.	V	
336	.	RCF	
	.	.	
	.	.	
339	.	.	25-HS1
	.	.	
	.	.	
344	.	.	STN1
	.	.	
	.	.	
350	.	CSTN1.....	
	.	V	
	.	V	
353	.	RCSTN1	
	.	.	
	.	.	
356	.	.	STG1
	.	.	
	.	.	
361	.	CSTG1.....	
	.	.	
	.	.	
364	.	CP6.....	
	.	V	
	.	V	
367	.	RCP6	
	.	.	
	.	.	
370	.	.	L-M
	.	.	
	.	.	
375	.	.	STJ2
	.	.	
	.	.	
380	.	CSTJ2.....	
	.	V	
	.	V	
383	.	RCSTJ2	
	.	.	
	.	.	
386	.	.	STF
	.	.	
	.	.	
391	.	CSTF.....	
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	.	.	
394	.	.	U
	.	.	
	.	.	
399	.	.	DES4
	.	.	
	.	.	
404	.	CDES4.....	
	.	.	
	.	.	
407	.	.	S
	.	.	
	.	.	
412	.	CS.....	
	.	.	
	.	.	
415	.	CP7.....	
	.	V	
	.	V	
418	.	RCP7	
	.	.	
	.	.	
421	.	.	STF2
	.	.	
	.	.	
426	.	CSTF2.....	
	.	V	
	.	V	
429	.	RCSTF2	
	.	.	
	.	.	
432	.	.	V
	.	.	
	.	.	
437	.	.	W
	.	.	

442	.	.	.	CVW.....
	.	.	.	
445	.	.	.	CARR3
	.	.	.	V
	.	.	.	V
450	.	.	.	RCARR3
	.	.	.	
	.	.	.	
453	.	CCARR3.....	.	
	.	.	.	
	.	.	.	
456	.	.	STE3	
	.	.	.	
	.	.	.	
461	.	CP8.....	.	
	.	V	.	
	.	V	.	
464	.	RCP8	.	
	.	.	.	
	.	.	.	
467	.	.	EE	
	.	.	.	
	.	.	.	
472	.	CEE.....	.	
	.	V	.	
	.	V	.	
475	.	RCP8	.	
	.	.	.	
	.	.	.	
478	.	.	NP-3	
	.	.	.	
	.	.	.	
483	.	.	.	STEE3
	.	.	.	
	.	.	.	
488	.	.	CSTEE3.....	
	.	.	.	
	.	.	.	
491	.	CP9.....	.	
	.	V	.	
	.	V	.	
494	.	RCP9	.	
	.	.	.	
	.	.	.	
497	.	.	HH	
	.	.	.	
	.	.	.	
502	.	.	.	CARR4
	.	.	.	
	.	.	.	
507	.	DUMMY2.....	.	
	.	.	.	
	.	.	.	
510	.	.	25-HS1B	
	.	.	.	
	.	.	.	
515	.	.	.	STN2
	.	.	.	
	.	.	.	
520	.	.	CSTN2.....	
	.	.	V	
	.	.	V	
523	.	.	RCSTN2	
	.	.	.	
	.	.	.	
526	.	.	.	Y-Z
	.	.	.	
	.	.	.	
531	.	.	.	STE1
	.	.	.	
	.	.	.	
536	.	.	CSTE1.....	
	.	.	V	
	.	.	V	
539	.	.	RCSTE1	
	.	.	.	
	.	.	.	
542	.	.	.	COS-3
	.	.	.	
	.	.	.	
547	.	.	.	STJ3
	.	.	.	
	.	.	.	
552	.	.	CSTJ3.....	
	.	.	.	
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555	.	.	.	AA
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560      .      .      DUMMY3.....
      .      .      .
563      .      .      .      STE2
      .      .      .      .
568      .      .      .      .      BB
      .      .      .      .      .
573      .      .      .      CBB.....
      .      .      .      .
575      .      .      .      .      T
      .      .      .      .      .
580      .      .      .      CT.....
      .      .      .      .
582      .      .      .      .      CC
      .      .      .      .      .
587      .      .      .      CCC.....
      .      .      .      V
      .      .      .      V
589      .      .      .      RCCC
      .      .      .      .
592      .      .      .      .      DD
      .      .      .      .      .
597      .      .      .      CDD.....
      .      .      .      V
      .      .      .      V
599      .      .      .      RCDD
      .      .      .      .
602      .      .      .      .      DESS
      .      .      .      .      .
607      .      .      .      CDESS.....
      .      .      .      V
      .      .      .      V
609      .      .      .      RCDESS
      .      .      .      .
612      .      .      .      .      STEE2
      .      .      .      .      .
617      .      .      .      CSTEE2.....
      .      .      .      .
619      .      .      .      .      GG
      .      .      .      .      .
624      .      .      .      CGG.....
      .      .      .      .
626      .      .      .      .      FF
      .      .      .      .      .
631      .      .      DUMMY4.....

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 23OCT19 TIME 13:10:22 *
*
*****

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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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ULTIMATE CONDITION HYDROLOGIC MODEL
 INPUT FILE DATE = OCTOBER 2019
 DESIGN STORM = 100-YEAR 6-HR STORM
 STORM DISTRIBUTION = SDN #3
 MODELED BY VTN (JYA)

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*****
* UPDATE #2 - SUMMERLIN WEST VILLAGE 22 *
*****

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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	.02	1 FLOW	36.	
			TIME	3.50	
HYDROGRAPH AT					
+	D	.02	1 FLOW	50.	
			TIME	3.50	
HYDROGRAPH AT					
+	DES1	.01	1 FLOW	20.	
			TIME	3.50	
2 COMBINED AT					
+	CDES1	.03	1 FLOW	70.	
			TIME	3.50	
ROUTED TO					
+	RCDES1	.03	1 FLOW	69.	
			TIME	3.50	
HYDROGRAPH AT					
+	COS-2	.01	1 FLOW	22.	
			TIME	3.58	
2 COMBINED AT					
+	CCOS-2	.04	1 FLOW	89.	
			TIME	3.50	
ROUTED TO					
+	RCCOS-2	.04	1 FLOW	87.	
			TIME	3.50	
HYDROGRAPH AT					
+	A	.03	1 FLOW	68.	
			TIME	3.50	
2 COMBINED AT					
+	CA	.06	1 FLOW	156.	
			TIME	3.50	
ROUTED TO					
+	RCA	.06	1 FLOW	155.	
			TIME	3.50	

2 COMBINED AT					
+	CP1	.08	1	FLOW TIME	191. 3.50
HYDROGRAPH AT					
+	STI	.00	1	FLOW TIME	11. 3.50
HYDROGRAPH AT					
+	C	.02	1	FLOW TIME	51. 3.50
2 COMBINED AT					
+	CSTI	.02	1	FLOW TIME	62. 3.50
HYDROGRAPH AT					
+	G	.01	1	FLOW TIME	30. 3.50
2 COMBINED AT					
+	CG	.03	1	FLOW TIME	92. 3.50
ROUTED TO					
+	RCG	.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
ROUTED TO					
+	RCH	.05	1	FLOW TIME	123. 3.50
HYDROGRAPH AT					
+	STH	.00	1	FLOW TIME	10. 3.50
HYDROGRAPH AT					
+	J	.01	1	FLOW TIME	24. 3.50
2 COMBINED AT					
+	CJ	.01	1	FLOW TIME	34. 3.50
ROUTED TO					
+	RCJ	.01	1	FLOW TIME	33. 3.50
HYDROGRAPH AT					
+	K	.01	1	FLOW TIME	22. 3.50
HYDROGRAPH AT					
+	DES2	.00	1	FLOW TIME	13. 3.50
3 COMBINED AT					
+	CDES2	.03	1	FLOW TIME	68. 3.50
ROUTED TO					
+	RCDES2	.03	1	FLOW TIME	66. 3.50
2 COMBINED AT					
+	CP2	.07	1	FLOW TIME	189. 3.50
ROUTED TO					
+	RCP2	.07	1	FLOW TIME	184. 3.50
HYDROGRAPH AT					
+	CARR1	.01	1	FLOW TIME	29. 3.50
HYDROGRAPH AT					
+	I	.02	1	FLOW TIME	38. 3.50
HYDROGRAPH AT					
+	N-O-P	.02	1	FLOW TIME	49. 3.50

HYDROGRAPH AT +	NP-1	.00	1	FLOW TIME	6. 3.50
HYDROGRAPH AT +	STG2	.00	1	FLOW TIME	13. 3.50
3 COMBINED AT +	CSTG2	.03	1	FLOW TIME	68. 3.50
HYDROGRAPH AT +	DES3	.00	1	FLOW TIME	9. 3.50
2 COMBINED AT +	CP3	.03	1	FLOW TIME	77. 3.50
ROUTED TO +	RCP3	.03	1	FLOW TIME	76. 3.50
HYDROGRAPH AT +	STG3	.00	1	FLOW TIME	3. 3.50
2 COMBINED AT +	CSTG3	.03	1	FLOW TIME	79. 3.50
HYDROGRAPH AT +	Q	.01	1	FLOW TIME	17. 3.50
HYDROGRAPH AT +	R	.01	1	FLOW TIME	20. 3.50
2 COMBINED AT +	CQR	.01	1	FLOW TIME	37. 3.50
HYDROGRAPH AT +	CARR2	.01	1	FLOW TIME	15. 3.50
2 COMBINED AT +	CCARR2	.02	1	FLOW TIME	52. 3.50
ROUTED TO +	RCCARR2	.02	1	FLOW TIME	51. 3.50
2 COMBINED AT +	CP4	.05	1	FLOW TIME	131. 3.50
ROUTED TO +	RCP4	.05	1	FLOW TIME	127. 3.50
4 COMBINED AT +	CP5	.15	1	FLOW TIME	379. 3.50
HYDROGRAPH AT +	II	.03	1	FLOW TIME	61. 3.50
HYDROGRAPH AT +	X	.03	1	FLOW TIME	60. 3.50
HYDROGRAPH AT +	B	.13	1	FLOW TIME	304. 3.50
HYDROGRAPH AT +	DC-1	.02	1	FLOW TIME	36. 3.67
HYDROGRAPH AT +	COS-4	.00	1	FLOW TIME	2. 3.50
5 COMBINED AT +	DUMMY1A	.20	1	FLOW	454.

				TIME	3.50
HYDROGRAPH AT					
+	COS-1	.00	1	FLOW	6.
				TIME	3.58
4 COMBINED AT					
+	DUMMY1	.44	1	FLOW	1030.
				TIME	3.50
HYDROGRAPH AT					
+	27-F	.03	1	FLOW	83.
				TIME	3.50
HYDROGRAPH AT					
+	27-COS2	.01	1	FLOW	20.
				TIME	3.50
HYDROGRAPH AT					
+	LM2	.01	1	FLOW	28.
				TIME	3.50
3 COMBINED AT					
+	CLM2	.05	1	FLOW	132.
				TIME	3.50
HYDROGRAPH AT					
+	27-COS3	.03	1	FLOW	53.
				TIME	3.50
2 COMBINED AT					
+	COFF	.08	1	FLOW	185.
				TIME	3.50
ROUTED TO					
+	RCOFF	.08	1	FLOW	182.
				TIME	3.50
HYDROGRAPH AT					
+	E	.02	1	FLOW	58.
				TIME	3.50
HYDROGRAPH AT					
+	STJ1	.01	1	FLOW	15.
				TIME	3.50
3 COMBINED AT					
+	CSTJ1	.10	1	FLOW	255.
				TIME	3.50
ROUTED TO					
+	RCSTJ1	.10	1	FLOW	250.
				TIME	3.50
HYDROGRAPH AT					
+	NP-2	.00	1	FLOW	5.
				TIME	3.50
2 COMBINED AT					
+	CNP-2	.11	1	FLOW	255.
				TIME	3.50
ROUTED TO					
+	RCNP-2	.11	1	FLOW	250.
				TIME	3.50
HYDROGRAPH AT					
+	F	.02	1	FLOW	59.
				TIME	3.50
2 COMBINED AT					
+	CF	.13	1	FLOW	309.
				TIME	3.50
ROUTED TO					
+	RCF	.13	1	FLOW	303.
				TIME	3.50
HYDROGRAPH AT					
+	25-HS1	.08	1	FLOW	211.
				TIME	3.50
HYDROGRAPH AT					
+	STN1	.01	1	FLOW	13.
				TIME	3.58
2 COMBINED AT					
+	CSTN1	.08	1	FLOW	224.
				TIME	3.50
ROUTED TO					

+	RCSTN1	.08	1	FLOW TIME	220. 3.50
HYDROGRAPH AT +	STG1	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT +	CSTG1	.09	1	FLOW TIME	229. 3.50
2 COMBINED AT +	CP6	.21	1	FLOW TIME	532. 3.50
ROUTED TO +	RCP6	.21	1	FLOW TIME	518. 3.50
HYDROGRAPH AT +	L-M	.03	1	FLOW TIME	81. 3.50
HYDROGRAPH AT +	STJ2	.00	1	FLOW TIME	13. 3.50
3 COMBINED AT +	CSTJ2	.25	1	FLOW TIME	612. 3.50
ROUTED TO +	RCSTJ2	.25	1	FLOW TIME	602. 3.50
HYDROGRAPH AT +	STF	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT +	CSTF	.25	1	FLOW TIME	610. 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
HYDROGRAPH AT +	S	.00	1	FLOW TIME	10. 3.50
2 COMBINED AT +	CS	.01	1	FLOW TIME	29. 3.50
2 COMBINED AT +	CP7	.27	1	FLOW TIME	639. 3.50
ROUTED TO +	RCP7	.27	1	FLOW TIME	632. 3.50
HYDROGRAPH AT +	STF2	.00	1	FLOW TIME	5. 3.50
2 COMBINED AT +	CSTF2	.27	1	FLOW TIME	637. 3.50
ROUTED TO +	RCSTF2	.27	1	FLOW TIME	623. 3.50
HYDROGRAPH AT +	V	.01	1	FLOW TIME	17. 3.50
HYDROGRAPH AT +	W	.01	1	FLOW TIME	19. 3.50

2 COMBINED AT					
+	CVW	.02	1	FLOW TIME	36. 3.50
HYDROGRAPH AT					
+	CARR3	.00	1	FLOW TIME	8. 3.50
ROUTED TO					
+	RCARR3	.00	1	FLOW TIME	8. 3.50
3 COMBINED AT					
+	CCARR3	.29	1	FLOW TIME	667. 3.50
HYDROGRAPH AT					
+	STE3	.00	1	FLOW TIME	6. 3.50
2 COMBINED AT					
+	CP8	.29	1	FLOW TIME	673. 3.50
ROUTED TO					
+	RCP8	.29	1	FLOW TIME	664. 3.50
HYDROGRAPH AT					
+	EE	.01	1	FLOW TIME	25. 3.50
2 COMBINED AT					
+	CEE	.30	1	FLOW TIME	689. 3.50
ROUTED TO					
+	RCP8	.30	1	FLOW TIME	680. 3.50
HYDROGRAPH AT					
+	NP-3	.00	1	FLOW TIME	2. 3.50
HYDROGRAPH AT					
+	STEE3	.00	1	FLOW TIME	5. 3.50
2 COMBINED AT					
+	CSTEE3	.00	1	FLOW TIME	7. 3.50
2 COMBINED AT					
+	CP9	.30	1	FLOW TIME	688. 3.50
ROUTED TO					
+	RCP9	.30	1	FLOW TIME	678. 3.50
HYDROGRAPH AT					
+	HH	.01	1	FLOW TIME	20. 3.50
HYDROGRAPH AT					
+	CARR4	.00	1	FLOW TIME	10. 3.50
3 COMBINED AT					
+	DUMMY2	.32	1	FLOW TIME	708. 3.50
HYDROGRAPH AT					
+	25-HS1B	.02	1	FLOW TIME	48. 3.50
HYDROGRAPH AT					
+	STN2	.01	1	FLOW TIME	19. 3.50
2 COMBINED AT					
+	CSTN2	.03	1	FLOW TIME	67. 3.50
ROUTED TO					
+	RCSTN2	.03	1	FLOW TIME	65. 3.50
HYDROGRAPH AT					
+	Y-Z	.02	1	FLOW TIME	42. 3.50

HYDROGRAPH AT +	STE1	.00	1	FLOW TIME	8. 3.50
3 COMBINED AT +	CSTE1	.05	1	FLOW TIME	115. 3.50
ROUTED TO +	RCSTE1	.05	1	FLOW TIME	107. 3.50
HYDROGRAPH AT +	COS-3	.00	1	FLOW TIME	4. 3.50
HYDROGRAPH AT +	STJ3	.00	1	FLOW TIME	14. 3.50
3 COMBINED AT +	CSTJ3	.05	1	FLOW TIME	126. 3.50
HYDROGRAPH AT +	AA	.02	1	FLOW TIME	33. 3.50
2 COMBINED AT +	DUMMY3	.07	1	FLOW TIME	159. 3.50
HYDROGRAPH AT +	STE2	.00	1	FLOW TIME	8. 3.50
HYDROGRAPH AT +	BB	.01	1	FLOW TIME	23. 3.50
2 COMBINED AT +	CBB	.01	1	FLOW TIME	31. 3.50
HYDROGRAPH AT +	T	.01	1	FLOW TIME	13. 3.50
2 COMBINED AT +	CT	.02	1	FLOW TIME	44. 3.50
HYDROGRAPH AT +	CC	.01	1	FLOW TIME	19. 3.50
2 COMBINED AT +	CCC	.03	1	FLOW TIME	63. 3.50
ROUTED TO +	RCCC	.03	1	FLOW TIME	60. 3.50
HYDROGRAPH AT +	DD	.01	1	FLOW TIME	17. 3.50
2 COMBINED AT +	CDD	.03	1	FLOW TIME	77. 3.50
ROUTED TO +	RCDD	.03	1	FLOW TIME	74. 3.50
HYDROGRAPH AT +	DESS	.00	1	FLOW TIME	7. 3.50
2 COMBINED AT +	CDESS	.04	1	FLOW TIME	81. 3.50
ROUTED TO +	RCDESS	.04	1	FLOW TIME	80. 3.50
HYDROGRAPH AT +	STEE2	.00	1	FLOW	8.

				TIME	3.50
2 COMBINED AT					
+	CSTEE2	.04	1	FLOW TIME	88.3.50
HYDROGRAPH AT					
+	GG	.01	1	FLOW TIME	21.3.50
2 COMBINED AT					
+	CGG	.05	1	FLOW TIME	109.3.50
HYDROGRAPH AT					
+	FF	.01	1	FLOW TIME	15.3.50
3 COMBINED AT					
+	DUMMY4	.12	1	FLOW TIME	282.3.50

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION PEAK	INTERVAL TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1	RATIO=	.00							
RCDES1	MANE	.22	69.31	210.22	2.92	5.00	69.07	210.00	2.92
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4002E+01 EXCESS= .0000E+00 OUTFLOW= .4002E+01 BASIN STORAGE= .1969E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RCCOS-2	MANE	.47	87.71	210.20	2.72	5.00	87.19	210.00	2.72
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5425E+01 EXCESS= .0000E+00 OUTFLOW= .5424E+01 BASIN STORAGE= .4464E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RCA	MANE	.19	155.37	210.19	2.77	5.00	154.65	210.00	2.78
CONTINUITY SUMMARY (AC-FT) - INFLOW= .9561E+01 EXCESS= .0000E+00 OUTFLOW= .9561E+01 BASIN STORAGE= .1942E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RCG	MANE	.29	91.58	210.20	2.89	5.00	91.06	210.00	2.89
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5175E+01 EXCESS= .0000E+00 OUTFLOW= .5175E+01 BASIN STORAGE= .2873E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RCH	MANE	.12	123.23	210.04	2.88	5.00	123.08	210.00	2.88
CONTINUITY SUMMARY (AC-FT) - INFLOW= .6989E+01 EXCESS= .0000E+00 OUTFLOW= .6989E+01 BASIN STORAGE= .1204E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RCJ	MANE	.43	33.61	210.51	2.73	5.00	33.37	210.00	2.73
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1875E+01 EXCESS= .0000E+00 OUTFLOW= .1875E+01 BASIN STORAGE= .3567E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RCDES2	MANE	.73	67.25	210.43	2.84	5.00	66.40	210.00	2.85
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3910E+01 EXCESS= .0000E+00 OUTFLOW= .3910E+01 BASIN STORAGE= .7532E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RCP2	MANE	.73	186.67	210.84	2.87	5.00	184.26	210.00	2.87
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1091E+02 EXCESS= .0000E+00 OUTFLOW= .1091E+02 BASIN STORAGE= .8878E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RCP3	MANE	.29	76.78	210.29	2.55	5.00	76.14	210.00	2.55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4490E+01 EXCESS= .0000E+00 OUTFLOW= .4490E+01 BASIN STORAGE= .2690E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCARR2 MANE .37 51.68 210.13 2.74 5.00 51.44 210.00 2.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3006E+01 EXCESS= .0000E+00 OUTFLOW= .3006E+01 BASIN STORAGE= .3196E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP4 MANE .66 129.07 210.69 2.64 5.00 127.48 210.00 2.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7688E+01 EXCESS= .0000E+00 OUTFLOW= .7688E+01 BASIN STORAGE= .6725E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCOFF MANE .38 183.88 210.27 2.65 5.00 182.24 210.00 2.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1084E+02 EXCESS= .0000E+00 OUTFLOW= .1084E+02 BASIN STORAGE= .4273E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCSTJ1 MANE .48 250.37 210.43 2.73 5.00 250.31 210.00 2.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1511E+02 EXCESS= .0000E+00 OUTFLOW= .1511E+02 BASIN STORAGE= .5607E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCNP-2 MANE .52 250.86 210.48 2.72 5.00 250.12 210.00 2.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1538E+02 EXCESS= .0000E+00 OUTFLOW= .1538E+02 BASIN STORAGE= .1047E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCF MANE .41 304.65 210.23 2.75 5.00 303.48 210.00 2.75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1879E+02 EXCESS= .0000E+00 OUTFLOW= .1878E+02 BASIN STORAGE= .8389E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCSTN1 MANE .41 221.54 210.18 2.88 5.00 220.20 210.00 2.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1275E+02 EXCESS= .0000E+00 OUTFLOW= .1275E+02 BASIN STORAGE= .5014E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP6 MANE .59 520.09 210.36 2.81 5.00 517.62 210.00 2.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3204E+02 EXCESS= .0000E+00 OUTFLOW= .3203E+02 BASIN STORAGE= .1553E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCSTJ2 MANE .45 608.79 210.39 2.81 5.00 602.17 210.00 2.82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3779E+02 EXCESS= .0000E+00 OUTFLOW= .3779E+02 BASIN STORAGE= .1206E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP7 MANE .32 635.65 210.19 2.80 5.00 631.67 210.00 2.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3994E+02 EXCESS= .0000E+00 OUTFLOW= .3994E+02 BASIN STORAGE= .8070E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCSTF2 MANE .50 626.08 210.22 2.80 5.00 622.83 210.00 2.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4028E+02 EXCESS= .0000E+00 OUTFLOW= .4027E+02 BASIN STORAGE= .1270E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCARR3 MANE 1.27 7.90 211.47 3.14 5.00 7.63 210.00 3.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5521E+00 EXCESS= .0000E+00 OUTFLOW= .5521E+00 BASIN STORAGE= .1050E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP8 MANE .28 665.68 210.11 2.78 5.00 664.00 210.00 2.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4321E+02 EXCESS= .0000E+00 OUTFLOW= .4320E+02 BASIN STORAGE= .7574E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP8 MANE .26 681.97 210.12 2.77 5.00 680.39 210.00 2.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4455E+02 EXCESS= .0000E+00 OUTFLOW= .4454E+02 BASIN STORAGE= .6454E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP9 MANE .33 679.63 210.08 2.77 5.00 677.90 210.00 2.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4497E+02 EXCESS= .0000E+00 OUTFLOW= .4496E+02 BASIN STORAGE= .8376E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCSTN2 MANE .70 65.57 210.88 2.76 5.00 65.03 210.00 2.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3685E+01 EXCESS= .0000E+00 OUTFLOW= .3685E+01 BASIN STORAGE= .6612E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCSTE1 MANE 1.78 110.49 211.63 2.72 5.00 107.44 210.00 2.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6575E+01 EXCESS= .0000E+00 OUTFLOW= .6571E+01 BASIN STORAGE= .3348E-03 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .00
RCCC MANE 1.13 61.16 210.84 2.44 5.00 59.99 210.00 2.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3534E+01 EXCESS= .0000E+00 OUTFLOW= .3533E+01 BASIN STORAGE= .1137E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCDD MANE .73 75.16 210.34 2.43 5.00 74.39 210.00 2.43

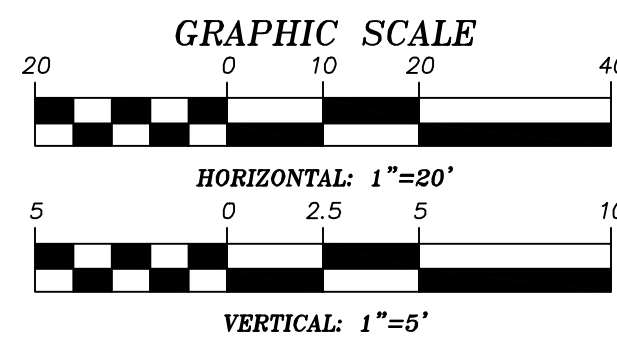
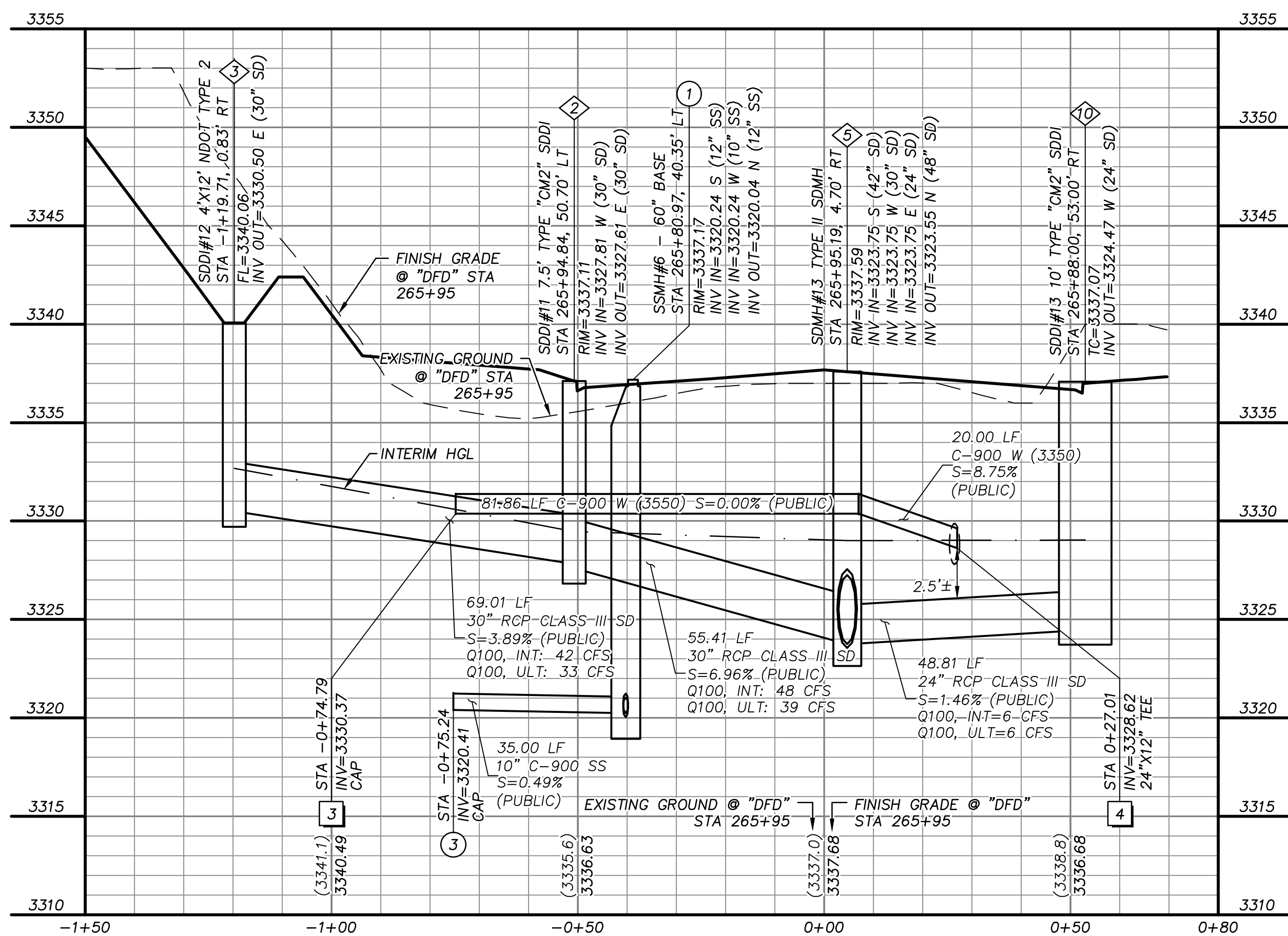
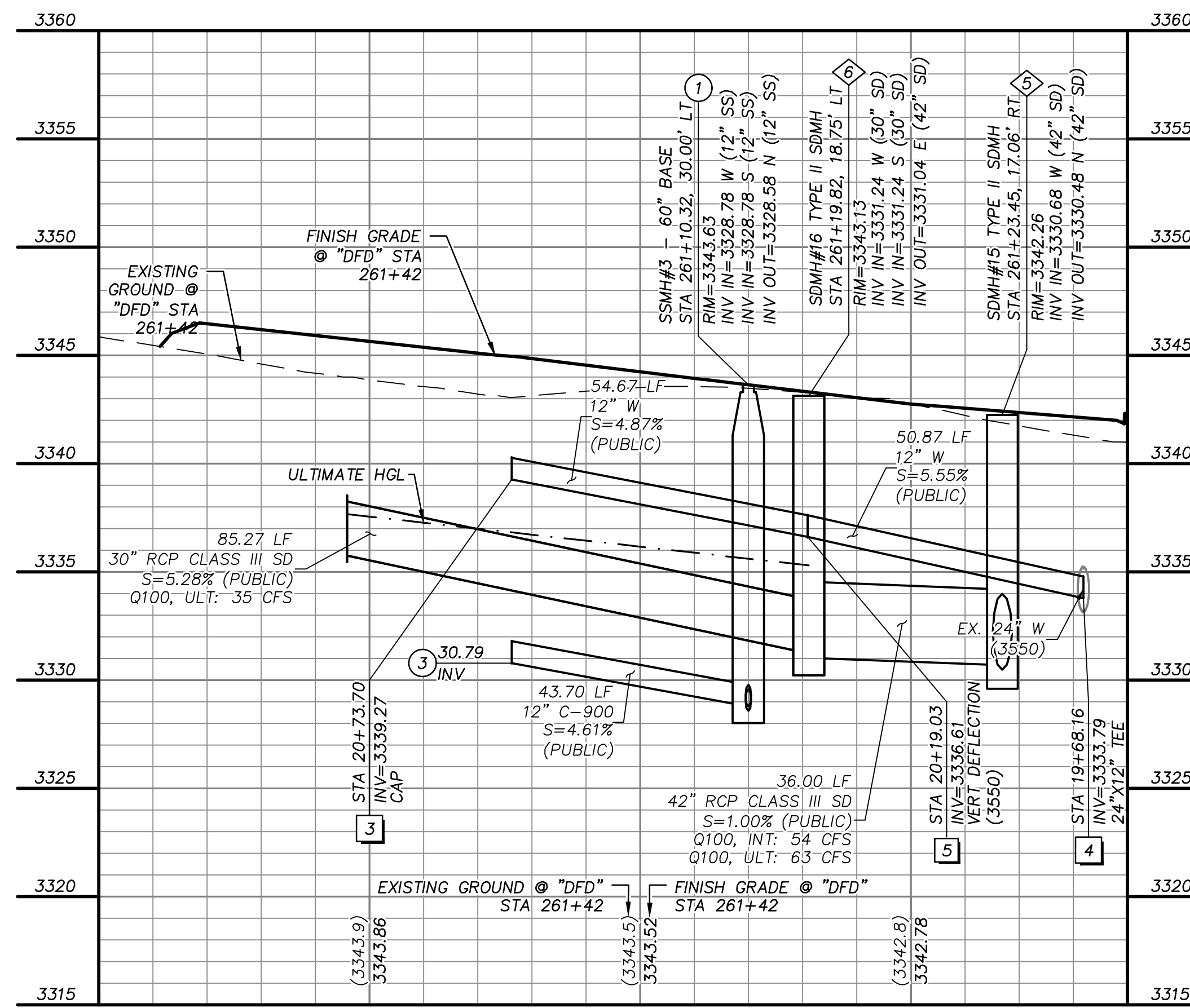
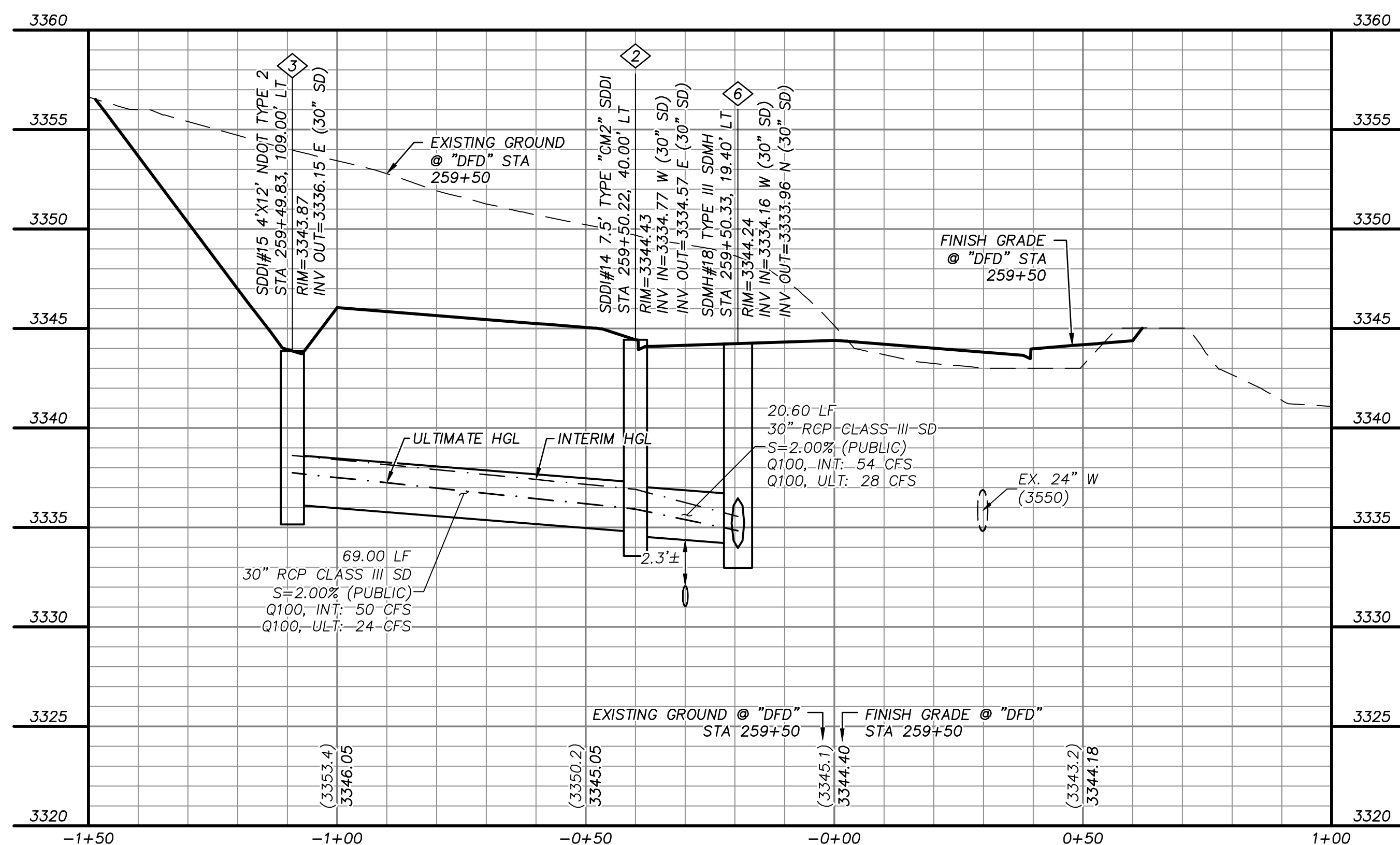
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4482E+01 EXCESS= .0000E+00 OUTFLOW= .4481E+01 BASIN STORAGE= .7532E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCDESS MANE .52 80.22 210.45 2.48 5.00 79.73 210.00 2.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4905E+01 EXCESS= .0000E+00 OUTFLOW= .4903E+01 BASIN STORAGE= .5246E-04 PERCENT ERROR= .0

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

A.2 Approved Plans Reference



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 136925 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.

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

- 1 INSTALL STORM DRAIN. SEE SHEET 30 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
- 2 INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
- 3 INSTALL NDOT TYPE 2 DROP INLET PER NDOT R-4.2.1 (SEE SHEET 30)
- 4 INSTALL TYPE II SD MANHOLE PER CCAUSD #405
- 5 INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
- 6 INSTALL TYPE III SD MANHOLE PER CCAUSD #406
- 7 REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
- 8 STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL SEE SHEET 30
- 9 INSTALL RIP-RAP (D50=8", THICKNESS=16")
- 10 INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421 AND DETAIL D ON SHEET 30

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" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRE 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-15

WATERLINE CONSTRUCTION NOTES

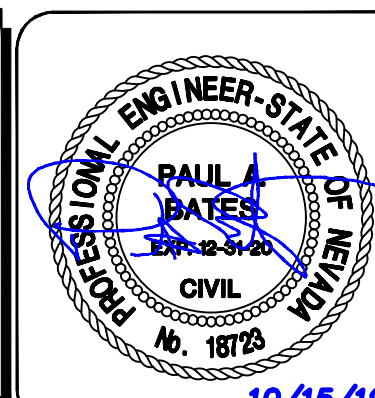
- 1 INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
- 2 INSTALL 1.5" SERVICE SADDLE PER UDACS PLATE #4
- 3 INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
- 4 INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
- 5 INSTALL DEFLECTION AT PIPE JOINTS (MAXIMUM OF 1')
- 6 INSTALL 5' VERTICAL BEND PER UDACS PLATE #31
- 7 INSTALL 22.5' HORIZONTAL BEND PER UDACS PLATE #31
- 8 INSTALL 45' HORIZONTAL BEND PER UDACS PLATE #31
- 9 REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
- 10 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) CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
- (3) CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD #219
- (4) FUTURE SIDEWALK BY OTHERS
- (5) CONSTRUCT CONCRETE SIDEWALK PER CCAUSD #234
- (6) CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5').
- (7) CONSTRUCT 0" FLUSH CURB
- (8) TRANSITION CURB FROM FULL HEIGHT (6") TO FLUSH (0")
- (9) CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 3 FOR TYPICAL PAVEMENT SECTION.
- (10) INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL B ON SHEET 33

NOTE: ALL WATERLINE LATERALS ARE
CONNECTED TO THE 24" 3550 WATER MAIN.

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.



JOB NO.	100060652	DESIGNED BY: N. BARCOS
DATE:	OCTOBER, 2019	DRAWN BY: L. MAMAOLAY
DRAWING NO.		CHECKED BY: P. BATES
		HORIZ.: NONE

REVISIONS

ATKINS

2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN VILLAGE 22
DESERT FOOTHILLS DRIVE

STORM DRAIN LATERAL PROFILES

	VERT.: =4		PdX:
2076Z			
Projects\Summ West\ Village 22\100060652 - V22N Desert Foothills (Lake Mead to Street I)			Sheets\60652-XX-LATL-P.dwg LAYOUT: L-1 Oct 16, 2019 - 8:32AM

Appendix B. Hydrology Appendix

B.1. Parameters

B.2. HEC-1 Model

B.1 Parameters

Summerlin West Village 22

Clowder Pass Way

Collection Subbasins

CN Calculation Summary

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
STH-1N	7	Public Facility and Residential, 8-12 units/acre	1155	94	18841	18841	100.0%	100.0%	94.00	94.00	94.0
STH-1S	7	Public Facility and Residential, 8-12 units/acre	1155	94	19966	19966	100.0%	100.0%	94.00	94.00	94.0
STH-2N	7	Public Facility and Residential, 8-12 units/acre	1155	94	41402	41402	100.0%	100.0%	94.00	94.00	94.0
STH-2S	7	Public Facility and Residential, 8-12 units/acre	1155	94	38427	38427	100.0%	100.0%	94.00	94.00	94.0
INT-H1	1	Undeveloped Land, Open Desert	1152	88	786	232979	0.3%	0.3%	0.30	0.30	
INT-H1	1	Undeveloped Land, Open Desert	1155	88	232194	232979	99.7%	100.0%	87.70	88.00	88.0
INT-H2	1	Undeveloped Land, Open Desert	1152	88	81716	81716	100.0%	100.0%	88.00	88.00	88.0

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Summerlin West Village 22
Clowder Pass Way (Street H)
Desert Foothills Drive to Kettle Ridge Drive (Street J)
INTERIM CONDITION

BY: **MMA**
DATE: **11/16/19**

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tag
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	Tag= 0.6Tc/60 Hours
(1)			(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(13)	(14)	
SH-1N	D	94.0	0.851	0.43	0.00068	19.0	2.0	1.6	390	8.0	5.7	8.7	1.1	2.7	12.3	0.05*
SH-1S	D	94.0	0.851	0.46	0.00072	19.0	2.0	1.6	390	8.0	5.7	8.7	1.1	2.7	12.3	0.05*
SH-2N	D	94.0	0.851	0.95	0.00149	19.0	2.0	1.6	850	8.0	5.7	8.7	2.1	3.7	14.8	0.05*
SH-2S	D	94.0	0.851	0.88	0.00138	19.0	2.0	1.6	850	8.0	5.7	8.7	2.1	3.7	14.8	0.05*
INT-H1	E	88.0	0.772	5.35	0.00836	400.0	6.3	6.4	325	8.0	4.2	8.3	1.3	7.7	N/A	0.10**
INT-H2	E	88.0	0.772	1.88	0.00138	100.0	7.5	3.0	439	7.5	4.1	8.1	1.8	4.8	N/A	0.10**
Tc = Ti + Tt Tag = 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

```

1*****
*
*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)
*       JUN   1998
*       VERSION 4.1
*
*   RUN DATE   16NOV19   TIME   21:19:18
*
*****

```

```

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

```

```

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

```

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

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

1 HEC-1 INPUT PAGE 1

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

*DIAGRAM

*** FREE ***

```

1      ID  TECHNICAL DRAINAGE STUDY
2      ID  SUMMERLIN WEST VILLAGE 22
3      ID  CLOWDER PASS WAY (STREET H)
4      ID  DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
5      ID  DESIGN STORM 100-YEAR 6 HOUR
6      ID
7      ID  JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES
8      ID
9      ID      AREA (SQUARE MILES)          DARF
10     ID
11     ID      0 - 0.5                      0.99
12     ID      Estimated 10-year            0.57
13     ID
14     IT      5      0      0      300
15     IO      5      0      0
16     IN      5      0      0
17     JR      PREC   0.99   0.57
18
19     KK      SH-1N
20     BA      0.00068
21     PB      3.42
22     PC      0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
23     PC      0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
24     PC      0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
25     PC      0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
26     PC      0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
27     PC      0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
28     PC      0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
29     PC      0.998   0.999   1.000
30     LS      0      94.0
31     UD      0.050
32
33     KK      SH-2N
34     BA      0.00149
35     PB      3.42
36     LS      0      94.0
37     UD      0.050
38
39     KK      SH-1S
40     BA      0.00072
41     PB      3.42
42     LS      0      94.0
43     UD      0.050
44
45     *
46     *

```

1 HEC-1 INPUT PAGE 2

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

41 KK SH-2S
42 BA 0.00138
43 PB 3.42
44 LS 0 94.0
45 UD 0.050
*

46 KK INT-H1
47 BA 0.00836
48 PB 3.42
49 LS 0 88.0
50 UD 0.100
*

51 KK INT-H2
52 BA 0.00138
53 PB 3.42
54 LS 0 88.0
55 UD 0.100
*

56 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
18 SH-1N
.
.
31 . SH-2N
.
.
36 . SH-1S
.
.
41 . SH-2S
.
.
46 . INT-H1
.
.
51 . INT-H2
.

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 16NOV19 TIME 21:19:18 *

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

TECHNICAL DRAINAGE STUDY
SUMMERLIN WEST VILLAGE 22
CLOWDER PASS WAY (STREET H)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (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

15 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 +	SH-1N	.00	1 FLOW TIME	2. 3.50	1. 3.50
HYDROGRAPH AT +	SH-2N	.00	1 FLOW TIME	4. 3.50	2. 3.50
HYDROGRAPH AT +	SH-1S	.00	1 FLOW TIME	2. 3.50	1. 3.50
HYDROGRAPH AT +	SH-2S	.00	1 FLOW TIME	4. 3.50	2. 3.50
HYDROGRAPH AT +	INT-H1	.01	1 FLOW TIME	16. 3.50	7. 3.50
HYDROGRAPH AT +	INT-H2	.00	1 FLOW TIME	3. 3.50	1. 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 3% 100 yr Ultimate

Project Description	
Solve For	Efficiency
Input Data	
Discharge	2.46 cfs
Slope	0.030 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	98.04 %
Intercepted Flow	2.41 cfs
Bypass Flow	0.05 cfs
Spread	7.5 ft
Depth	0.2 ft
Flow Area	0.6 ft ²
Gutter Depression	1.1 in
Total Depression	5.1 in
Velocity	3.92 ft/s
Splash Over Velocity	8.05 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.193
Grate Flow Ratio	0.573
Equivalent Cross Slope	0.141 ft/ft
Active Grate Length	3.8 ft
Length Factor	0.528
Total Interception Length	11.8 ft
Messages	

Worksheet for SDDI #1 10' Combo Inlet On Grade at 3% 100 yr Ultimate

Messages

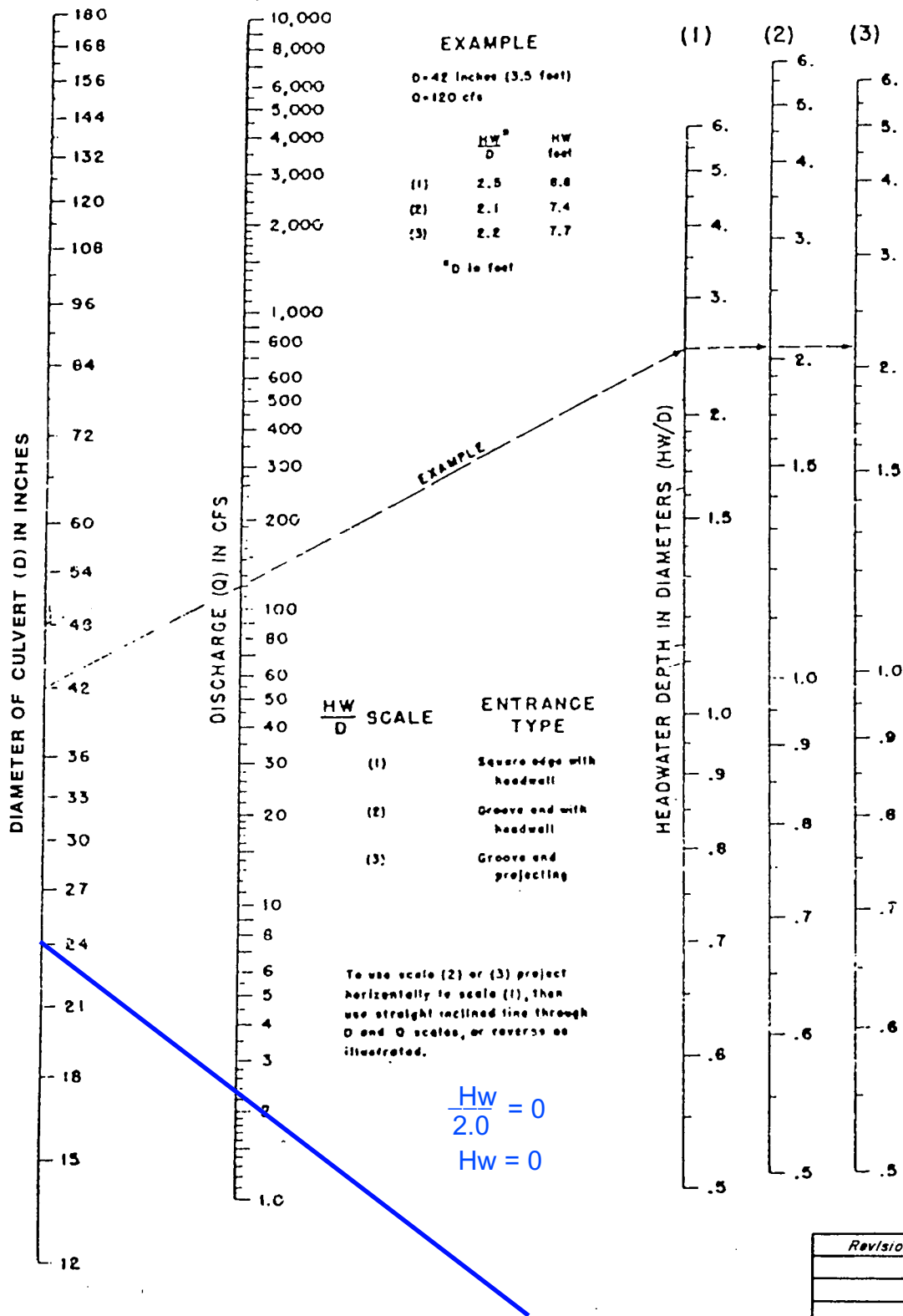
Messages

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 H Ultimate



Total Discharge
 $Q = 2.5$ -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 3% 100 yr Ultimate

Project Description	
Solve For	Efficiency
Input Data	
Discharge	2.46 cfs
Slope	0.030 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	98.04 %
Intercepted Flow	2.41 cfs
Bypass Flow	0.05 cfs
Spread	7.5 ft
Depth	0.2 ft
Flow Area	0.6 ft ²
Gutter Depression	1.1 in
Total Depression	5.1 in
Velocity	3.92 ft/s
Splash Over Velocity	8.05 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.193
Grate Flow Ratio	0.573
Equivalent Cross Slope	0.141 ft/ft
Active Grate Length	3.8 ft
Length Factor	0.528
Total Interception Length	11.8 ft
Messages	

Worksheet for SDDI #2 10' Combo Inlet On Grade at 3% 100 yr Ultimate

Messages

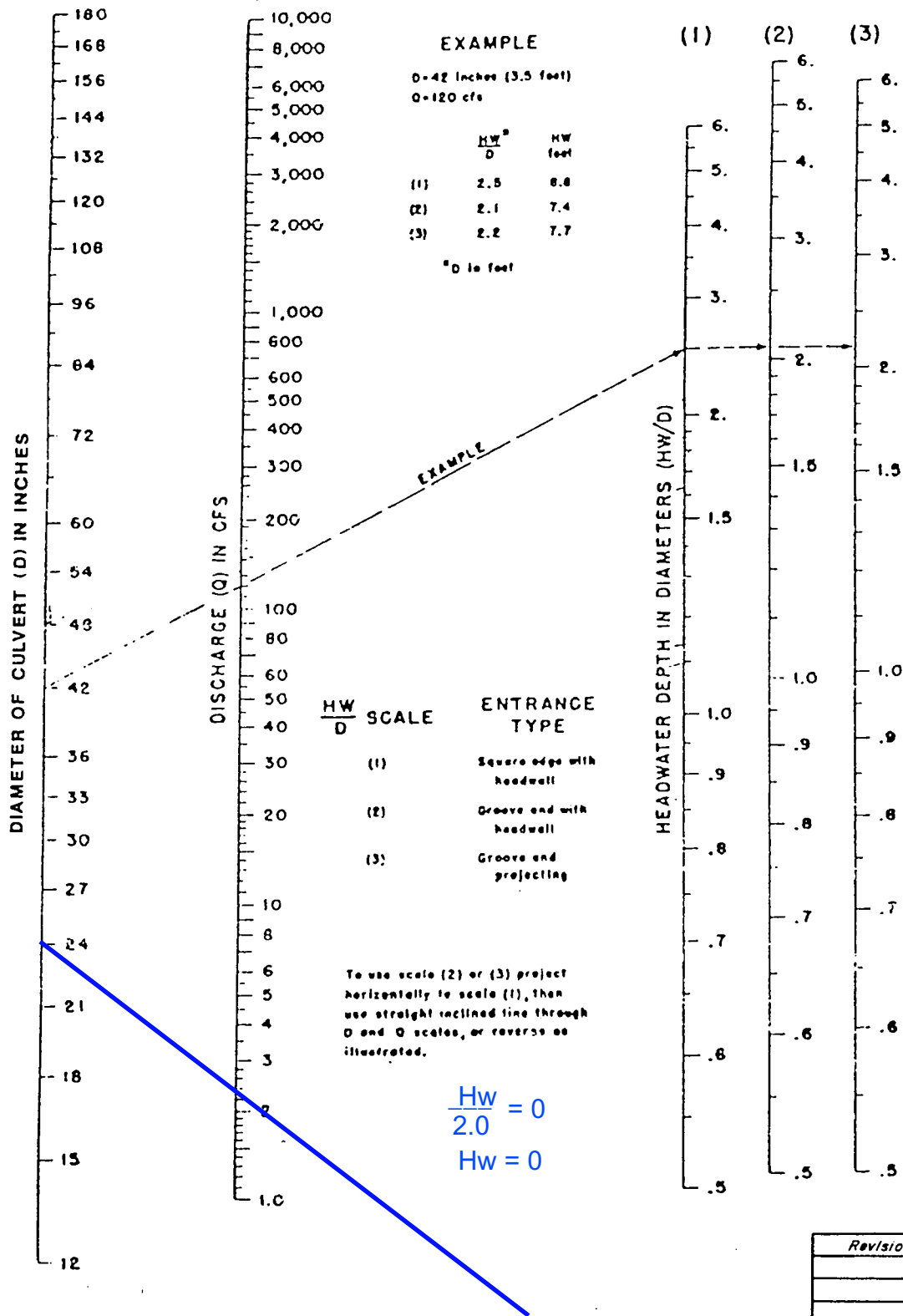
Messages

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 H Ultimate



Total Discharge
 $Q = 2.5$ -CFS
 24" RCP
 LATERAL

Revision	Date

WRC
 ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #3 10' Combo Inlet On Grade at 8% 100 yr Ultimate

Project Description	
Solve For	Efficiency
Input Data	
Discharge	4.00 cfs
Slope	0.080 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	88.48 %
Intercepted Flow	3.54 cfs
Bypass Flow	0.46 cfs
Spread	7.5 ft
Depth	0.2 ft
Flow Area	0.6 ft ²
Gutter Depression	1.1 in
Total Depression	5.1 in
Velocity	6.39 ft/s
Splash Over Velocity	8.05 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.090
Grate Flow Ratio	0.574
Equivalent Cross Slope	0.141 ft/ft
Active Grate Length	3.8 ft
Length Factor	0.321
Total Interception Length	19.5 ft
Messages	

Worksheet for SDDI #3 10' Combo Inlet On Grade at 8% 100 yr Ultimate

Messages

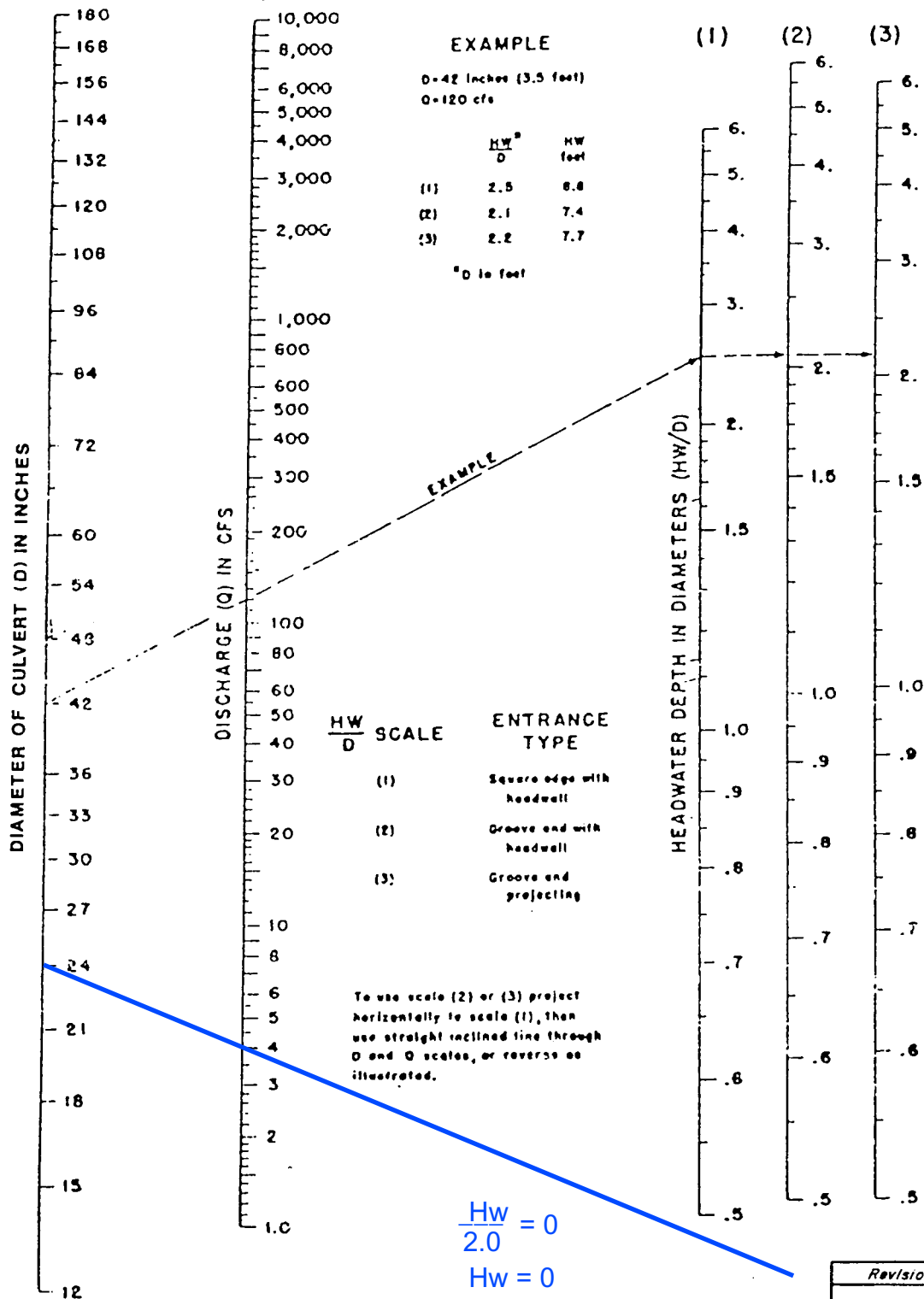
Messages

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 H Ultimate



Total Discharge
 $Q = 4.0$ -CFS
 24" RCP
 LATERAL

Revision	Date

Worksheet for SDDI #4 10' Combo Inlet On Grade at 8% 100 yr Ultimate

Project Description	
Solve For	Efficiency
Input Data	
Discharge	4.00 cfs
Slope	0.080 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	88.48 %
Intercepted Flow	3.54 cfs
Bypass Flow	0.46 cfs
Spread	7.5 ft
Depth	0.2 ft
Flow Area	0.6 ft ²
Gutter Depression	1.1 in
Total Depression	5.1 in
Velocity	6.39 ft/s
Splash Over Velocity	8.05 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.090
Grate Flow Ratio	0.574
Equivalent Cross Slope	0.141 ft/ft
Active Grate Length	3.8 ft
Length Factor	0.321
Total Interception Length	19.5 ft
Messages	

Worksheet for SDDI #4 10' Combo Inlet On Grade at 8% 100 yr Ultimate

Messages

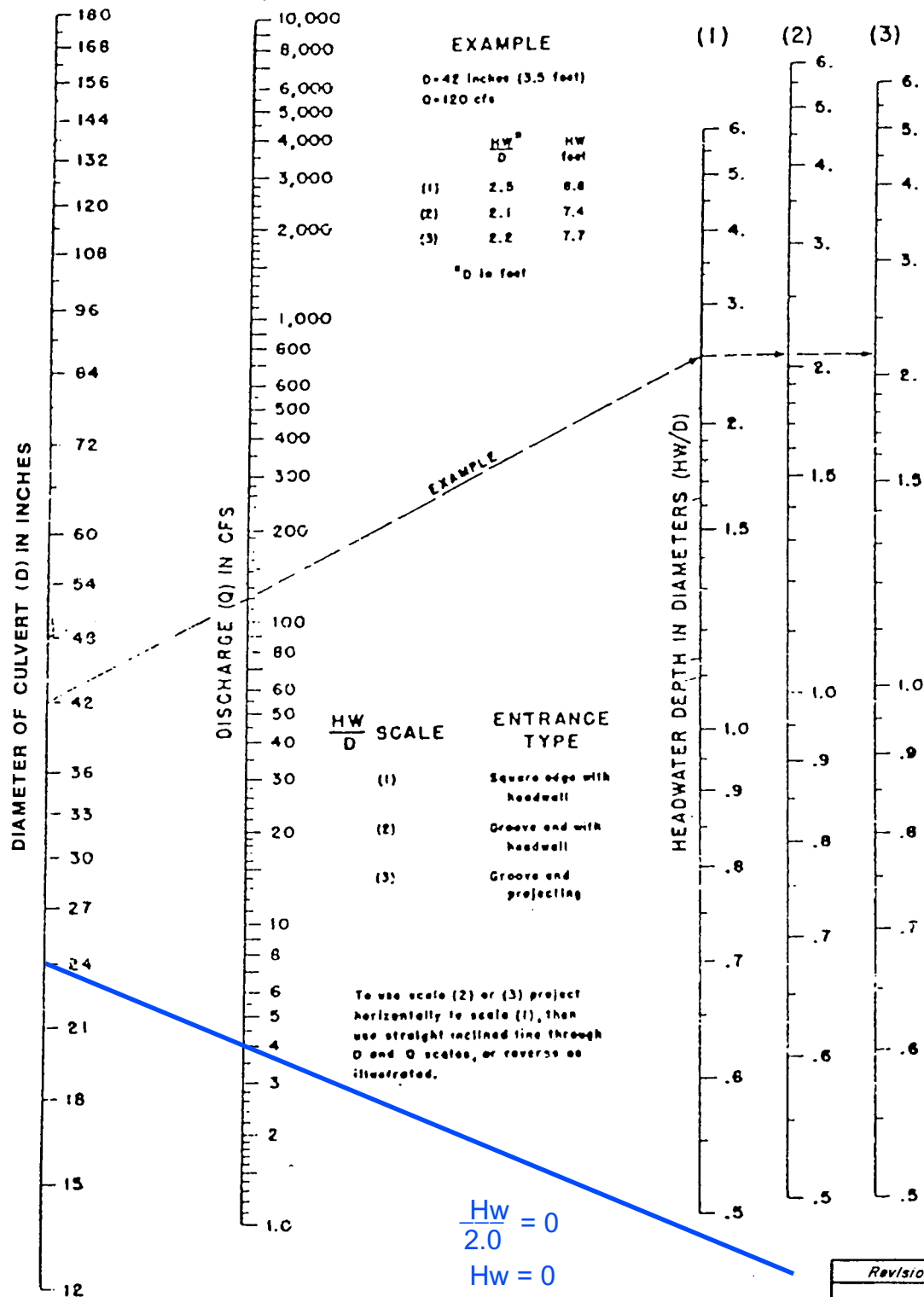
Messages

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) #4 / Street H Ultimate



Total Discharge
 $Q = 4.0$ -CFS
 24" RCP
 LATERAL

Revision	Date

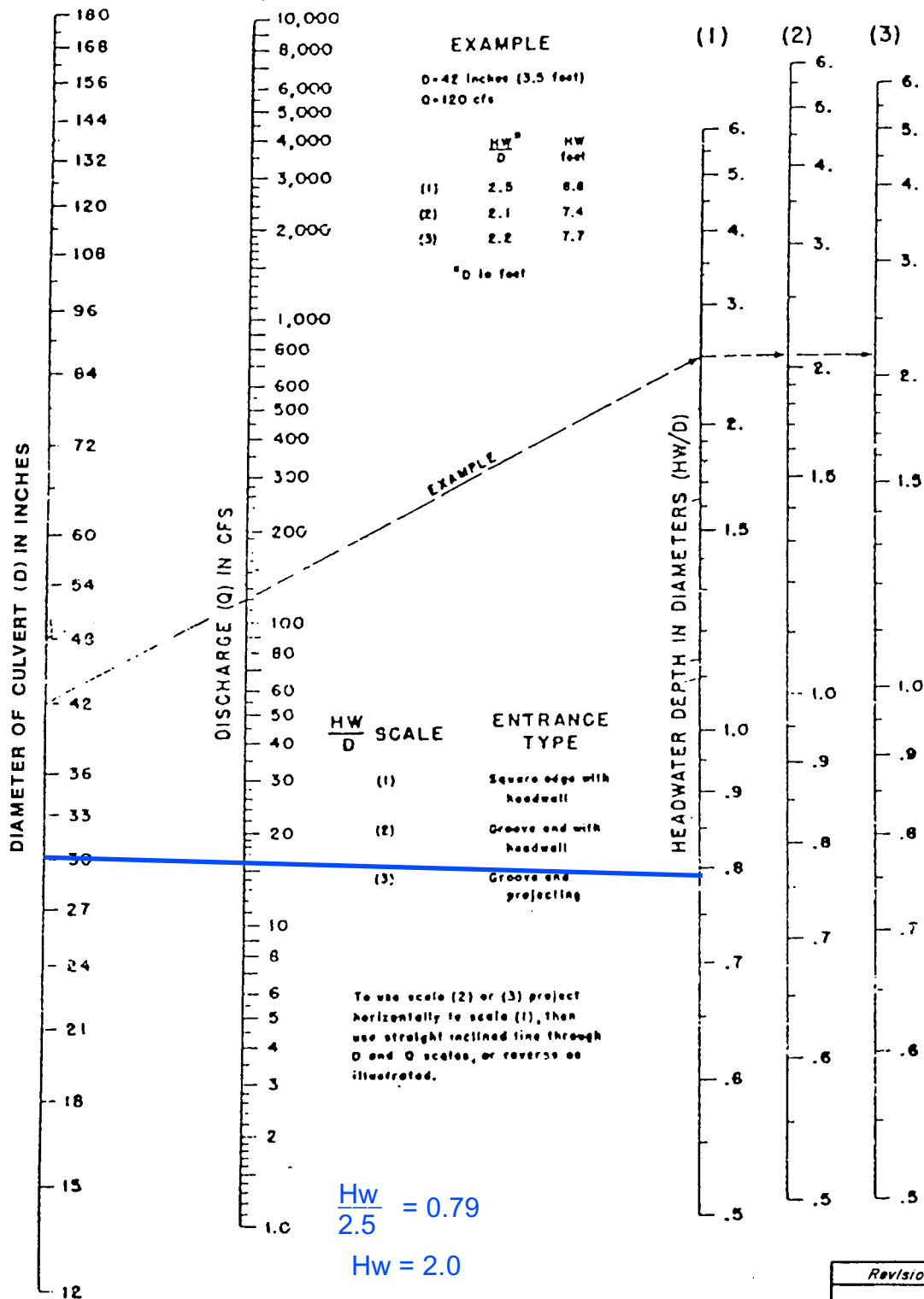
Worksheet for SDDI #5 Ditch Inlet In Sag 4'x4' 100 yr Ultimate - P-50x100

Project Description	
Solve For	Spread
Input Data	
Discharge	24.00 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	4.6 ft
Depth	0.8 ft
Wetted Perimeter	4.8 ft
Top Width	4.58 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) #5 / Street H Ultimate



Total Discharge
 $Q = 16.0$ CFS
 30" RCP
 LATERAL

Revision	Date

WRC
 ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

C.2 Normal Depth Calculations

Worksheet for Clowder Pass Way -STH 1 -100 yr Ultimate

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.080 ft/ft
Discharge	4.92 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.50
0+00.6	0.00
0+02.0	0.08
0+02.0	0.10
0+16.5	0.39
0+31.0	0.10
0+31.0	0.08
0+32.4	0.00
0+32.5	0.50
0+33.0	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.50)	(0+02.0, 0.08)	0.013
(0+02.0, 0.08)	(0+31.0, 0.08)	0.015
(0+31.0, 0.08)	(0+33.0, 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	0.0 to 0.5 ft
Flow Area	1.0 ft ²
Wetted Perimeter	13.4 ft
Hydraulic Radius	0.1 ft
Top Width	13.06 ft
Normal Depth	0.2 ft
Critical Depth	0.3 ft
Critical Slope	0.007 ft/ft

Worksheet for Clowder Pass Way -STH 1 -100 yr Ultimate

Results

Velocity	5.04 ft/s
Velocity Head	0.40 ft
Specific Energy	0.60 ft
Froude Number	3.254
Flow Type	Supercritical

GVF Input Data

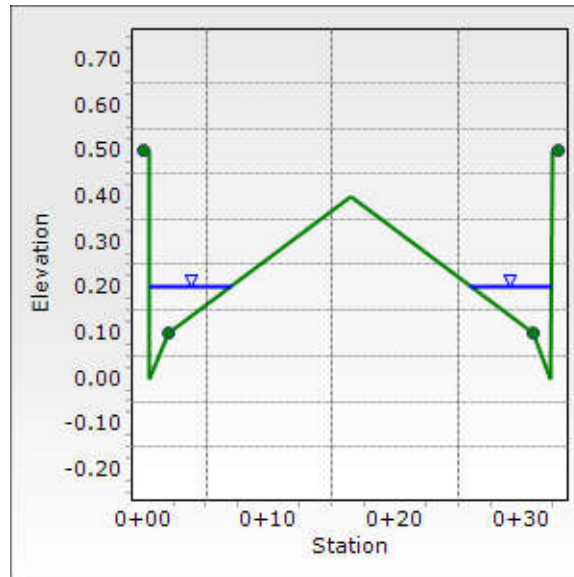
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

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	0.080 ft/ft
Critical Slope	0.007 ft/ft

Cross Section for Clowder Pass Way -STH 1 -100 yr Ultimate

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.080 ft/ft
Normal Depth	0.2 ft
Discharge	4.92 cfs



Worksheet for Clowder Pass Way - STH 2 - 100 yr Ultimate

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.080 ft/ft
Discharge	8.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.50
0+00.6	0.00
0+02.0	0.10
0+02.0	0.10
0+16.5	0.40
0+31.0	0.10
0+31.0	0.10
0+32.4	0.00
0+32.5	0.50
0+33.0	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.50)	(0+02.0, 0.10)	0.013
(0+02.0, 0.10)	(0+31.0, 0.10)	0.015
(0+31.0, 0.10)	(0+33.0, 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	0.0 to 0.5 ft
Flow Area	1.4 ft ²
Wetted Perimeter	16.4 ft
Hydraulic Radius	0.1 ft
Top Width	16.01 ft
Normal Depth	0.2 ft
Critical Depth	0.3 ft
Critical Slope	0.006 ft/ft

Worksheet for Clowder Pass Way - STH 2 - 100 yr Ultimate

Results

Velocity	5.63 ft/s
Velocity Head	0.49 ft
Specific Energy	0.73 ft
Froude Number	3.334
Flow Type	Supercritical

GVF Input Data

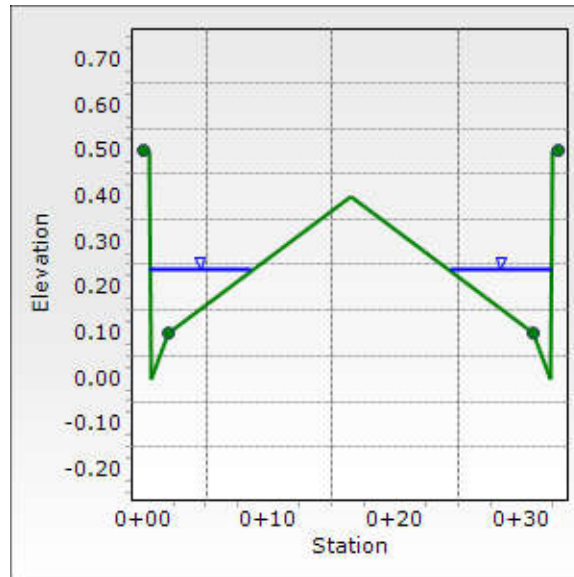
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

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	0.080 ft/ft
Critical Slope	0.006 ft/ft

Cross Section for Clowder Pass Way - STH 2 - 100 yr Ultimate

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.080 ft/ft
Normal Depth	0.2 ft
Discharge	8.00 cfs



C.3 Ultimate Condition WSPG-W Model

T1 SUMMERLIN WEST VILLAGE 22
T2 CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)
T3 ATKINS / ULTIMATE CONDITIONS
SO 2103.34 3335.74 30 3337.75
REM Tailwater from Desert Foothills Drive Addendum #1
R 2103.34 3335.74 30 .013 .000 02.0 0
REM Downstream of SDMH #1 (Junction with Lateral SDDI#1, 2)
JX 2106.34 3335.84 30 24 24.013 2.0 2.0 3335.94 3335.94 90.0-90.0 .000
R 2109.34 3335.94 30 .013 .000 02.0 0
REM Upstream of SDMH #1 (Junction with Lateral SDDI#1, 2)
REM 84.67 foot Reach
R 2189.21 3339.12 30 .013 .000 00.0 0
REM Downstream of SDMH #2
R 2192.21 3339.22 30 .013 .000 07.0 0
R 2195.21 3339.32 30 .013 .000 00.0 0
REM Upstream of SDMH #2
REM 93.45 foot Reach
R 2283.92 3343.52 30 .013 .000 04.0 0
REM Downstream of SDMH #3
R 2286.92 3343.62 30 .013 .000 08.0 0
R 2289.92 3343.72 30 .013 .000 04.0 0
REM Upstream of SDMH #3
REM 114.02 foot Reach
REM Downstream of SDMH #4
R 2399.53 3352.56 30 .013 .000 00.0 0
R 2402.53 3352.66 30 .013 .000 08.0 0
REM Upstream of SDMH #4
R 2405.53 3352.76 30 .013 .000 00.0 0
REM 98.43 foot Reach
REM Downstream of SDMH #5 (Junction with SDDI #3, 4)
R 2498.90 3360.39 30 .013 .000 01.0 0
JX 2501.90 3360.49 30 24 24.013 4.0 4.0 3360.59 3360.59 90.0-90.0 .000
R 2504.90 3360.59 30 .013 .000 01.0 0
REM Upstream of SDMH #5 (Junction with SDDI #3, 4)
REM 158.52 foot Reach
R 2657.41 3372.87 30 .013 .000 15.0 0
REM Downstream of SDMH #6
R 2658.41 3372.90 30 .013 .000 15.0 0
R 2659.41 3372.93 30 .013 .000 15.0 0
R 2660.41 3372.97 30 .013 .000 15.0 0
R 2661.41 3372.01 30 .013 .000 15.0 0
R 2662.41 3373.04 30 .013 .000 15.0 0
R 2663.41 3373.07 30 .013 .000 15.0 0
REM Upstream of SDMH#6
REM 66.1 foot Reach
R 2726.51 3374.23 30 .013 .000 00.0 0
REM Downstream of SDDI #6
SH 2726.51 3374.23 30
CD 24 4 1 .000 2.000 .000 .000 .000 .00
CD 30 4 1 .000 2.500 .000 .000 .000 .00
Q 24.0 .0

STH-ULT.OUT

FILE: STH-ULT.WSW

W S P G W - CIVILDESIGN Version 14.08
Program Package Serial Number: 7271

PAGE 1

WATER SURFACE PROFILE LISTING

Date:11-19-2019 Time: 2:14:59

SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)

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	*****	

----- WARNING - Junction Analysis - Large Lateral Flow(s) -----																
2103.340	3335.740	1.321	3337.062	36.00	13.67	2.90	3339.96	.00	2.03	2.50	2.500	.000	.00	1	.0	
JUNCT STR	.0334					.0338	.10	1.32	2.35		.013	.00	.00	PIPE		
2106.340	3335.840	1.069	3336.909	32.00	15.97	3.96	3340.87	.00	1.93	2.47	2.500	.000	.00	1	.0	
3.000	.0333					.0424	.13	1.07	3.13	1.14	.013	.00	.00	PIPE		
2109.340	3335.940	1.065	3337.005	32.00	16.05	4.00	3341.01	.00	1.93	2.47	2.500	.000	.00	1	.0	
33.010	.0398					.0437	1.44	1.07	3.15	1.09	.013	.00	.00	PIPE		
2142.350	3337.254	1.051	3338.305	32.00	16.34	4.15	3342.45	.00	1.93	2.47	2.500	.000	.00	1	.0	
46.860	.0398					.0479	2.24	1.05	3.23	1.09	.013	.00	.00	PIPE		
2189.210	3339.120	1.014	3340.134	32.00	17.14	4.56	3344.69	.00	1.93	2.45	2.500	.000	.00	1	.0	
3.000	.0333					.0514	.15	1.01	3.46	1.14	.013	.00	.00	PIPE		
2192.210	3339.220	1.009	3340.229	32.00	17.25	4.62	3344.85	.00	1.93	2.45	2.500	.000	.00	1	.0	
3.000	.0334					.0524	.16	1.01	3.50	1.14	.013	.00	.00	PIPE		
2195.210	3339.320	1.004	3340.324	32.00	17.36	4.68	3345.01	.00	1.93	2.45	2.500	.000	.00	1	.0	
31.998	.0473					.0549	1.76	1.00	3.53	1.03	.013	.00	.00	PIPE		
2227.208	3340.835	.983	3341.818	32.00	17.85	4.95	3346.77	.00	1.93	2.44	2.500	.000	.00	1	.0	
33.688	.0473					.0610	2.06	.98	3.67	1.03	.013	.00	.00	PIPE		

STH-ULT.OUT

FILE: STH-ULT.WSW

W S P G W - CIVILDESIGN Version 14.08
Program Package Serial Number: 7271

PAGE 2

WATER SURFACE PROFILE LISTING

Date:11-19-2019 Time: 2:14:59

SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)

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		
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2260.897	3342.430	.949	3343.379	32.00	18.72	5.44	3348.82	.00	1.93	2.43	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
23.023	.0473					.0696	1.60	.95	3.93	1.03	.013	.00	.00	PIPE		
2283.920	3343.520	.916	3344.436	32.00	19.64	5.99	3350.42	.00	1.93	2.41	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.000	.0334					.0753	.23	.92	4.21	1.14	.013	.00	.00	PIPE		
2286.920	3343.620	.909	3344.529	32.00	19.86	6.12	3350.65	.00	1.93	2.40	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.000	.0333					.0777	.23	.91	4.27	1.14	.013	.00	.00	PIPE		
2289.920	3343.720	.901	3344.621	32.00	20.09	6.27	3350.89	.00	1.93	2.40	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
60.307	.0807					.0768	4.63	.90	4.35	.90	.013	.00	.00	PIPE		
2350.227	3348.584	.914	3349.498	32.00	19.70	6.03	3355.53	.00	1.93	2.41	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
49.303	.0807					.0702	3.46	.91	4.23	.90	.013	.00	.00	PIPE		
2399.530	3352.560	.947	3353.507	32.00	18.79	5.48	3358.99	.00	1.93	2.43	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.000	.0333					.0665	.20	.95	3.95	1.14	.013	.00	.00	PIPE		
2402.530	3352.660	.940	3353.600	32.00	18.97	5.59	3359.19	.00	1.93	2.42	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.000	.0334					.0683	.20	.94	4.01	1.14	.013	.00	.00	PIPE		
2405.530	3352.760	.933	3353.693	32.00	19.16	5.70	3359.39	.00	1.93	2.42	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
23.587	.0817					.0661	1.56	.93	4.06	.89	.013	.00	.00	PIPE		
2429.117	3354.688	.958	3355.645	32.00	18.50	5.31	3360.96	.00	1.93	2.43	2.500	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
19.734	.0817					.0590	1.16	.96	3.86	.89	.013	.00	.00	PIPE		

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WATER SURFACE PROFILE LISTING

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)

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
2448.851	3356.300	.992	3357.292	32.00	17.64	4.83	3362.12	.00	1.93	2.45	2.500	.000	.00	1 .0
13.457	.0817					.0518	.70	.99	3.61	.89	.013	.00	.00	PIPE
2462.307	3357.400	1.028	3358.428	32.00	16.81	4.39	3362.82	.00	1.93	2.46	2.500	.000	.00	1 .0
9.969	.0817					.0455	.45	1.03	3.37	.89	.013	.00	.00	PIPE
2472.277	3358.215	1.066	3359.281	32.00	16.03	3.99	3363.27	.00	1.93	2.47	2.500	.000	.00	1 .0
7.739	.0817					.0399	.31	1.07	3.14	.89	.013	.00	.00	PIPE
2480.016	3358.847	1.105	3359.952	32.00	15.29	3.63	3363.58	.00	1.93	2.48	2.500	.000	.00	1 .0
6.194	.0817					.0351	.22	1.11	2.93	.89	.013	.00	.00	PIPE
2486.210	3359.353	1.146	3360.499	32.00	14.57	3.30	3363.80	.00	1.93	2.49	2.500	.000	.00	1 .0
5.050	.0817					.0309	.16	1.15	2.74	.89	.013	.00	.00	PIPE
2491.260	3359.766	1.189	3360.955	32.00	13.90	3.00	3363.95	.00	1.93	2.50	2.500	.000	.00	1 .0
4.170	.0817					.0271	.11	1.19	2.55	.89	.013	.00	.00	PIPE
2495.430	3360.106	1.234	3361.341	32.00	13.25	2.73	3364.07	.00	1.93	2.50	2.500	.000	.00	1 .0
3.470	.0817					.0239	.08	1.23	2.38	.89	.013	.00	.00	PIPE
2498.900	3360.390	1.281	3361.671	32.00	12.63	2.48	3364.15	.00	1.93	2.50	2.500	.000	.00	1 .0
JUNCT STR	.0334					.0490	.15	1.28	2.21		.013	.00	.00	PIPE
2501.900	3360.490	.783	3361.273	24.00	18.25	5.17	3366.44	.00	1.67	2.32	2.500	.000	.00	1 .0
3.000	.0334					.0769	.23	.78	4.27	.97	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)

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
2504.900	3360.590	.776	3361.366	24.00	18.49	5.31	3366.68	.00	1.67	2.31	2.500	.000	.00	1 .0
61.823	.0805					.0742	4.59	.78	4.35	.77	.013	.00	.00	PIPE
2566.723	3365.568	.799	3366.367	24.00	17.75	4.89	3371.26	.00	1.67	2.33	2.500	.000	.00	1 .0
27.990	.0805					.0656	1.84	.80	4.11	.77	.013	.00	.00	PIPE
2594.713	3367.822	.827	3368.649	24.00	16.93	4.45	3373.10	.00	1.67	2.35	2.500	.000	.00	1 .0
16.299	.0805					.0575	.94	.83	3.84	.77	.013	.00	.00	PIPE
2611.011	3369.134	.856	3369.990	24.00	16.14	4.05	3374.04	.00	1.67	2.37	2.500	.000	.00	1 .0
11.195	.0805					.0504	.56	.86	3.59	.77	.013	.00	.00	PIPE
2622.207	3370.035	.887	3370.922	24.00	15.39	3.68	3374.60	.00	1.67	2.39	2.500	.000	.00	1 .0
8.325	.0805					.0442	.37	.89	3.36	.77	.013	.00	.00	PIPE
2630.531	3370.706	.919	3371.624	24.00	14.67	3.34	3374.97	.00	1.67	2.41	2.500	.000	.00	1 .0
6.483	.0805					.0387	.25	.92	3.14	.77	.013	.00	.00	PIPE
2637.015	3371.228	.952	3372.179	24.00	13.99	3.04	3375.22	.00	1.67	2.43	2.500	.000	.00	1 .0
5.197	.0805					.0340	.18	.95	2.93	.77	.013	.00	.00	PIPE
2642.212	3371.646	.986	3372.632	24.00	13.34	2.76	3375.40	.00	1.67	2.44	2.500	.000	.00	1 .0
4.248	.0805					.0298	.13	.99	2.74	.77	.013	.00	.00	PIPE
2646.459	3371.988	1.022	3373.010	24.00	12.72	2.51	3375.52	.00	1.67	2.46	2.500	.000	.00	1 .0
3.513	.0805					.0262	.09	1.02	2.56	.77	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)

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
2649.973	3372.271	1.059	3373.330	24.00	12.13	2.28	3375.61	.00	1.67	2.47	2.500	.000	.00	1 .0
2.930	.0805					.0230	.07	1.06	2.39	.77	.013	.00	.00	PIPE
2652.903	3372.507	1.098	3373.605	24.00	11.56	2.08	3375.68	.00	1.67	2.48	2.500	.000	.00	1 .0
2.452	.0805					.0202	.05	1.10	2.23	.77	.013	.00	.00	PIPE
2655.355	3372.705	1.139	3373.844	24.00	11.02	1.89	3375.73	.00	1.67	2.49	2.500	.000	.00	1 .0
2.055	.0805					.0178	.04	1.14	2.08	.77	.013	.00	.00	PIPE
2657.410	3372.870	1.182	3374.052	24.00	10.51	1.72	3375.77	.00	1.67	2.50	2.500	.000	.00	1 .0
1.000	.0298					.0165	.02	1.18	1.94	1.00	.013	.00	.00	PIPE
2658.410	3372.900	1.186	3374.086	24.00	10.46	1.70	3375.78	.00	1.67	2.50	2.500	.000	.00	1 .0
1.000	.0300					.0163	.02	1.19	1.92	1.00	.013	.00	.00	PIPE
2659.410	3372.930	1.191	3374.121	24.00	10.40	1.68	3375.80	.00	1.67	2.50	2.500	.000	.00	1 .0
1.000	.0400					.0159	.02	1.19	1.91	.93	.013	.00	.00	PIPE
2660.410	3372.970	1.201	3374.171	24.00	10.29	1.65	3375.82	.00	1.67	2.50	2.500	.000	.00	1 .0
.096	-.9600					.0166	.00	1.20	1.88	.00	.013	.00	.00	PIPE
2660.506	3372.878	1.166	3374.044	24.00	10.69	1.77	3375.82	.00	1.67	2.49	2.500	.000	.00	1 .0
.138	-.9600					.0186	.00	1.17	1.99	.00	.013	.00	.00	PIPE
2660.644	3372.745	1.124	3373.870	24.00	11.21	1.95	3375.82	.00	1.67	2.49	2.500	.000	.00	1 .0
.158	-.9600					.0211	.00	1.12	2.13	.00	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)

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				
*****																	*****	
2660.802	3372.594	1.084	3373.678	24.00	11.76	2.15	3375.82	.00	1.67	2.48	2.500	.000	.00	1	.0			
	.179	-.9600				.0241	.00	1.08	2.28	.00	.013	.00	.00	PIPE				
2660.981	3372.421	1.046	3373.467	24.00	12.33	2.36	3375.83	.00	1.67	2.47	2.500	.000	.00	1	.0			
	.202	-.9600				.0274	.01	1.05	2.45	.00	.013	.00	.00	PIPE				
2661.183	3372.228	1.009	3373.236	24.00	12.94	2.60	3375.83	.00	1.67	2.45	2.500	.000	.00	1	.0			
	.227	-.9600				.0312	.01	1.01	2.62	.00	.013	.00	.00	PIPE				
2661.410	3372.010	.974	3372.984	24.00	13.57	2.86	3375.84	.00	1.67	2.44	2.500	.000	.00	1	.0			
	.219	1.0300				.0313	.01	.97	2.81	.41	.013	.00	.00	PIPE				
2661.630	3372.236	1.008	3373.244	24.00	12.95	2.61	3375.85	.00	1.67	2.45	2.500	.000	.00	1	.0			
	.199	1.0300				.0275	.01	1.01	2.63	.41	.013	.00	.00	PIPE				
2661.829	3372.442	1.045	3373.486	24.00	12.35	2.37	3375.85	.00	1.67	2.47	2.500	.000	.00	1	.0			
	.176	1.0300				.0242	.00	1.04	2.45	.41	.013	.00	.00	PIPE				
2662.005	3372.623	1.083	3373.706	24.00	11.78	2.15	3375.86	.00	1.67	2.48	2.500	.000	.00	1	.0			
	.154	1.0300				.0212	.00	1.08	2.29	.41	.013	.00	.00	PIPE				
2662.159	3372.782	1.123	3373.905	24.00	11.23	1.96	3375.86	.00	1.67	2.49	2.500	.000	.00	1	.0			
	.135	1.0300				.0187	.00	1.12	2.13	.41	.013	.00	.00	PIPE				
2662.294	3372.920	1.165	3374.085	24.00	10.70	1.78	3375.86	.00	1.67	2.49	2.500	.000	.00	1	.0			
	.116	1.0300				.0164	.00	1.16	1.99	.41	.013	.00	.00	PIPE				

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)

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				
*****																	*****	
2662.410	3373.040	1.209	3374.249	24.00	10.21	1.62	3375.87	.00	1.67	2.50	2.500	.000	.00	1	.0			
	1.000	.0300				.0152	.02	1.21	1.85	1.00	.013	.00	.00	PIPE				
2663.410	3373.070	1.215	3374.285	24.00	10.14	1.60	3375.88	.00	1.67	2.50	2.500	.000	.00	1	.0			
	2.605	.0184				.0150	.04	1.21	1.84	1.15	.013	.00	.00	PIPE				
2666.015	3373.118	1.218	3374.336	24.00	10.10	1.59	3375.92	.00	1.67	2.50	2.500	.000	.00	1	.0			
	22.574	.0184				.0141	.32	1.22	1.83	1.15	.013	.00	.00	PIPE				
2688.589	3373.533	1.265	3374.798	24.00	9.63	1.44	3376.24	.00	1.67	2.50	2.500	.000	.00	1	.0			
	13.713	.0184				.0124	.17	1.26	1.70	1.15	.013	.00	.00	PIPE				
2702.301	3373.785	1.313	3375.098	24.00	9.19	1.31	3376.41	.00	1.67	2.50	2.500	.000	.00	1	.0			
	9.105	.0184				.0109	.10	1.31	1.58	1.15	.013	.00	.00	PIPE				
2711.406	3373.952	1.365	3375.317	24.00	8.76	1.19	3376.51	.00	1.67	2.49	2.500	.000	.00	1	.0			
	6.213	.0184				.0096	.06	1.36	1.47	1.15	.013	.00	.00	PIPE				
2717.620	3374.067	1.418	3375.485	24.00	8.35	1.08	3376.57	.00	1.67	2.48	2.500	.000	.00	1	.0			
	4.216	.0184				.0085	.04	1.42	1.37	1.15	.013	.00	.00	PIPE				
2721.836	3374.144	1.475	3375.619	24.00	7.96	.98	3376.60	.00	1.67	2.46	2.500	.000	.00	1	.0			
	2.707	.0184				.0075	.02	1.48	1.27	1.15	.013	.00	.00	PIPE				
2724.543	3374.194	1.535	3375.729	24.00	7.59	.89	3376.62	.00	1.67	2.43	2.500	.000	.00	1	.0			
	1.498	.0184				.0067	.01	1.54	1.17	1.15	.013	.00	.00	PIPE				

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) DFD TO KETTLE RIDGE DRIVE (STREET J)

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
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
| | | | | | | | | | | | | | | |
2726.041 | 3374.221 | 1.599 | 3375.821 | 24.00 | 7.24 | .81 | 3376.63 | .00 | 1.67 | 2.40 | 2.500 | .000 | .00 | 1 | .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
.469 | .0184 | | | | | .0059 | .00 | 1.60 | 1.09 | 1.15 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
2726.510 | 3374.230 | 1.668 | 3375.898 | 24.00 | 6.90 | .74 | 3376.64 | .00 | 1.67 | 2.36 | 2.500 | .000 | .00 | 1 | .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-

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STH-Lat-SDDI1-ULT.wsw

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T1 SUMMERLIN WEST VILLAGE 22
T2 CLOWDER PASS WAY (STREET H) SDDI #1
T3 ATKINS / ULTIMATE CONDITIONS
SO 0.00 3335.94 24 3336.91
R 0.00 3335.94 24 .013 .000 00.0 0
R 27.36 3336.57 24 .013 .000 00.0 0
SH 27.36 3336.57 24
CD 24 4 1 .000 2.000 .000 .000 .000 .00
Q 2.0 .0

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) 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 Width	Top Dia.-FT	Height/ I.D.	Base Wt ZL	No Wth Prs/Pip		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch		
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
.000	3335.940	.970	3336.910	2.00	1.32	.03	3336.94	.00	.49	2.00	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.436	.0230					.0004	.00	.97	.27	.33	.013	.00	.00	PIPE		
1.436	3335.973	.935	3336.908	2.00	1.39	.03	3336.94	.00	.49	2.00	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.354	.0230					.0004	.00	.93	.29	.33	.013	.00	.00	PIPE		
2.790	3336.004	.901	3336.905	2.00	1.46	.03	3336.94	.00	.49	1.99	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.282	.0230					.0005	.00	.90	.31	.33	.013	.00	.00	PIPE		
4.072	3336.034	.869	3336.903	2.00	1.53	.04	3336.94	.00	.49	1.98	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.209	.0230					.0005	.00	.87	.33	.33	.013	.00	.00	PIPE		
5.280	3336.062	.838	3336.900	2.00	1.60	.04	3336.94	.00	.49	1.97	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.139	.0230					.0006	.00	.84	.35	.33	.013	.00	.00	PIPE		
6.419	3336.088	.809	3336.896	2.00	1.68	.04	3336.94	.00	.49	1.96	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.071	.0230					.0007	.00	.81	.38	.33	.013	.00	.00	PIPE		
7.491	3336.112	.780	3336.893	2.00	1.76	.05	3336.94	.00	.49	1.95	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.007	.0230					.0008	.00	.78	.41	.33	.013	.00	.00	PIPE		
8.498	3336.135	.753	3336.889	2.00	1.85	.05	3336.94	.00	.49	1.94	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
.941	.0230					.0009	.00	.75	.44	.33	.013	.00	.00	PIPE		
9.438	3336.157	.727	3336.884	2.00	1.94	.06	3336.94	.00	.49	1.92	2.000	.000	.00	1	.0	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
.872	.0230					.0010	.00	.73	.47	.33	.013	.00	.00	PIPE		

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) 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
10.310	3336.177	.702	3336.879	2.00	2.03	.06	3336.94	.00	.49	1.91	2.000	.000	.00	1 .0
	.810	.0230				.0012	.00	.70	.50	.33	.013	.00	.00	PIPE
11.120	3336.196	.678	3336.874	2.00	2.13	.07	3336.94	.00	.49	1.89	2.000	.000	.00	1 .0
	.211	.0230				.0014	.00	.68	.53	.33	.013	.00	.00	PIPE
11.332	3336.201	.655	3336.855	2.00	2.24	.08	3336.93	.00	.49	1.88	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
11.332	3336.201	.339	3336.540	2.00	5.67	.50	3337.04	.00	.49	1.50	2.000	.000	.00	1 .0
	2.241	.0230				.0187	.04	.34	2.06	.33	.013	.00	.00	PIPE
13.573	3336.253	.351	3336.603	2.00	5.40	.45	3337.06	.00	.49	1.52	2.000	.000	.00	1 .0
	4.380	.0230				.0163	.07	.35	1.93	.33	.013	.00	.00	PIPE
17.952	3336.354	.362	3336.716	2.00	5.15	.41	3337.13	.00	.49	1.54	2.000	.000	.00	1 .0
	2.877	.0230				.0143	.04	.36	1.81	.33	.013	.00	.00	PIPE
20.829	3336.420	.375	3336.794	2.00	4.91	.37	3337.17	.00	.49	1.56	2.000	.000	.00	1 .0
	2.018	.0230				.0125	.03	.37	1.69	.33	.013	.00	.00	PIPE
22.847	3336.466	.387	3336.853	2.00	4.68	.34	3337.19	.00	.49	1.58	2.000	.000	.00	1 .0
	1.469	.0230				.0109	.02	.39	1.59	.33	.013	.00	.00	PIPE
24.317	3336.500	.400	3336.900	2.00	4.46	.31	3337.21	.00	.49	1.60	2.000	.000	.00	1 .0
	1.075	.0230				.0095	.01	.40	1.49	.33	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) 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	*****	
25.392	3336.525	.414	3336.939	2.00	4.26	.28	3337.22	.00	.49	1.62	2.000	.000	.00	1	.0	
	.786	.0230				.0083	.01	.41	1.39	.33	.013	.00	.00	PIPE		
26.178	3336.543	.428	3336.971	2.00	4.06	.26	3337.23	.00	.49	1.64	2.000	.000	.00	1	.0	
	.549	.0230				.0073	.00	.43	1.31	.33	.013	.00	.00	PIPE		
26.727	3336.555	.443	3336.998	2.00	3.87	.23	3337.23	.00	.49	1.66	2.000	.000	.00	1	.0	
	.362	.0230				.0063	.00	.44	1.22	.33	.013	.00	.00	PIPE		
27.089	3336.564	.458	3337.021	2.00	3.69	.21	3337.23	.00	.49	1.68	2.000	.000	.00	1	.0	
	.207	.0230				.0055	.00	.46	1.14	.33	.013	.00	.00	PIPE		
27.296	3336.569	.473	3337.042	2.00	3.52	.19	3337.23	.00	.49	1.70	2.000	.000	.00	1	.0	
	.064	.0230				.0048	.00	.47	1.07	.33	.013	.00	.00	PIPE		
27.360	3336.570	.491	3337.061	2.00	3.34	.17	3337.23	.00	.49	1.72	2.000	.000	.00	1	.0	

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0

T1 SUMMERLIN WEST VILLAGE 22
T2 CLOWDER PASS WAY (STREET H) SDDI #2
T3 ATKINS / ULTIMATE CONDITIONS
SO 0.00 3335.94 24 3336.91
R 0.00 3335.94 24 .013 .000 00.0 0
R 5.65 3336.43 24 .013 .000 00.0 0
SH 5.65 3336.43 24
CD 24 4 1 .000 2.000 .000 .000 .000 .00
Q 2.0 .0

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) 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		

.000	3335.940	.970	3336.910	2.00	1.32	.03	3336.94	.00	.49	2.00	2.000	.000	.00	1	.0	
-.377	.0867					.0004	.00	.97	.27	.24	.013	.00	.00	PIPE		
.377	3335.973	.935	3336.907	2.00	1.39	.03	3336.94	.00	.49	2.00	2.000	.000	.00	1	.0	
-.355	.0867					.0004	.00	.93	.29	.24	.013	.00	.00	PIPE		
.732	3336.003	.901	3336.905	2.00	1.46	.03	3336.94	.00	.49	1.99	2.000	.000	.00	1	.0	
-.335	.0867					.0005	.00	.90	.31	.24	.013	.00	.00	PIPE		
1.067	3336.032	.869	3336.901	2.00	1.53	.04	3336.94	.00	.49	1.98	2.000	.000	.00	1	.0	
-.315	.0867					.0005	.00	.87	.33	.24	.013	.00	.00	PIPE		
1.382	3336.060	.838	3336.898	2.00	1.60	.04	3336.94	.00	.49	1.97	2.000	.000	.00	1	.0	
-.296	.0867					.0006	.00	.84	.35	.24	.013	.00	.00	PIPE		
1.678	3336.085	.809	3336.894	2.00	1.68	.04	3336.94	.00	.49	1.96	2.000	.000	.00	1	.0	
-.278	.0867					.0007	.00	.81	.38	.24	.013	.00	.00	PIPE		
1.956	3336.110	.780	3336.890	2.00	1.76	.05	3336.94	.00	.49	1.95	2.000	.000	.00	1	.0	
-.260	.0867					.0008	.00	.78	.41	.24	.013	.00	.00	PIPE		
2.217	3336.132	.753	3336.885	2.00	1.85	.05	3336.94	.00	.49	1.94	2.000	.000	.00	1	.0	
-.242	.0867					.0009	.00	.75	.44	.24	.013	.00	.00	PIPE		
2.459	3336.153	.727	3336.880	2.00	1.94	.06	3336.94	.00	.49	1.92	2.000	.000	.00	1	.0	
-.208	.0867					.0010	.00	.73	.47	.24	.013	.00	.00	PIPE		

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) 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	*****	
2.667	3336.171	.702	3336.874	2.00	2.03	.06	3336.94	.00	.49	1.91	2.000	.000	.00	1	.0	
HYDRAULIC JUMP																
2.667	3336.171	.318	3336.489	2.00	6.23	.60	3337.09	.00	.49	1.46	2.000	.000	.00	1	.0	
.022	.0867					.0245	.00	.32	2.35	.24	.013	.00	.00	PIPE		
2.689	3336.173	.328	3336.501	2.00	5.94	.55	3337.05	.00	.49	1.48	2.000	.000	.00	1	.0	
.595	.0867					.0214	.01	.33	2.20	.24	.013	.00	.00	PIPE		
3.284	3336.225	.339	3336.564	2.00	5.67	.50	3337.06	.00	.49	1.50	2.000	.000	.00	1	.0	
.498	.0867					.0187	.01	.34	2.06	.24	.013	.00	.00	PIPE		
3.783	3336.268	.351	3336.618	2.00	5.40	.45	3337.07	.00	.49	1.52	2.000	.000	.00	1	.0	
.418	.0867					.0163	.01	.35	1.93	.24	.013	.00	.00	PIPE		
4.200	3336.304	.362	3336.666	2.00	5.15	.41	3337.08	.00	.49	1.54	2.000	.000	.00	1	.0	
.348	.0867					.0143	.00	.36	1.81	.24	.013	.00	.00	PIPE		
4.548	3336.334	.375	3336.709	2.00	4.91	.37	3337.08	.00	.49	1.56	2.000	.000	.00	1	.0	
.287	.0867					.0125	.00	.37	1.69	.24	.013	.00	.00	PIPE		
4.836	3336.359	.387	3336.746	2.00	4.68	.34	3337.09	.00	.49	1.58	2.000	.000	.00	1	.0	
.235	.0867					.0109	.00	.39	1.59	.24	.013	.00	.00	PIPE		
5.071	3336.380	.400	3336.780	2.00	4.46	.31	3337.09	.00	.49	1.60	2.000	.000	.00	1	.0	
.188	.0867					.0095	.00	.40	1.49	.24	.013	.00	.00	PIPE		

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) 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	*****	
5.259	3336.396	.414	3336.810	2.00	4.26	.28	3337.09	.00	.49	1.62	2.000	.000	.00	1	.0	
	.148	.0867				.0083	.00	.41	1.39	.24	.013	.00	.00	PIPE		
5.407	3336.409	.428	3336.837	2.00	4.06	.26	3337.09	.00	.49	1.64	2.000	.000	.00	1	.0	
	.109	.0867				.0073	.00	.43	1.31	.24	.013	.00	.00	PIPE		
5.516	3336.418	.443	3336.861	2.00	3.87	.23	3337.09	.00	.49	1.66	2.000	.000	.00	1	.0	
	.075	.0867				.0063	.00	.44	1.22	.24	.013	.00	.00	PIPE		
5.591	3336.425	.458	3336.883	2.00	3.69	.21	3337.09	.00	.49	1.68	2.000	.000	.00	1	.0	
	.045	.0867				.0055	.00	.46	1.14	.24	.013	.00	.00	PIPE		
5.636	3336.429	.473	3336.902	2.00	3.52	.19	3337.09	.00	.49	1.70	2.000	.000	.00	1	.0	
	.014	.0867				.0048	.00	.47	1.07	.24	.013	.00	.00	PIPE		
5.650	3336.430	.491	3336.921	2.00	3.34	.17	3337.09	.00	.49	1.72	2.000	.000	.00	1	.0	

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0

T1 SUMMERLIN WEST VILLAGE 22
T2 CLOWDER PASS WAY (STREET H) SDDI #3
T3 ATKINS / ULTIMATE CONDITIONS
SO 0.00 3360.59 24 3361.27
R 0.00 3360.59 24 .013 .000 00.0 0
R 26.70 3361.53 24 .013 .000 00.0 0
SH 26.70 3361.53 24
CD 24 4 1 .000 2.000 .000 .000 .000 .00
Q 4.0 .0

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) SDDI #3

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				
*****																	*****	
.000	3360.590	.441	3361.031	4.00	7.78	.94	3361.97	.00	.70	1.66	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
4.802	.0352					.0265	.13	.44	2.46	.41	.013	.00	.00	PIPE				
4.802	3360.759	.449	3361.208	4.00	7.58	.89	3362.10	.00	.70	1.67	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
5.833	.0352					.0239	.14	.45	2.38	.41	.013	.00	.00	PIPE				
10.635	3360.964	.465	3361.429	4.00	7.23	.81	3362.24	.00	.70	1.69	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
4.047	.0352					.0209	.08	.46	2.22	.41	.013	.00	.00	PIPE				
14.682	3361.107	.480	3361.587	4.00	6.89	.74	3362.32	.00	.70	1.71	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2.986	.0352					.0183	.05	.48	2.08	.41	.013	.00	.00	PIPE				
17.668	3361.212	.497	3361.709	4.00	6.57	.67	3362.38	.00	.70	1.73	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2.281	.0352					.0160	.04	.50	1.95	.41	.013	.00	.00	PIPE				
19.949	3361.292	.514	3361.806	4.00	6.26	.61	3362.42	.00	.70	1.75	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
1.776	.0352					.0140	.02	.51	1.83	.41	.013	.00	.00	PIPE				
21.725	3361.355	.532	3361.886	4.00	5.97	.55	3362.44	.00	.70	1.77	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
1.391	.0352					.0122	.02	.53	1.71	.41	.013	.00	.00	PIPE				
23.116	3361.404	.550	3361.954	4.00	5.69	.50	3362.46	.00	.70	1.79	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
1.089	.0352					.0107	.01	.55	1.60	.41	.013	.00	.00	PIPE				
24.205	3361.442	.569	3362.011	4.00	5.43	.46	3362.47	.00	.70	1.80	2.000	.000	.00	1	.0			
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
.840	.0352					.0094	.01	.57	1.50	.41	.013	.00	.00	PIPE				

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) SDDI #3

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			

25.045	3361.472	.589	3362.061	4.00	5.18	.42	3362.48	.00	.70	1.82	2.000	.000	.00	1 .0			
	.642	.0352				.0082	.01	.59	1.40	.41	.013	.00	.00	PIPE			
25.687	3361.494	.610	3362.104	4.00	4.94	.38	3362.48	.00	.70	1.84	2.000	.000	.00	1 .0			
	.463	.0352				.0072	.00	.61	1.31	.41	.013	.00	.00	PIPE			
26.150	3361.511	.631	3362.142	4.00	4.71	.34	3362.49	.00	.70	1.86	2.000	.000	.00	1 .0			
	.313	.0352				.0063	.00	.63	1.23	.41	.013	.00	.00	PIPE			
26.464	3361.522	.653	3362.175	4.00	4.49	.31	3362.49	.00	.70	1.88	2.000	.000	.00	1 .0			
	.179	.0352				.0055	.00	.65	1.15	.41	.013	.00	.00	PIPE			
26.643	3361.528	.676	3362.204	4.00	4.28	.28	3362.49	.00	.70	1.89	2.000	.000	.00	1 .0			
	.057	.0352				.0048	.00	.68	1.07	.41	.013	.00	.00	PIPE			
26.700	3361.530	.701	3362.231	4.00	4.07	.26	3362.49	.00	.70	1.91	2.000	.000	.00	1 .0			

STH-Lat-SDDI4-ULT.wsw

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T1 SUMMERLIN WEST VILLAGE 22
T2 CLOWDER PASS WAY (STREET H) SDDI #4
T3 ATKINS / ULTIMATE CONDITIONS
SO 0.00 3360.59 24 3361.27
R 0.00 3360.59 24 .013 .000 00.0 0
R 7.04 3361.53 24 .013 .000 00.0 0
SH 7.04 3361.53 24
CD 24 4 1 .000 2.000 .000 .000 .000 .00
Q 4.0 .0

STH-Lat-SDDI4-ULT.OUT

FILE: STH-Lat-SDDI4-ULT.WSW

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) 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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
.000	3360.590	.392	3360.982	4.00	9.20	1.32	3362.30	.00	.70	1.59	2.000	.000	.00	1 .0
.154	.1335					.0440	.01	.39	3.10	.30	.013	.00	.00	PIPE
.154	3360.611	.393	3361.004	4.00	9.17	1.31	3362.31	.00	.70	1.59	2.000	.000	.00	1 .0
1.139	.1335					.0410	.05	.39	3.08	.30	.013	.00	.00	PIPE
1.293	3360.763	.406	3361.169	4.00	8.74	1.19	3362.36	.00	.70	1.61	2.000	.000	.00	1 .0
.963	.1335					.0358	.03	.41	2.89	.30	.013	.00	.00	PIPE
2.257	3360.891	.420	3361.312	4.00	8.34	1.08	3362.39	.00	.70	1.63	2.000	.000	.00	1 .0
.820	.1335					.0313	.03	.42	2.71	.30	.013	.00	.00	PIPE
3.077	3361.001	.434	3361.435	4.00	7.95	.98	3362.42	.00	.70	1.65	2.000	.000	.00	1 .0
.701	.1335					.0274	.02	.43	2.54	.30	.013	.00	.00	PIPE
3.777	3361.094	.449	3361.543	4.00	7.58	.89	3362.44	.00	.70	1.67	2.000	.000	.00	1 .0
.600	.1335					.0239	.01	.45	2.38	.30	.013	.00	.00	PIPE
4.378	3361.174	.465	3361.639	4.00	7.23	.81	3362.45	.00	.70	1.69	2.000	.000	.00	1 .0
.513	.1335					.0209	.01	.46	2.22	.30	.013	.00	.00	PIPE
4.891	3361.243	.480	3361.723	4.00	6.89	.74	3362.46	.00	.70	1.71	2.000	.000	.00	1 .0
.438	.1335					.0183	.01	.48	2.08	.30	.013	.00	.00	PIPE
5.329	3361.302	.497	3361.798	4.00	6.57	.67	3362.47	.00	.70	1.73	2.000	.000	.00	1 .0
.373	.1335					.0160	.01	.50	1.95	.30	.013	.00	.00	PIPE

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) 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				
*****																	*****	
5.702	3361.351	.514	3361.865	4.00	6.26	.61	3362.47	.00	.70	1.75	2.000	.000	.00	1	.0			
	.315	.1335				.0140	.00	.51	1.83	.30	.013	.00	.00	PIPE				
6.017	3361.393	.532	3361.925	4.00	5.97	.55	3362.48	.00	.70	1.77	2.000	.000	.00	1	.0			
	.263	.1335				.0122	.00	.53	1.71	.30	.013	.00	.00	PIPE				
6.281	3361.428	.550	3361.979	4.00	5.69	.50	3362.48	.00	.70	1.79	2.000	.000	.00	1	.0			
	.217	.1335				.0107	.00	.55	1.60	.30	.013	.00	.00	PIPE				
6.498	3361.458	.569	3362.027	4.00	5.43	.46	3362.48	.00	.70	1.80	2.000	.000	.00	1	.0			
	.175	.1335				.0094	.00	.57	1.50	.30	.013	.00	.00	PIPE				
6.673	3361.481	.589	3362.070	4.00	5.18	.42	3362.49	.00	.70	1.82	2.000	.000	.00	1	.0			
	.138	.1335				.0082	.00	.59	1.40	.30	.013	.00	.00	PIPE				
6.811	3361.500	.610	3362.109	4.00	4.94	.38	3362.49	.00	.70	1.84	2.000	.000	.00	1	.0			
	.103	.1335				.0072	.00	.61	1.31	.30	.013	.00	.00	PIPE				
6.914	3361.513	.631	3362.144	4.00	4.71	.34	3362.49	.00	.70	1.86	2.000	.000	.00	1	.0			
	.071	.1335				.0063	.00	.63	1.23	.30	.013	.00	.00	PIPE				
6.985	3361.523	.653	3362.176	4.00	4.49	.31	3362.49	.00	.70	1.88	2.000	.000	.00	1	.0			
	.042	.1335				.0055	.00	.65	1.15	.30	.013	.00	.00	PIPE				
7.026	3361.528	.676	3362.205	4.00	4.28	.28	3362.49	.00	.70	1.89	2.000	.000	.00	1	.0			
	.014	.1335				.0048	.00	.68	1.07	.30	.013	.00	.00	PIPE				

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SUMMERLIN WEST VILLAGE 22

CLOWDER PASS WAY (STREET H) SDDI #4

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
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
| | | | | | | | | | | | | | | |
7.040 3361.530 .701 3362.231 4.00 4.07 .26 3362.49 .00 .70 1.91 2.000 .000 .00

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C.5. RipRap Calculations

Worksheet for Interim Berm South 1% - Bare Earth

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.010 ft/ft
Discharge	16.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	2.00
0+06.0	0.00
0+56.0	1.00
0+59.0	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 2.00)	(0+59.0, 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	0.5 ft
Elevation Range	0.0 to 2.0 ft
Flow Area	6.8 ft²
Wetted Perimeter	26.9 ft
Hydraulic Radius	0.3 ft
Top Width	26.77 ft
Normal Depth	0.5 ft
Critical Depth	0.5 ft
Critical Slope	0.015 ft/ft
Velocity	2.37 ft/s
Velocity Head	0.09 ft
Specific Energy	0.59 ft
Froude Number	0.831
Flow Type	Subcritical

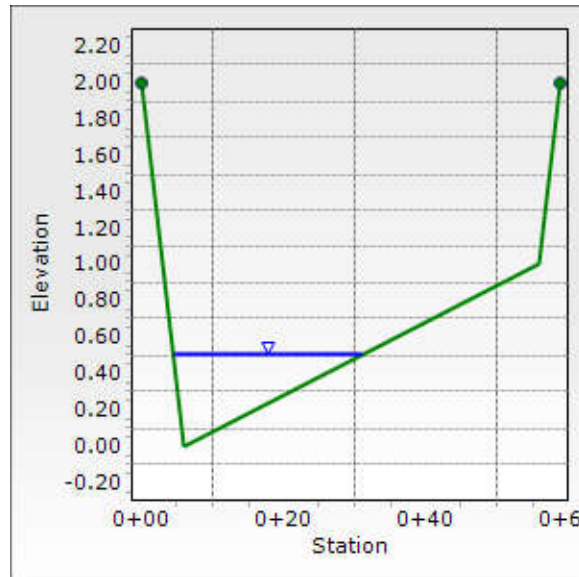
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft

Worksheet for Interim Berm South 1% - 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	0.5 ft
Critical Depth	0.5 ft
Channel Slope	0.010 ft/ft
Critical Slope	0.015 ft/ft

Cross Section for Interim Berm South 1% - Bare Earth

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.010 ft/ft
Normal Depth	0.5 ft
Discharge	16.00 cfs



HEC-11 RIPRAP SIZING CALCULATIONS

Location: Summerlin West Village 22 Street H Interim Berm (South) Riprap Channel
 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 " =	0.01	ft/ft	
Hydraulic Radius "R" =	0.3	ft	
Flow area =	6.8	sqft	Balance w/ Manning's n until
Wetted perimeter =	26.9	ft	results match input FlowMaster
Top width =	26.77	ft	
Average channel velocity =	2.37	fps	
Depth of flow =	0.5	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 =	0.04	ft	

Calculations:

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

$$K_1 = 0.876$$

$$d_{\text{avg}} = 0.25 \text{ ft}$$

$$\text{Manning's } n = 0.082$$

$$\text{Bank } D_{50} = 0.02 \text{ ft}$$

$$\text{Bed } D_{50} = 0.03$$

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

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

$$C = 1.128$$

Bank D' ₅₀ = 0.02 ft
Bed D' ₅₀ = 0.03 ft

Stable? **Yes**

$$t_o = 0.2 \text{ lb/ft}^2 \text{ (average shear stress on channel)}$$

$$t_c = 0.2 \text{ lb/ft}^2 \text{ (critical shear stress-resistance to movement)}$$

Stable? **Yes**

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

R _h =	2.15	ft (Eq. 732 for R _h > 2d ₅₀)
n =	0.023	OK
Y/d ₅₀ =	13.2	(Eq. 733 for 1.5 < Y/d ₅₀ < 185)
n =	0.029	Yes
d ₅₀ =	0.05	ft (Eq. 734)
d ₅₀ =	0.08	ft (Eq. 735, generally larger sizes)
d ₅₀ =	0.11	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

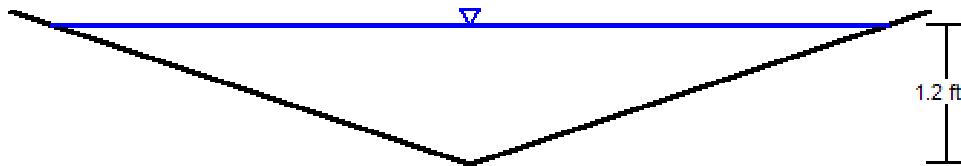
Spreadsheet not for pier scour or wave action

Worksheet for Interim Triangular Swale South of STH - 10" RipRap

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.038
Channel Slope	0.100 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	19.00 cfs
Results	
Normal Depth	0.9 ft
Flow Area	2.6 ft²
Wetted Perimeter	5.9 ft
Hydraulic Radius	0.4 ft
Top Width	5.63 ft
Critical Depth	1.2 ft
Critical Slope	0.027 ft/ft
Velocity	7.20 ft/s
Velocity Head	0.81 ft
Specific Energy	1.74 ft
Froude Number	1.855
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	0.9 ft
Critical Depth	1.2 ft
Channel Slope	0.100 ft/ft
Critical Slope	0.027 ft/ft

Cross Section for Interim Triangular Swale South of STH - 10" RipRap

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.038
Channel Slope	0.100 ft/ft
Normal Depth	1.2 ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	37.00 cfs



V: 1
H: 1

HEC-11 RIPRAP SIZING CALCULATIONS

Location: Summerlin West Village 22 Street H Interim Berm (South) Riprap Channel
 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 D50 > 0.2 ft)

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

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

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

Stability Factor = 1.3 (Table 1 pg 31)

Gradually Varying Flow; Moderate Bed Curvature (30 > 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 " =	0.1	ft/ft	
Hydraulic Radius "R" =	0.2	ft	
Flow area =	3.7	sqft	Balance w/ Manning's n until
Wetted perimeter =	19.8	ft	results match input FlowMaster
Top width =	19.71	ft	
Average channel velocity =	4.36	fps	
Depth of flow =	0.4	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 =	0.50	ft	

Calculations:

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

$$K_1 = 0.876$$

$$d_{\text{avg}} = 0.19 \text{ ft}$$

$$\text{Manning's } n = 0.210$$

$$\text{Bank } D_{50} = 0.16 \text{ ft}$$

$$\text{Bed } D_{50} = 0.19$$

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

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

$$C = 1.128$$

$$\text{Bank } D'_{50} = 0.18 \text{ ft}$$

$$\text{Bed } D'_{50} = 0.22 \text{ ft}$$

Stable? **Yes**

$$t_o = 1.2 \text{ lb/ft}^2 \text{ (average shear stress on channel)}$$

$$t_c = 2.1 \text{ lb/ft}^2 \text{ (critical shear stress-resistance to movement)}$$

Stable? **Yes**

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

R _h =	1.46	ft (Eq. 732 for R _h > 2d ₅₀)
n =	0.035	OK
Y/d ₅₀ =	0.8	(Eq. 733 for 1.5 < Y/d ₅₀ < 185)
n =	0.129	Y/d ₅₀ Not Within Limits
d ₅₀ =	0.35	ft (Eq. 734)
d ₅₀ =	0.36	ft (Eq. 735, generally larger sizes)
d ₅₀ =	0.84	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 > curve radius/channel width > 10); impact from waves or floating debris moderate.
- 1.6 - 2.0 Approaching rapidly varying flow; sharp bend curvature (10 > 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

Appendix D. CD-ROM

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 AND ORDINANCES OF 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 CIVIL PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS PROVIDED FOR THE CONTRACTOR BY THE CITY ENGINEER. EXISTING UTILITY 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 DAMAGE TO BE REPAIRED 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 ($\frac{1}{2}$ ") ABOVE TOP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMP'S AND CROSS GUTTERS.
9. CURB AND GUTTER FLOW TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMP'S SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMP'S 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 INSPECTOR 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 STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APPRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING LIDS, 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 NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY. SEWER AND STORM DRAIN MAP(S) SHALL INCLUDE THE LOCATION OF THE SANITARY SEWER AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTANTIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTAL AND ± 0.03 METERS (± 0.1 FEET) VERTICAL. THE FINAL LOCATION MAP(S) FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED 06/04/2018

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 GRADIES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION, ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

	HORIZONTAL	VERTICAL	COMPACTION
A. PAVEMENT AREA SUBGRADE	0.1"	+0.0' TO -0.1'	SEE SOILS REPORT
B. ENGINEERED FILL	0.5"	+0.1' TO -0.1'	SEE SOILS REPORT

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.
7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION, ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 04/15/10

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

1. KETTLE RIDGE DRIVE (STREET J) (FLEET WING DRIVE TO LAKE MEAD BLVD)
2. DESERT FOOTHILLS DRIVE (FLEET WING DRIVE TO LAKE MEAD BLVD)
3. KESTREL CREEK DRIVE (STREET I) (DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J))
4. LAKE MEAD BOULEVARD (DESERT FOOTHILLS DRIVE TO SCURRY BEND DRIVE (STREET N))

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6631 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING MUST BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. IFC § 105.6.15
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL HYDRANTS SHALL BE INSTALLED IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. IFC § 331.0, § 331.2
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. IFC § 507.5.7.3.
6. ALL UNDERGROUND AND ABOVEGROUND HYDRANT VERIFICATION TESTS SHALL BE CONDUCTED ON ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES, CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. IFC § 106.3
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. IFC § 507.2.1, NFPA 24
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER 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. BEFORE FIRE HYDRANT SPACING VERIFICATION 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 EXTENDING ALONG A STREET OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAVEL LANES, FIRE HYDRANTS SHALL BE SPACED NO 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 INTERSECTION OF THE ROAD.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. IFC § C102.10
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT. AS MEASURED BY AN APPROVED ROAD. 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 ROAD. 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-INS DICHES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM FOR SYSTEMS REQUIRED TO HAVE TWO (2) SOURCES OF WATER. WHERE THE WATER MAINS ARE EXTENDING ALONG A STREET OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAVEL LANES, FIRE HYDRANTS SHALL BE SPACED NO 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
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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 STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SUGGESTED ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". 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 RELATIONSHIP OF ANY EXISTING SIGNAGE, THE CONTRACTOR SHALL BE REQUIRED TO HAVE THE SIGNAGE 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 CALTRANS 627 AND 716 AND SHALL HAVE AN ANTI-GRAFFITI PROTECTIVE OVERLAY FILM THAT IS A MATCHING COMPONENT TO, AND THE MANUFACTURER OF, THE RETROREFLECTIVE SHEETING TO WHICH IT IS APPLIED. STREET NAME PLANS SHALL CONFORM TO 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 PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL, TECHNICAL, OR SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.

12. THE CONTRACTOR SHALL ADVISE METRO IN ADVANCE OF ANY 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 # 828-3244) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THE OFFICERS 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 INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND THE ADDITION OF ANY ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE THE TRAFFIC ENGINEERING DIVISION WITH A DETAILED DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH AS ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST EDITION (USD), 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. 18 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. 320. WHEN POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY EXCEED STREET LIGHTING CLEARANCE.
7. AS-BUILT DRAWINGS SHALL BE SUBMITTED 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 PREPARE.
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)

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 AND SHALL WITHIN 24 HOURS OF THE END OF 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 TO THIS APPLY RELATIVE TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVRI000000, SECTION II.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS, AREAS WHERE EROSION IS EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITY RELATIVE TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVRI000000, 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.

GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020
2. MINIMUM HORIZONTAL AND VERTICAL CLEARANCES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND FACILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC SHALL BE AT LEAST 12-INCHES OR GREATER AS DICTATED BY LOCAL CODES AND STANDARDS.
 - A. ANY DEVIATION FROM SPECIFIED MINIMUM CLEARANCES MUST BE APPROVED BY ALL AFFECTED UTILITIES AND/OR MUNICIPALITIES
3. FOR VALVE ADJUSTMENT CONTACT 702-688-6107 48 HOURS PRIOR TO CONSTRUCTION
4. IN THE EVENT OF A NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND/OR STRUCTURES CONTACT 702-365-2099

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

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

1. INDICATED GRADES OTHER THAN TC, FG & GUTTER FL ARE ROUGH GRADES.
2. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE GRADING QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLAN WILL RESULT IN QUANTITY CHANGES.
3. SOILS REPORT PREPARED BY: NOVA GEOTECHNICAL & INSPECTION SERVICES 1480 W. HACIENDA AVENUE, SUITE 104, LAS VEGAS, NV 89118, PHONE: 702-873-3478, PROJECT NO.: G-18-176, DATED: DECEMBER 3, 2018.
4. EARTHWORK QUANTITIES (RAW):
 - CUT = 25,000 CUBIC YARDS
 - FILL = 9,900 CUBIC YARDS
5. THE ABOVE QUANTITIES DO NOT REFLECT LOSSES DUE TO SUBSIDENCE OR SHRINKAGE.
6. THE ABOVE QUANTITIES DO REFLECT USING NATIVE MATERIAL IN LIEU OF TYPE 1 GRAVEL BASE MATERIAL FOR STREET SECTIONS.
7. 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.

1. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PUBLIC ENTITIES, THE PROJECT ENGINEER AND CLARK COUNTY AREA 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 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 OTHER IMPROVEMENTS. WHEN ANYTHING IS 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, WALLS, FENCES, SIGNS, STRUCTURES, LIGHTS, OR ANY OTHER EXISTING IMPROVEMENTS OUTSIDE OF STREET RIGHT-OF-WAY, EXCEPT WHERE REQUIRED TO DO SO BY THE CONTRACT. PRIOR TO THE PROJECT ENGINEER'S 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 OBTAINED 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 SHALL MAINTAIN 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 DAMAGED OR BEING 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 II-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 UTILITIES 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. EMBARGO SHALL BE RESPONSIBLE FOR THE VERTICAL OR HORIZONTAL ADJUSTMENT OF ALL TELEPHONE FACILITIES WHICH INTERFERE WITH IMPROVEMENTS SHOWN ON CONTRACT DRAWINGS, UNLESS NOTED OTHERWISE.

LVVMD PROJECT #136882
(REVISED 08/01/2017)

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVMD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVMD COMMUNICATION SUPPORT CENTER (258-7171) THAT WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2: P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVMD INSPECTION. **WHEN REQUESTING INSPECTIONS, PLEASE REFERENCE THE PROJECT # IDENTIFIED ABOVE.**

3. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVMD. FOLLOW THE WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVMD COMMUNICATION SUPPORT CENTER (258-7177). TWO WORKING DAYS PRIOR TO THE START OF CONSTRUCTION, FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVMD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE CALL **TO THE PROJECT # IDENTIFIED ABOVE.**
4. ALL WORK SHALL CONFORM TO LVVMD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). **THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.**
5. 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.
6. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVMD.
7. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVMD APPROVED SERVICE SADDLES.
8. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
9. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
10. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
11. ALL WATER FACILITIES AND APPURTENANCES SHALL BE DISINFECTED, PRESSURE TESTED, AND HAVE AN ACCEPTABLE PASSING HEALTH WATER SAMPLE OBTAINED, PRIOR TO OPERATION AND USE.
12. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVMD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802 TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
13. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01 AND APPROVED BY THE LVVMD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
14. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVMD APPROVED PRODUCTS LIST FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS BY SUBMITTING SHOP DRAWINGS.
15. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.

ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVMD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVMD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVMD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVMD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

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

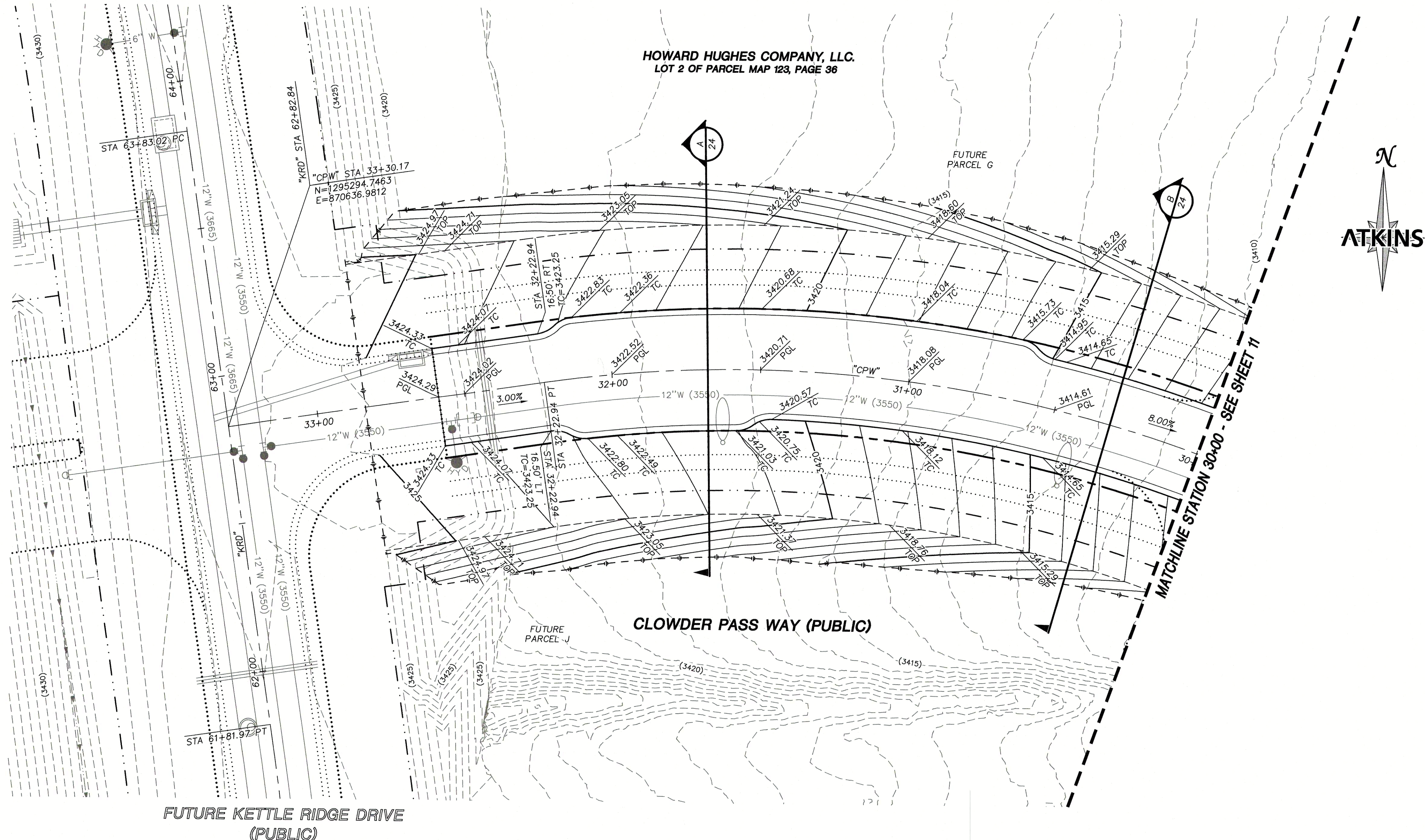
APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. 136892 FIRST APPROVED DATE:

JOB NO. 100064083		DESIGNED BY: N. BARCOS		SUMMERLIN VILLAGE 22 CLOWDER PASS WAY DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J) GENERAL NOTES	 SUMMERLIN®	ATKINS 2270 Corporate Circle Suite 200 Henderson, Nevada 89074 Telephone: +1702.263.7275 Fax: +1702.263.7200	REVISIONS		
DRAWN BY: MAMAGLAY		REV.	DESCRIPTION				BY	DATE	APPROVAL
CHECKED BY: P. BATES									
DRAWING NO. 3 / 27									
CLV 00-000000									

FUTURE KETTLE RIDGE DRIVE
(PUBLIC)



FUTURE KETTLE RIDGE DRIVE
(PUBLIC)

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 27 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 27)
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=10", THICKNESS=20")
11. INSTALL RIP-RAP (D50=8", THICKNESS=16")

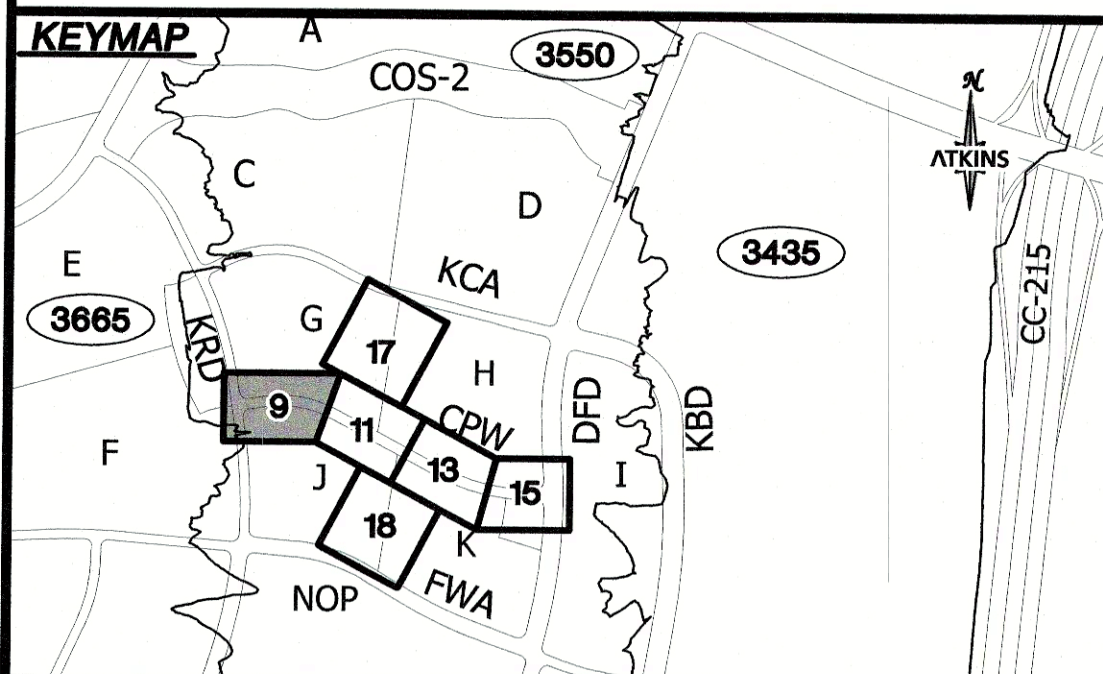
REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

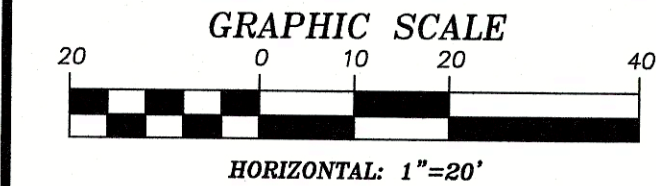
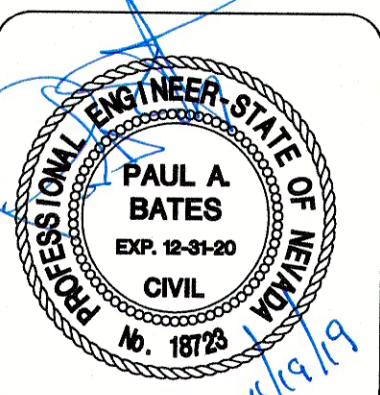
SUMMERLIN

SUMMERLIN VILLAGE 22
CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY GRADING PLAN
STA 30+00 TO END

DESIGNED BY: J. BATES
DRAWN BY: C. DANIELS
CHECKED BY: P. BATES
DATE: NOVEMBER, 2019
DRAWING NO.: 9 / 27
JOB NO.: 100064083
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.



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#9155A

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: 0368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.83 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
1-800-642-2444

Call before you Dig
1-800-642-2444

Call before you Dig
1-800-642-2444

FUTURE KETTLE RIDGE DRIVE
(PUBLIC)

HOWARD HUGHES COMPANY, LLC.
LOT 2 OF PARCEL MAP 123, PAGE 36

FUTURE
PARCEL G



CLOWDER PASS WAY (PUBLIC)

FUTURE
PARCEL J

FUTURE KETTLE RIDGE DRIVE
(PUBLIC)

MATCHLINE STATION 30+00 - SEE SHEET 12

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 27 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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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=10", THICKNESS=20")
11. INSTALL RIP-RAP (D50=8", THICKNESS=16")

SEWER CONSTRUCTION NOTES

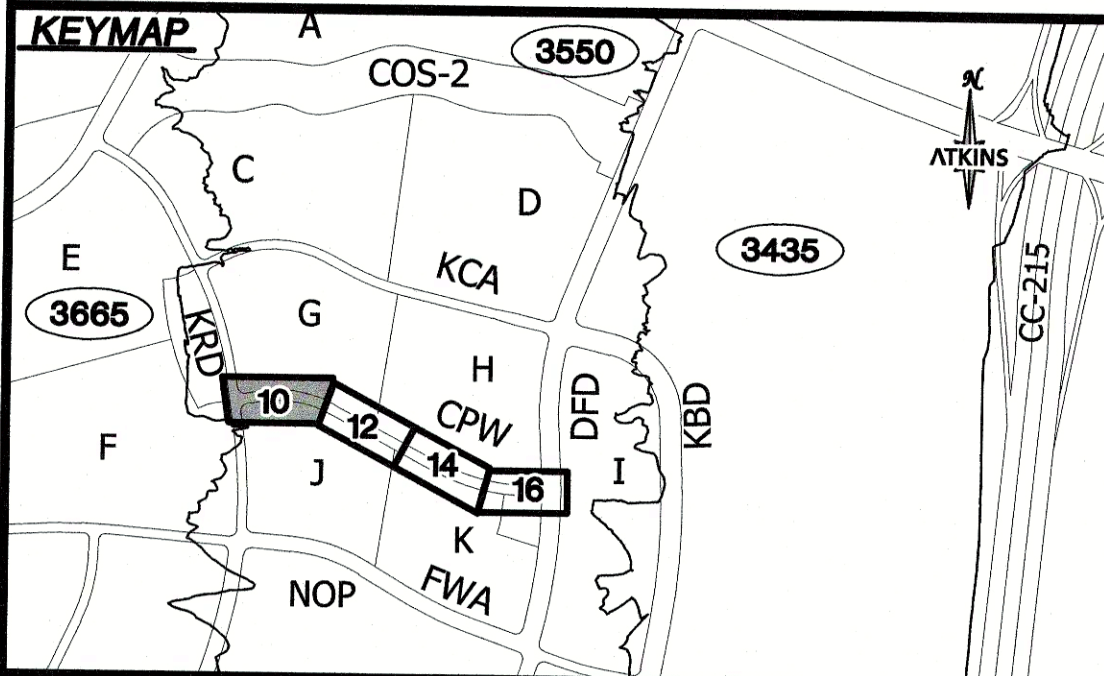
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1, AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"x4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE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

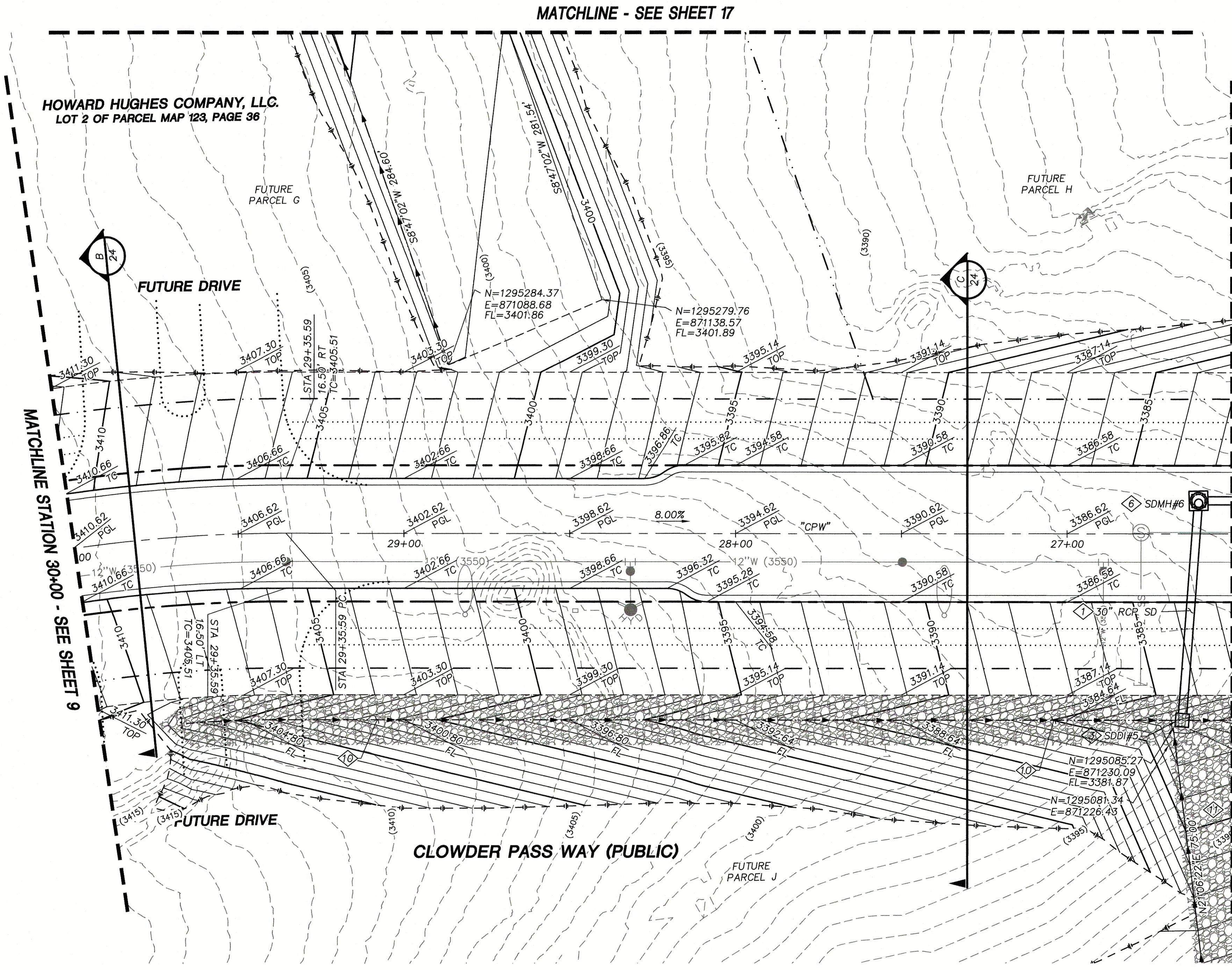
WATERLINE CONSTRUCTION NOTES

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. SEE REFERENCED SHEET FOR LATERAL PLAN AND PROFILE
4. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
5. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD #219
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. COORDINATE RELOCATION OF EXISTING PALM TREES & LANDSCAPING WITH SUMMERLIN
12. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (G-18-176). SEE SHEET 24 FOR TYPICAL PAVEMENT SECTION.
13. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 25





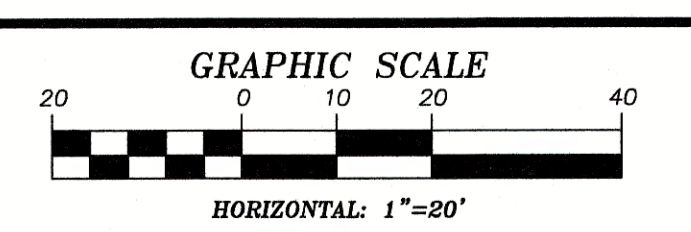
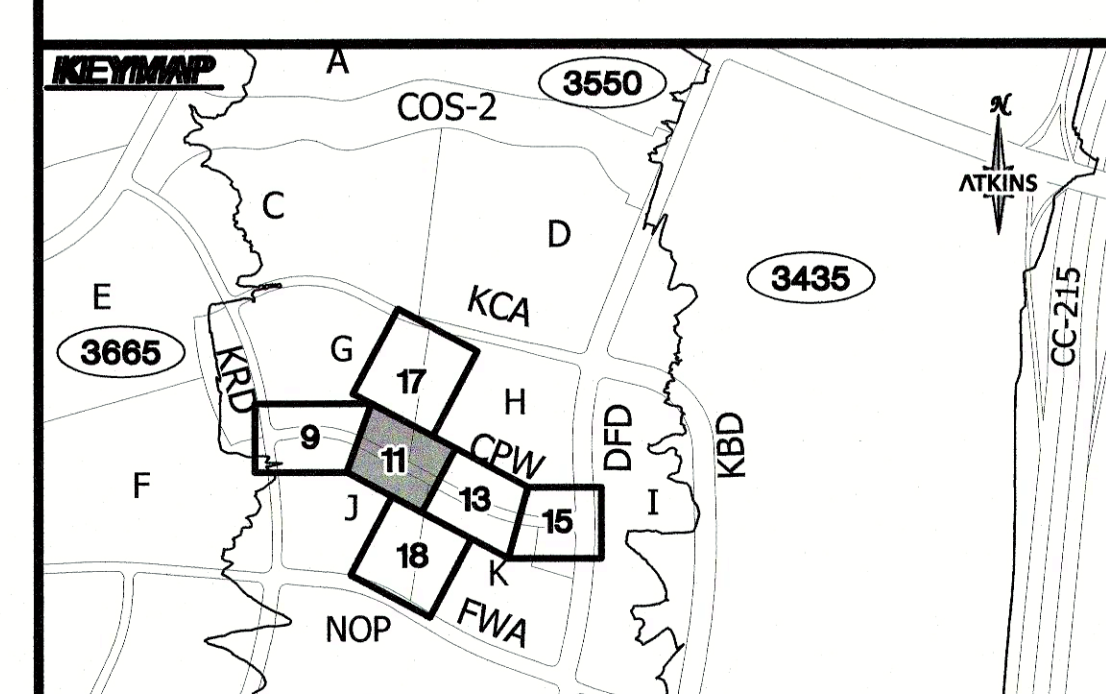
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 10. INSTALL RIP-RAP (D50=10", THICKNESS=20")
 11. INSTALL RIP-RAP (D50=8", THICKNESS=16")

REVISIONS		
REV.	DESCRIPTION	DATE

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

SUMMERLIN
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY GRADING PLAN
STA 26+50 TO STA 30+00

SUMMERLIN VILLAGE 22
CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY GRADING PLAN
STA 26+50 TO STA 30+00



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#5155A

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.

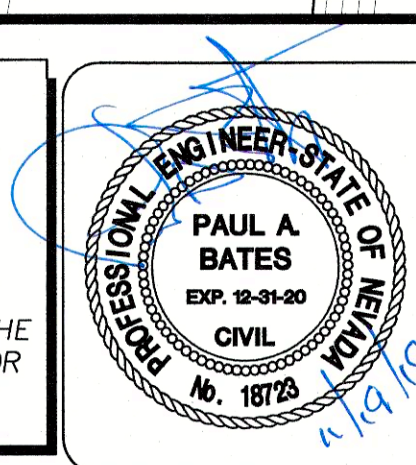
BENCHMARK
CITY OF LAS VEGAS BENCHMARK: 0368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USGAGS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T215, R39E, S03

Call before you Dig
UnderGround
1-702-432-5300
SYSTEMS AND SOLUTIONS

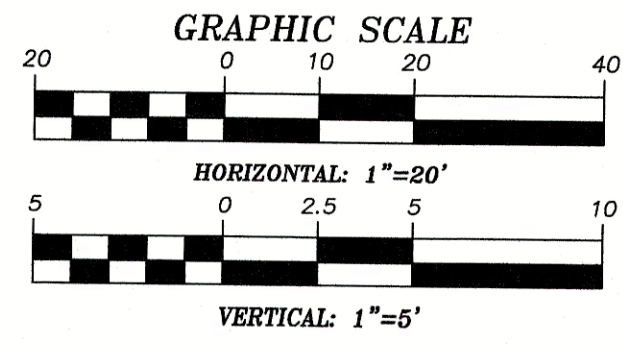
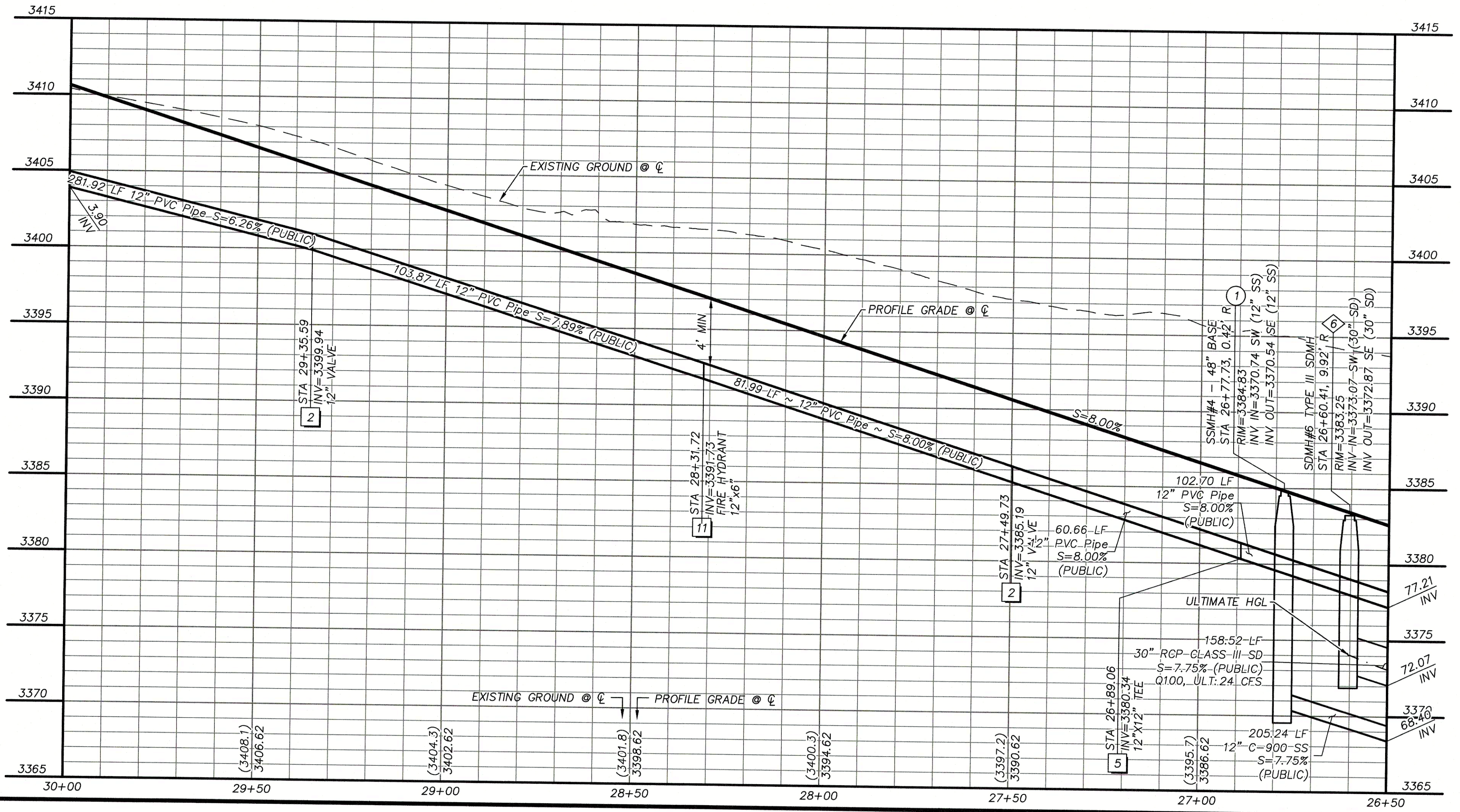
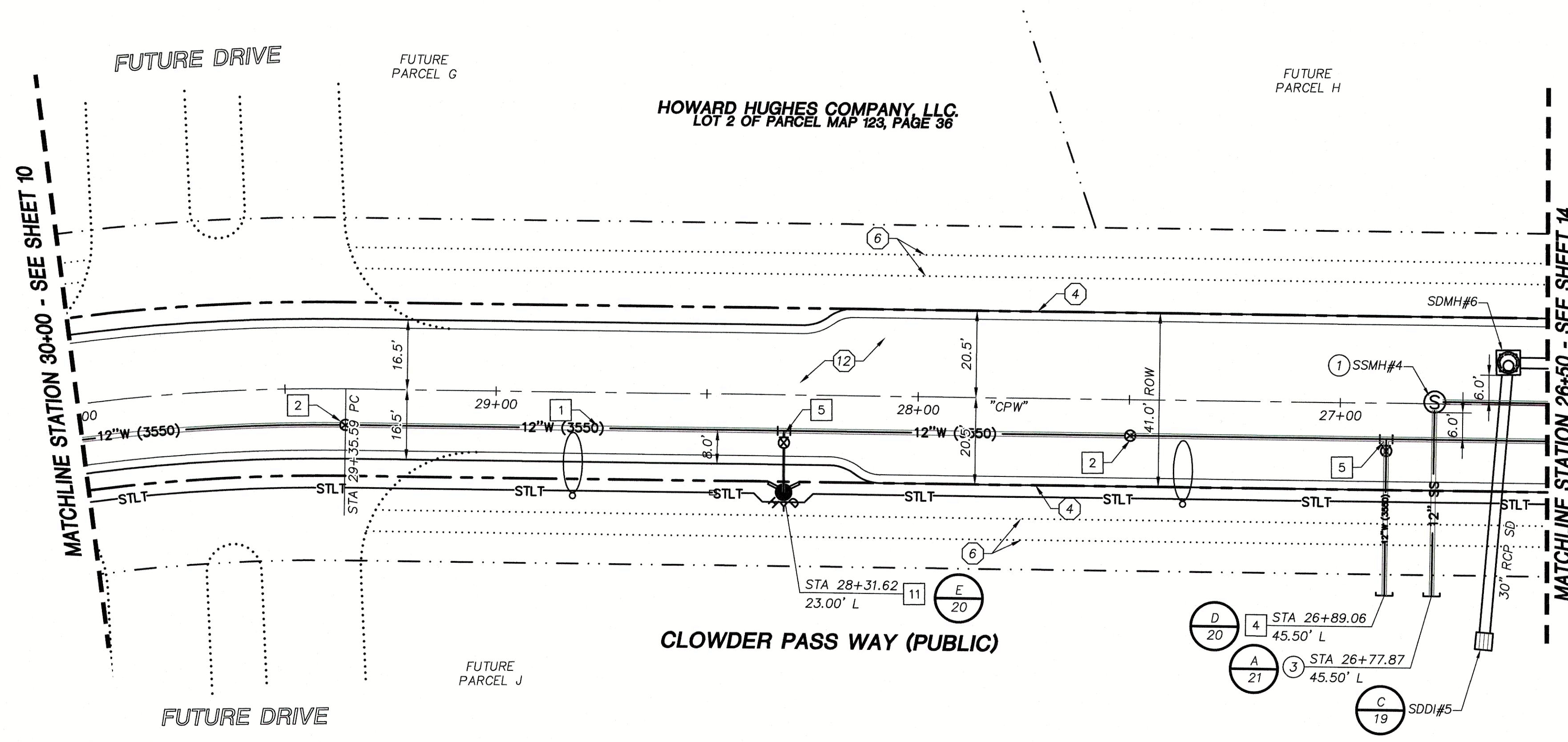
Call before you Dig
811
1-800-642-2444

Call before you Dig
1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS 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: J. BANTA	DATE: NOVEMBER 2019
DRAWN BY: C. DANIELS	DRAWING NO. 11/27
CHECKED BY: P. BATES	CLV 00-00000
HORIZ.: 1"=20'	
VERT.: NONE	



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

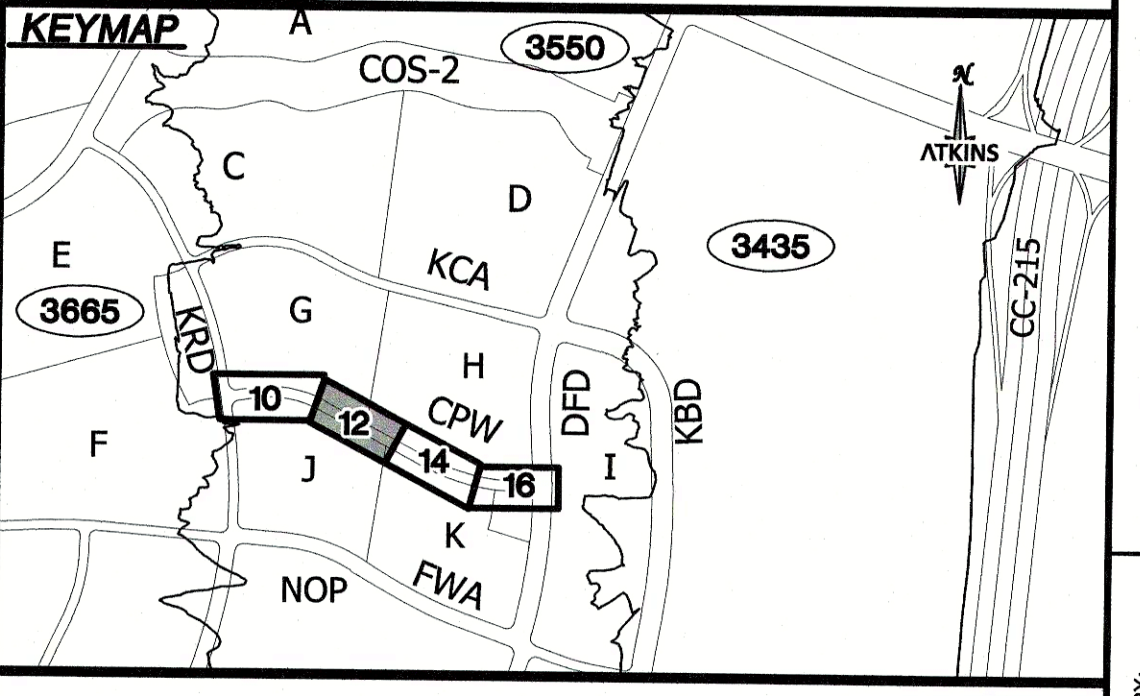
PROJECT NO. 136893 FIRST APPROVED DATE: _____

BASIS OF BEARING BENCHMARK

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, S40 MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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

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 11. INSTALL RIP-RAP (D50=8", THICKNESS=16")
- ### 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.
- ### 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
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PAUL A. BATES
EXP. 12-31-20
CIVIL
No. 18725

DESIGNED BY: J. BANTA
DRAWN BY: C. DANIELS
CHECKED BY: P. BATES
DATE: NOVEMBER, 2019
DRAWING NO. 12/27
VERT: 1"=5'

SUMMERLIN VILLAGE 22

CLOWDER PASS WAY

DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

ROADWAY PLAN AND PROFILE

STA 26+50 TO STA 30+00

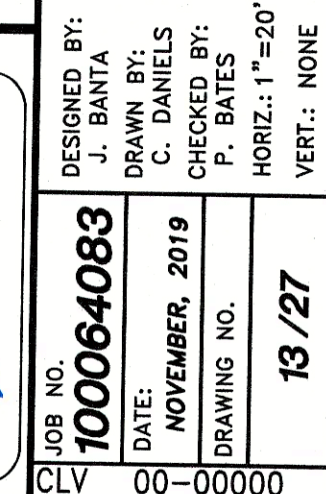
JOB NO. 100064083

DATE: NOVEMBER, 2019

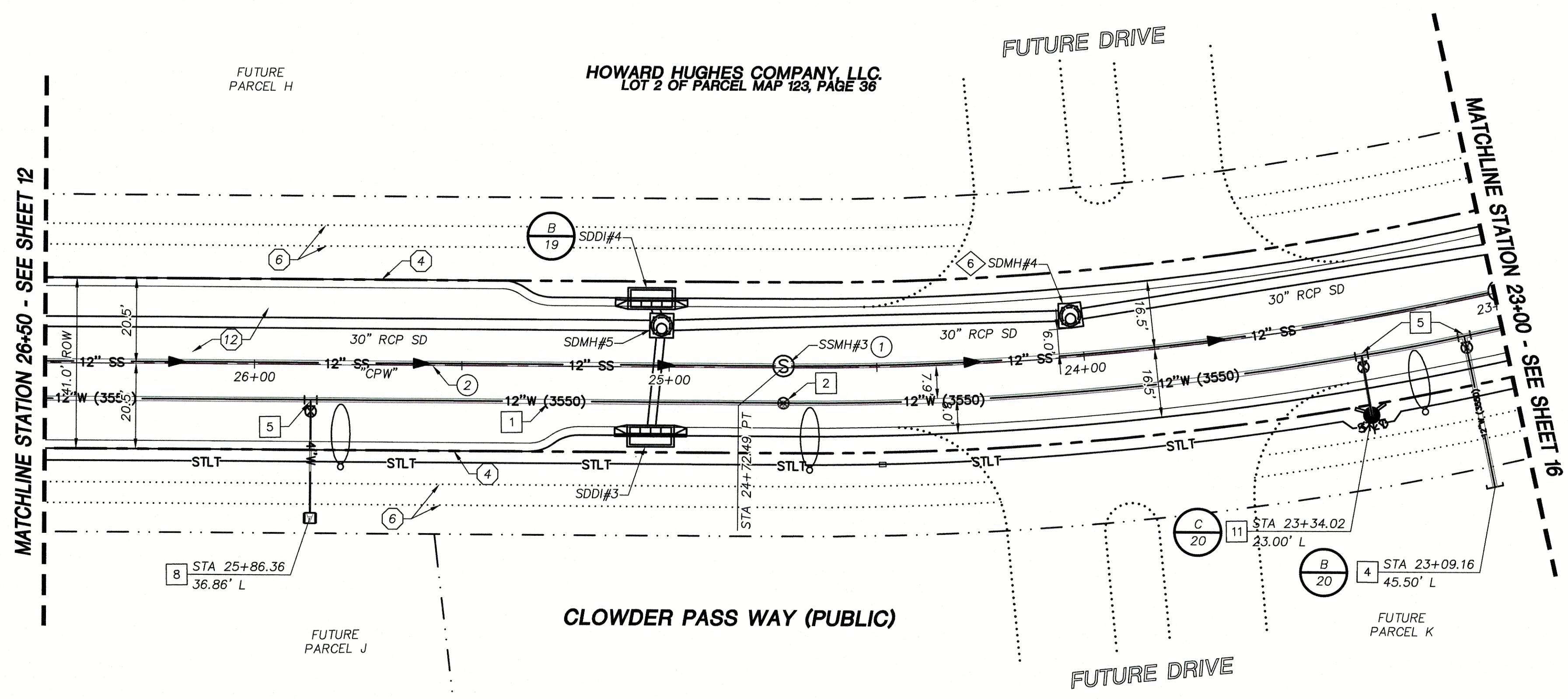
DRAWING NO. 12/27

CLY 00-00000

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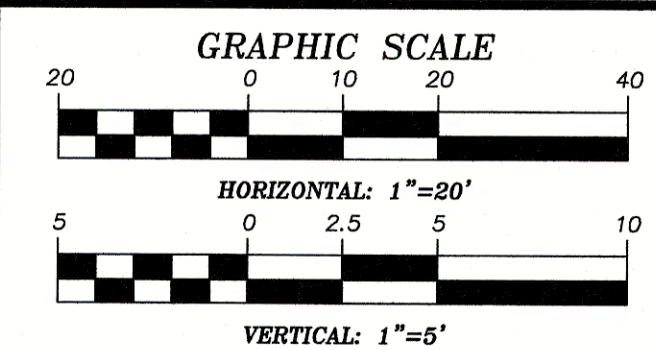
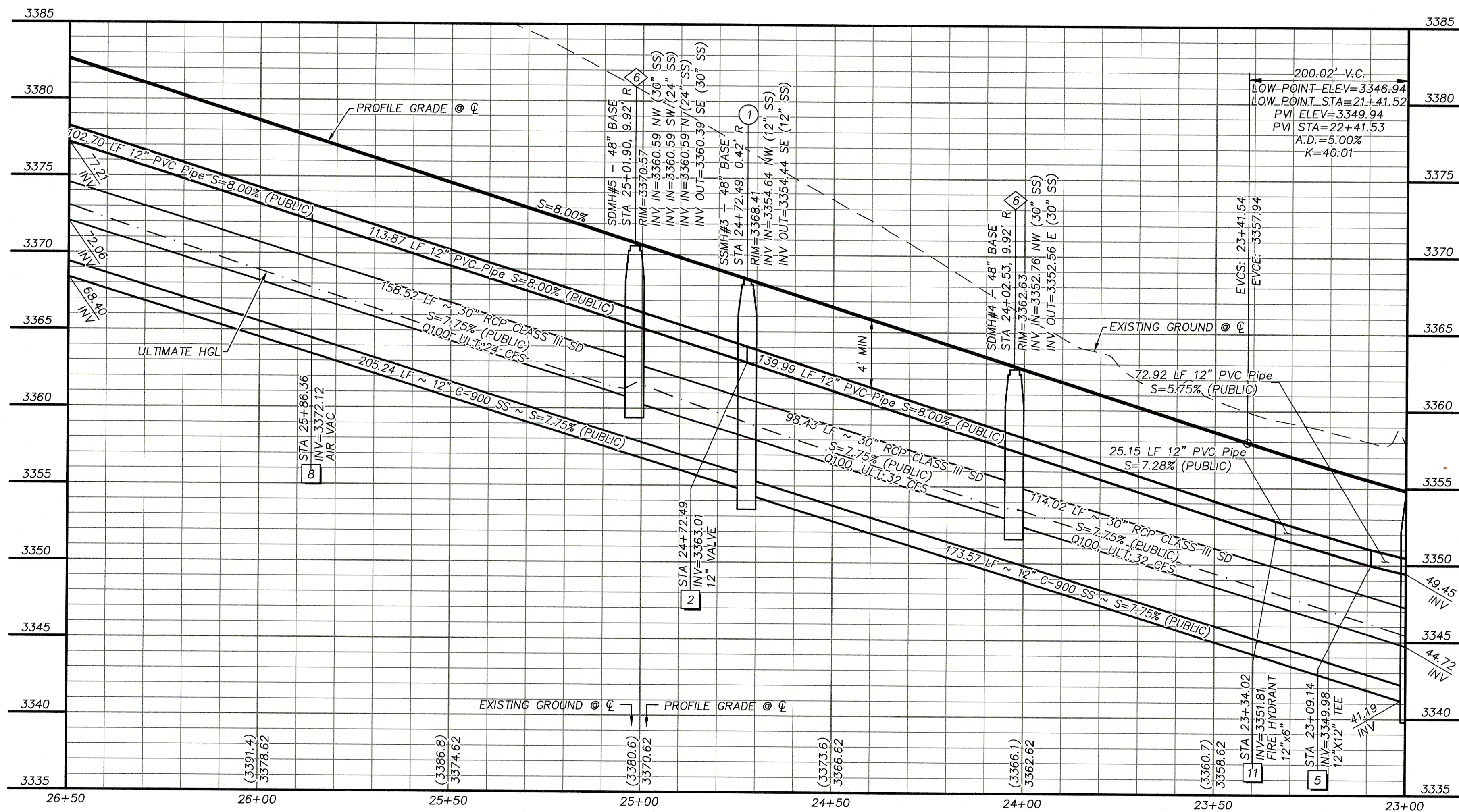
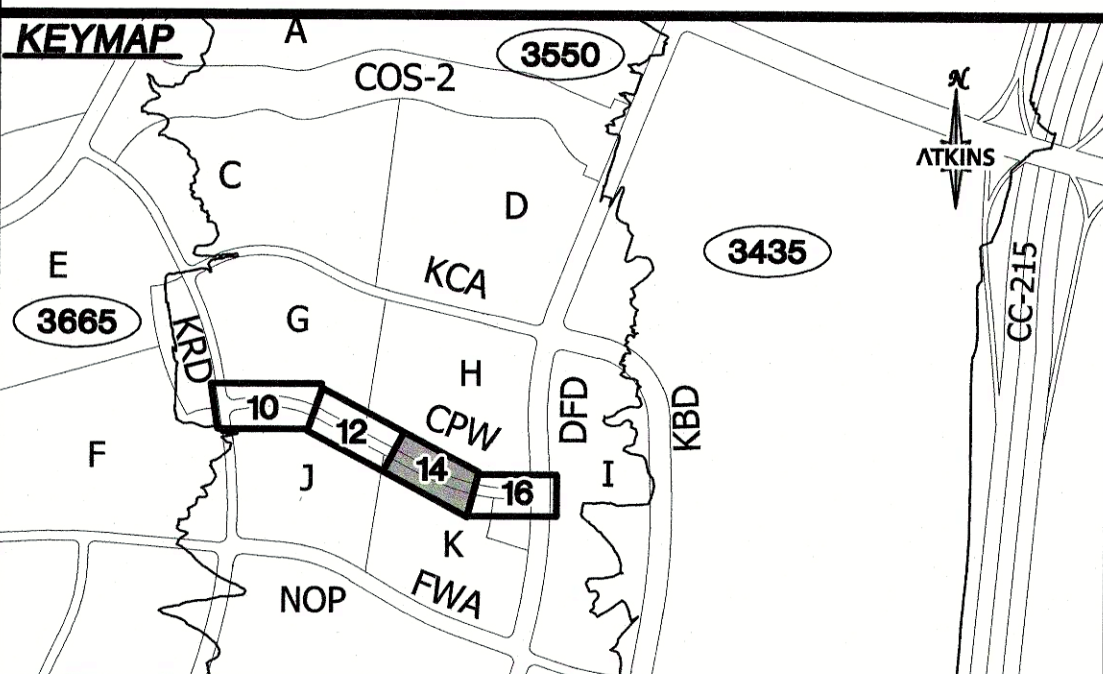


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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 136893 FIRST APPROVED DATE: _____

BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NORS), 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 USG&S DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T215, R99E, SD3

Call before you Dig
1-702-432-5300

Call before you Dig
1-800-642-2444

Call before you Dig
1-702-227-2929

PAUL A. BATES
CIVIL
EXP. 12-31-20

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ATKINS

2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

SUMMERLIN

DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

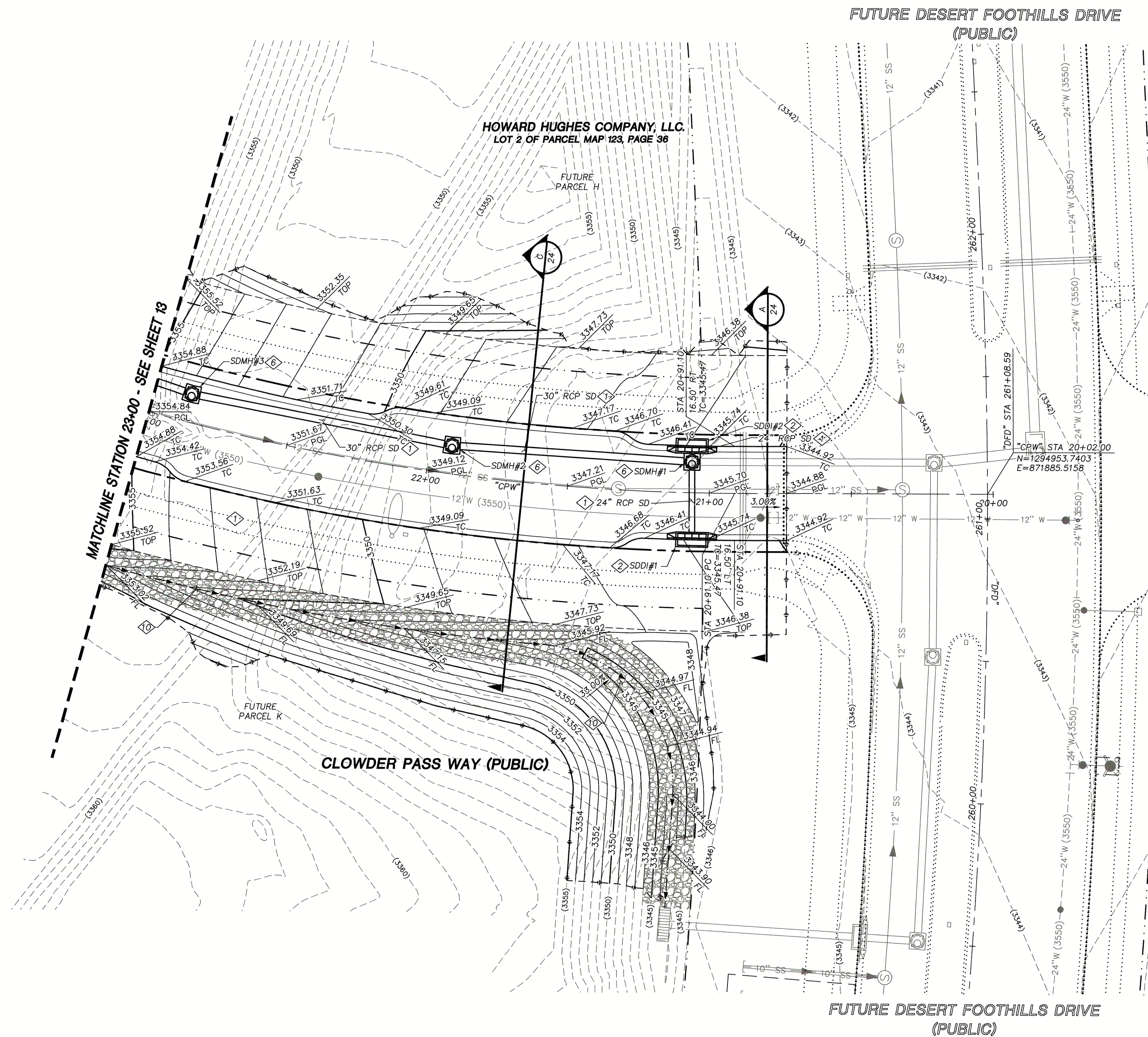
SUMMERLIN VILLAGE 22

CLOWDER PASS WAY

ROADWAY PLAN AND PROFILE
STA 23+00 TO STA 26+50

DESIGNED BY: J. BANTA
DRAWN BY: C. DANIELS
CHECKED BY: C. DANIELS
DATE: NOVEMBER, 2019
JOB NO. 100064083
CLV 00-00000

14 / 27



STORM DRAIN CONSTRUCTION NOTES

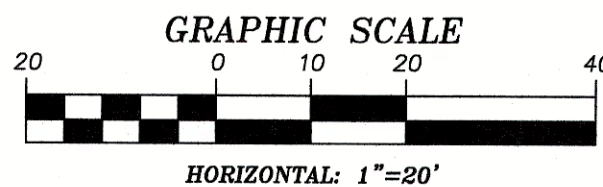
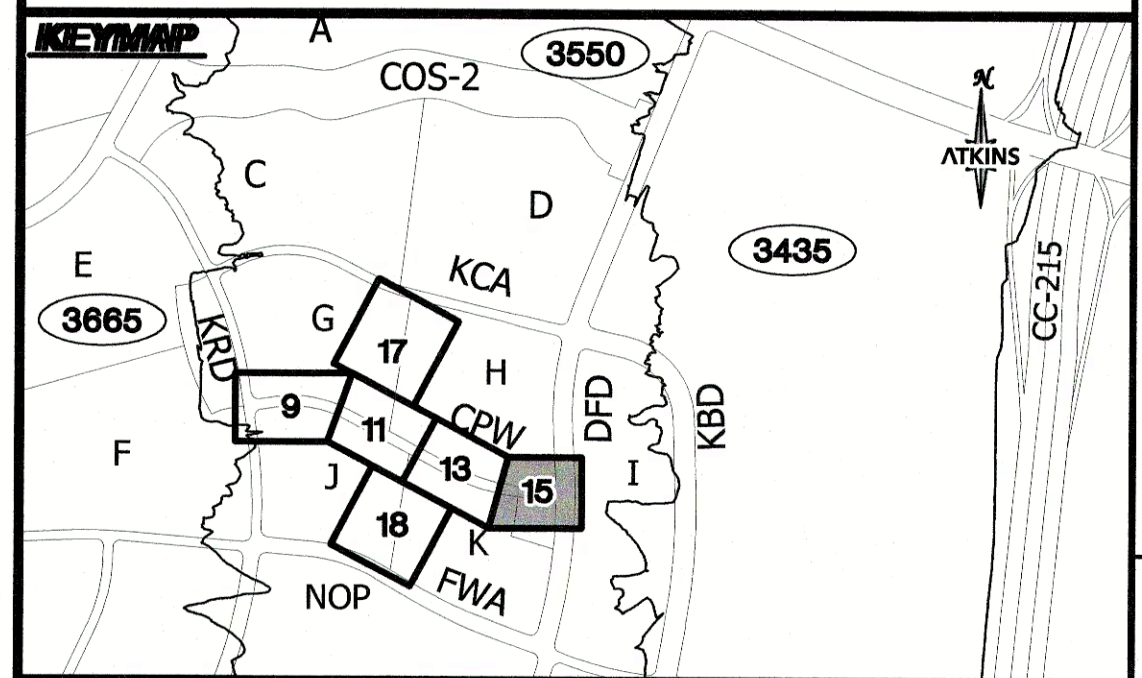
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REV.	DESCRIPTION	REVISIONS	
		BY	DATE / APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Kirkland, WA 98033
Telephone: +1702.263.7275
Fax: +1702.263.7200

SUMMERLIN

SUMMERLIN VILLAGE 22
CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY GRADING PLAN
BEGIN TO STA 23+00



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#5155A

BASIS OF BEARING BENCHMARK

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T215, R59E, S03

FAST

Call before you Dig

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1-702-432-5300

SYSTEM OF TRANSPORTATION

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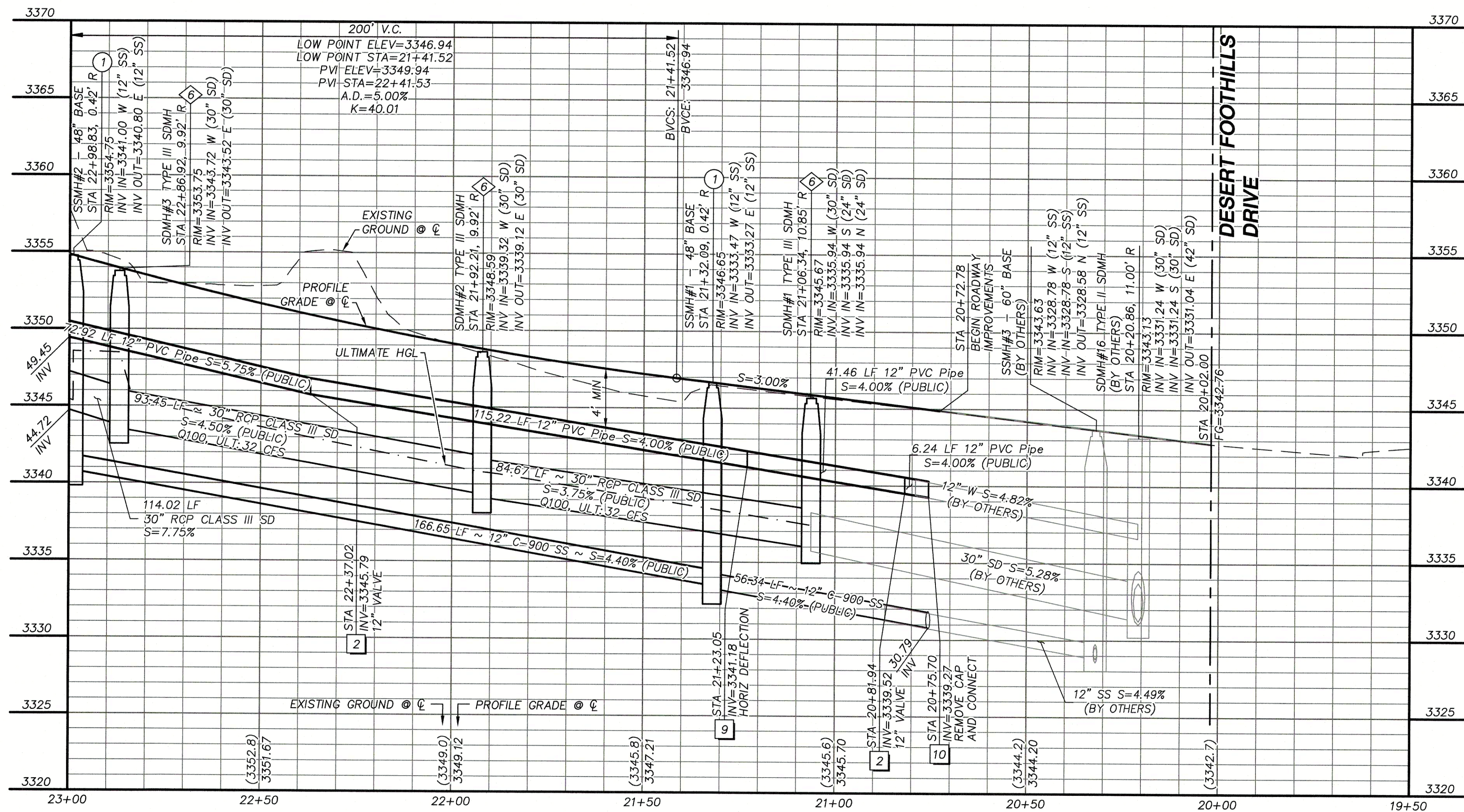
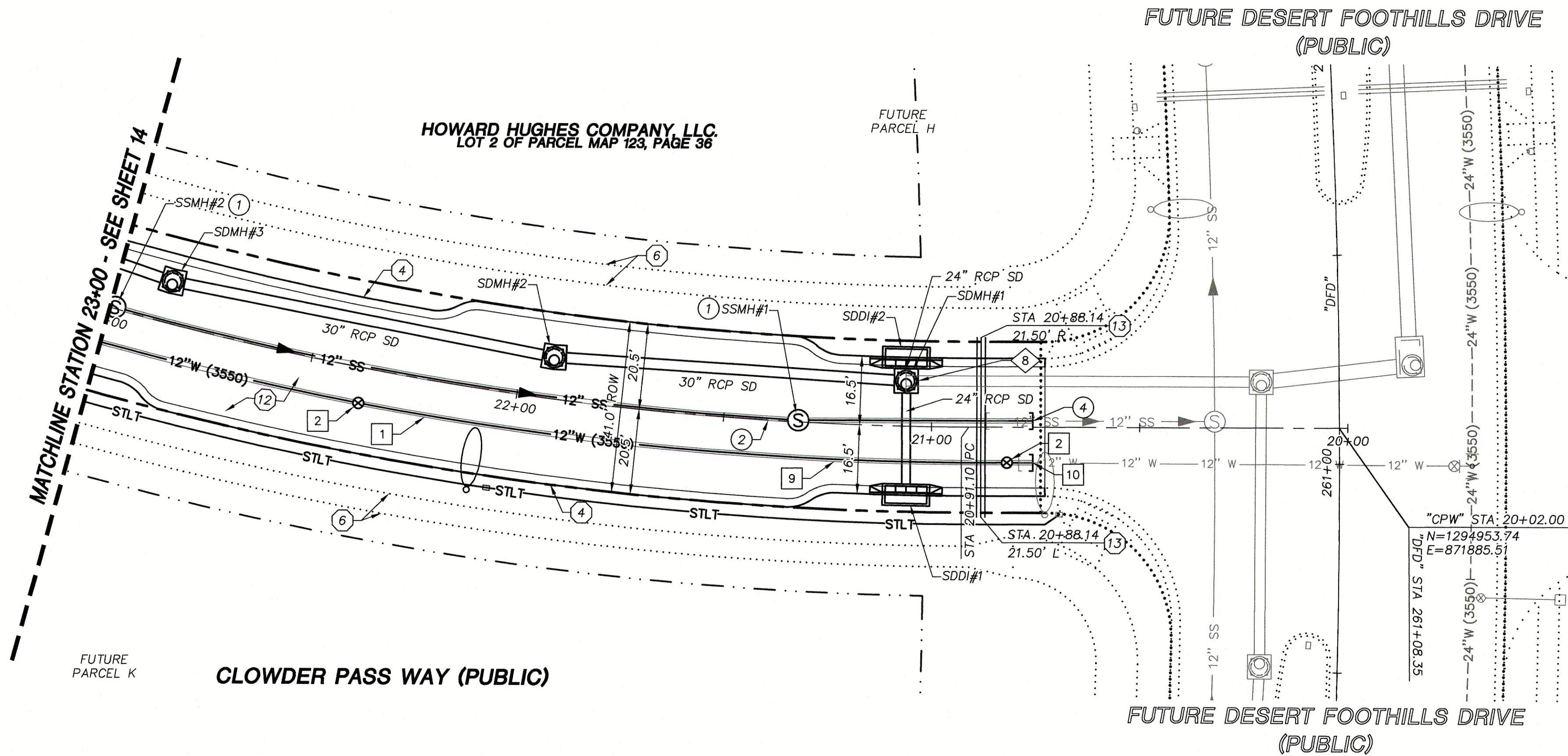
CALL BEFORE YOU DIG OVERHEAD

1-702-227-2929

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PAUL A. BATES
CIVIL
EXP. 12-31-20
No. 18723

JOB NO. 100064083	DESIGNED BY: J. BATES
DATE: NOVEMBER, 2019	DRAWN BY: C. DANIELS
DRAWING NO. 15 / 27	CHECKED BY: P. BATES
CLV 00-00000	HORIZ.: 1"=20'
	VERT.: NONE



STORM DRAIN CONSTRUCTION NOTES

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SEWER CONSTRUCTION NOTES

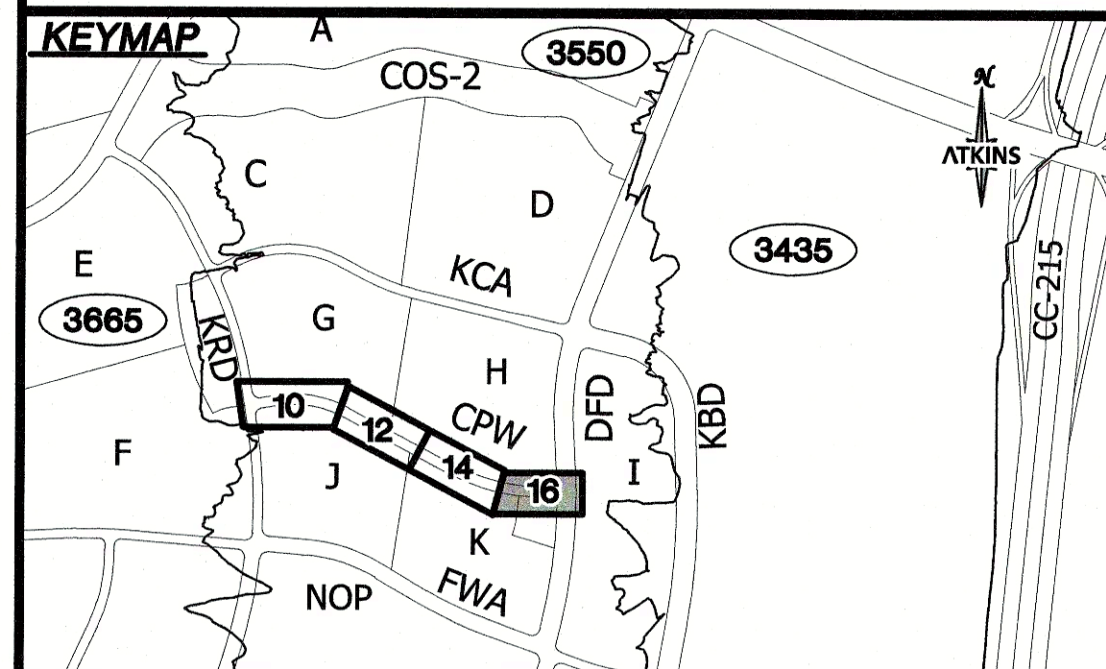
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5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.

WATERLINE CONSTRUCTION NOTES

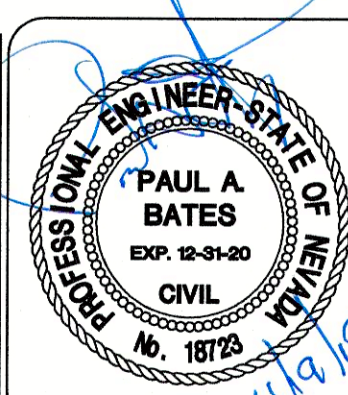
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ROADWAY CONSTRUCTION NOTES

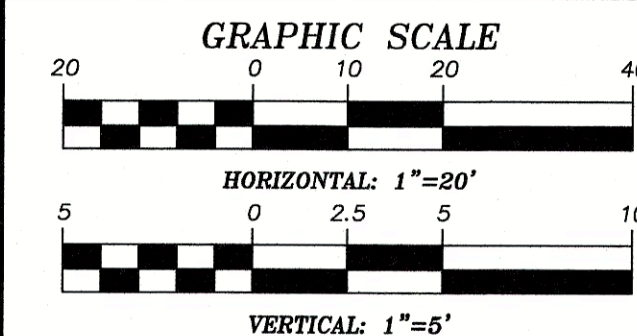
1. SAWCUT AND MATCH EXISTING
2. SEE REFERENCED SHEET FOR LATERAL PLAN AND PROFILE
4. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
5. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD #219
6. FUTURE SIDEWALK BY OTHERS
7. CONSTRUCT CONCRETE SIDEWALK PER CCAUSD #234
8. CONSTRUCT CURB RAMP, TYPE A, PER NDOT 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. COORDINATE RELOCATION OF EXISTING PALM TREES & LANDSCAPING WITH SUMMERLIN
12. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (G-18-176). SEE SHEET 24 FOR TYPICAL PAVEMENT SECTION.
13. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2'-4", 1'-6") PER DETAIL ON SHEET 25



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.



ATKINS		SUMMERLIN		SUMMERLIN VILLAGE 22	
2270 Corporate Circle Suite 200 Henderson, Nevada 89074 Telephone: +1702.263.7275 Fax: +1702.263.7200		DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)		ROADWAY PLAN AND PROFILE BEGIN TO STA 23+00	
DESIGNED BY:	J. BANTA	CHECKED BY:	P. BATES	DATE:	NOVEMBER, 2019
DRAWING NO.	100064083	DRAWING NO.	16 / 27	DATE:	NOVEMBER, 2019
CLV	00-00000	CLV	00-00000	DATE:	NOVEMBER, 2019



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 136893 FIRST APPROVED DATE: _____

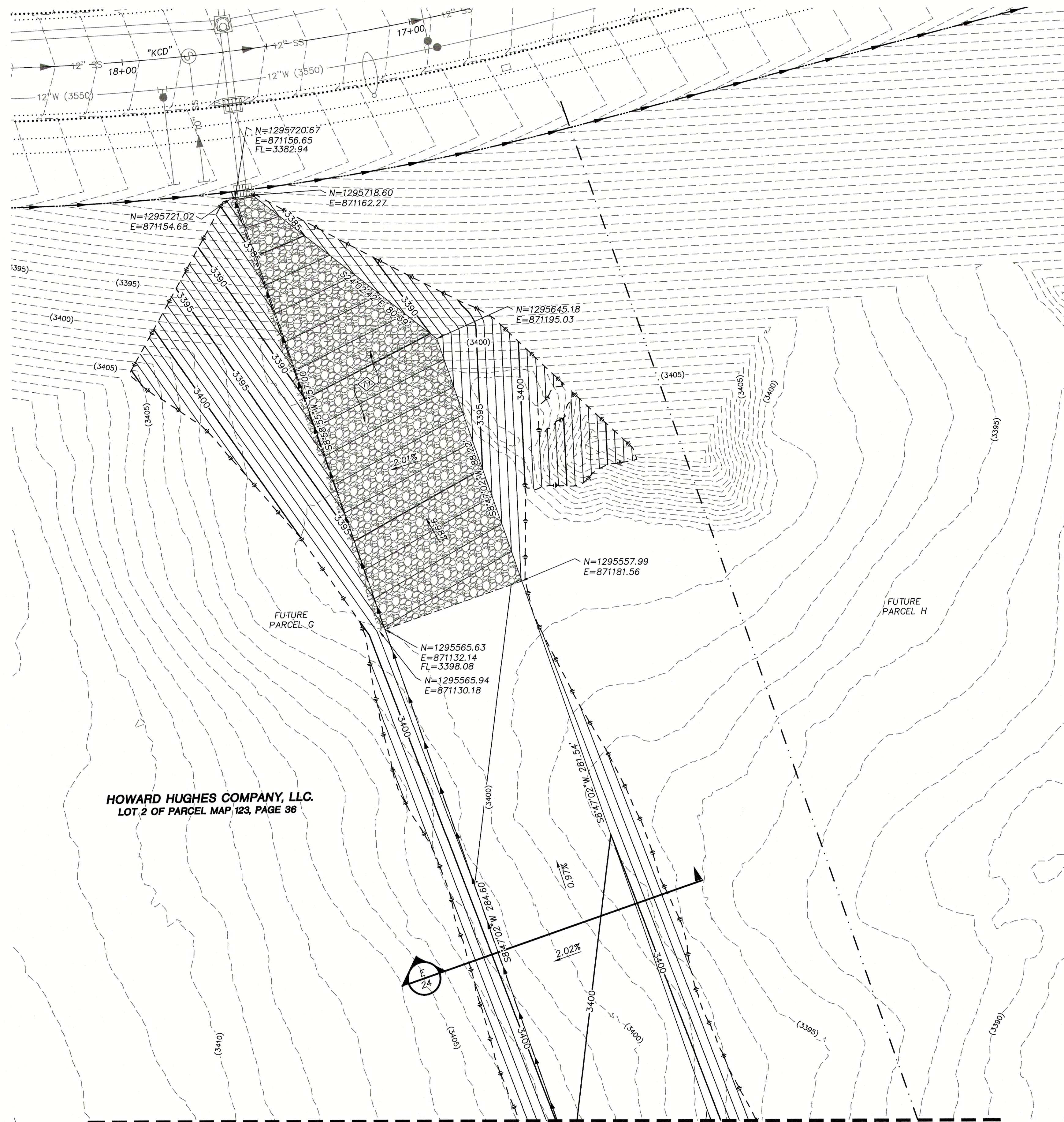
BASIS OF BEARING

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





STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 27 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 27)
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 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=10", THICKNESS=20")
11. INSTALL RIP-RAP (D50=8", THICKNESS=16")

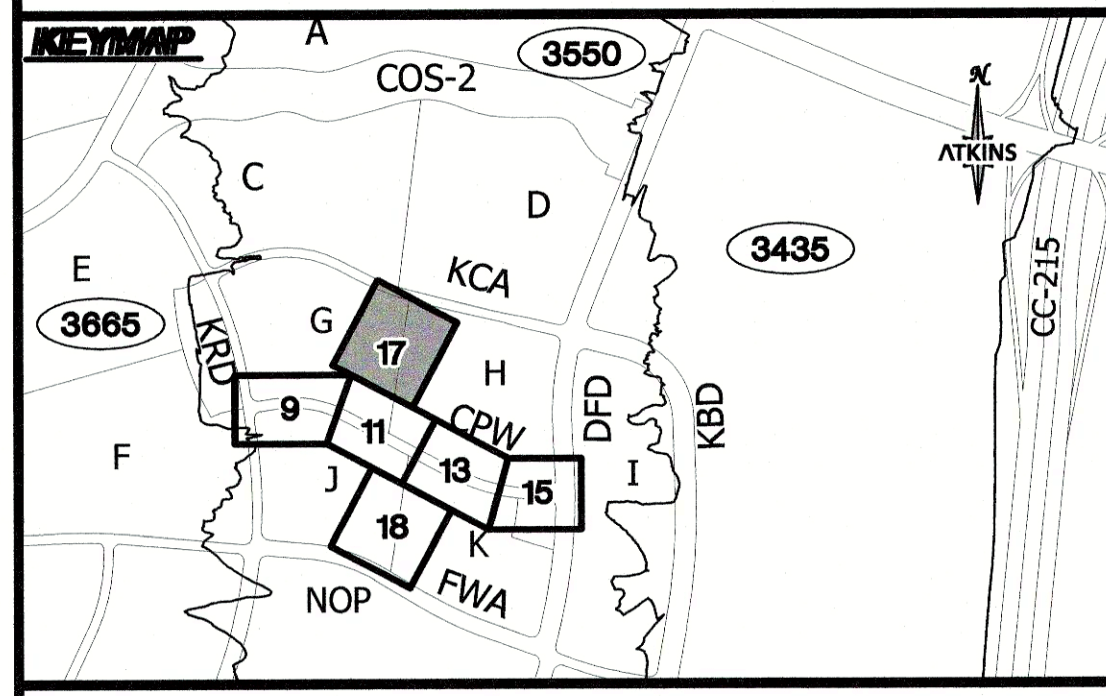
REVISIONS		
REV.	DESCRIPTION	BY DATE APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

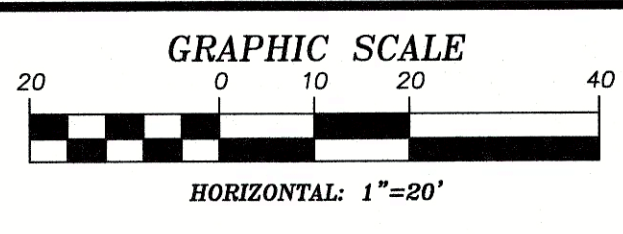
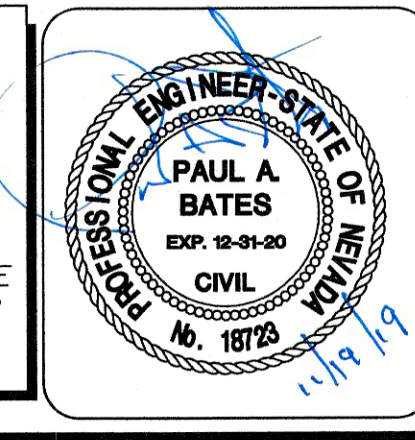
SUMMERLIN
DESIGN & CONSTRUCTION

SUMMERLIN VILLAGE 22
CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY GRADING PLAN

DESIGNED BY: J. BANTA
CHECKED BY: C. DANIELS
DATE: NOVEMBER, 2019
DRAWING NO.: 17 / 27
VERT.: NONE



UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS 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.



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#5155A

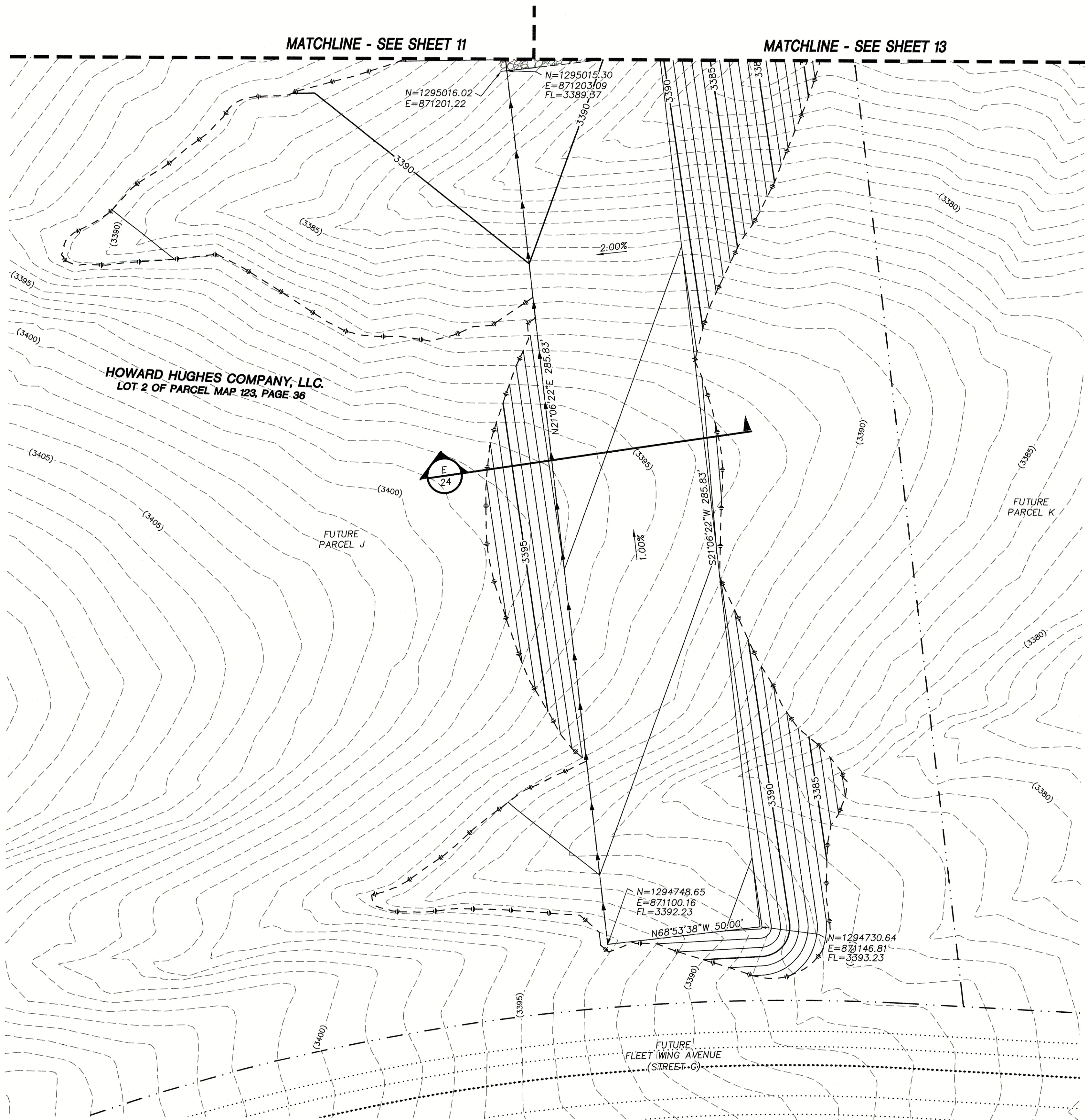
BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS). LAS VEGAS HIGH ELEVATION ZONE: NORTH AMERICAN DATUM OF 1983. SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND US&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
121S, R59E, S03

FAST
Call before you Dig
UnderGround
1-702-432-6300
FREQUENTLY USED NATIONAL SYSTEM OF TRANSPORTATION

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

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



STORM DRAIN CONSTRUCTION NOTES

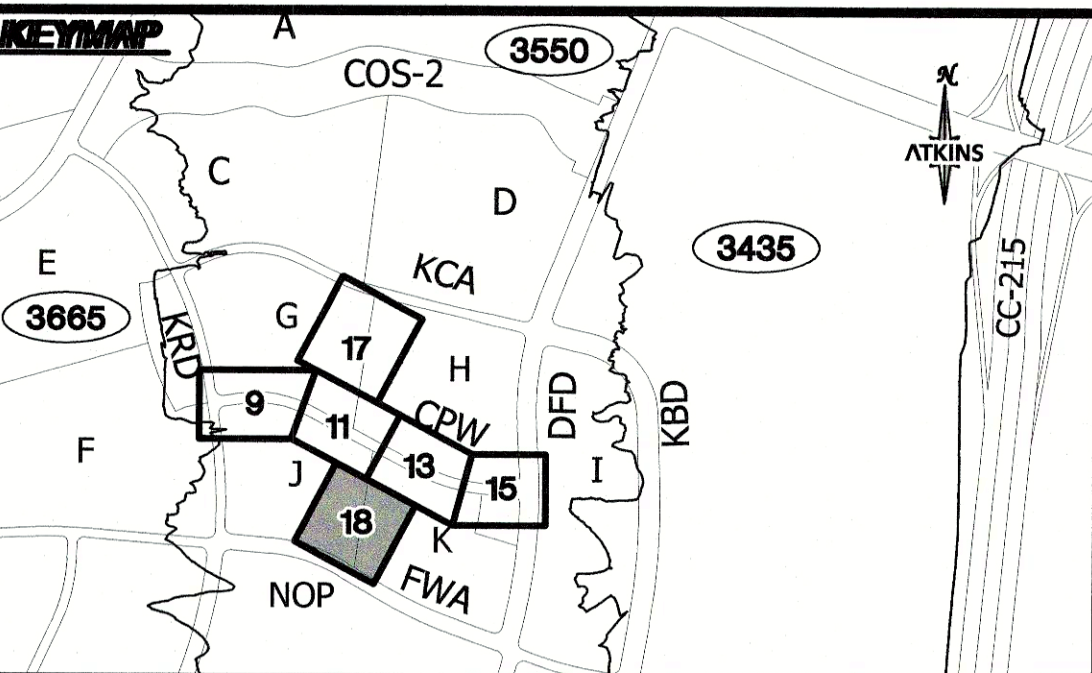
1. INSTALL STORM DRAIN. SEE SHEET 27 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE II DROP INLET PER NDOT R-4.2.1 (SEE SHEET 27)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
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=10", THICKNESS=20")
11. INSTALL RIP-RAP (D50=8", THICKNESS=16")

REV.	DESCRIPTION	BY	DATE	APPROVAL

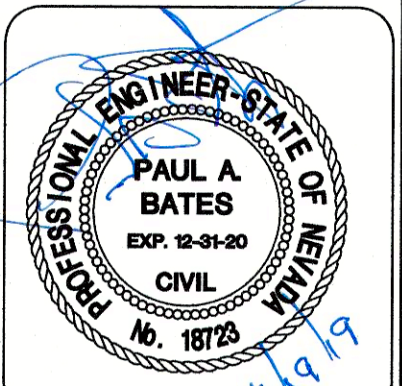
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: 702.263.7275
Fax: 702.263.7200

SUMMERLIN

SUMMERLIN VILLAGE 22
CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY GRADING PLAN



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.



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#5155A

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.

DS#5155A

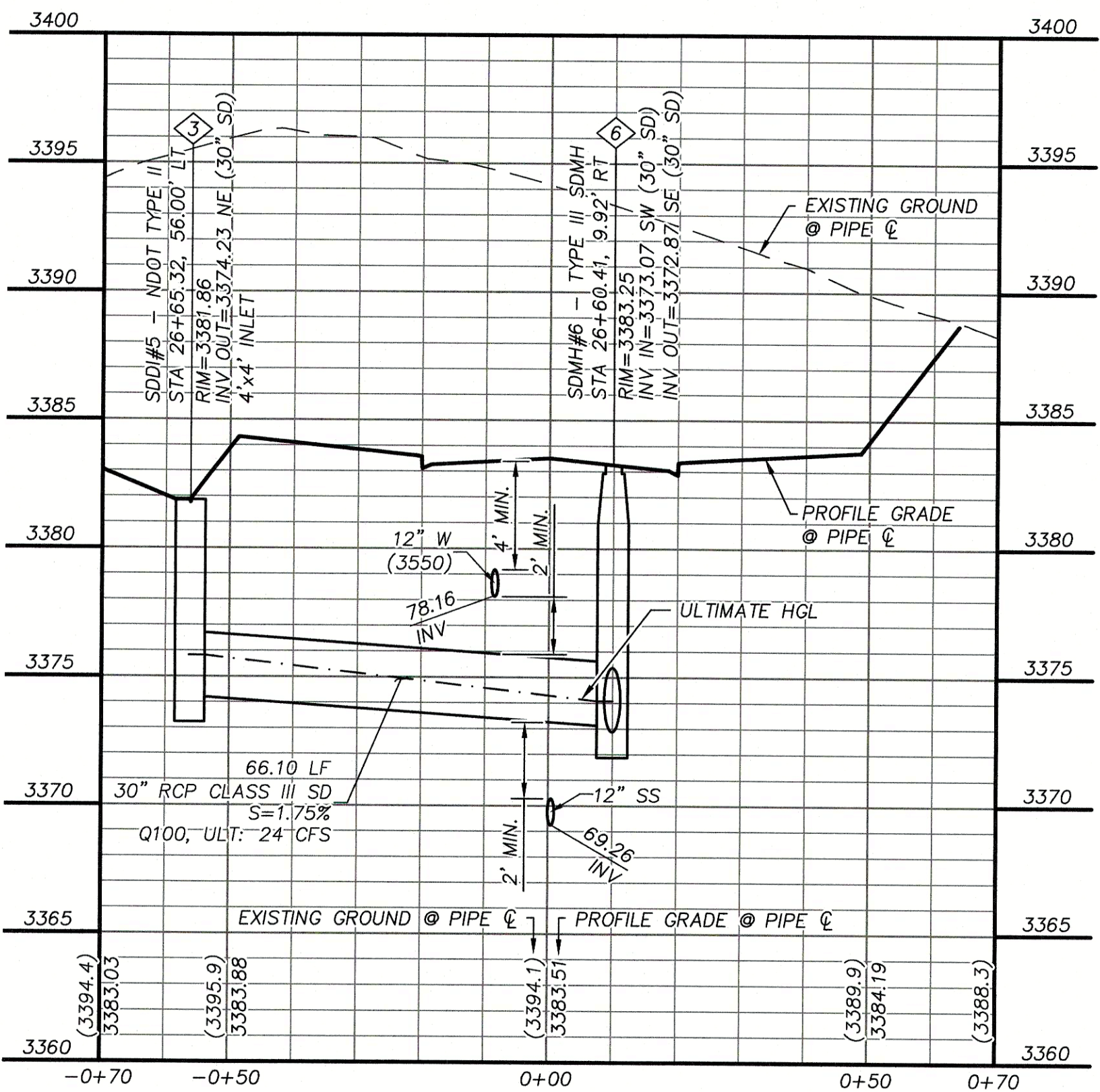
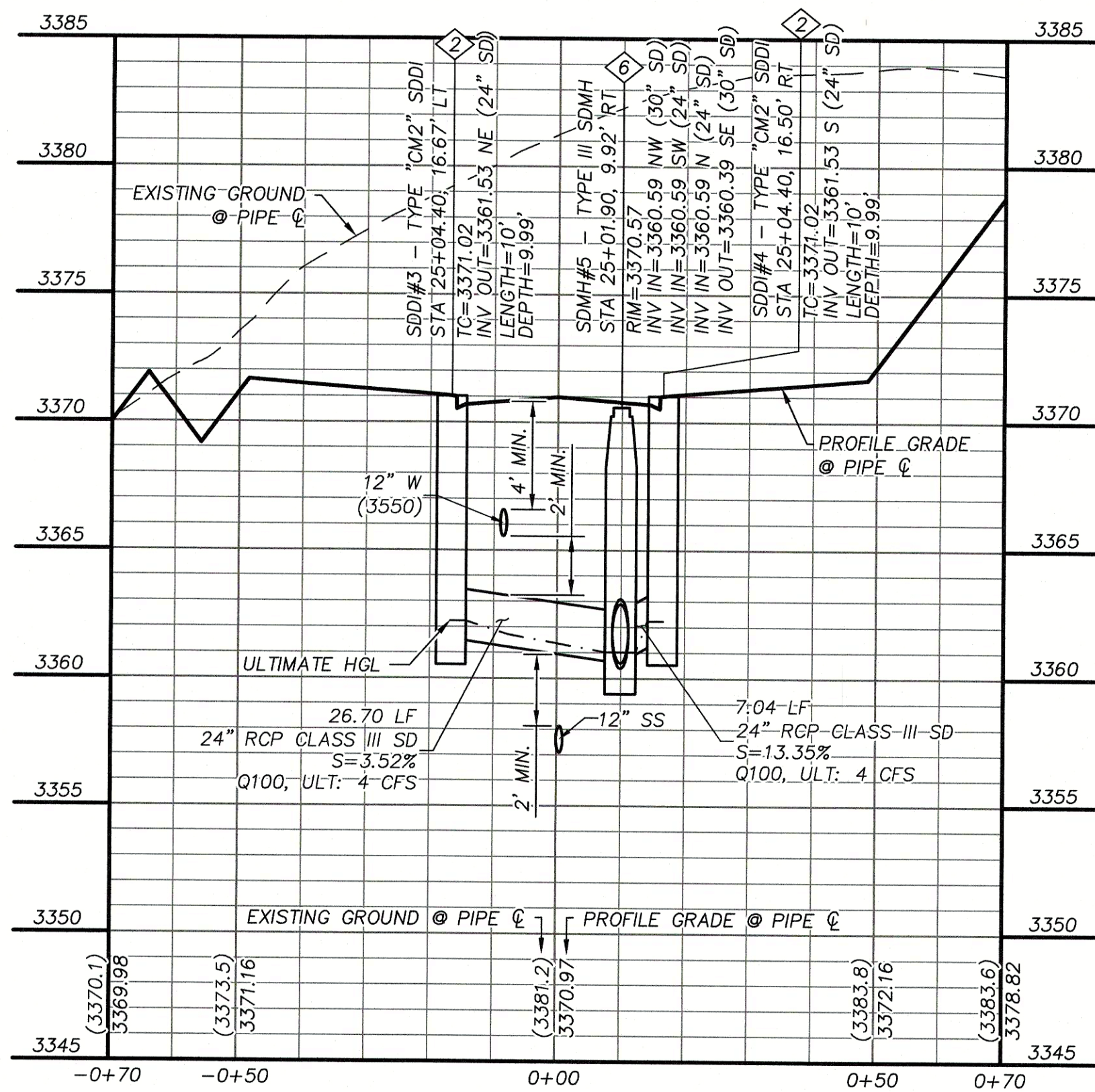
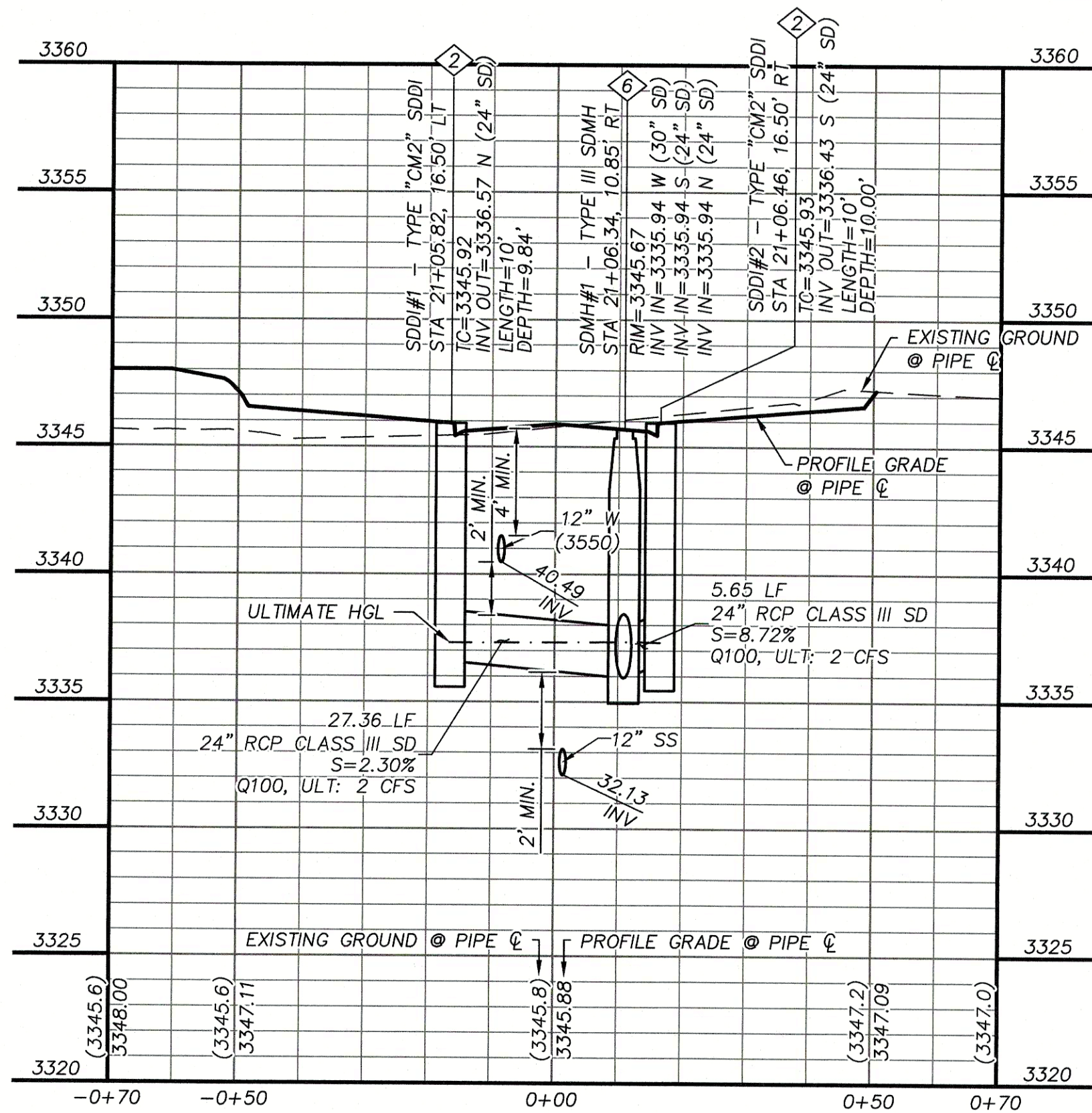
BENCHMARK

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



DESIGNED BY: CLW
CHECKED BY: C. DANIELS
DATE: NOVEMBER, 2019
DRAWING NO.: 18/27
VERT.: NONE

CLV 00-00000



- ### STORM DRAIN CONSTRUCTION NOTES
- INSTALL STORM DRAIN. SEE SHEET 27 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
 - INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
 - INSTALL NDOT TYPE II DROP INLET PER NDOT R-4.2.1 (SEE SHEET 27)
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 - STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
 - INSTALL RIP-RAP (D50=10", THICKNESS=20")
 - INSTALL RIP-RAP (D50=8", THICKNESS=16")

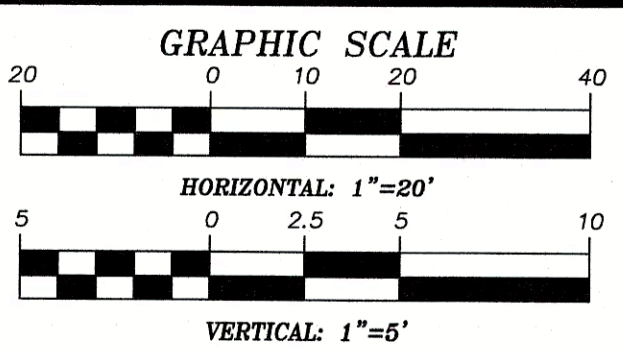
REV.	DESCRIPTION	REVISIONS	
		BY	DATE

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

SUMMERLIN

SUMMERLIN VILLAGE 22
CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
STORM DRAIN LATERAL PROFILES

DESIGNED BY: N. BARCOS
CHECKED BY: L. MANACLAY
DATE: NOVEMBER, 2019
DRAWING NO.: 19/27
JOB NO.: 100064083
CLV 00-00000



APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 136893 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 USCARGS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN. T21S,R59E,S03

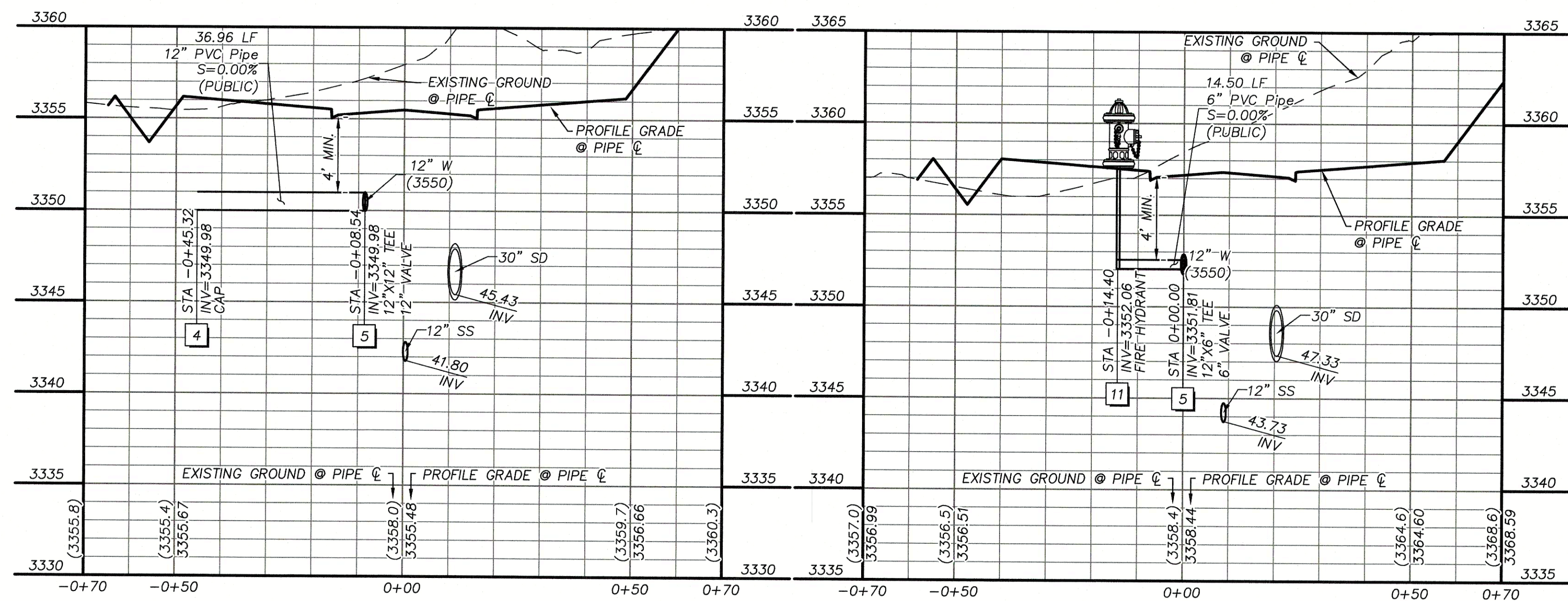
FAST
Call before you Dig
1-800-642-2444

811
Call before you Dig
1-702-432-6300

CALL BEFORE YOU DIG
1-702-227-2829

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS 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.

PAUL A. BATES
PROFESSIONAL ENGINEER - STATE OF NEVADA
No. 18728
CIVIL
EXP. 12-31-20

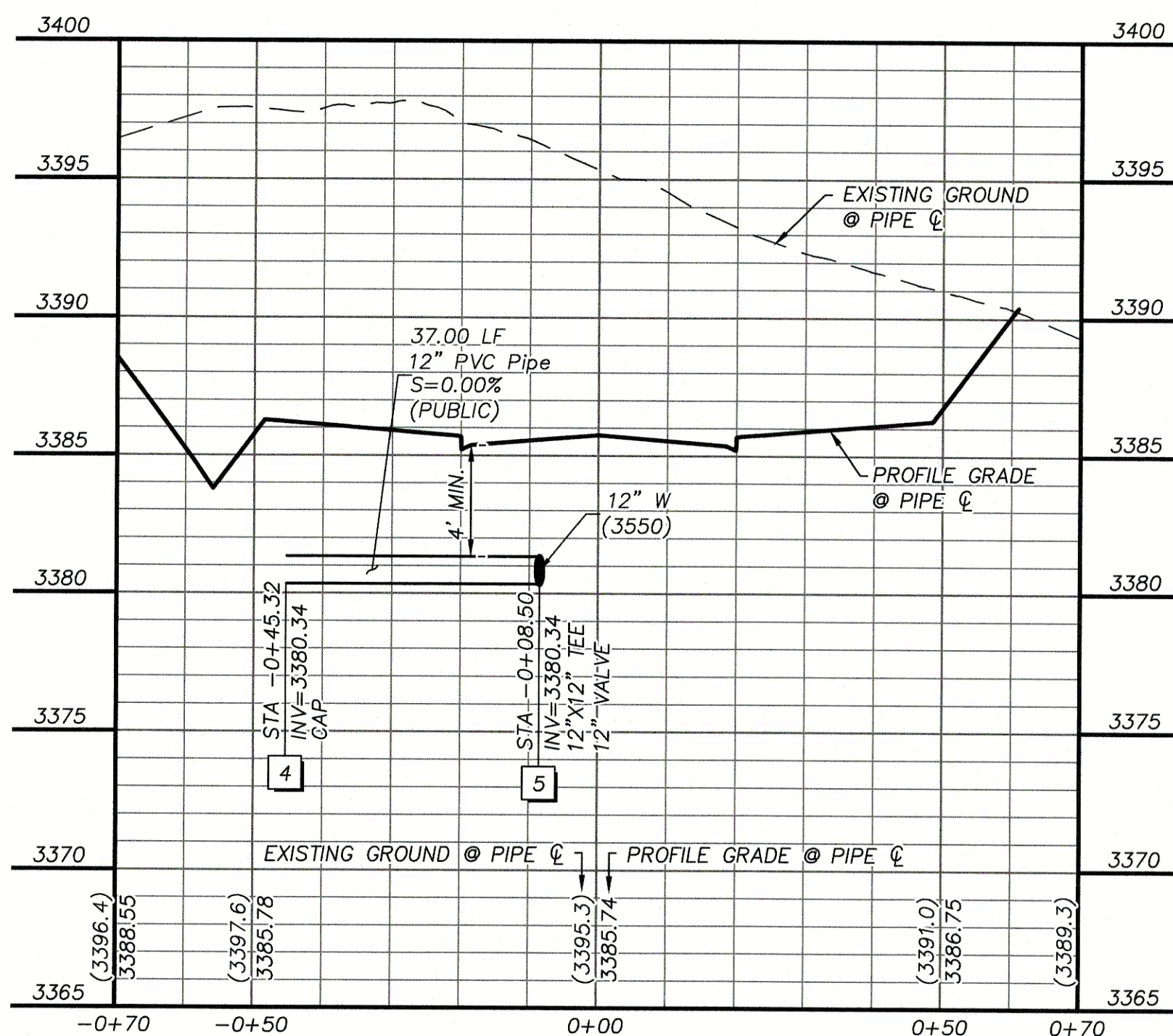


WATER LATERAL 2

"CPW" STA. 23+09 SEE SHEET 14

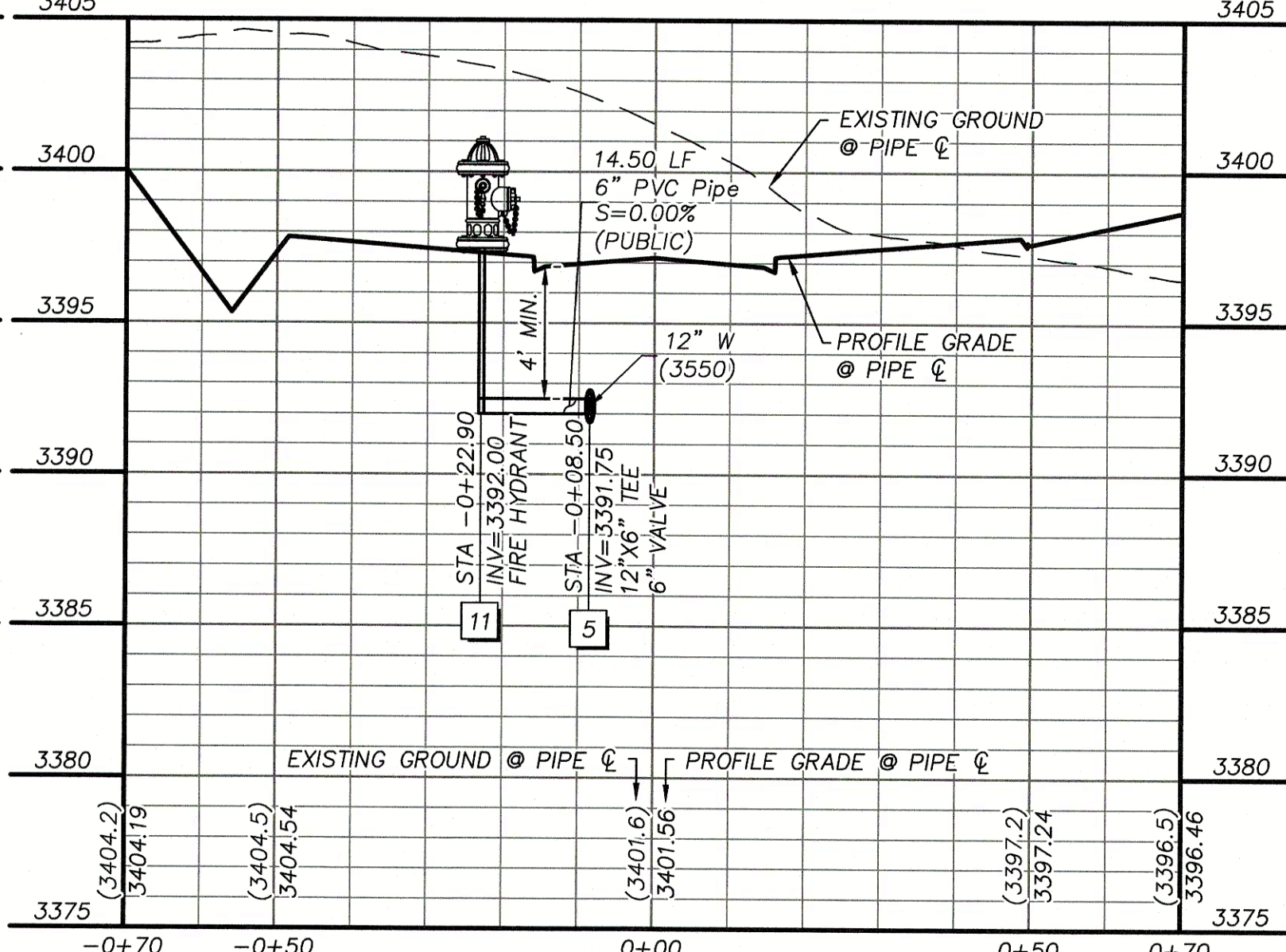
WATER LATERAL 3

"CPW" STA. 23+34 SEE SHEET 14



WATER LATERAL 4

"CPW" STA. 26+89 SEE SHEET 12



WATER LATERAL 5

"CPW" STA. 28+31 SEE SHEET 12

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 27 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 27)
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=10", THICKNESS=20")
11. INSTALL RIP-RAP (D50=8", THICKNESS=16")

SEWER CONSTRUCTION NOTES

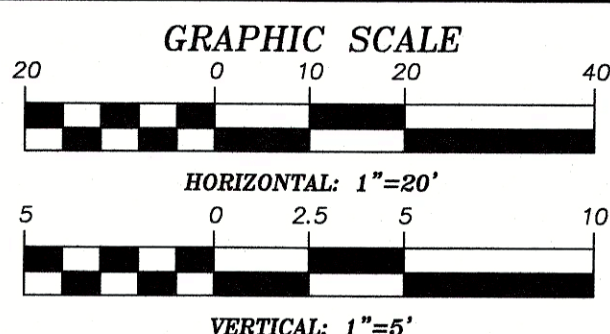
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1, AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"x4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE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

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. SEE REFERENCED SHEET FOR LATERAL PLAN AND PROFILE
4. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
5. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD #219
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. COORDINATE RELOCATION OF EXISTING PALM TREES & LANDSCAPING WITH SUMMERLIN
12. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (G-18-176). SEE SHEET 24 FOR TYPICAL PAVEMENT SECTION.
13. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2'-4", 1'-6") PER DETAIL ON SHEET 25



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 136893 FIRST APPROVED DATE: _____

BASIS OF BEARING

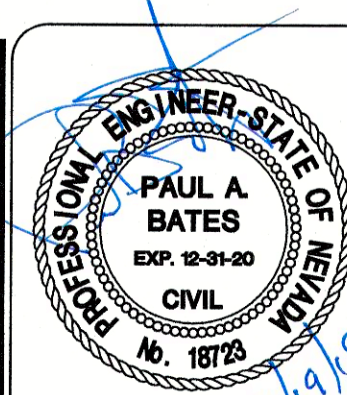
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983, SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FIND USCAR'S DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T215, R59E, S03



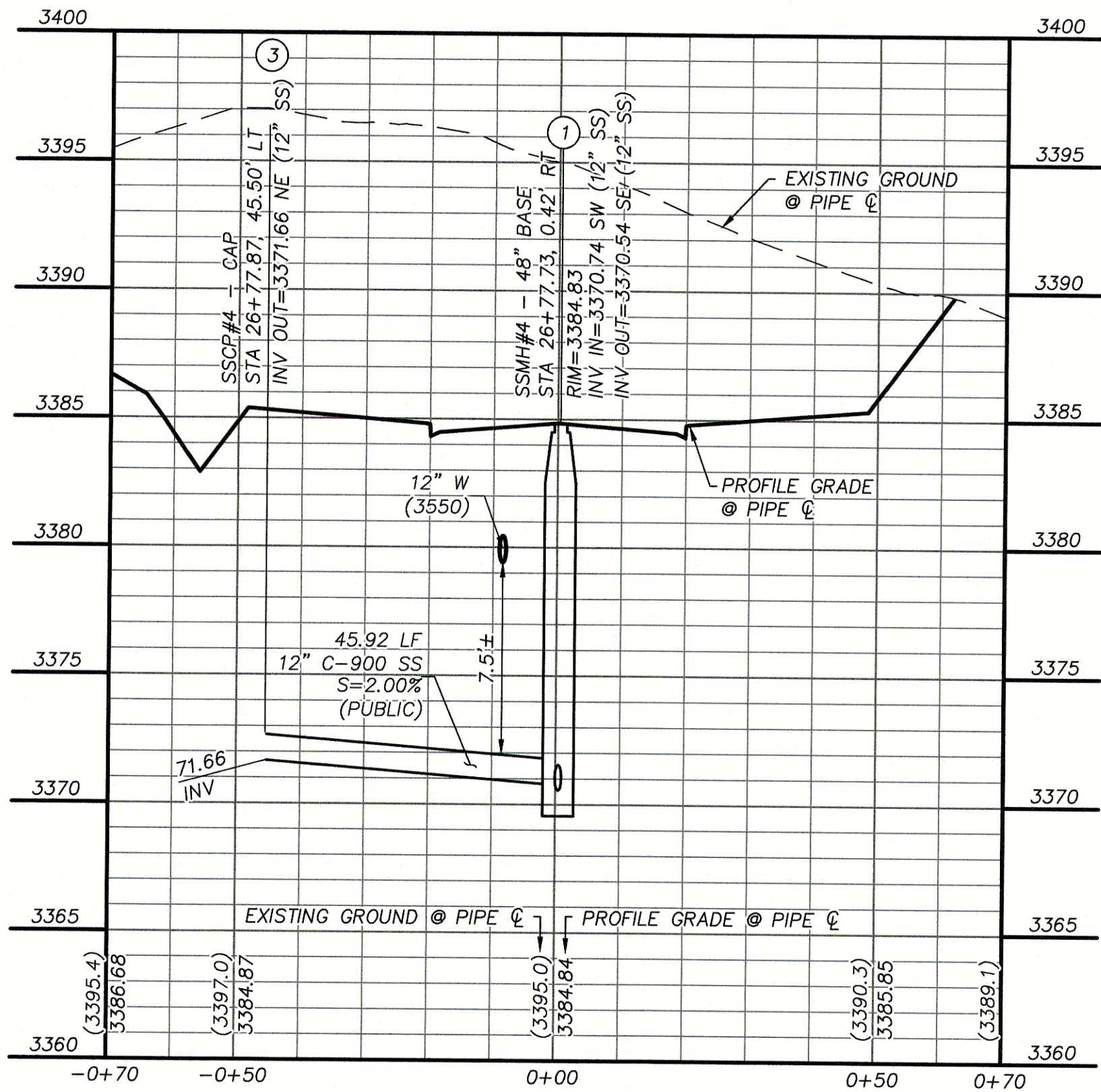
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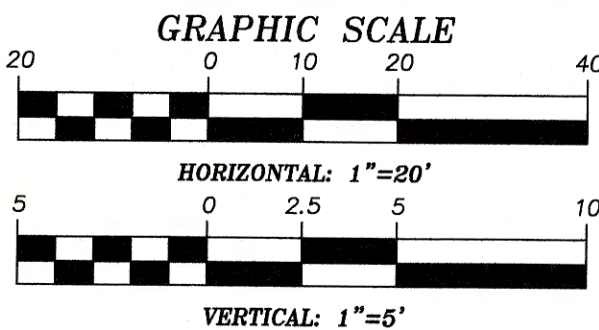
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1 702.263.7275
Fax: +1 702.263.7200

SUMMERLIN
SUMMERLIN VILLAGE 22
CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
WATER LATERAL PROFILES

DESIGNED BY: N. BARCOS
CHECKED BY: L. MANAGLAY
DATE: NOVEMBER, 2019
DRAWING NO. 20/27
JOB NO. 100064083
CLV 00-00000



SANITARY SEWER LATERAL 1
"CPW" STA. 26+77 SEE SHEET 12



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 136893 FIRST APPROVED DATE: _____

BASIS OF BEARING

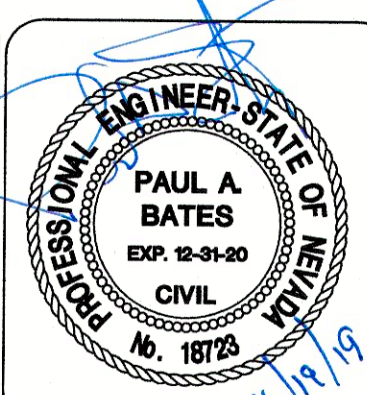
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS). LAS VEGAS HIGH ELEVATION ZONE; NORTH AMERICAN DATUM OF 1983. SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND US&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: NOVEMBER, 2019
DRAWING NO.: 21/27
JOB NO.: 100064083
CLV 00-00000

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 27 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 27)
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 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=10", THICKNESS=20")
11. INSTALL RIP-RAP (D50=8", THICKNESS=16")

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.

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
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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. SEE REFERENCED SHEET FOR LATERAL PLAN AND PROFILE
4. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
5. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD #219
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. COORDINATE RELOCATION OF EXISTING PALM TREES & LANDSCAPING WITH SUMMERLIN
12. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (G-18-176). SEE SHEET 24 FOR TYPICAL PAVEMENT SECTION.
13. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 25

SUMMERLIN VILLAGE 22

CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

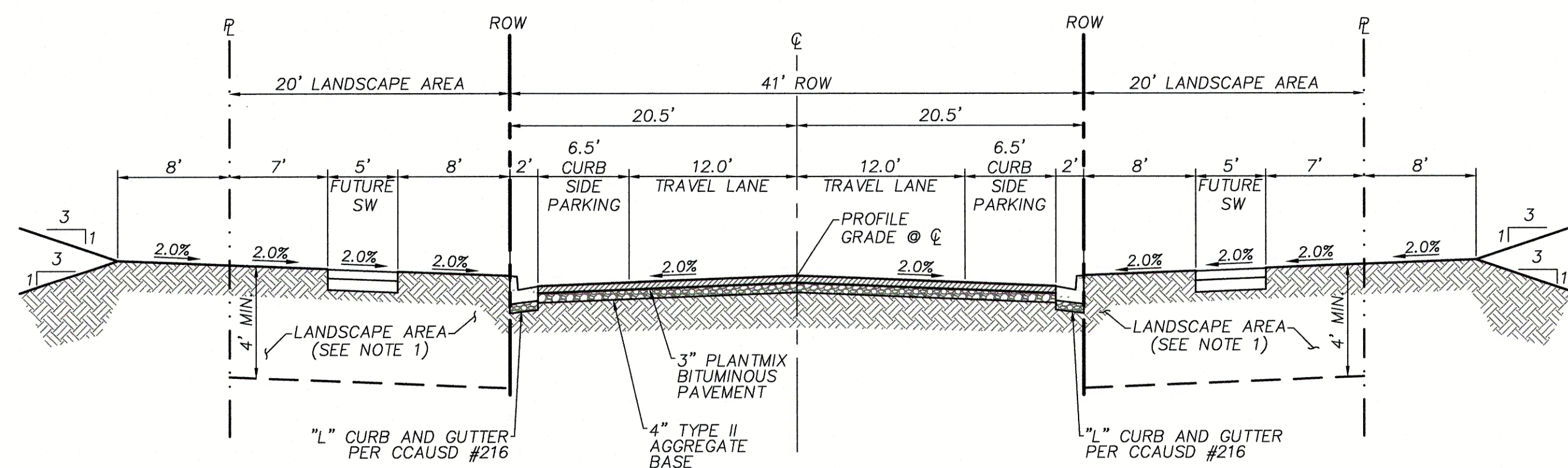
SANITARY SEWER LATERAL PROFILES



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REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

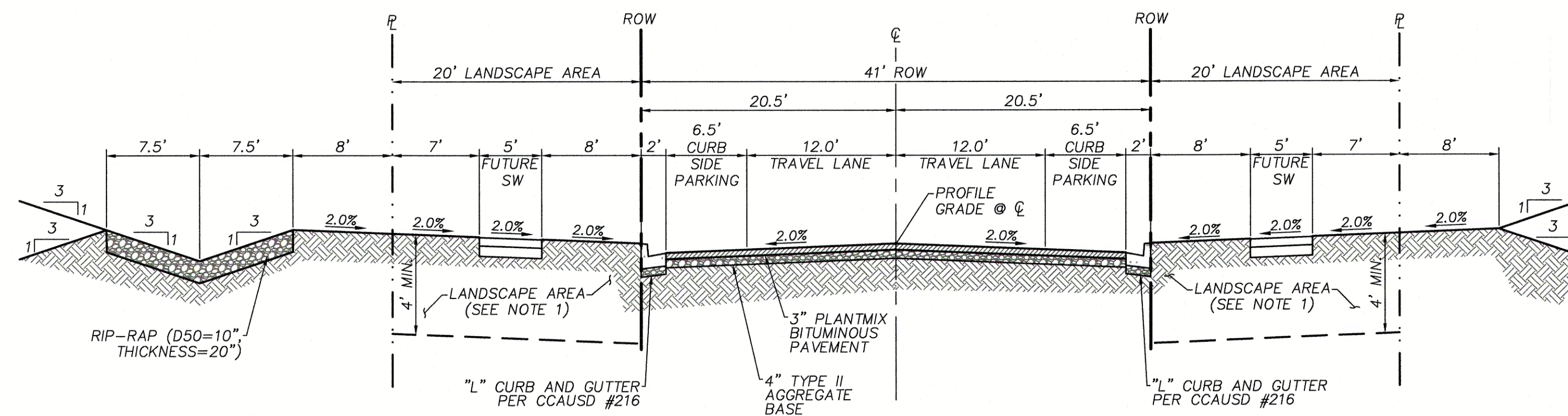
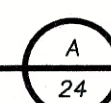


NOTES:

1. EXCAVATE BOTH SIDES TO DEPTH INDICATED PRIOR TO STREET IMPROVEMENTS. SIFT/SCREEN OUT ROCK AND DEBRIS GREATER THAN 6" FROM EXCAVATED MATERIAL, THEN BACKFILL TO 85% COMPACTION. FILL AS NECESSARY TO 2" BELOW THE FINISHED GRADE.

CLOWDER PASS WAY - TYPICAL SECTION WITH PARKING

N.T.S.

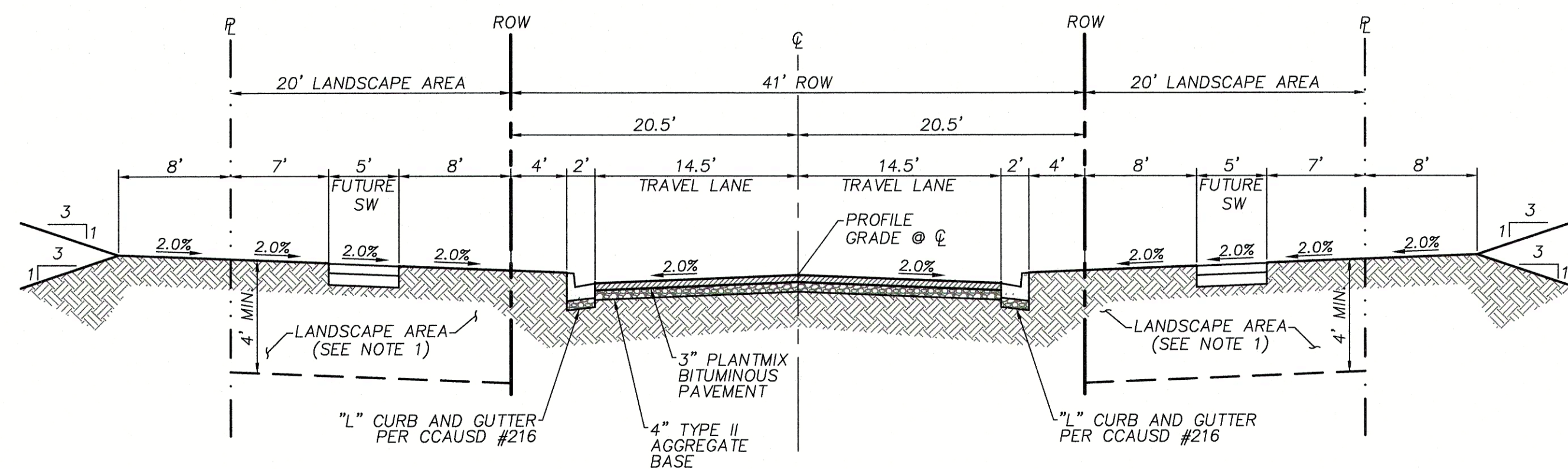
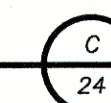


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CLOWDER PASS WAY - TYPICAL SECTION W/ PARKING & SWALE

N.T.S.

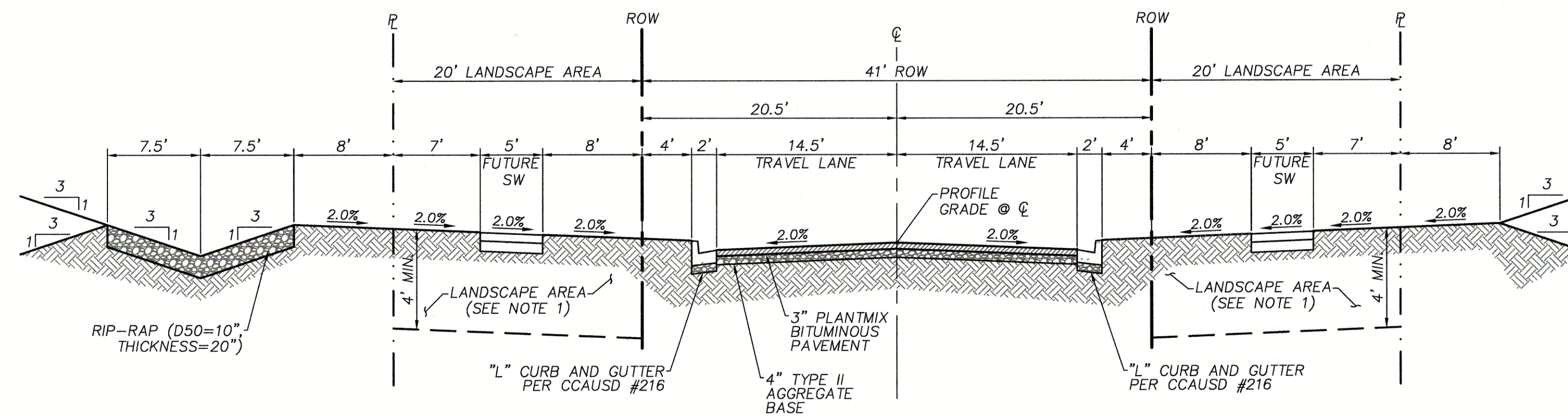
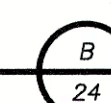


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CLOWDER PASS WAY - TYPICAL SECTION

N.T.S.

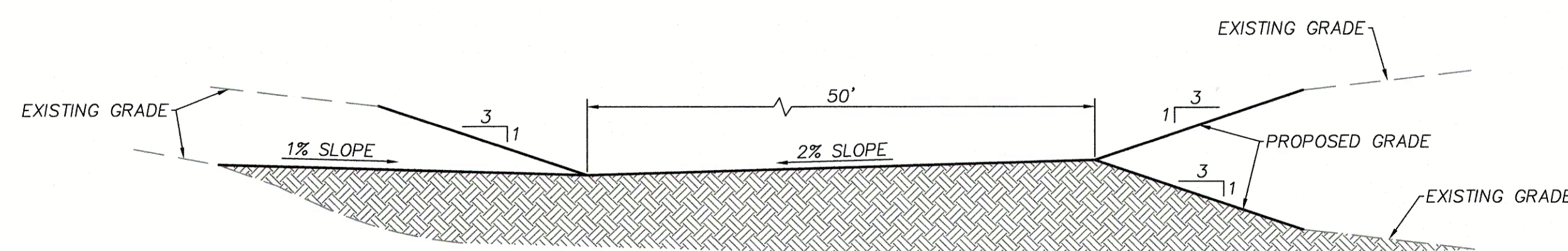
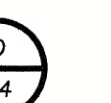


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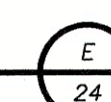
CLOWDER PASS WAY - TYPICAL SECTION WITH SWALE

N.T.S.



CLOWDER PASS WAY - BERM TYPICAL SECTION

N.T.S.



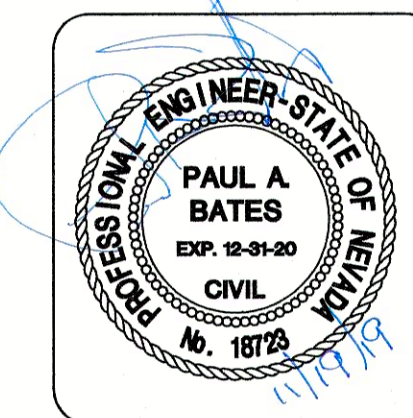
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SUMMERLIN

SUMMERLIN VILLAGE 22
CLOWDER PASS WAY
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

TYPICAL SECTIONS



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DRAWN BY: C. DANIELS
CHECKED BY: P. BATES
HORIZ.: NONE
VERT.: NONE

DATE: NOVEMBER, 2019
DRAWING NO.: 24/27
JOB NO.: 100064083
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