DS #: 5155

APN: 137-14-401-006 ; 137-23-101-002

PROJECT: Summerlin West V22-Lake Mead Blvd. Street Improvements

SUBMITTAL: 2nd

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: September 30, 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: **Summerlin West V22 – Lake Mead Blvd. Street Improvements from Desert Foothill Boulevard to Kettle Ridge Drive (Street J) (also Lake Mead Rough Grade from Kettle Ridge to Scurry Bend)**			**COPIES TO:** Atkins
Cross Streets:	Lake Mead Boulevard & Desert Foothill Drive			Howard Hughes Company, LLC
File Number:	F:\Depot\DSMemos\DS5155B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	137-14-401-006 & 137-23-101-002			CCRFCD
Zoning Action:	N/A			
FEMA Flood Zone	YES	NO	**X**	
Proposed Storm Drain	YES	NO	**X**	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	7/16/2019	8/2/2019	Not Approved	$400.00	3490116: $400
2nd Submittal	9/11/2019	9/28/2019	See Comments Below	$400.00	3563449: $400
			TOTAL FEES (LDDRS):	**$800.00**	**----**

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

   A technical drainage study for the modification of the Beltway Channel has been submitted and has just been conditionally approved. The *Clark County Regional Flood Control District* later issued comments about the modification project and VTN is addressing the comments. The subject drainage study will not be approved prior to the construction bond of the *Beltway Channel Modification* project has been executed.

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

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

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

3. **Second Request**: Drop inlets deeper than 10' require special structural design and structural calculations. Provide a soils report, structural calculations and specifications, two wet stamped structural sets, and a grading plan to the *Building Department* for processing. The engineer must provide a copy of *Building Department* approval of the structures to *Flood Control* prior to final acceptance of the drainage study.

4. ***Sheet 18/66:*** Previous comment required finished grade elevation to be labeled at the entrance of the pedestrian tunnel. It is understood that the pedestrian tunnel may function as an emergency overflow path. However, based on the revised grading design, the pedestrian tunnel will function as a regular drainage path because the entrance is lower than the two inlets. Raise the entrance of the tunnel to at least 18" above the finished grade of SDDI #11. Review and revise accordingly.

5. **Second Request**: Clearly label "Public" and Private" storm drains in all pertinent sheets. For example, storm drains in the perimeter streets such as *Lake Mead Boulevard* are "Public"; storm drains in the common elements such as SDDI #10, SDDI #11 and the connecting pipes are "Private". Review and revise accordingly in the next submittal.

6. **Second Request**: Revise all drop inlets to Type "C-D" Modified Drop Inlet per Standard Drawing 412.1 or Neenah Pre-cast inlets. Note that the lengths of "C-D" modified inlets are in the multiple of 2.5'. Revise all pertinent construction notes and callouts accordingly.

   In the *Storm Drain Construction Notes* column, Type "A" drop inlets are still shown. Note that the City does not allow Type "A" inlets.

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
ays

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



SNC·LAVALIN

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SUMMERLIN®

Summerlin West Village 22

Lake Mead Boulevard

Desert Foothills Drive to Kettle Ridge Drive (Street J)

Lake Mead Boulevard Rough Grade

Kettle Ridge Drive to Scurry Bend Drive (Street N)

July 16, 2019

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Lake Mead Boulevard Desert Foothills Drive to Kettle Ridge Drive (Street J) and Lake Mead Boulevard Rough Grading Kettle Ridge Drive to Scurry Bend Drive (Street N) Date: July 16, 2019

Location of Development: a) Descriptive (Cross Streets) North/South: Kettle Ridge 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

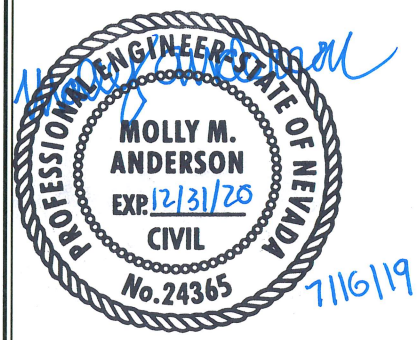
Firm: Atkins

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	x	Roadway Improvements

1. Total Owned Land Area: At Site: +/- 446 acres Being Developed/Disturbed: 16.81 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: 69.63 acres
6. Has the site drainage been evaluated in the past? ✔ **YES** **NO** If yes, please identify documentation: Master Conceptual Drainage Study for Summerlin West Village 22
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.

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Lake Mead Boulevard and Lake Mead Boulevard Rough Grading	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**

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**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		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.
X		Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
X		Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
X		Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
	N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
X		Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$ 8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
	N/A	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
	N/A	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
	N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • 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 (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

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

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

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

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

II. GRADING PLAN INFORMATION		
Yes	No	
X		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
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.

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.

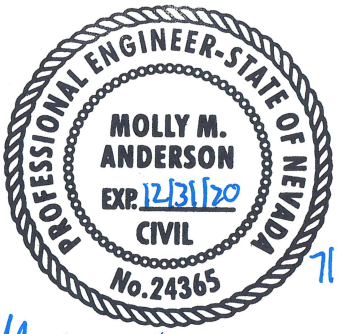
- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

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 Lake Mead Boulevard: Desert Foothills Drive to Kettle Ridge Drive (Street J) and Lake Mead Boulevard Rough Grade: Kettle Ridge Drive (Street J) to Scurry Bend Drive (Street N)** electronic submittal matches the paper version bound into the study.



7116119

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

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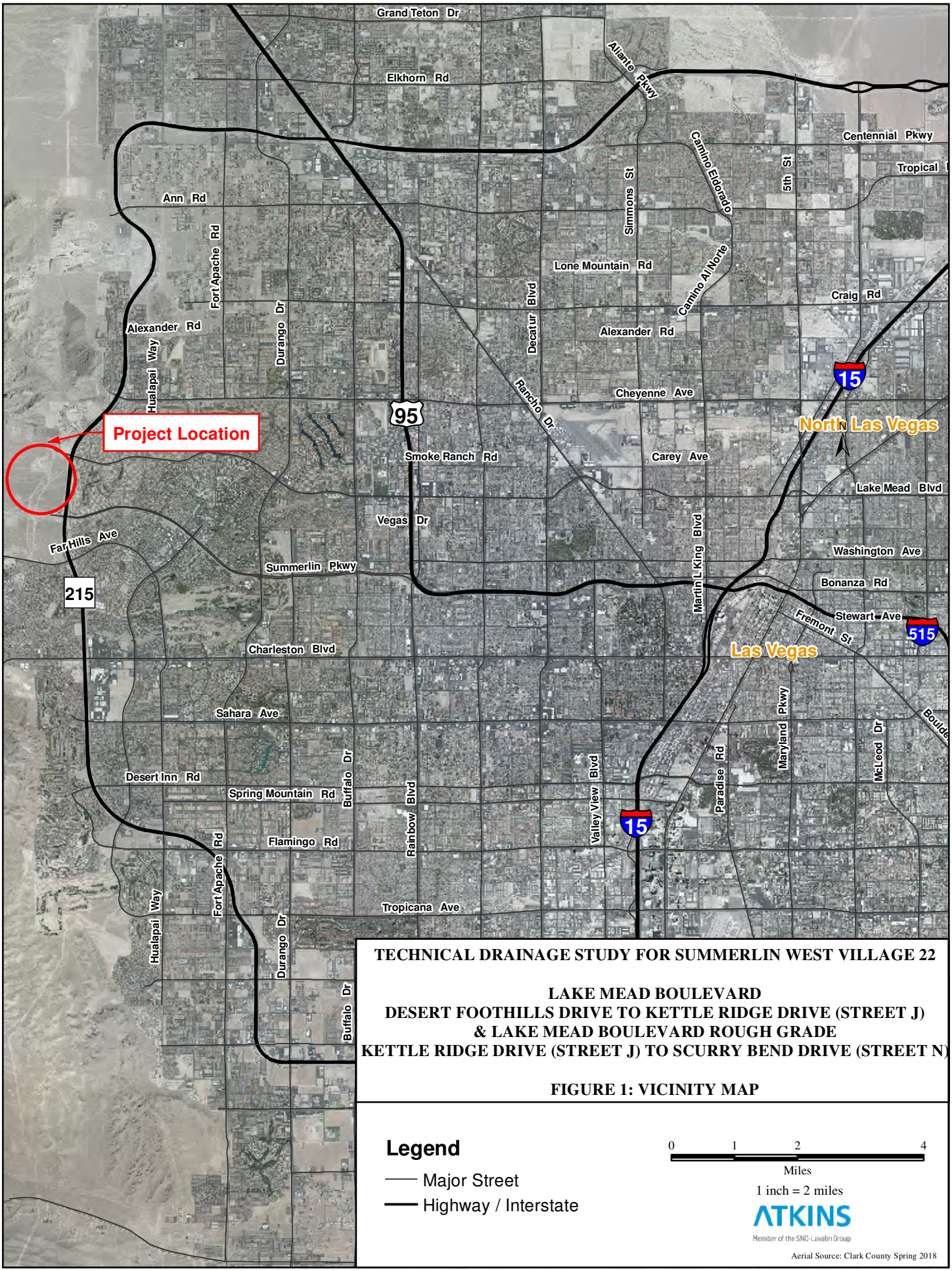
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Executive Summary

This Technical Drainage Study (TDS), prepared on behalf of Howard Hughes Company, LLC represents the hydrologic and hydraulic analysis for the Lake Mead Boulevard roadway improvements of the Summerlin West Village 22 development, as well as the Lake Mead Boulevard rough grade improvements. 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 Lake Mead Boulevard proposed roadway improvements are located between Desert Foothills Drive and Kettle Ridge Drive (Street J) and the rough grade improvements are located between Kettle Ridge Drive (Street J) and Scurry Bend Drive (Street N) and are shown on the location map on Figure 2.

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



TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
& LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FIGURE 1: VICINITY MAP

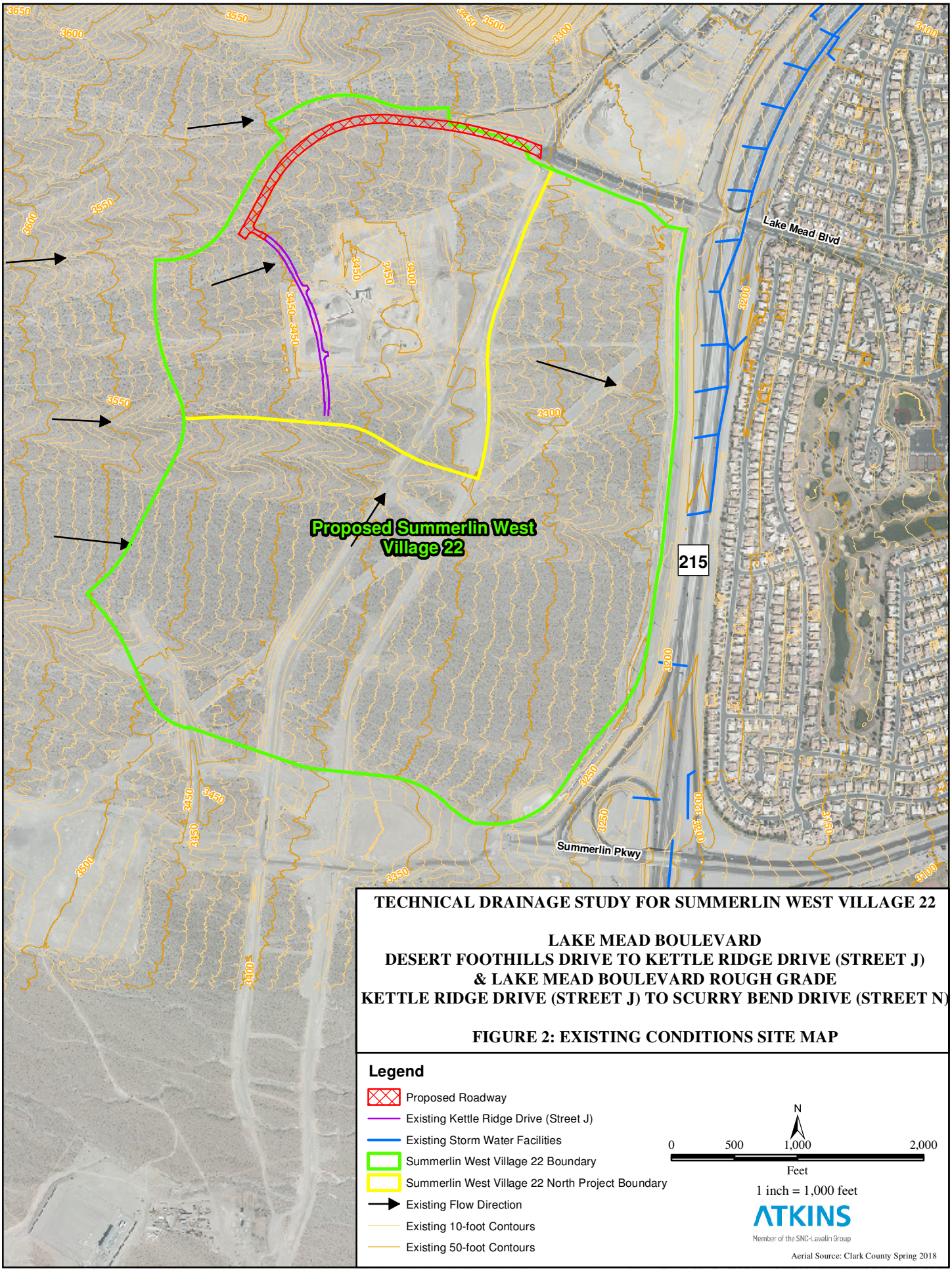
Legend

- Major Street
- Highway / Interstate

0 1 2 4
Miles
1 inch = 2 miles

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Aerial Source: Clark County Spring 2018



TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
& LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FIGURE 2: EXISTING CONDITIONS SITE MAP

Legend

- Proposed Roadway
- Existing Kettle Ridge Drive (Street J)
- Existing Storm Water Facilities
- Summerlin West Village 22 Boundary
- Summerlin West Village 22 North Project Boundary
- Existing Flow Direction
- Existing 10-foot Contours
- Existing 50-foot Contours

N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

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Aerial Source: Clark County Spring 2018

1. Hydrologic Analysis

1.1. Existing Condition

The existing site condition is undeveloped desert land. As established in the Master Conceptual Drainage Study (MCDS), there are two downstream facilities that collect runoff from the proposed street improvements. The Street J storm drain system accepts flow from the west portion of the proposed roadway, while an existing 66-inch RCP in Lake Mead Boulevard accepts flow from the east portion of the proposed roadway. Both facilities discharge to the Western Beltway Channel. 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 adjacent roadways to the proposed roadway are referred to as “Kettle Ridge Drive” and “Scurry Bend Drive” in this study and on the plans. The MCDS refers to the adjacent roadways by a letter name, “Street J” and “Street N”, respectively. Now that the roadways have been named, the plans and report refer to the roadways by name. Table 8 in Section 2.6 compares the roadway names to their letter name in the MCDS.

Construction of Kettle Ridge Drive is to be completed prior to the interim conditions of Kestrel Creek Avenue. The proposed Lake Mead Boulevard improvements will be constructed prior to the adjacent onsite parcels and roadways. As a result, an interim condition exists for the proposed improvements. Refer to Figure 3 for the interim condition hydrology workmap.

The proposed street improvements and interim grading have been designed to ensure that the existing drainage patterns are maintained in the interim condition and none of the existing downstream facilities are adversely affected by the proposed improvements. The interim subbasins were modeled using HEC-1. The results are summarized in Table 1 and on Figure 3.

The flood wall north of the proposed Lake Mead Boulevard roadway will cut off upstream offsite flow northwest of Lake Mead Boulevard and the surrounding parcels. The flow is routed east to the existing wash, which discharges to the existing Western Beltway Channel.

Parcels A, C, and D, as identified by the MCDS (see Figure 3), are developable upon construction of the Lake Mead Boulevard roadway, Kettle Ridge Drive (Street J) roadway and Scurry Bend Drive (Street N) rough grading, as shown in the TDS and Lake Mead Boulevard roadway plans, as described in this TDS because all upstream flow to those parcels has been diverted or brought into the public storm drain system.

Table 1 – Interim Condition HEC-1 Model Results

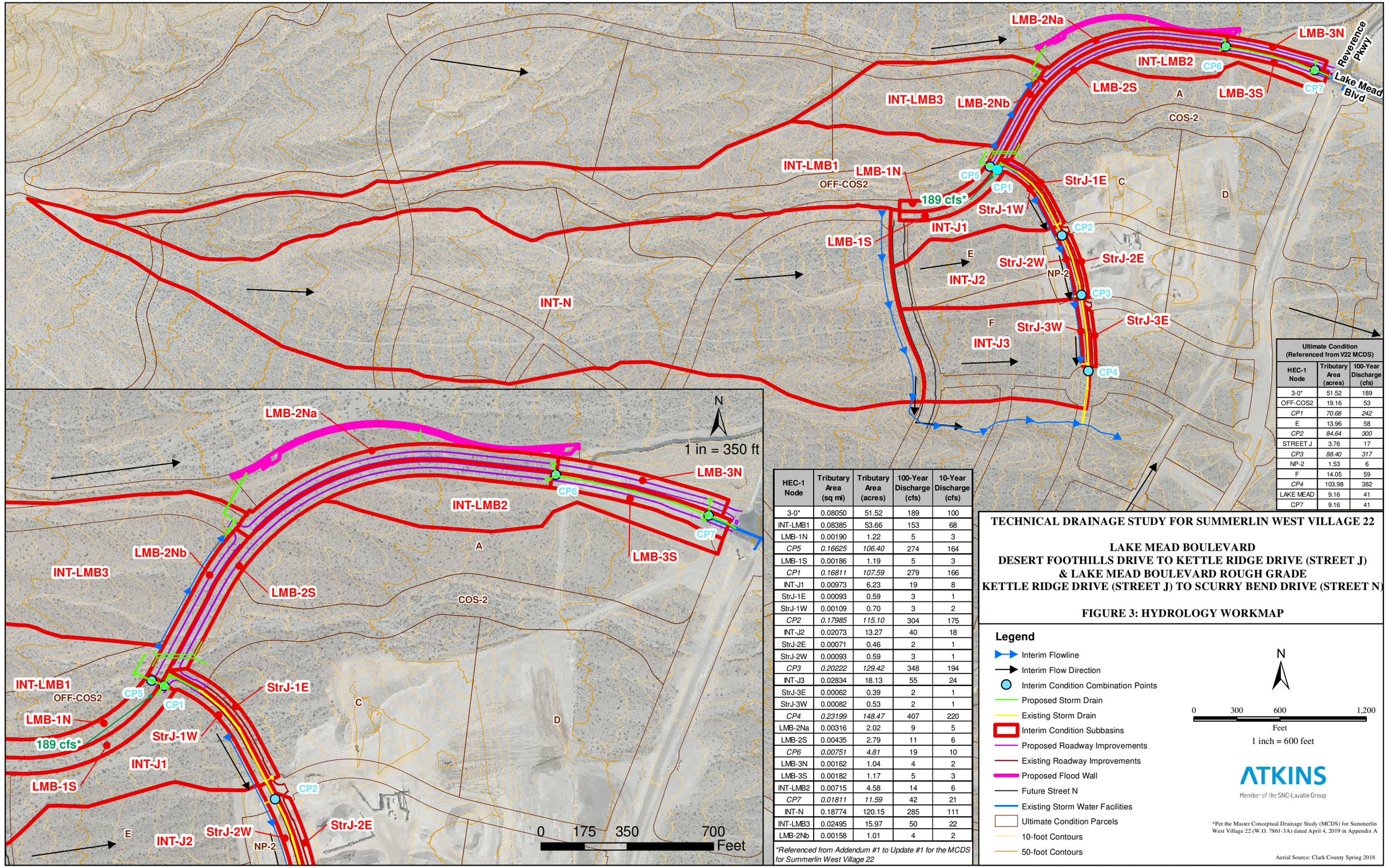
HEC-1 Node	Tributary Area (sq mi)	Tributary Area (ac)	100-year Flow (cfs)	10-year Flow (cfs)
3-0*	0.08050	51.52	189	100
DI-DIV	0.08385	53.66	85	68
LMB-1N	0.00190	1.22	5	3
CP5	*0.16625*	*106.40*	*274*	*164*
LMB-1S	0.00186	1.19	5	3
CP1	*0.16811*	*107.59*	*279*	*166*
INT-J1	0.00973	6.23	19	8
StrJ-1E	0.00093	0.59	3	1
StrJ-1W	0.00109	0.70	3	2
CP2	*0.17985*	*115.10*	*304*	*175*
INT-J2	0.02073	13.27	40	18
StrJ-2E	0.00071	0.46	2	1
StrJ-2W	0.00093	0.59	3	1
CP3	*0.20222*	*129.42*	*348*	*194*
INT-J3	0.02834	18.13	55	24
StrJ-3E	0.00062	0.39	2	1
StrJ-3W	0.00082	0.53	2	1
CP4	*0.23199*	*148.47*	*407*	*220*
LMB-2Na	0.00316	2.02	9	5
LMB-2S	0.00435	2.79	11	6
CP6	*0.00751*	*4.81*	*19*	*10*
LMB-3N	0.00162	1.04	4	2
LMB-3S	0.00182	1.17	5	3
INT-LMB2	0.00715	4.58	14	6
CP7	*0.01811*	*11.59*	*42*	*21*
INT-N	0.18774	120.15	285	111
INT-LMB3	0.02495	15.97	50	22
LMB-2Nb	0.00158	1.01	4	2

1.3. Ultimate Condition

The ultimate condition flows were directly referenced from the approved MCDS, as shown in the HEC-1 output and hydrology figure in Appendix A.1. These flows are also shown on Figure 3 as a comparison to the interim condition for reference for the ultimate condition hydraulic calculations.

Table 2 – Ultimate Condition MCDS Reference Information

HEC-1 Node	Tributary Area (ac)	100-year Flow (cfs)
3-0*	51.52	189
OFF-COS2	19.16	53
CP1	*70.68*	*242*
E	13.96	58
CP2	*84.64*	*300*
STREET J	3.76	17
CP3	*88.40*	*317*
NP-2	1.53	6
F	14.05	59
CP4	*103.98*	*382*
LAKE MEAD	9.16	41
CP7	*9.16*	*41*



Ultimate Condition (Referenced from V22 MCDS)		
HEC-1 Node	Tributary Area (acres)	100-Year Discharge (cfs)
3-0*	51.52	189
OFF-COS2	19.16	53
CP1	*70.68*	*242*
E	13.96	58
CP2	*84.64*	*300*
STREET J	3.76	17
CP3	*88.40*	*317*
NP-2	1.53	6
F	14.05	59
CP4	103.98	382
LAKE MEAD	9.16	41
CP7	9.16	41

HEC-1 Node	Tributary Area (sq mi)	Tributary Area (acres)	100-Year Discharge (cfs)	10-Year Discharge (cfs)
3-0*	0.08050	51.52	189	100
INT-LMB1	0.08385	53.66	153	68
LMB-1N	0.00190	1.22	5	3
CP5	*0.16625*	*106.40*	274	164
LMB-1S	0.00186	1.19	5	3
CP1	*0.16811*	*107.59*	279	166
INT-J1	0.00973	6.23	19	8
StrJ-1E	0.00093	0.59	3	1
StrJ-1W	0.00109	0.70	3	2
CP2	*0.17985*	*115.10*	304	175
INT-J2	0.02073	13.27	40	18
StrJ-2E	0.00071	0.46	2	1
StrJ-2W	0.00093	0.59	3	1
CP3	*0.20222*	*129.42*	348	194
INT-J3	0.02834	18.13	55	24
StrJ-3E	0.00062	0.39	2	1
StrJ-3W	0.00082	0.53	2	1
CP4	*0.23199*	*148.47*	407	220
LMB-2Na	0.00316	2.02	9	5
LMB-2S	0.00435	2.79	11	6
CP6	*0.00751*	*4.81*	19	10
LMB-3N	0.00162	1.04	4	2
LMB-3S	0.00182	1.17	5	3
INT-LMB2	0.00715	4.58	14	6
CP7	*0.01811*	*11.59*	42	21
INT-N	0.18774	120.15	285	111
INT-LMB3	0.02495	15.97	50	22
LMB-2Nb	0.00158	1.01	4	2

**Referenced from Addendum #1 to Update #1 for the MCDS for Summerlin West Village 22*

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
& LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FIGURE 3: HYDROLOGY WORKMAP

Legend

- Interim Flowline
- Interim Flow Direction
- Interim Condition Combination Points
- Proposed Storm Drain
- Existing Storm Drain
- Interim Condition Subbasins
- Proposed Roadway Improvements
- Existing Roadway Improvements
- Proposed Flood Wall
- Future Street N
- Existing Storm Water Facilities
- Ultimate Condition Parcels
- 10-foot Contours
- 50-foot Contours

N

0 300 600 1,200
Feet
1 inch = 600 feet

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*Per the Master Conceptual Drainage Study (MCDS) for Summerlin West Village 22 (W.O. 7861-3A) dated April 4, 2019 in Appendix A

Aerial Source: Clark County Spring 2018

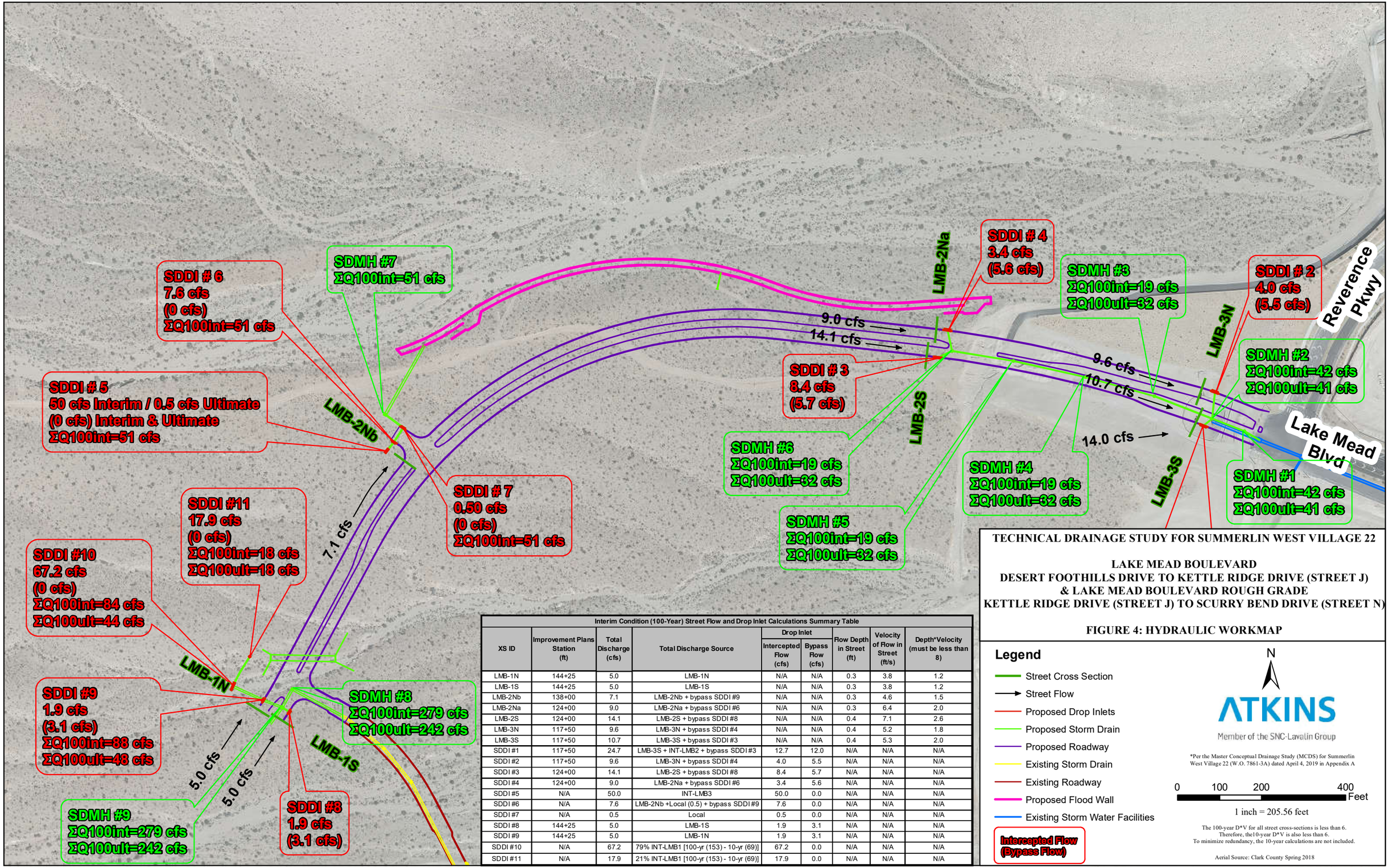
2. Hydraulic Analysis

2.1. Drop Inlet Calculations

The computer program Bentley FlowMaster was utilized to perform calculations for the eleven proposed drop inlets along Lake Mead Boulevard. SDDI #5, #10, and #11 are ditch inlets, while the rest of the drop inlets collect flow along the proposed roadway. Drop inlet calculations are provided in Appendix C.1. Table 3 provides a summary of the drop inlets.

Table 3 – Drop Inlet Calculations

ID	Station (ft)	Total Flow (cfs)	Discharge Source	Intercepted Flow (cfs)	Bypass Flow (cfs)
100-year					
SDDI #1	117+50	24.7	LMB-3S + INT-LMB2 + bypass SDDI #3	12.7	12.0
SDDI #2	117+50	9.6	LMB-3N + bypass SDDI #4	4.0	5.5
SDDI #3	124+00	14.1	LMB-2S + bypass SDDI #8	8.4	5.7
SDDI #4	124+00	9.0	LMB-2Na + bypass SDDI #6	3.4	5.6
SDDI #5	N/A	50.0	INT-LMB3	50.0	0.0
SDDI #6	N/A	7.6	LMB-2Nb +Local (0.5) + bypass SDDI #9	7.6	0.0
SDDI #7	N/A	0.5	Local	0.5	0.0
SDDI #8	144+25	5.0	LMB-1S	1.9	3.1
SDDI #9	144+25	5.0	LMB-1N	1.9	3.1
SDDI #10	N/A	67.2	79% INT-LMB1 [100-yr (153) - 10-yr (68)]	67.2	0.0
SDDI #11	N/A	17.9	21% INT-LMB1 [100-yr (153) - 10-yr (68)]	17.9	0.0



Interim Condition (100-Year) Street Flow and Drop Inlet Calculations Summary Table

XS ID	Improvement Plans Station (ft)	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)			
LMB-1N	144+25	5.0	LMB-1N	N/A	N/A	0.3	3.8	1.2
LMB-1S	144+25	5.0	LMB-1S	N/A	N/A	0.3	3.8	1.2
LMB-2Nb	138+00	7.1	LMB-2Nb + bypass SDDI #9	N/A	N/A	0.3	4.6	1.5
LMB-2Na	124+00	9.0	LMB-2Na + bypass SDDI #6	N/A	N/A	0.3	6.4	2.0
LMB-2S	124+00	14.1	LMB-2S + bypass SDDI #8	N/A	N/A	0.4	7.1	2.6
LMB-3N	117+50	9.6	LMB-3N + bypass SDDI #4	N/A	N/A	0.4	5.2	1.8
LMB-3S	117+50	10.7	LMB-3S + bypass SDDI #3	N/A	N/A	0.4	5.3	2.0
SDDI #1	117+50	24.7	LMB-3S + INT-LMB2 + bypass SDDI #3	12.7	12.0	N/A	N/A	N/A
SDDI #2	117+50	9.6	LMB-3N + bypass SDDI #4	4.0	5.5	N/A	N/A	N/A
SDDI #3	124+00	14.1	LMB-2S + bypass SDDI #8	8.4	5.7	N/A	N/A	N/A
SDDI #4	124+00	9.0	LMB-2Na + bypass SDDI #6	3.4	5.6	N/A	N/A	N/A
SDDI #5	N/A	50.0	INT-LMB3	50.0	0.0	N/A	N/A	N/A
SDDI #6	N/A	7.6	LMB-2Nb +Local (0.5) + bypass SDDI #9	7.6	0.0	N/A	N/A	N/A
SDDI #7	N/A	0.5	Local	0.5	0.0	N/A	N/A	N/A
SDDI #8	144+25	5.0	LMB-1S	1.9	3.1	N/A	N/A	N/A
SDDI #9	144+25	5.0	LMB-1N	1.9	3.1	N/A	N/A	N/A
SDDI #10	N/A	67.2	79% INT-LMB1 [100-yr (153) - 10-yr (69)]	67.2	0.0	N/A	N/A	N/A
SDDI #11	N/A	17.9	21% INT-LMB1 [100-yr (153) - 10-yr (69)]	17.9	0.0	N/A	N/A	N/A

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
& LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FIGURE 4: HYDRAULIC WORKMAP

Legend

- Street Cross Section
- Street Flow
- Proposed Drop Inlets
- Proposed Storm Drain
- Proposed Roadway
- Existing Storm Drain
- Existing Roadway
- Proposed Flood Wall
- Existing Storm Water Facilities

Intercepted Flow (Bypass Flow)

N

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*Per the Master Conceptual Drainage Study (MCDS) for Summerlin West Village 22 (W.O. 7861-3A) dated April 4, 2019 in Appendix A

0 100 200 400 Feet

1 inch = 205.56 feet

The 100-year D*V for all street cross-sections is less than 6.
Therefore, the10-year D*V is also less than 6.
To minimize redundancy, the 10-year calculations are not included.

Aerial Source: Clark County Spring 2018

2.2. Normal Depth Calculations

The computer program Bentley FlowMaster V8i 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 is met.

Seven cross-sections were analyzed. 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 4 summarizes the normal depth calculations for both the 10 and 100-year storm event. Depth*Velocity must be less than 8 for the 100-year and less than 6 for the 10-year. The 100-year D*V for all street cross-sections is less than 6. Therefore, the10-year D*V is also less than 6. To minimize redundancy, the 10-year calculations are not included. Print-outs of all normal depth calculations for the ultimate condition are provided in Appendix C.2. Cross section locations and calculation summaries are shown on Figure 4.

Table 4 – Normal Depth Calculations

ID	Total Flow (cfs)	Discharge Source	Slope (%)	Flow Depth (ft)	Velocity (ft/s)	D*V
100-year						
LMB-1N	5.0	LMB-1N	3.0	0.3	3.8	1.2
LMB-1S	5.0	LMB-1S	3.0	0.3	3.8	1.2
LMB-2Nb	7.1	LMB-2Nb + bypass SDDI #9	3.9	0.3	4.6	1.5
LMB-2Na	9.0	LMB-2Na + bypass SDDI #6	8.0	0.3	6.4	2.0
LMB-2S	14.1	LMB-2S + bypass SDDI #8	8.0	0.4	7.1	2.6
LMB-3N	9.6	LMB-3N + bypass SDDI #4	4.5	0.4	5.2	1.8
LMB-3S	10.7	LMB-3S + bypass SDDI #3	4.5	0.4	5.3	2.0

2.3. Storm Drain System Modeling

The proposed storm drain systems were modeled using Water Surface Pressure Gradient (WSPG-W). A print-out of the WSPG-W models are provided in Appendix C.3 and Appendix C.4. Because the interim condition flows are higher than the ultimate condition flows in some areas, both conditions were analyzed in the WSPG-W models. For the elliptical pipe in Lateral 4, the round equivalent size was modeled in WSPG-W. Flowmaster calculations proving the equivalent size are included within the WSPG-W output for the lateral. The Q_{100} and hydraulic grade lines for both conditions are shown on the improvement plans in Appendix D.

There are three “mainline” storm drain systems with the proposed development. The first mainline storm drain is located at the upstream end of Lake Mead Boulevard. The proposed storm drain discharges to the 54-inch Kettle Ridge Drive (Street J) storm drain. The tailwater elevation for the hydraulic model was taken from the upstream HGL in the plans and is referenced in Appendix A.2.

The second storm drain system is labeled Lateral 4 in the plan and profile sheets in Appendix D. This storm drain is near the intersection of Lake Mead Boulevard and future Park Drift Trail (Street K). The flow within this storm drain discharges through the flood wall, as intended in the MCDS for COS-1.

The third mainline storm drain is at the downstream end of the proposed roadway near the intersection of Lake Mead Boulevard and future Desert Foothills Drive. This proposed storm drain discharges to the existing 66-inch storm drain in Lake Mead Boulevard. The tailwater elevation for the hydraulic model was

taken from the upstream HGL in the approved plans. The plan sheets that reference the HGL information is included in the reference information in Appendix A.2. Tables 5, 6, and 7 summarize the WSPG-W model at the mainline manholes.

Table 5 – Mainline to Kettle Ridge Drive 54-inch WSPG-W Summary Table

SDMH#	WSPG-W Station	Ultimate Condition			Interim Condition		
		Q_{100}	ΣQ_{100}	HGL (ft)	Q_{100}	ΣQ_{100}	HGL (ft)
Upstream	228.720	189	189	3461.56	0	0	3459.59
SDMH #9	179.160	53	242	3461.16	279	279	3459.59
SDMH #8	129.050	0	242	3455.59	0	279	3454.41
Downstream	0.000	0	242	3450.47	0	279	3449.45

Table 6 – Mainline to Flood Wall WSPG-W Summary Table

SDMH#	WSPG-W Station	Ultimate Condition			Interim Condition		
		Q_{100}	ΣQ_{100}	HGL (ft)	Q_{100}	ΣQ_{100}	HGL (ft)
Upstream	309.724	51	51	3445.544	51	51	3445.544
SDMH #7	186.543	0	51	3444.01	0	51	3444.01
Downstream	0.000	0	51	3343.39	0	51	3343.39

Table 7 – Mainline to Desert Foothills Drive 66-inch WSPG-W Summary Table

SDMH#	WSPG-W Station	Ultimate Condition			Interim Condition		
		Q_{100}	ΣQ_{100}	HGL (ft)	Q_{100}	ΣQ_{100}	HGL (ft)
Upstream	765.257	32	32	3341.01	19	19	3340.87
SDMH #6	765.257	0	32	3341.01	0	19	3340.87
SDMH #5	443.500	0	32	3314.28	0	19	3313.84
SDMH #4	273.680	0	32	3309.80	0	19	3303.89
SDMH #3	126.210	0	32	3306.74	0	19	3303.47
SDMH #2	120.210	9	41	3306.70	23	42	3303.45
SDMH #1	43.760	0	41	3302.12	0	42	3300.95
Downstream	0.000	0	41	3300.40	0	42	3300.40

2.4. 2D Modeling

Atkins was tasked with performing detailed hydraulic modeling to review options for potential storm drain design improvements. Portions of this 2D model were referenced in the approved Overall Summerlin West Planning Area (SWPA) MCDS.

LiDAR collected by the Southern Nevada Water Authority (SNWA) in 2016 was used as the source for digital elevation data. The model was developed using a 20-foot maximum element size.

2.4.1. FLO-2D Modeling (Pedestrian Tunnel)

Near the intersection of Lake Mead Boulevard and Kettle Ridge Drive (Street J), there is a proposed pedestrian crossing under Lake Mead Boulevard. A 2-dimensional (2D) hydraulic model of the upstream wash was used to establish the existing hydraulic condition (Figures 5 and 6) and the diversion of flow away from the proposed crossing. The proposed condition (Figures 7 and 8) includes the maximum allowable bypass from proposed SDDI #10 and #11 in order to pass the 10-year flow through the pedestrian crossing in the interim condition.

FLO-2D Pro software was used for the two-dimensional (2D) hydraulic model for this portion of the project. FLO-2D software is capable of using the rainfall and curve number to determine runoff. 100-year, 6-hour rainfall depth was averaged for the model domain based on the rainfall polygon developed with the 2018 LVVMPU. SDN3 rainfall distribution curve was used.

2.4.2. HEC-RAS 2D Modeling (Flood Wall)

The US Army Corps of Engineers HEC-RAS v. 5.0.5 program was used for the two-dimensional (2D) hydraulic model for this project. This program can run both 1-dimensional (1D) and 2D hydraulic calculations for a full network of natural and constructed channels. For the purposes of this project only the 2D interface was used.

Hydrographs from VTNs offsite hydrology served as the inflow boundary conditions for the model. A uniform Manning's roughness of 0.036 was used for the entire project area. The model simulations were run for 3 hours with a variable time step.

The proposed flood wall was analyzed using HEC-RAS 2D in order to confirm the MCDS flood wall height is sufficient to protect from over-topping. The depth and velocity results are shown in Figures 9 and 10, respectively.

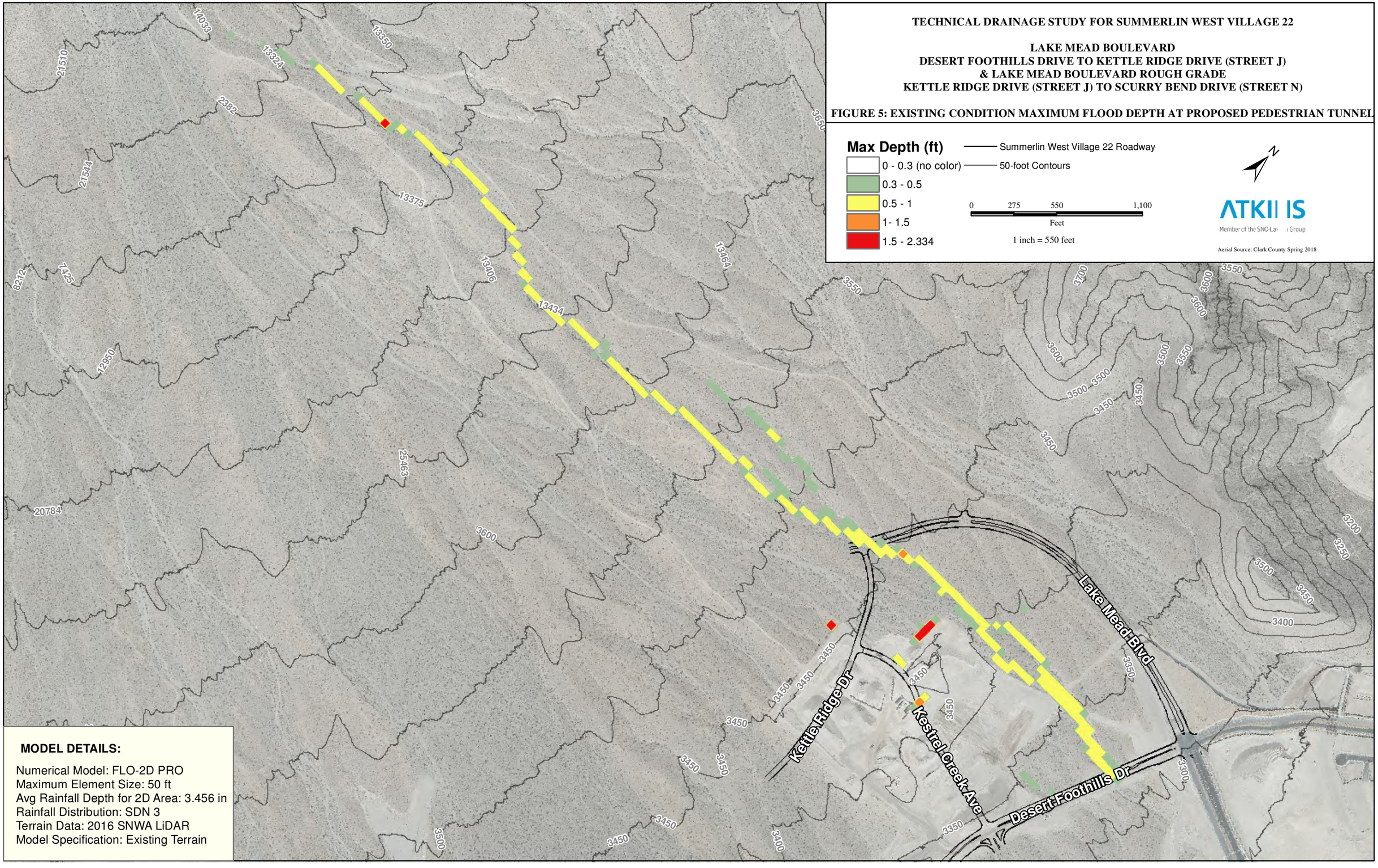
2.5. Riprap Calculations

The riprap calculations were performed utilizing shear stress calculations based on HCDDM Section 705 using HEC-11 methodology. Shear stress calculations show that a median riprap particle size (D_{50}) for the ditch along Lake Mead Boulevard of 8 inches is required to resist the average channel shear stress for the channel velocities along the ditch. Results are shown in Appendix C.5.

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

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& LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FIGURE 5: EXISTING CONDITION MAXIMUM FLOOD DEPTH AT PROPOSED PEDESTRIAN TUNNEL



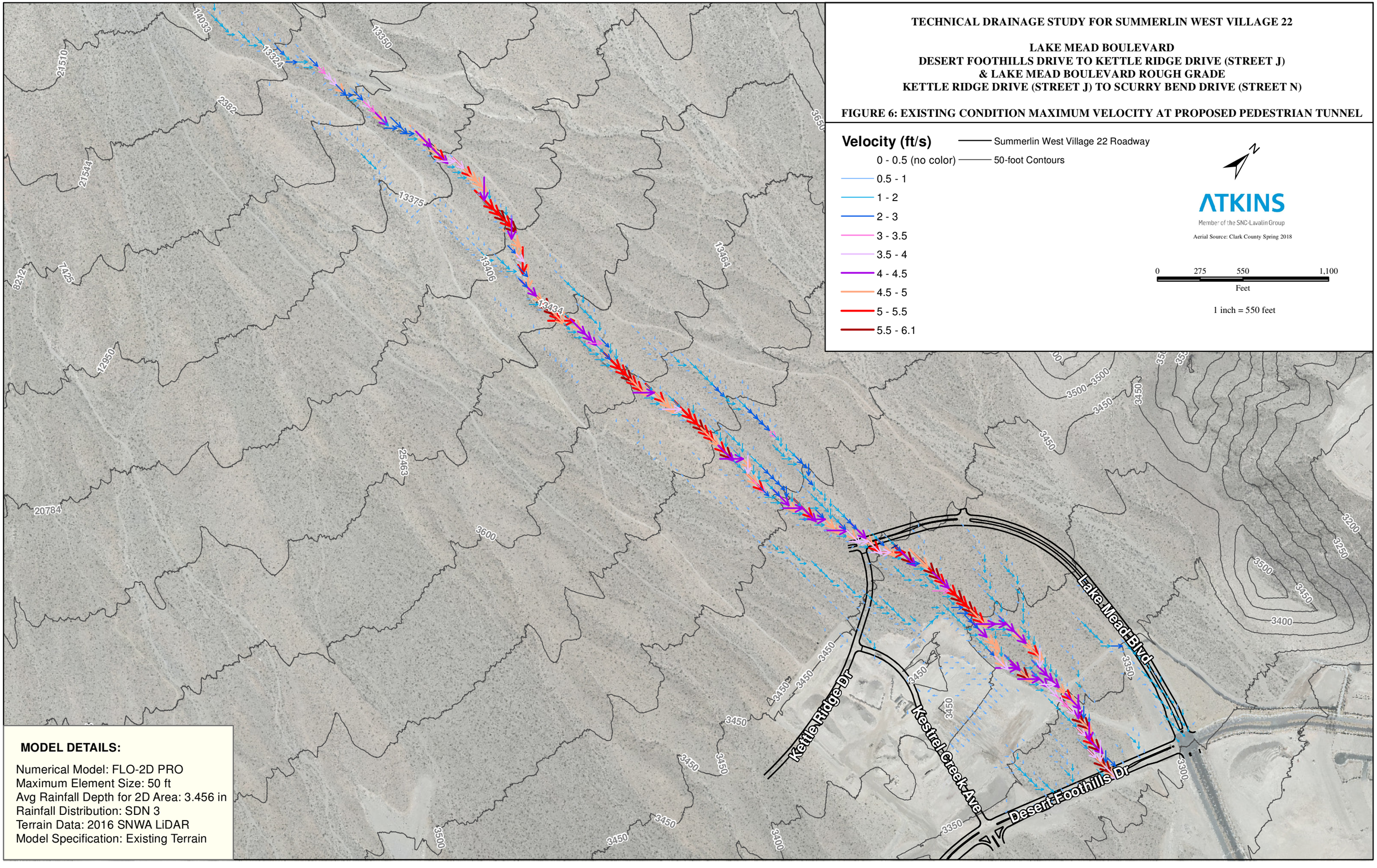
MODEL DETAILS:

Numerical Model: FLO-2D PRO
Maximum Element Size: 50 ft
Avg Rainfall Depth for 2D Area: 3.456 in
Rainfall Distribution: SDN 3
Terrain Data: 2016 SNWA LiDAR
Model Specification: Existing Terrain

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
& LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FIGURE 6: EXISTING CONDITION MAXIMUM VELOCITY AT PROPOSED PEDESTRIAN TUNNEL



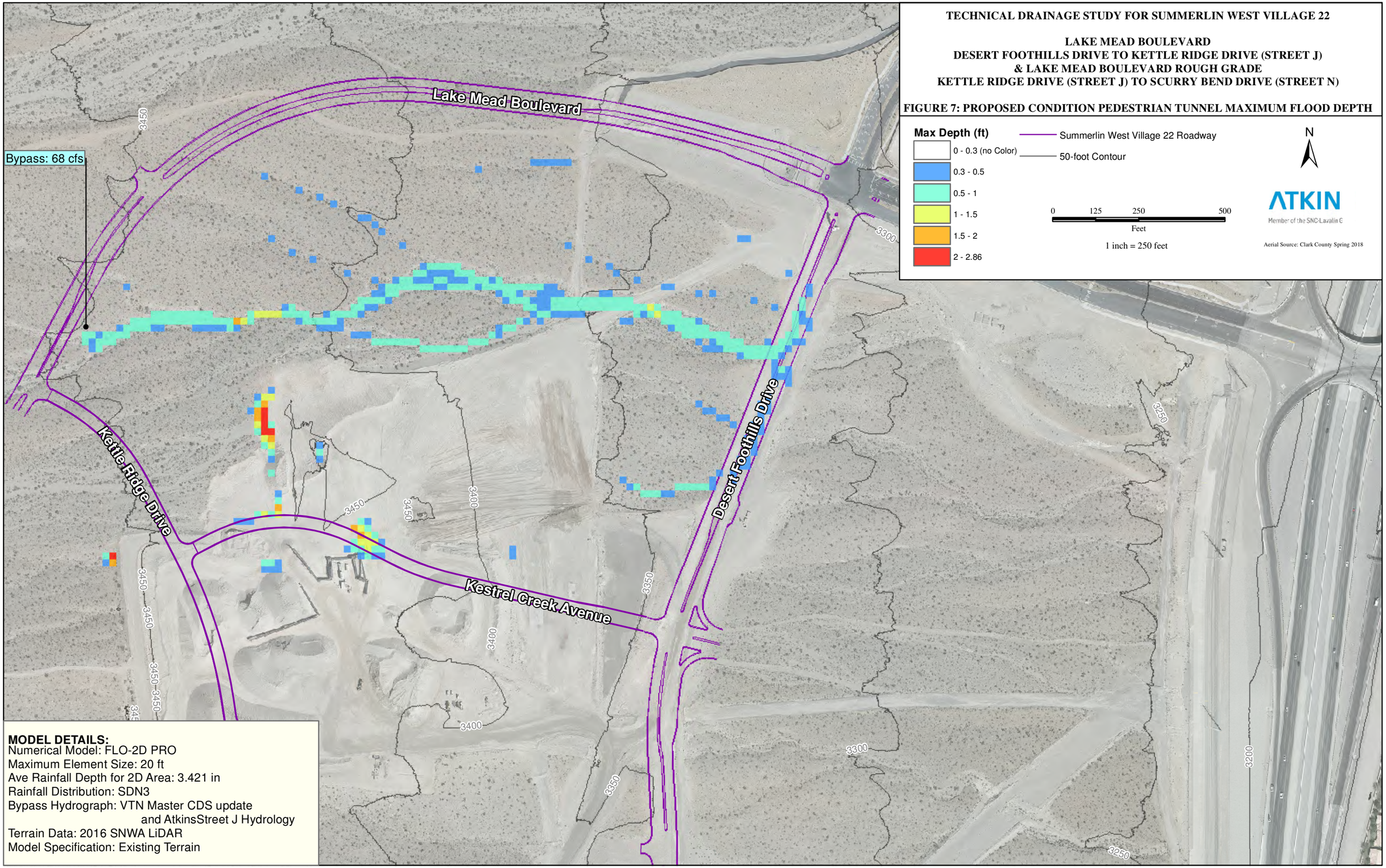
MODEL DETAILS:

Numerical Model: FLO-2D PRO
Maximum Element Size: 50 ft
Avg Rainfall Depth for 2D Area: 3.456 in
Rainfall Distribution: SDN 3
Terrain Data: 2016 SNWA LiDAR
Model Specification: Existing Terrain

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
& LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FIGURE 7: PROPOSED CONDITION PEDESTRIAN TUNNEL MAXIMUM FLOOD DEPTH



Max Depth (ft)
- 0 - 0.3 (no Color)
- 0.3 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.86

Summerlin West Village 22 Roadway
50-foot Contour

N

0 125 250 500
Feet
1 inch = 250 feet

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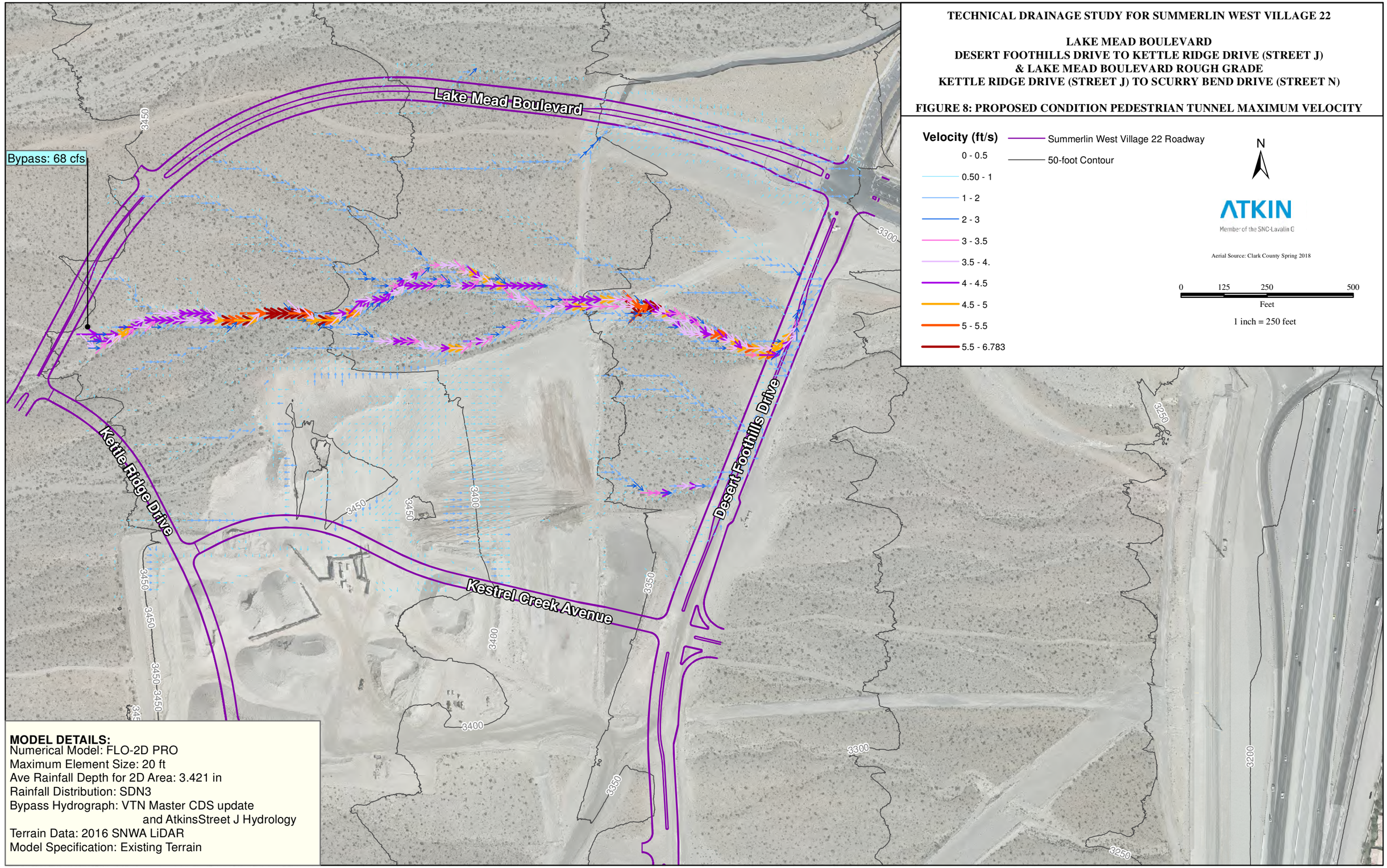
Aerial Source: Clark County Spring 2018

MODEL DETAILS:
Numerical Model: FLO-2D PRO
Maximum Element Size: 20 ft
Ave Rainfall Depth for 2D Area: 3.421 in
Rainfall Distribution: SDN3
Bypass Hydrograph: VTN Master CDS update
and AtkinsStreet J Hydrology
Terrain Data: 2016 SNWA LiDAR
Model Specification: Existing Terrain

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22

LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
& LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FIGURE 8: PROPOSED CONDITION PEDESTRIAN TUNNEL MAXIMUM VELOCITY



Velocity (ft/s)

- 0 - 0.5
- 0.50 - 1
- 1 - 2
- 2 - 3
- 3 - 3.5
- 3.5 - 4.
- 4 - 4.5
- 4.5 - 5
- 5 - 5.5
- 5.5 - 6.783

Summerlin West Village 22 Roadway

50-foot Contour

N

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Aerial Source: Clark County Spring 2018

0 125 250 500
Feet

1 inch = 250 feet

MODEL DETAILS:
Numerical Model: FLO-2D PRO
Maximum Element Size: 20 ft
Ave Rainfall Depth for 2D Area: 3.421 in
Rainfall Distribution: SDN3
Bypass Hydrograph: VTN Master CDS update
and AtkinsStreet J Hydrology
Terrain Data: 2016 SNWA LiDAR
Model Specification: Existing Terrain

3. Differences between Village 22 MCDS and Proposed TDS

Roadways in the Village 22 MCDS are represented by a letter or have been re-named. On the proposed improvement plans and in the report, the roadways are referenced by their proposed name. Table 8 compares the proposed name in the TDS to the MCDS letter.

Table 8 – Village 22 MCDS and TDS Roadway Names

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

Appendices

Appendix A. Reference Information

A.1. Summerlin West Village 22 Master Conceptual Drainage Study Reference Information

A.2. Hydraulic Grade Line reference sheets

A.1 Summerlin West Village 22 Master Conceptual Drainage Study Reference Information

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

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

REMARKS:

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

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

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

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

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

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

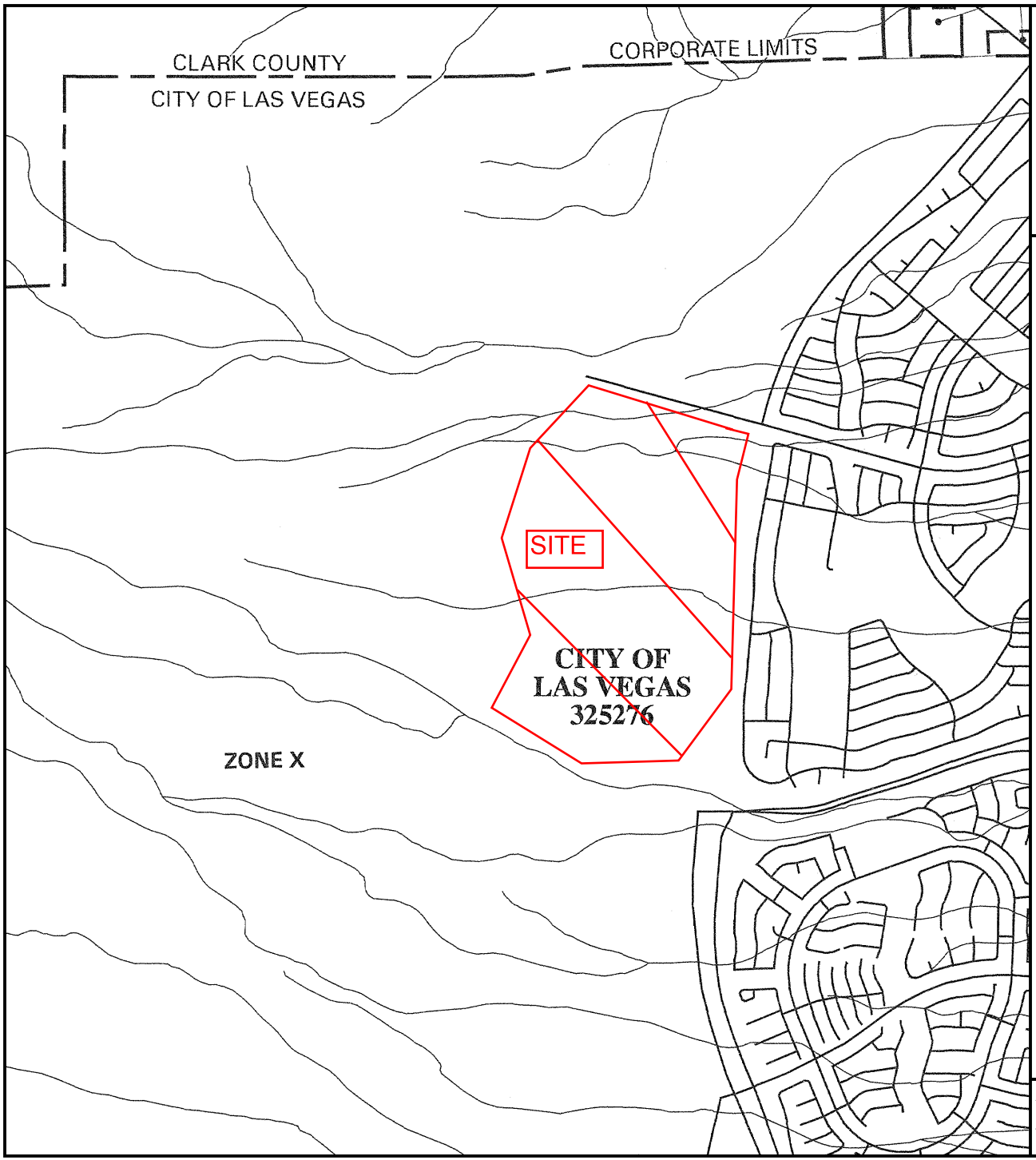
   A technical drainage study for the analysis, design and construction plans for the *Grand Park Detention Basin* must be submitted and approved by the City prior to the individual onsite parcel developments.

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

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

END OF REMARKS
WSP/AYS

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



MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

PANEL 2150 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 2150 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325276	2150	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	2150	E

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

MAP NUMBER
32003C2150 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FIGURE 3

REGIONAL FLOOD CONTROL DISTRICT

2018 Las Vegas Valley Master Plan Update

Figure W-4
Gowan Watershed

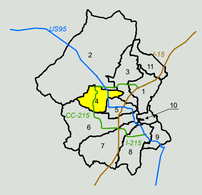
UPPER NORTHERN WATERSHED
GOWAN WATERSHED
TROPICANA/FLAMINGO WATERSHED
CENTRAL WATERSHED
LOWER NORTHERN WATERSHED

MOCCASIN OUTFALL DETENTION BASIN #2
MOCCASIN OUTFALL DETENTION BASIN #1
KYLE CANYON DETENTION BASIN
SOUTH ENVIRONMENTAL ENHANCEMENT AREA
PARK HIGHLANDS WEST DETENTION BASIN
EEKHORN SPRINGS DETENTION BASIN
FORT APACHE DETENTION BASIN
ANN ROAD DETENTION BASIN
RANCHO ROAD DETENTION BASIN
LOWER LAS VEGAS DETENTION BASIN
BOX CANYON DETENTION BASIN
LONE MOUNTAIN-BELTWAY DETENTION BASIN
LONE MOUNTAIN DETENTION BASIN
GOWAN NORTH DETENTION BASIN
VILLAGE 26 DETENTION BASIN
GOWAN SOUTH DETENTION BASIN
CAREY-LAKE MEAD DETENTION BASIN
GRAND PARK DETENTION BASIN
ANGEL PARK DETENTION BASIN
DETENTION BASIN #5
RAINBOW DETENTION BASIN
MEADOWS DETENTION BASIN
RED ROCK DETENTION BASIN
OKEY DETENTION BASIN
DESERT INN DETENTION BASIN
FAKE DETENTION BASIN
R4 DETENTION BASIN

Kyle Canyon
Elkhorn
Ann
Craig
Cheyenne
Summerlin
Spring Mountain
Flamingo
Las Vegas

Legend

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



1 Range
2 Upper Northern Las Vegas Wash
3 Lower Northern Las Vegas Wash
4 Gowan
5 Central
6 Flamingo/Tropicana
7 Duck Creek/Blue Diamond
8 Pittman
9 C-1
10 Lower Las Vegas Wash
11 Apex

N

Scale: 1 inch = 0.65 mile

0 0.325 0.65 1.3

Miles

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Louis Berger

ID / 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**						
0203	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	SUM5DB	GOW3A	6.73	3.40
APBE		**ANGEL PARK - BELTWAY BRANCH**						
0022	E	CONC CHNL 20'W 7'D 2:1 SS	1556	3366	CCSWFH15	GOW3A	3.39	1.81
0051	E	CONC CHNL 20'W 7'D 2:1 SS	1583	3366	CCSWFH15	GOW3A	3.39	2.77
0081	E	8' X 8' RCBC @ FAR HILLS	777	1048	CSWFH-15	GOW3A	0.59	2.32
0094	E	CONC CHNL 10'W 5'D 2:1 SS	1465	1048	CSWFH-15	GOW3A	0.59	1.88
0122	E	CONC CHNL 10'W 4'D 2:1 SS	1685	1048	CSWFH-15	GOW3A	0.59	0.80
0154	P0	8' X 6' RCB	5012	781	CSWFH-12	GOW3A	0.41	1.30
0249	P0	6' X 5' RCB	2858	606	CSWFH-11	GOW3A	0.31	3.00
APCH		**ANGEL PARK - CARRIAGE HILL BRANCH**						
0000	E	8' X 6' RCB	152	399	CSWFH-14	GOW3A	0.21	0.87
0003	P0	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		**ANGEL PARK - DESERT FOOTHILLS 2 BRANCH**						
0002	E	7' X 6' RCB	883	674	SWAA-2	GOW3A	0.68	1.08
APDF		**ANGEL PARK - DESERT FOOTHILLS BRANCH**						
0000	P0	10' X 6' RCB	1788	1428	CSWFH-9	GOW3B	0.80	3.55
0026	P0	8' X 6' RCB	1813	968	CSWFH-8	GOW3A	1.80	2.00
0073	P0	6' X 4' RCB	1922	486	CSWFH-4	GOW3A	1.52	4.40
0123	P0	42" RCP	1076	141	GPDB	GOW3A	1.29	6.00
0125	P0	130 AC-FT GRAND PARK DETENTION BASIN		1543	CSWFH-3	GOW3A	1.29	
0127	P0	6' X 6' RCB	2977	853	SWFH-1	GOW3A	0.69	3.80
0128	P0	5' X 4' RCB	2197	509	SWFH-2	GOW3A	0.37	5.70
APFH		**ANGEL PARK - FAR HILLS BRANCH**						
0000	E	2: 8' X 8' RCB	1070	2494	CCSWFH14	GOW3B	1.51	3.50
0019	E	2: 8' X 8' RCB	250	2149	CCSWFH-9	GOW3B	1.30	4.19
0024	E	16' X 8' RCAP	1951	2149	CCSWFH-9	GOW3B	1.30	5.10
0061	E	8' X 6' RCB	1435	839	CSWFH-7	GOW3A	0.50	2.00
0089	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		**DETENTION BASIN #5**						
0000	E	384 AC-FT DETENTION BASIN #5		6856	SUM5IN	GOW3A	6.73	
0008	P0	CONC CHNL 50'W 4.5'D 2:1 SS	2102	3634	CCDB54-7	GOW3A	4.13	5.20
0009	P0	CONC CHNL 50'W 4'D 2:1 SS	4180	3495	CDB55-7	GOW3A	2.60	5.80
0047	E	DIVERSION BERM WITH GABION BANK PROTECTION	1000	3634	CCDB54-7	GOW3A	4.13	1.30
0056	P0	CONC CHNL 80'W 4'D 2:1 SS	264	3634	CCDB54-7	GOW3A	4.13	1.30
0057	P0	CONC CHNL 50'W 3'D 2:1 SS	9922	1664	CDB54-4	GOW3A	0.81	6.80
0059	P0	CONC CHNL 100'W 3'D 2:1 SS	9075	2606	CDB54-7	GOW3A	3.31	7.00
0212	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		**ANGEL PARK - SUMMERLIN PARKWAY**						
0183	E	CONC CHNL 10'W 6'D 2:1 SS	1680	884	C11B-1	GOW3A	0.84	1.70
GOB3		**GOWAN LONE MOUNTAIN SYST. 3 BELTWAY**						
0000	E	66" RCP	1370	341	SV22-1	GOW3A	0.18	4.50
GOBE		**GOWAN LONE MOUNTAIN SYST. BELTWAY**						
0000	E	20' X 10' RCBC @ ACCESS RD	30	1044	CSV22	GOW3A	0.67	5.67
0001	E	CONC CHNL 20'W 5'D 2:1 SS	1100	1044	CSV22	GOW3A	0.67	6.50
0021	E	CONC CHNL 11'W 6.8'D 0:1 SS	2143	1044	CSV22	GOW3A	0.67	6.50
0058	E	CONC CHNL 15'W 7.5'D 0:1 SS	487	1044	CSV22	GOW3A	0.67	3.93
0065	E	CONC CHNL 17'W 7.5'D 0:1 SS	844	1044	CSV22	GOW3A	0.67	0.76
0088	E	2: 10' X 9' RCBC @ LAKE MEAD	400	782	SV22-2	GOW3A	0.49	0.50
0096	E	CONC CHNL 20'W 9'D 2:1 SS	627	782	SV22-2	GOW3A	0.49	0.50
0108	E	CONC CHNL 20'W 6'D 2:1 SS	1021	782	SV22-2	GOW3A	0.49	0.50
0127	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		**GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3**						
0010	E	CONC CHNL 20'W 10'D 0:1 SS	3037	3277	CRCLMT1R	GOW3A	7.31	2.78
0068	E	TRANSITION STRUCTURE	100	3277	CRCLMT1R	GOW3A	7.31	3.50
0070	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		**GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3**						
0100	E	CONC CHNL 20'W 10'D 0:1 SS	200	1271	CRCSV22	GOW3A	4.99	5.67
0115	E	96" RCP OUTLET	670	666	DET26	GOW3A	4.31	0.29
0128	E	305 AC-FT VILLAGE 26 DETENTION BASIN		3615	VIL26IN	GOW3A	4.31	
0137	E	CONC CHNL 20'W 7.5'D 0:1 SS	2720	3615	VIL26IN	GOW3A	4.31	6.50
0188	E	CONC CHNL 20'W 8'D 0:1 SS	563	3615	VIL26IN	GOW3A	4.31	3.91
0197	E	14' X 14' RCB	890	3615	VIL26IN	GOW3A	4.31	0.88
0214	E	Dual 10' X 14' RCB	124	3615	VIL26IN	GOW3A	4.31	0.57
0216	P0	CONC CHNL 50'W 4'D 2:1 SS	4060	3524	CSV26-1	GOW3A	4.02	6.08
0289	P0	CONC CHNL 50'W 3.5'D 2:1 SS	6215	2281	30	GOW3A	2.44	7.95
0290	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		**GOWAN LONE MOUNTAIN SYSTEM-BRANCH 4**						
0000	E	14' X 8' RCB	554	2243	CLMT1R	GOW3A	2.33	2.50
0010	E	2: 9' X 8' RCB	820	2243	CLMT1R	GOW3A	2.33	4.74
0025	E	SOIL CEMENT CHNL 60'W 8'D 3-4:1 SS	320	2243	CLMT1R	GOW3A	2.33	2.00
0026	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).

REGIONAL FLOOD CONTROL DISTRICT

2018 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F-22

LEGEND

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

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

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

Construction Features

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

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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

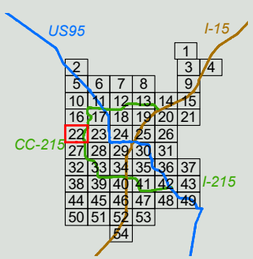
Category A	Category B
Channel	Channel
Stormdrain	Stormdrain
Crossing	Crossing

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

AerialSource:Esri World Imagery 2017



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Louis Berger

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 24
FLOOD CONTROL FACILITIES

LEGEND

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

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

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

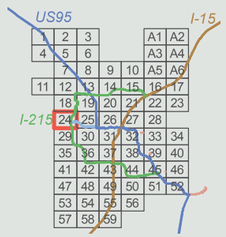


FIGURE 4A - MPU Facilities

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	SUM5DB	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).

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 24

LEGEND

ID (Facility Identifier) AABB
- Parent Stream Name
- Stream Name

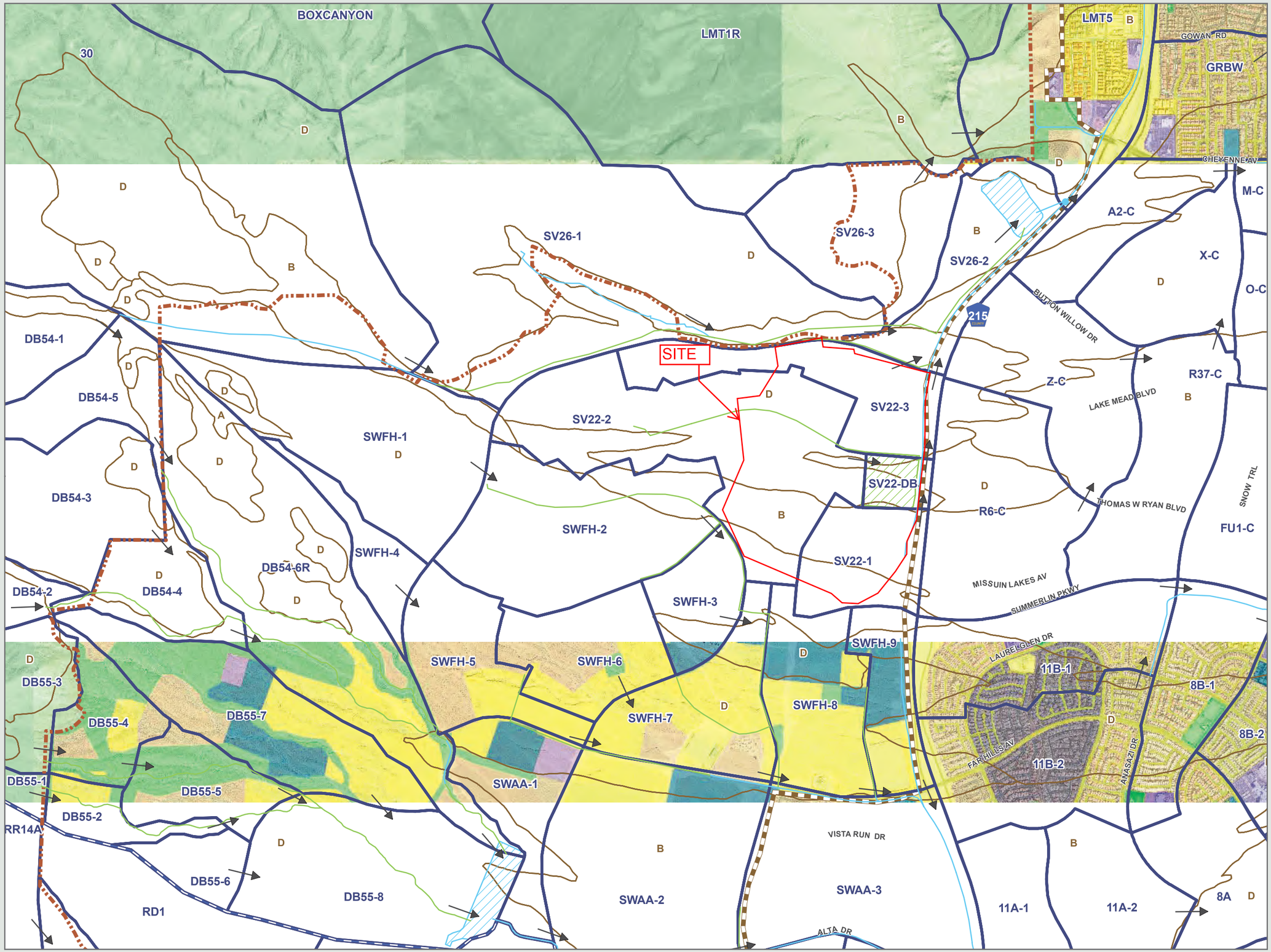
River Mile 0000
- Distance Above Confluence with Parent Stream (Miles)
- Miles in Hundredths

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

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

Construction Features

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



2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H- 24
HYDROLOGIC SUMMARY

LEGEND

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

Flood Control Facilities

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

Type Hydrologic Soil Groups

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

Typical Land Use

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

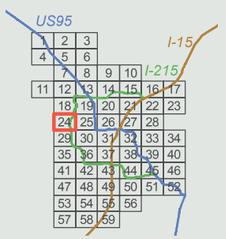
* Drought Ordinance Applied

N

0 500 1,000 2,000 3,000
Feet

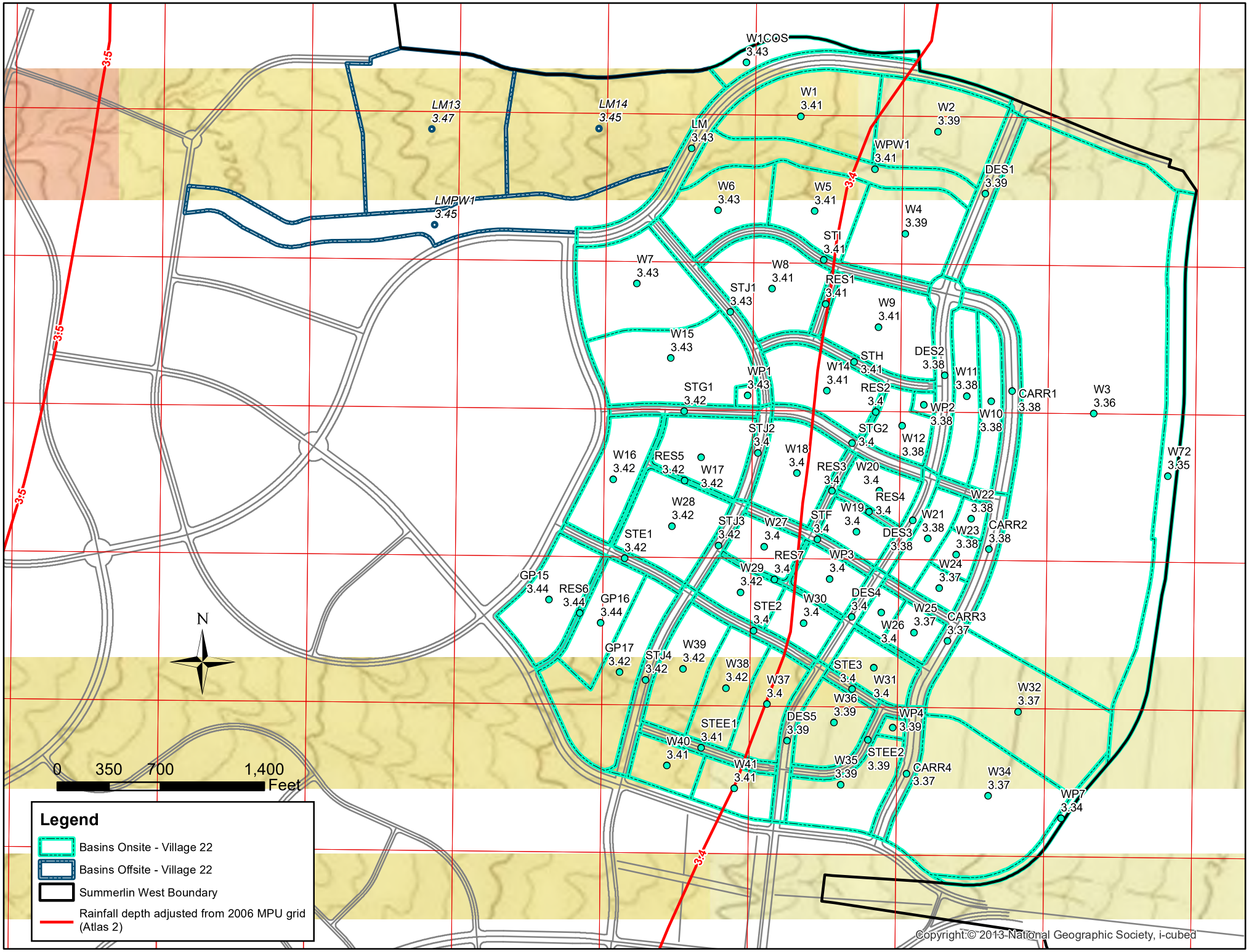
Scale: 1 inch = 2,000 feet

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



PBS&J
PB

FIGURE 4B - MPU HYDROLOGIC SUMMARY



H:\7861\Village 22 Master\GIS\Rainfall\mxd\Village22-2006MPU-Precipitation.mxd Date: 6/11/2018



GRAPHIC SCALE

350 0 175 350 700

1" = 350'

LEGEND

- BASIN BOUNDARY
- A — BASIN DESIGNATION
- CONCENTRATION POINT
- FLOW ARROW

ULTIMATE CONDITION
HEC-1 SUMMARY TABLE

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

REVISION | BY | DATE | REV

THE HOWARD HUGHES CORPORATION
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LAS VEGAS, NEVADA 89135

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CONSULTING ENGINEERS ● PLANNERS ● LAND SURVEYORS

FIGURE 6
ULTIMATE CONDITION BASIN MAP

SUMMERLIN WEST VILLAGE 22

DRAWN BY: AH
AUGUST 2018
DESIGNED BY: JYA
CHECKED BY: JYA
PROJECT NO: 7861
SCALE: 1" = 300' HORIZ. N/A VERT.

SHEET
OF SHEETS
DRAWING NO.

H:\7861\Village 22 Master\Drainage\4_ADD 1 TO UP\1A_Figures\Figure 6 - Village 22 Drainage Basin Map.dwg



GRAPHIC SCALE

300 0 150 300 600

1" = 300'

NORTH

LEGEND

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

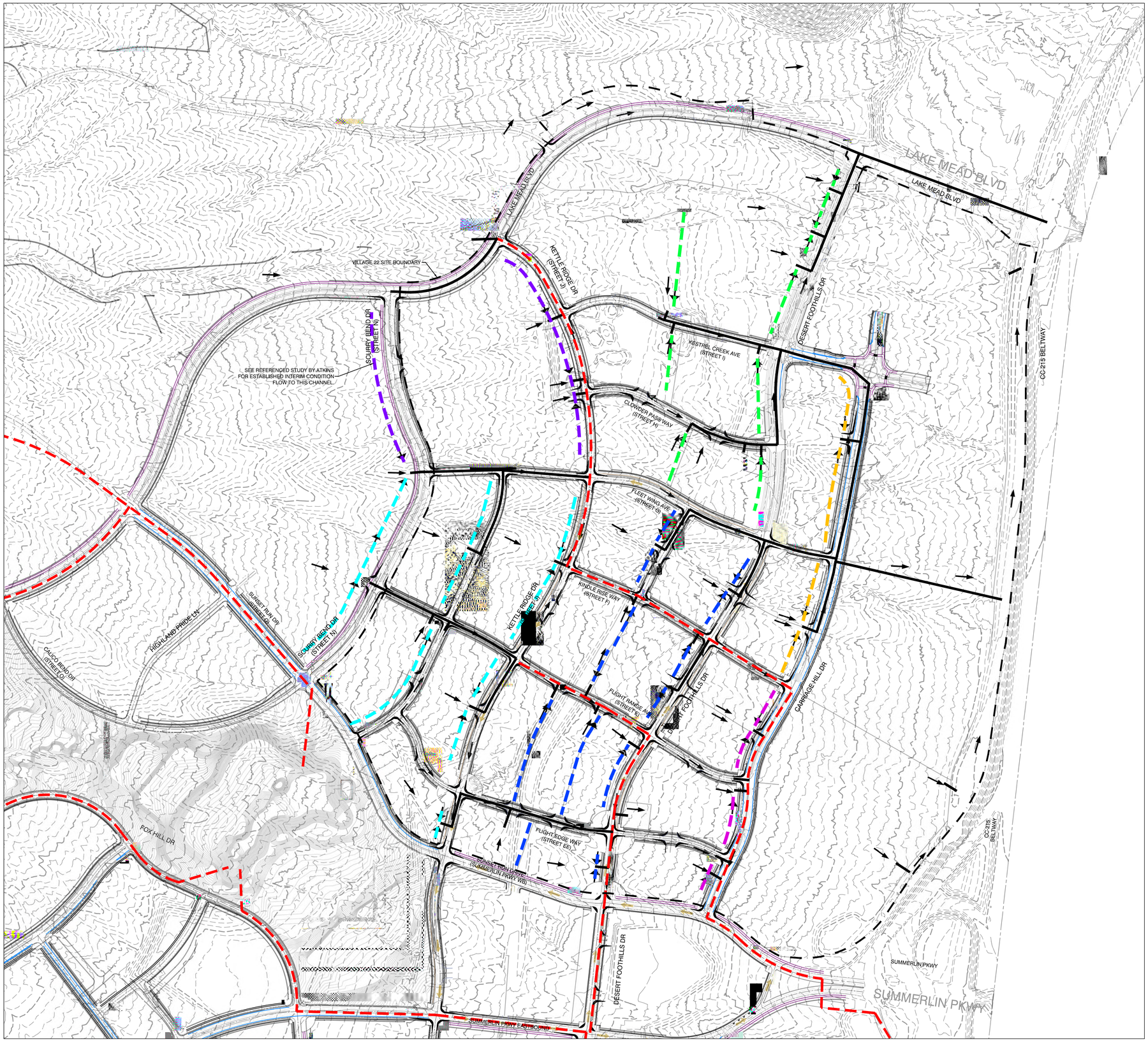
VILLAGE 22 LOCAL FLOOD PROTECTION FACILITIES

Facility #	Design Slope %	Q100 cfs	Velocity ft/s	Facility	Facility #	Design Slope %	Q100 cfs	Velocity ft/s	Facility
4	5.4	41	18.69	30" RCP	56	1.5	44	11.54	30" RCP
5	2.0	47	13.16	30" RCP	58	1.5	15	8.93	30" RCP
6	2.7	62	15.58	30" RCP	61	3.1	389	26.21	60" RCP
7	2.0	32	12.11	30" RCP	62	8.0	35	20.39	30" RCP
8	2.9	93	17.93	36" RCP	63	1.5	43	11.50	30" RCP
9	8.0	66	14.44	36" RCP	64	8.0	48	22.29	36" RCP
10	3.0	160	20.54	42" RCP	65	8.2	260	33.90	42" RCP
11	N/A	201	N/A	EX 66" RCP**	66	3.1	11	10.63	30" RCP
12A	8.0	53	22.91	36" RCP	68	1.3	9	7.36	30" RCP
12B	2.6	53	15.05	36" RCP	69	8.0	11	14.88	30" RCP
13	8.0	58	10.63	36" RCP	72	7.0	29	18.72	30" RCP
19	0.5	50	8.01	42" RCP	74	6.3	5	10.83	30" RCP
20	5.8	61	20.97	42" RCP	77A	8.0	53	22.91	36" RCP
21	0.5	30	7.07	36" RCP	77B	7.4	209	31.33	42" RCP
22	9.7	91	28.22	42" RCP	78	8.0	31	20.01	30" RCP
23	0.8	33	8.46	30" RCP	79	8.1	92	26.52	36" RCP
24	10.1	124	31.13	42" RCP	80	3.1	8	9.69	30" RCP
25	1.5	6	6.89	30" RCP	81	8.0	100	27.08	36" RCP
27	2.3	59	14.86	36" RCP	82	2.9	22	12.60	30" RCP
29	0.5	25	6.65	30" RCP	83	3.2	23	13.22	30" RCP
30	7.0	35	19.71	30" RCP	84	0.5	16	6.05	30" RCP
33	0.6	22	6.99	30" RCP	85	2.3	20	11.29	30" RCP
34	5.0	58	19.78	36" RCP	86	8.0	16	16.59	30" RCP
35	1.0	2	4.32	30" RCP	87	8.0	19	17.43	30" RCP
36	1.0	74	11.43	42" RCP	88	7.8	30	19.83	30" RCP
37	0.9	198	13.98	60" RCP	89	8.0	13	15.62	30" RCP
40	7.6	38	20.77	30" RCP	90	7.8	53	22.70	36" RCP
41	0.9	265	13.39	6'X5' RCB	91	0.5	2	3.39	30" RCP
43	0.5	28	6.73	30" RCP	92	2.7	16	11.25	30" RCP
44	3.3	33	14.72	30" RCP	93	7.4	24	18.12	30" RCP
45	6.8	46	20.97	30" RCP	94	6.2	19	15.91	30" RCP
50	7.9	26	18.97	30" RCP	95	4.0	77	19.52	42" RCP
51	2.5	34	13.37	30" RCP	96	5.0	56	23.05	36" RCP
52	7.1	80	24.48	36" RCP	97	5.0	339	30.51	54" RCP
55	7.3	29	19.01	30" RCP	98	N/A	138	N/A	EX 48" RCP***

*Replaces existing 30" RCP stub provided in Lake Mead Study

**Existing 66" RCP per Lake Mead Blvd Study

***Existing Facility (Per Lake Mead Blvd Study) can accept 138 cfs and may be used for flexibility



NORTH

GRAPHIC SCALE

300 0 150 300 600

1" = 300'

CHANNEL FACILITY LEGEND

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

STORM DRAIN LEGEND

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

REV	DATE	BY	REVISION

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

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH. (702) 873-7550 FAX (702) 362-2597 WEB WWW.VTNNV.COM
CONSULTING ENGINEERS ● PLANNERS ● LAND SURVEYORS

FIGURE 8
INTERIM CONDITION DITCH LOCATIONS

SUMMERLIN WEST VILLAGE 22

DRAWN BY: AH
AUGUST 2018
DESIGNED BY: JYA
CHECKED BY: JYA
PROJECT NO: 7861
SCALE: 1" = 300' HORIZ. N/A VERT.

SHEET
OF SHEETS
DRAWING NO.

H:\7861\Village 22 Master Drainage\4_ADD1 TO LP1\A_Figures\Figure 8 - Interim Condition Basin Map.dwg

```
1****************************************                                    ****************************************
 *                                      *                                   *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                   *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                                   *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                                   *         609 SECOND STREET            *
 *                                      *                                   *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   19MAR19  TIME  11:17:59  *                                   *          (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    ULTIMATE CONDITION HYDROLOGIC MODEL
             2          ID    INPUT FILE DATE = NOVEMBER 1, 2018
             3          ID    DESIGN STORM = 100-YEAR 6-HR STORM
             4          ID    STORM DISTRIBUTION = SDN #3
             5          ID    MODELED BY VTN (JYA)
             6          ID
             7          ID    ******************************************************
             8          ID    * UPDATE #1 - SUMMERLIN WEST VILLAGE 22               *
             9          ID    ******************************************************
            10          ID
            11          ID
            12          ID
            13          ID
            14          ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
            15          ID
            16          ID  100-YEAR,  6-HOUR STORM,  SDN3
            17          ID
            18          IT       5       0       0     100
            19          IO       5       0       0
            20          IN       5       0       0
            21          JR    PREC    1.00
                        *

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

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

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

```
              44          UD   0.100
                          *
1                                     HEC-1 INPUT                                          PAGE  2

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


              45          KK   CDES1
              46          KM   COMBINE D AND DES1
              47          HC       2
                          *

              48          KK   COS-2
              49          BA  0.0159
              50          PB    3.41
              51          LS       0    89.0
              52          UD   0.100
                          *

              53          KK  CCOS-2
              54          KM   COMBINE CDES1 AND COS-2
              55          HC       2
                          *

              56          KK       A
              57          BA  0.0264
              58          PB    3.41
              59          LS       0    95.0
              60          UD   0.078
                          *

              61          KK      CA
              62          KM   COMBINE CCOS-2 AND A
              63          HC       2
                          *

              64          KK     CP1
              65          KM   COMBINE LM AND CA
              66          HC       2
                          *

              67          KK     STI
              68          KM   STREET I
              69          BA  0.0038
              70          PB    3.41
              71          LS       0    98.0
              72          UD   0.050
                          *

              73          KK       C
              74          BA  0.0183
              75          PB    3.41
              76          LS       0    95.0
              77          UD   0.054
                          *
1                                     HEC-1 INPUT                                          PAGE  3

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


              78          KK    CSTI
              79          KM   COMBINE C AND STI
              80          HC       2
                          *

              81          KK       G
              82          BA  0.0111
              83          PB    3.41
              84          LS       0    95.0
              85          UD   0.056
                          *

              86          KK      CG
              87          KM   COMBINE CSTI AND CG
              88          HC       2
                          *

              89          KK       H
              90          BA  0.0120
              91          PB    3.41
              92          LS       0    95.0
              93          UD   0.053
                          *

              94          KK      CH
              95          KM   COMBINE CG AND CH
              96          HC       2
                          *
```

```
 97          KK     STH
 98          KM   STREET H
 99          BA  0.0036
100          PB    3.41
101          LS       0    98.0
102          UD   0.057
             *

103          KK       J
104          BA  0.0091
105          PB    3.41
106          LS       0    95.0
107          UD   0.051
             *

108          KK      CJ
109          KM   COMBINE J AND STH
110          HC       2
             *
```



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

111          KK       K
112          BA  0.0081
113          PB    3.40
114          LS       0    95.0
115          UD   0.050
             *

116          KK      CK
117          KM   COMBINE CJ AND K
118          HC       2
             *

119          KK    NP-1
120          BA  0.0008
121          PB    3.38
122          LS       0    89.0
123          UD   0.097
             *

124          KK   CNP-1
125          KM   COMBINE CK AND NP-1
126          HC       2
             *

127          KK    DES2
128          BA   .0053
129          PB    3.38
130          LS       0    98.0
131          UD   0.058
             *

132          KK   CDES2
133          KM   COMBINE DES2 & CNP-1
134          HC       2
             *

135          KK     CP2
136          KM   COMBINE CDES2 & CH
137          HC       2
             *

138          KK   CARR1
139          BA  0.0104
140          PB    3.38
141          LS       0    98.0
142          UD   0.056
             *

143          KK       I
144          BA  0.0165
145          PB    3.38
146          LS       0    92.0
147          UD   0.083
             *
```



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

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

151          KK       N
```

```
 152          BA  0.0104
 153          PB    3.40
 154          LS       0    95.0
 155          UD   0.054
              *

 156          KK    STFF
 157          BA  0.0017
 158          PB    3.40
 159          LS       0    98.0
 160          UD   0.050
              *

 161          KK   CSTFF
 162          KM   COMBINE N AND STFF
 163          HC       2
              *

 164          KK    STG2
 165          BA  0.0044
 166          PB    3.40
 167          LS       0    98.0
 168          UD   0.050
              *

 169          KK   CSTG2
 170          KM   COMBINE  CSTFF AND STG2
 171          HC       2
              *

 172          KK       O
 173          BA  0.0051
 174          PB    3.40
 175          LS       0    92.2
 176          UD   0.055
              *

 177          KK       P
 178          BA  0.0053
 179          PB    3.40
 180          LS       0    92.2
 181          UD   0.060
              *
```



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

 182          KK     COP
 183          KM   COMBINE P AND O
 184          HC       2
              *

 185          KK    DES3
 186          BA  0.0029
 187          PB    3.38
 188          LS       0    98.0
 189          UD   0.069
              *

 190          KK   CDES3
 191          KM   COMBINE COP & DES3
 192          HC       2
              *

 193          KK     CP3
 194          KM   COMBINES CSTG2 & CDES3
 195          HC       2
              *

 196          KK       Q
 197          BA  0.0057
 198          PB    3.38
 199          LS       0    92.2
 200          UD   0.057
              *

 201          KK       R
 202          BA  0.0055
 203          PB    3.37
 204          LS       0    94.3
 205          UD   0.053
              *

 206          KK     CQR
 207          KM   COMBINE R AND Q
 208          HC       2
              *
```

```
 209          KK   CARR2
 210          BA  0.0056
 211          PB    3.38
 212          LS       0    98.0
 213          UD   0.075
              *

 214          KK  CCARR2
 215          KM   COMBINE CQR AND CARR2
 216          HC       2
              *
1                                    HEC-1 INPUT                                         PAGE  7

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


 217          KK     CP4
 218          KM   COMBINE CP3, CCARR1, AND CCARR2
 219          HC       3
              *

 220          KK      II
 221          BA  0.0306
 222          PB    3.37
 223          LS       0    92.7
 224          UD   0.062
              *

 225          KK       X
 226          BA  0.0257
 227          PB    3.37
 228          LS       0    90.0
 229          UD   0.080
              *

 230          KK       B
 231          BA  0.1361
 232          PB    3.36
 233          LS       0    93.5
 234          UD   0.077
              *

 235          KK    DC-1
 236          BA  0.0169
 237          PB    3.35
 238          LS       0    98.0
 239          UD   0.050
              *

 240          KK   COS-3
 241          BA  0.0027
 242          PB    3.36
 243          LS       0    84.7
 244          UD   0.140
              *

 245          KK  DUMMY1
 246          KM   REGIONAL FACILITY - BELTWAY CHANNEL NORTH
 247          KM   COMBINE CP1, CP4, II, X, B, DC1, AND COS-3
 248          HC       7
              *

 249          KK    3-O*
 250          KM   REFERENCED FROM THE OVERALL SWPA MPU
 251          BA  0.0805
 252          PB    3.48
 253          LS       0    94.5
 254          UD   0.103
              *
1                                    HEC-1 INPUT                                         PAGE  8

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


 255          KKOFF-COS2
 256          KM   OFFSITE BASIN
 257          BA   .0299
 258          PB    3.45
 259          LS       0    86.0
 260          UD   0.110
              *

 261          KKCOFFCOS2
 262          KM   COMBINE 3-O AND OFF-COS2
 263          HC       2
              *

 264          KK       E
 265          BA  0.0218
```

```
             266          PB    3.43
             267          LS       0    95.0
             268          UD   0.062
                          *

             269          KK    STJ1
             270          KM   STREET J1
             271          BA  0.0059
             272          PB    3.43
             273          LS       0    98.0
             274          UD   0.050
                          *

             275          KK   CSTJ1
             276          KM   COMBINE OFF-COS2, E, AND STJ1
             277          HC       3
                          *

             278          KK    NP-2
             279          BA  0.0024
             280          PB    3.43
             281          LS       0    89.0
             282          UD   0.059
                          *

             283          KK    ES-1
             284          BA  0.0220
             285          PB    3.43
             286          LS       0    95.0
             287          UD   0.063
                          *

             288          KK   CES-1
             289          KM   COMBINE CSTJ, NP-2, AND ES-1
             290          HC       3
                          *
```



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

             291          KK    OFF4
             292          BA  0.0823
             293          PB    3.44
             294          LS       0    94.8
             295          UD   0.077
                          *

             296          KK       L
             297          BA  0.0126
             298          PB    3.42
             299          LS       0    94.6
             300          UD   0.050
                          *

             301          KK    STL1
             302          BA  0.0028
             303          PB    3.42
             304          LS       0    98.0
             305          UD   0.050
                          *

             306          KK   CSTL1
             307          KM   COMBINE L AND STL1
             308          HC       2
                          *

             309          KK    STG1
             310          BA  0.0028
             311          PB    3.42
             312          LS       0    98.0
             313          UD   0.050
                          *

             314          KK   CSTG1
             315          KM   COMBINE OFF4, CSTL, AND STG1
             316          HC       3
                          *

             317          KK       M
             318          BA  0.0176
             319          PB    3.42
             320          LS       0    94.3
             321          UD   0.053
                          *

             322          KK    STJ2
             323          BA  0.0048
             324          PB    3.42
```

```
            325          LS       0    98.0
            326          UD   0.072
                         *
1                                       HEC-1 INPUT                                          PAGE 10

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


            327          KK  DUMMY2
            328          KM   REGIONAL FACILITY
            329          HC       4
                         *

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

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

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

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

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

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

            358          KK  DUMMY3
            359          KM   COMBINE S, STF, NP-3, CDES4
            360          HC       5
                         *
1                                       HEC-1 INPUT                                          PAGE 11

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


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

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

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

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

            379          KK  DUMMY4
```

```
          380          KM   REGIONAL FACILITY
          381          HC       3
                       *

          382          KK    STE3
          383          BA  0.0017
          384          PB    3.40
          385          LS       0    98.0
          386          UD   0.050
                       *

          387          KK      EE
          388          BA  0.0104
          389          PB    3.39
          390          LS       0    90.5
          391          UD   0.075
                       *

          392          KK  DUMMY5
          393          KM   REGIONAL FACILITY
          394          HC       3
                       *
1                                       HEC-1 INPUT                                          PAGE 12

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


          395          KK   STEE3
          396          BA  0.0023
          397          PB    3.39
          398          LS       0    98.0
          399          UD   0.050
                       *

          400          KK      HH
          401          BA  0.0072
          402          PB    3.39
          403          LS       0    94.2
          404          UD   0.055
                       *

          405          KK   CARR4
          406          BA  0.0048
          407          PB    3.37
          408          LS       0    98.0
          409          UD   0.056
                       *

          410          KK  DUMMY6
          411          KM   REGIONAL FACILITY - BELTWAY CHANNEL SOUTH
          412          HC       4
                       *

          413          KK    OFF5
          414          BA  0.0199
          415          PB    3.44
          416          LS       0    92.2
          417          UD   0.050
                       *

          418          KK    STE1
          419          BA  0.0027
          420          PB    3.42
          421          LS       0    98.0
          422          UD   0.050
                       *

          423          KK       Y
          424          BA  0.0126
          425          PB    3.44
          426          LS       0    92.4
          427          UD   0.071
                       *

          428          KK      CY
          429          KM   COMBINES OFF5, Y, AND STE1
          430          HC       3
                       *
1                                       HEC-1 INPUT                                          PAGE 13

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


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

```
          436          KK   CSTL2
          437          KM   COMBINES CY AND STL2
          438          HC       2
                       *

          439          KK       Z
          440          BA  0.0110
          441          PB    3.42
          442          LS       0    87.6
          443          UD   0.086
                       *

          444          KK    STJ3
          445          BA  0.0038
          446          PB    3.42
          447          LS       0    98.0
          448          UD   0.058
                       *

          449          KK   CSTJ3
          450          KM   COMBINE Z AND STJ3
          451          HC       2
                       *

          452          KK  DUMMY7
          453          KM   REGIONAL FACILITY
          454          HC       2
                       *

          455          KK    STE2
          456          BA  0.0028
          457          PB    3.40
          458          LS       0    98.0
          459          UD   0.050
                       *

          460          KK      BB
          461          BA  0.0097
          462          PB    3.42
          463          LS       0    91.0
          464          UD   0.074
                       *
1                                          HEC-1 INPUT                                          PAGE 14

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

          465          KK       T
          466          BA  0.0063
          467          PB    3.42
          468          LS       0    92.0
          469          UD   0.055
                       *

          470          KK      CC
          471          BA  0.0086
          472          PB    3.42
          473          LS       0    90.7
          474          UD   0.079
                       *

          475          KK      DD
          476          BA  0.0071
          477          PB    3.40
          478          LS       0    90.6
          479          UD   0.079
                       *

          480          KK  DUMMY8
          481          KM   REGIONAL FACILITY
          482          HC       6
                       *

          483          KK    DES5
          484          BA  0.0028
          485          PB    3.40
          486          LS       0    98.0
          487          UD   0.050
                       *

          488          KK    NP-4
          489          BA  0.0011
          490          PB    3.39
          491          LS       0    84.1
          492          UD   0.071
                       *

          493          KK  DUMMY9
```

```
 494          KM   REGIONAL FACILITY
 495          HC       3
              *

 496          KK      AA
 497          BA  0.0073
 498          PB    3.43
 499          LS       0    93.0
 500          UD   0.065
              *
1                                        HEC-1 INPUT                                          PAGE 15

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


 501          KK    STJ4
 502          BA  0.0016
 503          PB    3.41
 504          LS       0    98.0
 505          UD   0.059
              *

 506          KK   CSTJ4
 507          KM   COMBINE AA AND STJ4
 508          HC       2
              *

 509          KK   STEE1
 510          BA  0.0023
 511          PB    3.44
 512          LS       0    98.0
 513          UD   0.050
              *

 514          KK  CSTEE2
 515          KM   COMBINES CSTJ4 AND STEE1
 516          HC       2
              *

 517          KK   STEE2
 518          BA  0.0038
 519          PB    3.41
 520          LS       0    98.0
 521          UD   0.050
              *

 522          KK      FF
 523          BA  0.0048
 524          PB    3.41
 525          LS       0    94.2
 526          UD   0.059
              *

 527          KK     CFF
 528          KM   COMBINES CSTEE2,STEE2, AND FF
 529          HC       3
              *

 530          KK DUMMY10
 531          KM   REGIONAL FACILITY
 532          HC       2
              *

 533          KK      GG
 534          BA  0.0058
 535          PB    3.41
 536          LS       0    94.2
 537          UD   0.050
              *
1                                        HEC-1 INPUT                                          PAGE 16

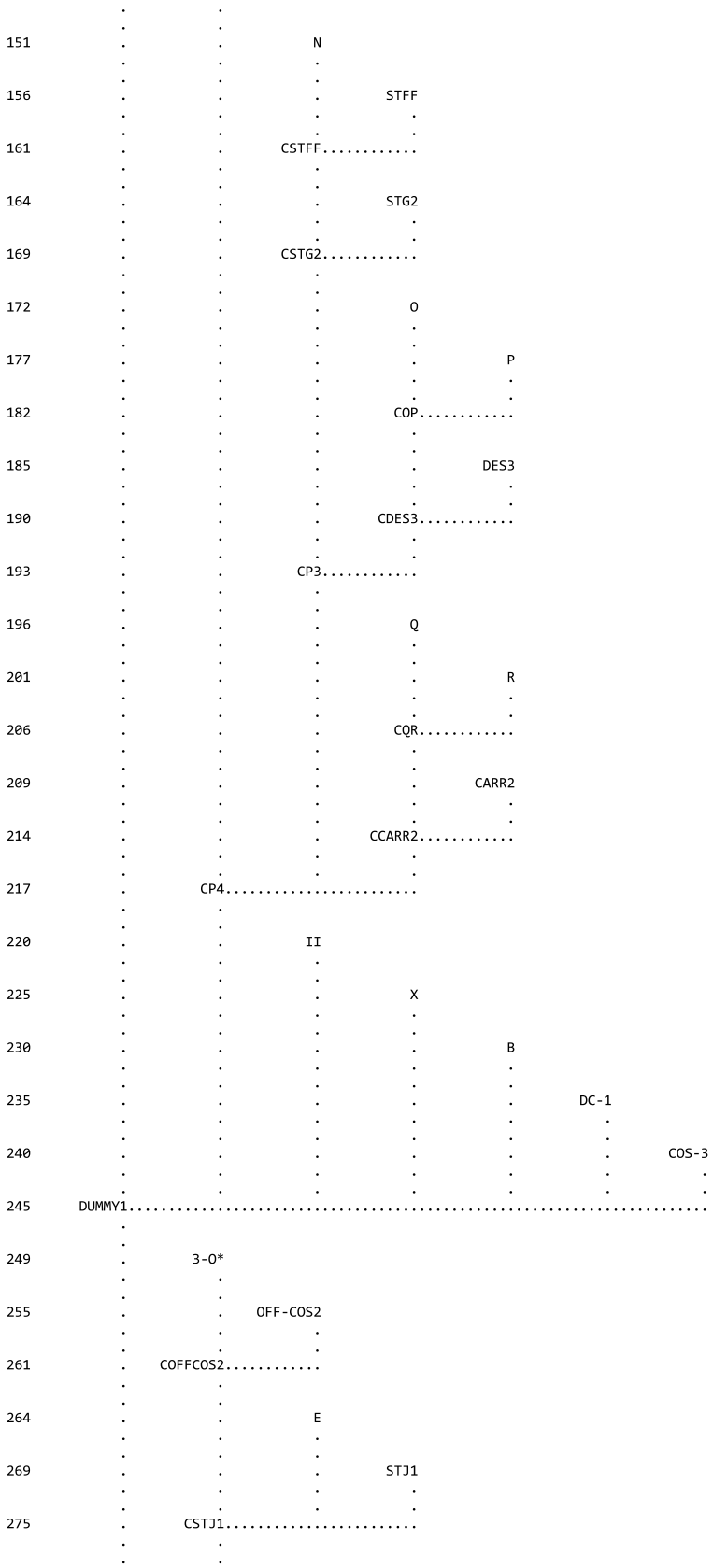
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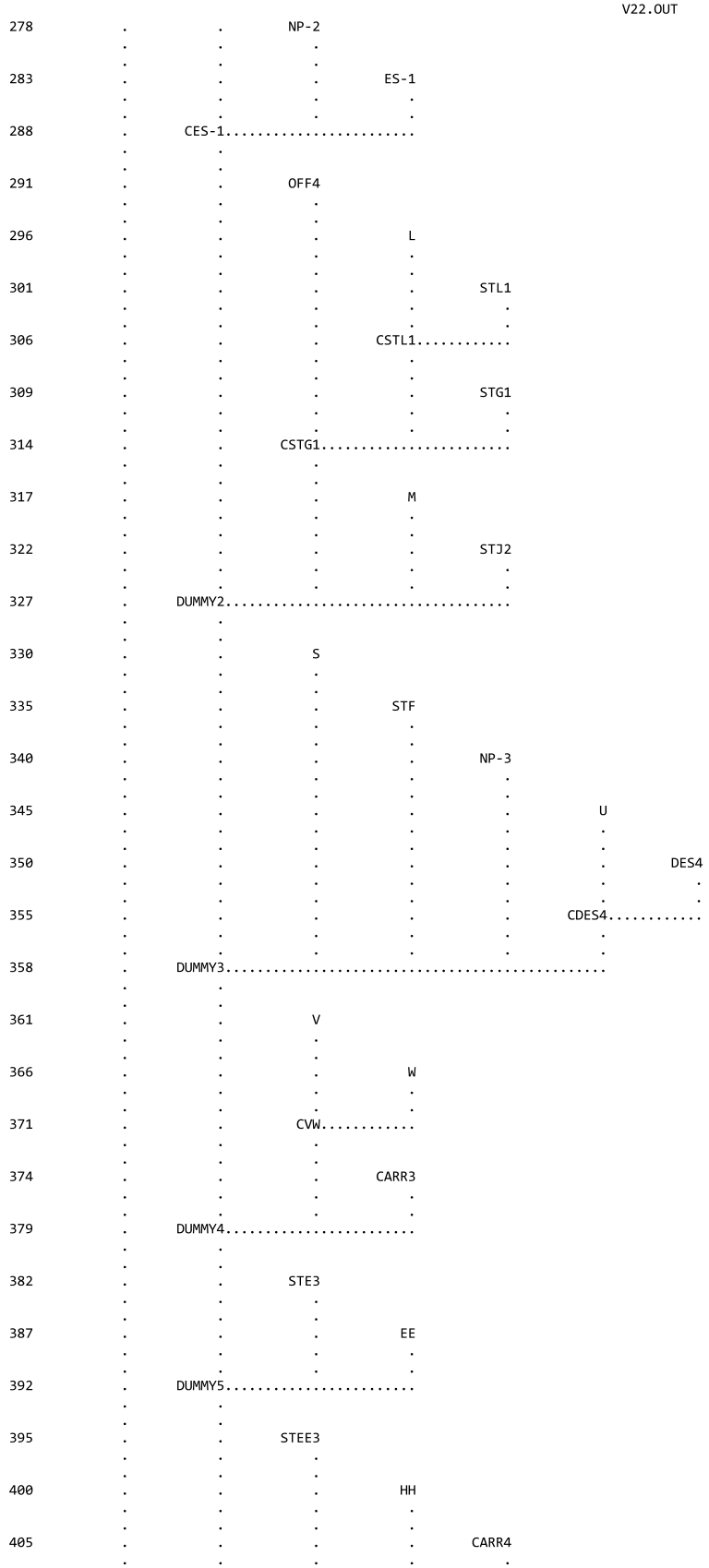

 538          KK    DES6
 539          BA  0.0017
 540          PB    3.39
 541          LS       0    98.0
 542          UD   0.053
              *

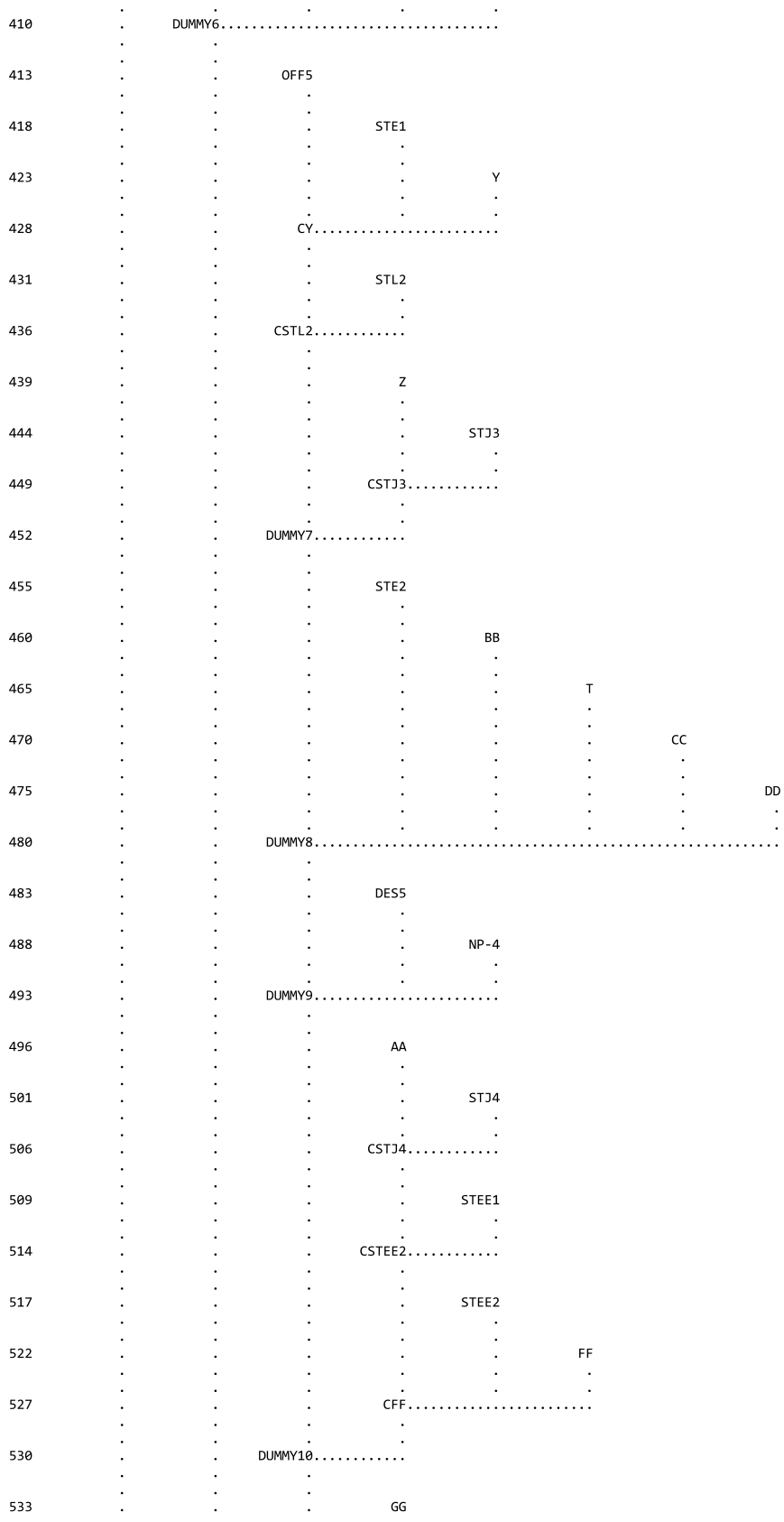
 543          KK DUMMY11
 544          KM   REGIONAL FACILITY - DESERT FOOTHILLS
 545          HC       3
              *
 546          ZZ
1
      SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
```

```
LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
 NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  22          LM
               .
               .
  35           .           D
               .           .
               .           .
  40           .           .        DES1
               .           .           .
               .           .           .
  45           .       CDES1............
               .           .
               .           .
  48           .           .       COS-2
               .           .           .
               .           .           .
  53           .      CCOS-2............
               .           .
               .           .
  56           .           .           A
               .           .           .
               .           .           .
  61           .          CA............
               .           .
               .           .
  64         CP1............
               .
               .
  67           .         STI
               .           .
               .           .
  73           .           .           C
               .           .           .
               .           .           .
  78           .        CSTI............
               .           .
               .           .
  81           .           .           G
               .           .           .
               .           .           .
  86           .          CG............
               .           .
               .           .
  89           .           .           H
               .           .           .
               .           .           .
  94           .          CH............
               .           .
               .           .
  97           .           .         STH
               .           .           .
               .           .           .
 103           .           .           .           J
               .           .           .           .
               .           .           .           .
 108           .           .          CJ............
               .           .           .
               .           .           .
 111           .           .           .           K
               .           .           .           .
               .           .           .           .
 116           .           .          CK............
               .           .           .
               .           .           .
 119           .           .           .        NP-1
               .           .           .           .
               .           .           .           .
 124           .           .       CNP-1............
               .           .           .
               .           .           .
 127           .           .           .        DES2
               .           .           .           .
               .           .           .           .
 132           .           .       CDES2............
               .           .           .
               .           .           .
 135           .         CP2............
               .           .
               .           .
 138           .           .       CARR1
               .           .           .
               .           .           .
 143           .           .           .           I
               .           .           .           .
               .           .           .           .
 148           .      CCARR1........................
```


N
STFF
CSTFF
STG2
CSTG2
O
P
COP
DES3
CDES3
CP3
Q
R
CQR
CARR2
CCARR2
CP4
II
X
B
DC-1
COS-3
DUMMY1
3-O*
OFF-COS2
COFFCOS2
E
STJ1
CSTJ1


NP-2
ES-1
CES-1
OFF4
L
STL1
CSTL1
STG1
CSTG1
M
STJ2
DUMMY2
S
STF
NP-3
U
DES4
CDES4
DUMMY3
V
W
CVW
CARR3
DUMMY4
STE3
EE
DUMMY5
STEE3
HH
CARR4


410 DUMMY6
413 OFF5
418 STE1
423 Y
428 CY
431 STL2
436 CSTL2
439 Z
444 STJ3
449 CSTJ3
452 DUMMY7
455 STE2
460 BB
465 T
470 CC
475 DD
480 DUMMY8
483 DES5
488 NP-4
493 DUMMY9
496 AA
501 STJ4
506 CSTJ4
509 STEE1
514 CSTEE2
517 STEE2
522 FF
527 CFF
530 DUMMY10
533 GG

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

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                    ************************************
 *                                      *                                   *                                  *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                   *   U.S. ARMY CORPS OF ENGINEERS    *
 *               JUN   1998             *                                   *   HYDROLOGIC ENGINEERING CENTER   *
 *            VERSION 4.1               *                                   *         609 SECOND STREET        *
 *                                      *                                   *      DAVIS, CALIFORNIA 95616     *
 *  RUN DATE   19MAR19  TIME  11:17:59  *                                   *          (916) 756-1104          *
 *                                      *                                   *                                  *
 ****************************************                                    ************************************



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

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



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

                       100-YEAR,  6-HOUR STORM,  SDN3


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

      IT          HYDROGRAPH TIME DATA
                        NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         100  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1    0  ENDING DATE
                      NDTIME        0815  ENDING TIME
                      ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL     .08 HOURS
                        TOTAL TIME BASE    8.25 HOURS

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

      JP          MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                     1.00
1


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


                                                                    RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1
                                                        1.00

 HYDROGRAPH AT
+                    LM       .01     1   FLOW          41.
                                          TIME         3.50

 HYDROGRAPH AT
+                     D       .02     1   FLOW          47.
```

```
                                        TIME         3.50

 HYDROGRAPH AT
+                   DES1       .01     1   FLOW          14.
                                        TIME         3.50

   2 COMBINED AT
+                  CDES1       .02     1   FLOW          62.
                                        TIME         3.50

 HYDROGRAPH AT
+                  COS-2       .02     1   FLOW          32.
                                        TIME         3.50

   2 COMBINED AT
+                 CCOS-2       .04     1   FLOW          93.
                                        TIME         3.50

 HYDROGRAPH AT
+                     A        .03     1   FLOW          66.
                                        TIME         3.50

   2 COMBINED AT
+                    CA        .07     1   FLOW         160.
                                        TIME         3.50

   2 COMBINED AT
+                   CP1        .08     1   FLOW         201.
                                        TIME         3.50

 HYDROGRAPH AT
+                   STI        .00     1   FLOW          11.
                                        TIME         3.50

 HYDROGRAPH AT
+                     C        .02     1   FLOW          50.
                                        TIME         3.50

   2 COMBINED AT
+                  CSTI        .02     1   FLOW          61.
                                        TIME         3.50

 HYDROGRAPH AT
+                     G        .01     1   FLOW          30.
                                        TIME         3.50

   2 COMBINED AT
+                    CG        .03     1   FLOW          91.
                                        TIME         3.50

 HYDROGRAPH AT
+                     H        .01     1   FLOW          33.
                                        TIME         3.50

   2 COMBINED AT
+                    CH        .05     1   FLOW         124.
                                        TIME         3.50

 HYDROGRAPH AT
+                   STH        .00     1   FLOW          10.
                                        TIME         3.50

 HYDROGRAPH AT
+                     J        .01     1   FLOW          25.
                                        TIME         3.50

   2 COMBINED AT
+                    CJ        .01     1   FLOW          35.
                                        TIME         3.50

 HYDROGRAPH AT
+                     K        .01     1   FLOW          22.
                                        TIME         3.50

   2 COMBINED AT
+                    CK        .02     1   FLOW          58.
                                        TIME         3.50

 HYDROGRAPH AT
+                  NP-1        .00     1   FLOW           2.
                                        TIME         3.50

   2 COMBINED AT
+                 CNP-1        .02     1   FLOW          59.
                                        TIME         3.50

 HYDROGRAPH AT
+                   DES2       .01     1   FLOW          15.
                                        TIME         3.50
```

```
  2 COMBINED AT
+                  CDES2       .03     1   FLOW          74.
                                             TIME         3.50

  2 COMBINED AT
+                    CP2       .07     1   FLOW         198.
                                             TIME         3.50

 HYDROGRAPH AT
+                  CARR1       .01     1   FLOW          29.
                                             TIME         3.50

 HYDROGRAPH AT
+                      I       .02     1   FLOW          38.
                                             TIME         3.50

  3 COMBINED AT
+                 CCARR1       .10     1   FLOW         265.
                                             TIME         3.50

 HYDROGRAPH AT
+                      N       .01     1   FLOW          28.
                                             TIME         3.50

 HYDROGRAPH AT
+                   STFF       .00     1   FLOW           5.
                                             TIME         3.50

  2 COMBINED AT
+                  CSTFF       .01     1   FLOW          33.
                                             TIME         3.50

 HYDROGRAPH AT
+                   STG2       .00     1   FLOW          13.
                                             TIME         3.50

  2 COMBINED AT
+                  CSTG2       .02     1   FLOW          46.
                                             TIME         3.50

 HYDROGRAPH AT
+                      O       .01     1   FLOW          13.
                                             TIME         3.50

 HYDROGRAPH AT
+                      P       .01     1   FLOW          13.
                                             TIME         3.50

  2 COMBINED AT
+                    COP       .01     1   FLOW          26.
                                             TIME         3.50

 HYDROGRAPH AT
+                   DES3       .00     1   FLOW           8.
                                             TIME         3.50

  2 COMBINED AT
+                  CDES3       .01     1   FLOW          34.
                                             TIME         3.50

  2 COMBINED AT
+                    CP3       .03     1   FLOW          80.
                                             TIME         3.50

 HYDROGRAPH AT
+                      Q       .01     1   FLOW          14.
                                             TIME         3.50

 HYDROGRAPH AT
+                      R       .01     1   FLOW          15.
                                             TIME         3.50

  2 COMBINED AT
+                    CQR       .01     1   FLOW          29.
                                             TIME         3.50

 HYDROGRAPH AT
+                  CARR2       .01     1   FLOW          15.
                                             TIME         3.50

  2 COMBINED AT
+                 CCARR2       .02     1   FLOW          44.
                                             TIME         3.50

  3 COMBINED AT
+                    CP4       .15     1   FLOW         389.
                                             TIME         3.50
```

```
 HYDROGRAPH AT
+                     II       .03     1   FLOW          77.
                                            TIME         3.50

 HYDROGRAPH AT
+                      X       .03     1   FLOW          56.
                                            TIME         3.50

 HYDROGRAPH AT
+                      B       .14     1   FLOW         328.
                                            TIME         3.50

 HYDROGRAPH AT
+                   DC-1       .02     1   FLOW          48.
                                            TIME         3.50

 HYDROGRAPH AT
+                  COS-3       .00     1   FLOW           4.
                                            TIME         3.58

  7 COMBINED AT
+                 DUMMY1       .44     1   FLOW        1103.
                                            TIME         3.50

 HYDROGRAPH AT
+                   3-O*       .08     1   FLOW         189.
                                            TIME         3.50

 HYDROGRAPH AT
+               OFF-COS2       .03     1   FLOW          53.
                                            TIME         3.50

  2 COMBINED AT
+               COFFCOS2       .11     1   FLOW         242.
                                            TIME         3.50

 HYDROGRAPH AT
+                      E       .02     1   FLOW          58.
                                            TIME         3.50

 HYDROGRAPH AT
+                   STJ1       .01     1   FLOW          17.
                                            TIME         3.50

  3 COMBINED AT
+                  CSTJ1       .14     1   FLOW         317.
                                            TIME         3.50

 HYDROGRAPH AT
+                   NP-2       .00     1   FLOW           6.
                                            TIME         3.50

 HYDROGRAPH AT
+                   ES-1       .02     1   FLOW          59.
                                            TIME         3.50

  3 COMBINED AT
+                  CES-1       .16     1   FLOW         382.
                                            TIME         3.50

 HYDROGRAPH AT
+                   OFF4       .08     1   FLOW         209.
                                            TIME         3.50

 HYDROGRAPH AT
+                      L       .01     1   FLOW          35.
                                            TIME         3.50

 HYDROGRAPH AT
+                   STL1       .00     1   FLOW           8.
                                            TIME         3.50

  2 COMBINED AT
+                  CSTL1       .02     1   FLOW          43.
                                            TIME         3.50

 HYDROGRAPH AT
+                   STG1       .00     1   FLOW           8.
                                            TIME         3.50

  3 COMBINED AT
+                  CSTG1       .10     1   FLOW         260.
                                            TIME         3.50

 HYDROGRAPH AT
+                      M       .02     1   FLOW          48.
                                            TIME         3.50

 HYDROGRAPH AT
```

```
+                   STJ2       .00     1   FLOW          13.
                                           TIME         3.50

  4 COMBINED AT
+                  DUMMY2       .29     1   FLOW         702.
                                           TIME         3.50

 HYDROGRAPH AT
+                      S       .00     1   FLOW          11.
                                           TIME         3.50

 HYDROGRAPH AT
+                    STF       .00     1   FLOW           8.
                                           TIME         3.50

 HYDROGRAPH AT
+                    NP-3      .01     1   FLOW           9.
                                           TIME         3.50

 HYDROGRAPH AT
+                      U       .01     1   FLOW          11.
                                           TIME         3.50

 HYDROGRAPH AT
+                   DES4       .00     1   FLOW           8.
                                           TIME         3.50

  2 COMBINED AT
+                   CDES4      .01     1   FLOW          19.
                                           TIME         3.50

  5 COMBINED AT
+                  DUMMY3       .31     1   FLOW         749.
                                           TIME         3.50

 HYDROGRAPH AT
+                      V       .01     1   FLOW          14.
                                           TIME         3.50

 HYDROGRAPH AT
+                      W       .01     1   FLOW          15.
                                           TIME         3.50

  2 COMBINED AT
+                     CVW      .01     1   FLOW          29.
                                           TIME         3.50

 HYDROGRAPH AT
+                   CARR3       .00     1   FLOW          13.
                                           TIME         3.50

  3 COMBINED AT
+                  DUMMY4       .32     1   FLOW         791.
                                           TIME         3.50

 HYDROGRAPH AT
+                    STE3       .00     1   FLOW           5.
                                           TIME         3.50

 HYDROGRAPH AT
+                      EE      .01     1   FLOW          24.
                                           TIME         3.50

  3 COMBINED AT
+                  DUMMY5       .34     1   FLOW         820.
                                           TIME         3.50

 HYDROGRAPH AT
+                   STEE3       .00     1   FLOW           7.
                                           TIME         3.50

 HYDROGRAPH AT
+                     HH       .01     1   FLOW          19.
                                           TIME         3.50

 HYDROGRAPH AT
+                   CARR4       .00     1   FLOW          13.
                                           TIME         3.50

  4 COMBINED AT
+                  DUMMY6       .35     1   FLOW         859.
                                           TIME         3.50

 HYDROGRAPH AT
+                    OFF5       .02     1   FLOW          53.
                                           TIME         3.50

 HYDROGRAPH AT
+                    STE1       .00     1   FLOW           8.
```

```
                                        TIME         3.50

 HYDROGRAPH AT
+                     Y       .01     1   FLOW          31.
                                          TIME         3.50

   3 COMBINED AT
+                    CY       .04     1   FLOW          92.
                                          TIME         3.50

 HYDROGRAPH AT
+                   STL2       .00     1   FLOW           8.
                                          TIME         3.50

   2 COMBINED AT
+                  CSTL2       .04     1   FLOW         100.
                                          TIME         3.50

 HYDROGRAPH AT
+                     Z       .01     1   FLOW          22.
                                          TIME         3.50

 HYDROGRAPH AT
+                   STJ3       .00     1   FLOW          11.
                                          TIME         3.50

   2 COMBINED AT
+                  CSTJ3       .01     1   FLOW          33.
                                          TIME         3.50

   2 COMBINED AT
+                 DUMMY7       .05     1   FLOW         133.
                                          TIME         3.50

 HYDROGRAPH AT
+                   STE2       .00     1   FLOW           8.
                                          TIME         3.50

 HYDROGRAPH AT
+                     BB       .01     1   FLOW          23.
                                          TIME         3.50

 HYDROGRAPH AT
+                      T       .01     1   FLOW          16.
                                          TIME         3.50

 HYDROGRAPH AT
+                     CC       .01     1   FLOW          20.
                                          TIME         3.50

 HYDROGRAPH AT
+                     DD       .01     1   FLOW          16.
                                          TIME         3.50

   6 COMBINED AT
+                 DUMMY8       .09     1   FLOW         215.
                                          TIME         3.50

 HYDROGRAPH AT
+                   DES5       .00     1   FLOW           8.
                                          TIME         3.50

 HYDROGRAPH AT
+                   NP-4       .00     1   FLOW           2.
                                          TIME         3.50

   3 COMBINED AT
+                 DUMMY9       .09     1   FLOW         225.
                                          TIME         3.50

 HYDROGRAPH AT
+                     AA       .01     1   FLOW          19.
                                          TIME         3.50

 HYDROGRAPH AT
+                   STJ4       .00     1   FLOW           4.
                                          TIME         3.50

   2 COMBINED AT
+                  CSTJ4       .01     1   FLOW          23.
                                          TIME         3.50

 HYDROGRAPH AT
+                  STEE1       .00     1   FLOW           7.
                                          TIME         3.50

   2 COMBINED AT
+                 CSTEE2       .01     1   FLOW          30.
                                          TIME         3.50
```

```
 HYDROGRAPH AT
+                  STEE2       .00     1   FLOW          11.
                                           TIME         3.50

 HYDROGRAPH AT
+                    FF        .00     1   FLOW          13.
                                           TIME         3.50

  3 COMBINED AT
+                   CFF        .02     1   FLOW          53.
                                           TIME         3.50

  2 COMBINED AT
+                DUMMY10       .11     1   FLOW         279.
                                           TIME         3.50

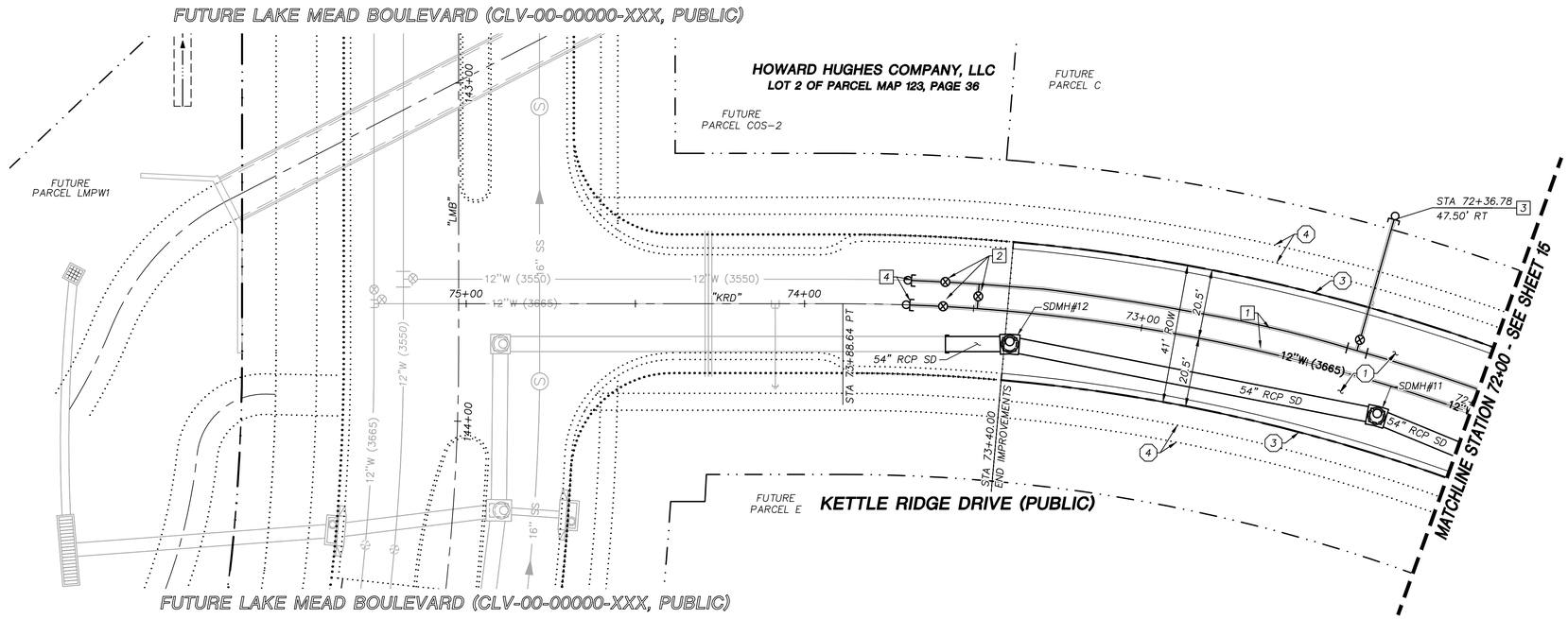
 HYDROGRAPH AT
+                    GG        .01     1   FLOW          16.
                                           TIME         3.50

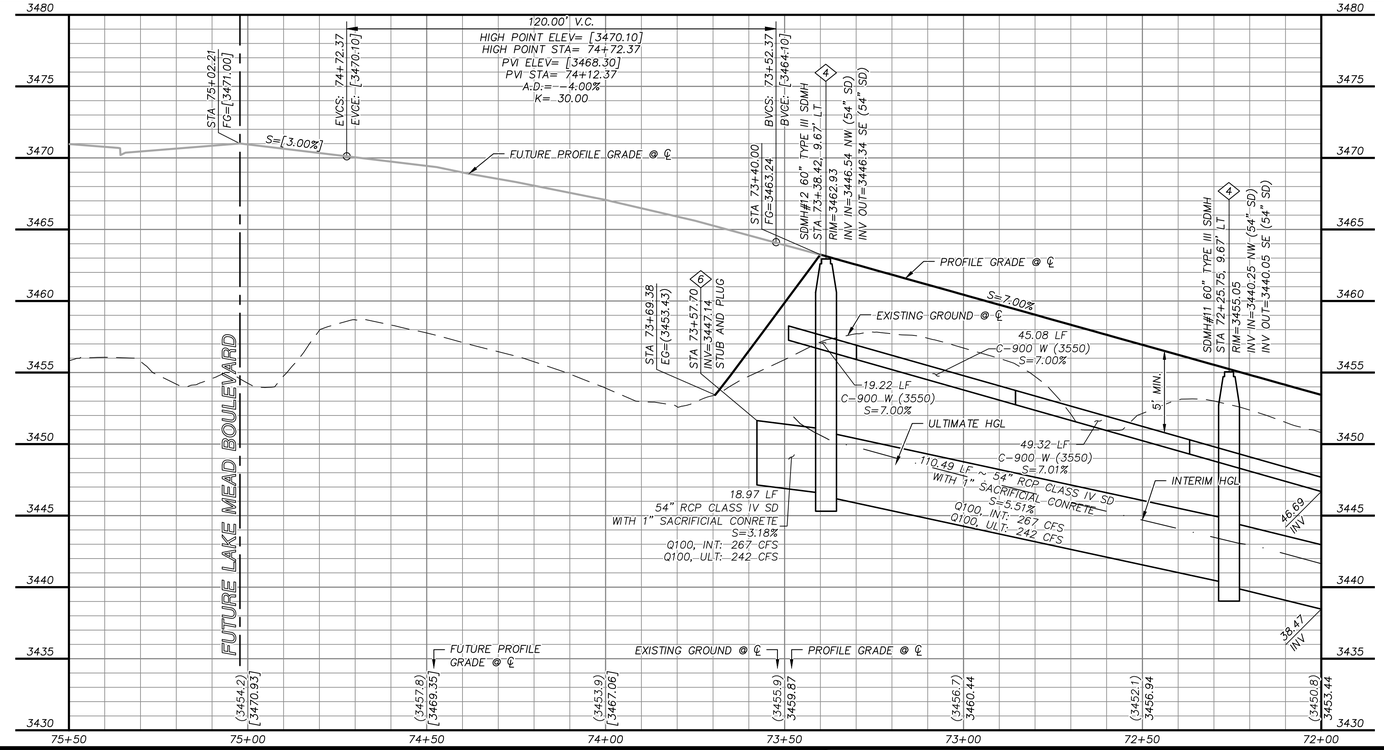
 HYDROGRAPH AT
+                   DES6       .00     1   FLOW           5.
                                           TIME         3.50

  3 COMBINED AT
+                DUMMY11       .12     1   FLOW         299.
                                           TIME         3.50


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

A.2 Hydraulic Grade Line Reference Sheets





GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

GRADING PLAN CERTIFICATION

PAUL A. BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. ITS SIMPLE. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. ITS SIMPLE. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 3 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
4. INSTALL TYPE III SD MANHOLE PER CCAUSD #406
5. INSTALL NDOT TYPE 2 DROP INLET PER NDOT R-4.2.1 (SEE SHEET 29)
6. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL (SEE SHEET 30)
7. INSTALL RIP-RAP (D50=8", THICKNESS=16")
8. INSTALL SD JUNCTION STRUCTURE
9. INSTALL SD DROP INLET MODIFIED STRUCTURE
10. DIRECT CONNECTION INTO RCB SEE SHEET 30 FOR DETAIL
11. INSTALL TYPE I SD RISER PER CCAUSD #403.1
12. INSTALL TYPE "A" DROP INLET PER CCAUSD #411

SEWER CONSTRUCTION NOTES

1. INSTALL SEWER MANHOLE PER DCSWCS SD-1A, SD-1B, 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).

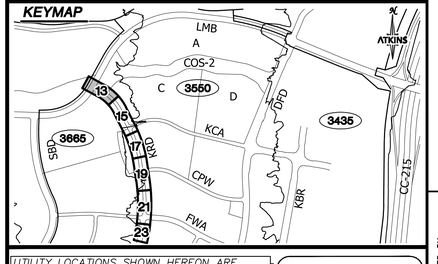
WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL 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 11.25° HORIZONTAL BEND PER UDACS PLATE #31
6. INSTALL 45° HORIZONTAL BEND PER UDACS PLATE #31
7. INSTALL IN-LINE REDUCER PER UDACS PLATE #30
8. INSTALL FIRE HYDRANTWITH APPURTENANCES (CONCRETE PAD, LATERAL, VALVE, AND TEE) PER UDACS PLATES #30, #31, #39, AND #40.

ROADWAY CONSTRUCTION NOTES

1. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 29 FOR TYPICAL PAVEMENT SECTION.
2. SEE REFERENCED SHEET FOR LATERAL PLAN AND PROFILE
3. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
4. FUTURE SIDEWALK BY OTHERS
5. CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5').
6. CONSTRUCT 0" FLUSH CURB
7. TRANSITION CURB FROM FULL HEIGHT (6") TO FLUSH (0")
8. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4",1-6") PER DETAIL ON SHEET XX

KEYMAP



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.

NOT FOR CONSTRUCTION
TDS SUBMITTAL

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

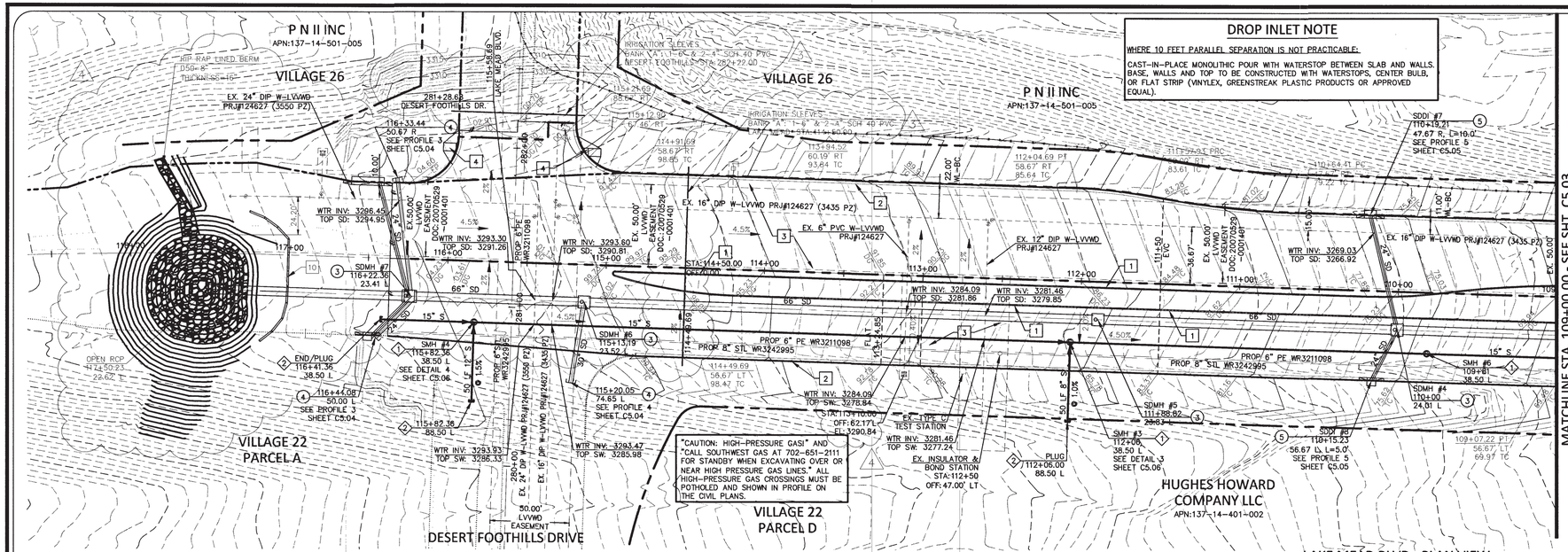
SUMMERLIN VILLAGE 22
KETTLE RIDGE DRIVE (STREET J) - FLEET WING AVENUE (STREET G) TO LAKE MEAD BOULEVARD
SCURRY BEND DRIVE (STREET N) ROUGH GRADE - FLEET WING AVENUE (STREET G) TO LAKE MEAD BOULEVARD

ROADWAY PLAN AND PROFILE - KETTLE RIDGE DRIVE
STA. 72+00 TO END

DESIGNED BY: N. BARCOS
DRAWN BY: O. QUASSANI
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060655
DATE: JULY, 2019
DRAWING NO. 13/37
CLV 00-00000

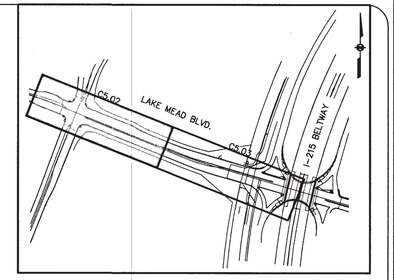
K:\Projects\SummitWest\Village 22\100060655 - V22N Street J (Lake Mead to Street G)_Sheets\60655-11-PLAN-P1.dwg LAYOUT: 13 Jul 02, 2019 - 3:19PM



DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE:

CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL).



KEY MAP
NTS

GRAPHIC SCALE

40 0 20 40

SCALE: 1"=40'

BASIS OF BEARING

NORTH 89°45'05" EAST BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN BY MAP ON FILE IN FILE 91, PAGE 28 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA

LVVWD STATIONING

REFERENCE PROFILE ON THIS SHEET FOR ALL EX. LVVWD FACILITY STATIONING..

BENCHMARK

U.S.C&G.S BRASS DISC SET IN ROCK ON THE EAST SIDE OF CHARLESTON BOULEVARD AND SOUTH OF THE RED ROCK DETENTION BASIN.

CLV BM NO.: D368 3
ELEVATION: 989.599 METERS (NAVD88)
3426.71 FEET

TO OBTAIN SUMMERLIN VILLAGE 26 – REVERENCE PROJECT MODIFIED DATUM ADD 0.42 FEET TO NAVD88 DATUM.

CONSTRUCTION NOTES:

NO.	ITEM: USDCCA: UNIFORM STANDARD DRAWINGS CLARK COUNTY AREA
1	INSTALL "A" TYPE ISLAND CURB PER USDCCA DWG NO. 219.
2	INSTALL "L" TYPE CURB & GUTTER PER USDCCA DWG NO. 216.
3	INSTALL A.C. PAVEMENT PER TYPICAL STREET SECTION DETAILS.
4	INSTALL HANDICAP RAMP CURB DEPRESSION (BY OTHERS).
5	VERIFY LOCATION AND ELEVATION OF EXISTING IMPROVEMENT. IF DISCREPANCY EXISTS, NOTIFY ENGINEER PRIOR TO CONSTRUCTION.
6	SAWCUT AND REPLACE EXISTING A.C. PAVEMENT.
7	CONSTRUCT CURB OPENING PER DETAIL '5' SHEET C8.01.
8	CONSTRUCT 0" TALL TYPE 'A' CURB PER DETAIL '7' SHEET C8.01.
9	CONSTRUCT CURB TRANSITION FROM 6" TALL CURB TO 0" TALL CURB PER DETAIL '6' SHEET C8.01.
10	TEMPORARY PORTABLE CONCRETE JERSEY BARRIER PER NDOT STD. DWG. NO. R-8.7.1.1.

SEWER CONSTRUCTION NOTES:

NO.	ITEM: DCSWCS DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS
1	INSTALL 72" DIA. SEWER MANHOLE W/CORROSION PROTECTION & DUAL CONCENTRIC LIDS DCSWCS SD-2.
2	INSTALL TEMPORARY PLUG AND CAP.
3	REMOVE PLUG & CONNECT TO EX. SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT, AND LOCATION OF EXISTING SEWER LINE) PRIOR TO CONSTRUCTION.
4	INSTALL 60" SEWER MANHOLE W/CORROSION PROTECTION.

STORM DRAIN CONSTRUCTION NOTES:

NO.	ITEM: UDACS: PLATE NO. PER UNIFORM DESIGN AND CONSTRUCTION STANDARD FOR WATER DISTRIBUTION SYSTEMS.
1	INSTALL TYPE I STORM DRAIN MANHOLE.
2	INSTALL TYPE II STORM DRAIN MANHOLE.
3	INSTALL TYPE IV STORM DRAIN MANHOLE, SEE DETAIL 4 SHEET C8.01.
4	INSTALL TEMPORARY PLUG AND CAP.
5	INSTALL MODIFIED TYPE "CM" DROP INLET PER USDCCA DWG. NO. 422, ADD STORMWATER INLET CONCRETE STAMP PER USDCCA DWG. NO. 421.
6	INSTALL JUNCTION STRUCTURE.
7	CONNECT TO EXISTING STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT, AND LOCATION OF EXISTING STORM DRAIN LINE).
	CONTRACTOR TO VERIFY SIZE, INVERT, AND LOCATION OF EXISTING STORM DRAIN LINE

FOR TRENCHES SIX (6) FEET WIDE AND GREATER:

IF THE PIPE MATERIAL IS A CP, THE EXPOSED PIPE MUST BE REPLACED WITH DUCTILE IRON PIPE.

CONTRACTOR MUST SUBMIT PIPE SUPPORT DETAIL PREPARED BY A NEVADA LICENSED ENGINEER, TO LVVWD ENGINEERING SIRVICES BEFORE CONSTRUCTION TO SHOW HOW WATERLINE(S) WILL BE SUPPORTED DURING EXCAVATION AND BACKFILL.

SUPPORTED PIPE MAY BE EXPOSED FOR NO LONLGER THAN 90 DAYS MAXIMUM. IF THE PIPE WILL BE EXPOSED FOR MORE THAN 90 DAYS, PLANS MUST BE SUBMITTED AND APPROVED BY THE LVVWD TO RELOCATE PIPE.

FOR ALL DRY UTILITY CROSSINGS

- MAINTAIN MINIMUM 12" VERTICAL SEPARATION AT ALL POINTS OF CROSSING
- MAINTAIN MINIMUM 3' PARALLEL SEPARATION
- ANY EXCAVATION AT BACK OF CURB MUST REMAIN OPEN FOR INSPECTION OF COPPER SERVICE LATERALS. ANY COPPER SERVICE LATERAL KINKED, BENT OR OTHERWISE DAMAGED MUST BE REPLACED FROM THE MAIN TO THE ANGLE METER STOP.

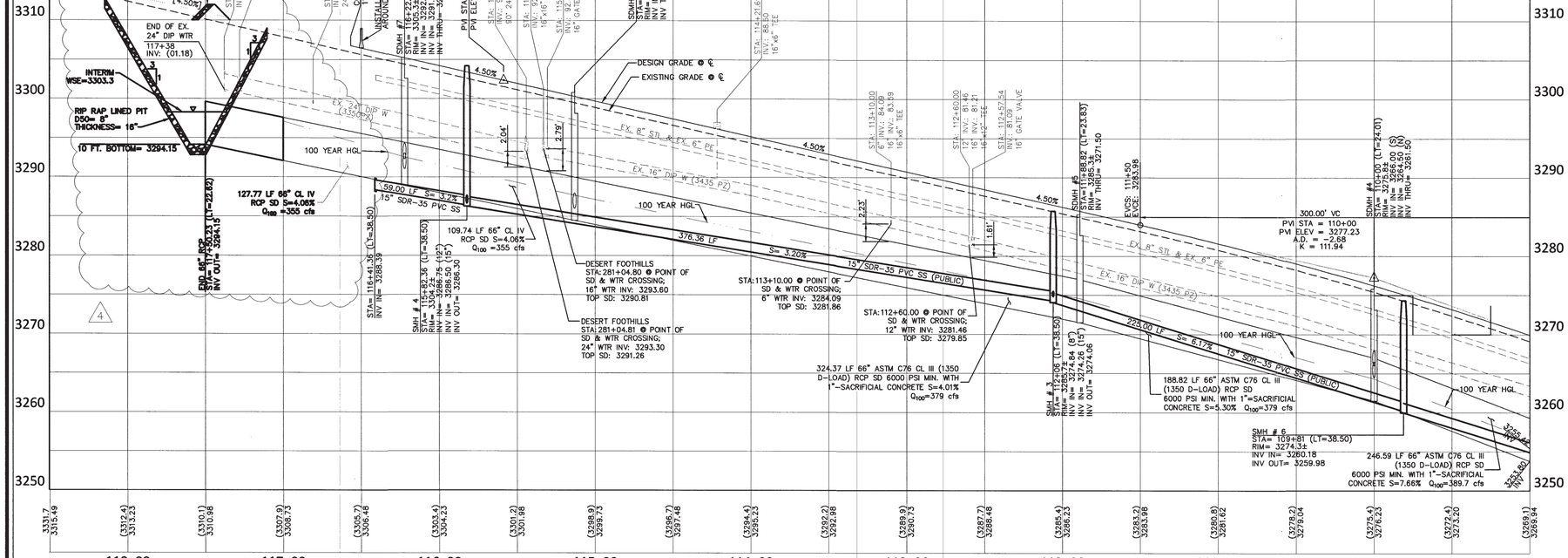
PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.

ESN. 078 01/05/15

APPROVED FOR CONSTRUCTION 1st Approved 11/2/16

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

DATE: 6/1/17 PROJECT NO: 124803



CALL BEFORE YOU DIG
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY
Call 811 or 1-800-227-2600

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND STREET LIGHT SYSTEMS. IT'S COSTLY.
CALL BEFORE YOU DO UNDERGROUND WORK
CALL 1-702-455-7511
CLARK COUNTY TRAFFIC SIGNALS AND STREET LIGHTS
CALL 1-702-432-5300
LAS VEGAS AREA SIGNAL SYSTEM OF TRANSPORTATION

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

COLLINS ENGINEERS INC ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION. IF A CONFLICT EXISTS BETWEEN WHAT IS SHOWN ON THESE DRAWINGS AND WHAT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT OR ENGINEER IMMEDIATELY.

LEGEND

EXISTING	PROPOSED	
0.00%	0.00%	SLOPE
0.00	0.00	ELEVATION TAG
(0.00)	(0.00)	ELEVATION TAG
(D)	(D)	DRAIN INLET
(S)	(S)	STORM MANHOLE
		RETAINING WALL
		DROP INLET
		SCREEN WALL
50	50	CONTOUR
		UTILITY POLE
		RETAINING WALL
		STREET LIGHT
		SCREEN WALL
		AC PAVEMENT
		6" TYPE "A" CURB
		24" TYPE "L" CURB & GUTTER
		30" ROLL CURB
		BACK WATER VALVE
		PL-RIGHT-OF-WAY
		PL-ADJACENT
		CENTERLINE
		EASEMENT LINE
		FLOW LINE
		SIGN W/POLE
		SAWCUT LINE
		AREA LIGHT
		WATER METER
		FIRE HYDRANT
		FIRE DEPARTMENT CONNECTION
		WATER VALVE
		REDUCER
		SEWER MANHOLE
		CLEANOUT
		GAS VALVE
		TELEPHONE LINE
		6" TYPE "A" CURB
		WATER LINE
		CURB & GUTTER
		SANITARY SEWER LINE
		30" ROLL CURB
		GAS LINE
(B)	(B)	STORM MANHOLE

COLLINS ENGINEERS INC
3130 S. DURANGO DR., SUITE 404
LAS VEGAS, NV 89117
PHONE: (702) 248-8000
FAX: (702) 248-8070
www.collinsengr.com

PROFESSIONAL ENGINEER-STATE OF NEVADA
KENNETH T. YAMADA
EXP. 06-30-18
CIVIL
NO. 9156
06/01/17

LAKE MEAD BLVD STREET IMPROVEMENTS (I-215 TO DESERT FOOTHILLS)

UTILITY PLAN & PROFILE
STA. 118+00.00 TO 109+00.00
LAKE MEAD BLVD
CITY OF LAS VEGAS

NO.	DATE	DESIGN BY	DESCRIPTION
3	06/01/17	J.S.H.	ADDED IRRIGATION SLEEVE
4	02/23/17	S.S.	ADDED LVVWD FACILITY, ASTERISK, PAVEMENT AND DRAINAGE INLET IMPROVEMENTS

CEI PROJECT: 9346
DESIGN BY: J. SALDIVAR
DRAWN BY: J. SALDIVAR
CHECKED BY: K. YAMADA
DATE: 09/01/16
SCALE: 1" = 40'
SHEET NUMBER C5.02
SHEET 7 OF 16
H# 65667
107V6673

PROJ#:124803 AGR:116094 QS:137-14-NE

H:\CAD\LAND\9346\DWG\SHEETS\IMPROVEMENTS\9346-C5.03-UT.DWG 06/02/2017 07:32:55 AM

Appendix B. Hydrology Appendix

B.1. Parameters

B.2. HEC-1 Model

B.3. 2D Model Input HEC-1 Model

B.1 Parameters

SUMMERLIN WEST VILLAGE 22

Lake Mead Boulevard

Desert Foothills Drive to Scurry Bend Drive (Street N)

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
INT-J1	1	Undeveloped Land, Open Desert	1155	88	271222	271222	100.0%	100.0%	88.00	88.00	**88.0**
INT-J2	1	Undeveloped Land, Open Desert	1155	88	577894	577894	100.0%	100.0%	88.00	88.00	**88.0**
INT-J3	1	Undeveloped Land, Open Desert	1155	88	789937	789937	100.0%	100.0%	88.00	88.00	**88.0**
INT-LMB1	1	Undeveloped Land, Open Desert	1155	88	2335645	2337705	99.9%	99.9%	87.92	87.92	
INT-LMB1	1	Undeveloped Land, Open Desert	1191	63	2060	2337705	0.1%	100.0%	0.06	87.98	**88.0**
INT-LMB2	1	Undeveloped Land, Open Desert	1155	88	199378	199378	100.0%	100.0%	88.00	88.00	**88.0**
INT-LMB3	1	Undeveloped Land, Open Desert	1155	88	694965	694965	100.0%	100.0%	88.00	88.00	**88.0**
INT-N	1	Undeveloped Land, Open Desert	1155	88	3837752	5233733	73.3%	73.3%	64.53	64.53	
INT-N	1	Undeveloped Land, Open Desert	1191	63	148364	5233733	2.8%	76.2%	1.79	66.31	
INT-N	1	Undeveloped Land, Open Desert	1502	73	1247617	5233733	23.8%	100.0%	17.40	83.72	**83.7**
LMB-1N	7	Public Facility and Residential, 8-12 units/acre	1155	94	53081	53081	100.0%	100.0%	94.00	94.00	**94.0**
LMB-1S	7	Public Facility and Residential, 8-12 units/acre	1155	94	51749	51749	100.0%	100.0%	94.00	94.00	**94.0**
LMB-2Na	7	Public Facility and Residential, 8-12 units/acre	1155	94	88190	88190	100.0%	100.0%	94.00	94.00	**94.0**
LMB-2Nb	7	Public Facility and Residential, 8-12 units/acre	1155	94	44159	44159	100.0%	100.0%	94.00	94.00	**94.0**
LMB-2S	7	Public Facility and Residential, 8-12 units/acre	1155	94	121340	121340	100.0%	100.0%	94.00	94.00	**94.0**
LMB-3N	7	Public Facility and Residential, 8-12 units/acre	1155	94	45219	45219	100.0%	100.0%	94.00	94.00	**94.0**
LMB-3S	7	Public Facility and Residential, 8-12 units/acre	1155	94	50774	50774	100.0%	100.0%	94.00	94.00	**94.0**
StrJ-1E	7	Public Facility and Residential, 8-12 units/acre	1155	94	25786	25786	100.0%	100.0%	94.00	94.00	**94.0**
StrJ-1W	7	Public Facility and Residential, 8-12 units/acre	1155	94	30287	30287	100.0%	100.0%	94.00	94.00	**94.0**
StrJ-2E	7	Public Facility and Residential, 8-12 units/acre	1155	94	19917	19917	100.0%	100.0%	94.00	94.00	**94.0**
StrJ-2W	7	Public Facility and Residential, 8-12 units/acre	1155	94	25778	25778	100.0%	100.0%	94.00	94.00	**94.0**
StrJ-3E	7	Public Facility and Residential, 8-12 units/acre	1155	94	17181	17181	100.0%	100.0%	94.00	94.00	**94.0**
StrJ-3W	7	Public Facility and Residential, 8-12 units/acre	1155	94	22888	22888	100.0%	100.0%	94.00	94.00	**94.0**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

ATKINS
Member of the SNC-Lavalin Group

TDS for Summerlin Village 22 West
Lake Mead Boulevard
Desert Foothills Drive to Scurry Bend Drive (Street N)
INTERIM CONDITION

BY: **MMA**
DATE: **6/11/19**

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag
DESIG: (1)	DEV./EX. (D or E)	CN	K (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	Ti Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours
INT-J1	E	88.0	0.772	6.23	0.00973	100	7.0	3.1	1011	6.8	3.9	7.7	3.3	6.4	N/A	**0.100****
INT-J2	E	88.0	0.772	13.27	0.02073	100	10.0	2.7	1216	8.1	4.2	8.4	3.4	6.1	N/A	**0.100****
INT-J3	E	88.0	0.772	18.13	0.02834	100	8.0	3.0	52	8.0	4.2	8.3	0.2	3.2	N/A	**0.100****
INT-LMB1	E	88.0	0.771	53.67	0.08385	100	6.0	3.3	6217	8.0	4.2	8.3	13.4	16.7	N/A	**0.167**
INT-LMB2	E	88.0	0.772	4.58	0.00715	100	6.0	3.3	848	6.8	3.9	7.7	2.9	6.2	N/A	**0.100****
INT-LMB3	E	88.0	0.772	15.95	0.02493	100	8.7	2.9	1380	8.7	4.4	8.7	3.6	6.5	N/A	**0.100****
INT-N	E	83.7	0.715	120.15	0.18774	100	8.0	3.5	6,493	7.3	4.0	7.9	14.7	18.1	N/A	**0.181**
LMB-1N	D	94.0	0.851	1.22	0.00190	16	2.0	1.4	678	8.0	5.7	8.7	1.8	3.2	13.9	**0.050***
LMB-1S	D	94.0	0.851	1.19	0.00186	16	2.0	1.4	737	8.0	5.7	8.7	1.9	3.3	14.2	**0.050***
LMB-2Na	D	94.0	0.851	2.02	0.00316	16	2.0	1.4	708	3.9	4.0	6.0	2.7	4.1	14.0	**0.050***
LMB-2Nb	D	94.0	0.851	1.01	0.00158	16	2.0	1.4	1388	3.9	4.0	6.0	4.5	5.9	17.8	**0.059**
LMB-2S	D	94.0	0.851	2.79	0.00435	16	2.0	1.4	2078	3.9	4.0	6.0	6.4	7.9	21.6	**0.079**
LMB-3N	D	94.0	0.851	1.04	0.00162	16	2.0	1.4	705	8.0	5.7	8.7	1.9	3.3	14.0	**0.050***
LMB-3S	D	94.0	0.851	1.17	0.00182	16	2.0	1.4	705	8.0	5.7	8.7	1.9	3.3	14.0	**0.050***
StrJ-1E	D	94.0	0.851	0.59	0.00093	16	2.0	1.4	639	7.0	5.3	8.1	1.8	3.3	13.6	**0.050***
StrJ-1W	D	94.0	0.851	0.70	0.00109	16	2.0	1.4	611	7.0	5.3	8.1	1.8	3.2	13.5	**0.050***
StrJ-2E	D	94.0	0.851	0.46	0.00071	16	2.0	1.4	468	3.0	3.5	5.3	2.2	3.7	12.7	**0.050***
StrJ-2W	D	94.0	0.851	0.59	0.00093	16	2.0	1.4	533	3.0	3.5	5.3	2.5	3.9	13.1	**0.050***
StrJ-3E	D	94.0	0.851	0.39	0.00062	16	2.0	1.4	403	1.0	2.0	3.1	3.3	4.7	12.3	**0.050***
StrJ-3W	D	94.0	0.851	0.53	0.00082	16	2.0	1.4	474	1.0	2.0	3.1	3.9	5.3	12.7	**0.053**

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39
Tc Check = L/180+10

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2
V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

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)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN  1998               *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   21JUN19  TIME  10:05:01  *                    *           (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 FOR SUMMERLIN WEST VILLAGE 22
              2          ID  LAKE MEAD BOULEVARD
              3          ID  DESERT FOOTHILLS DRIVE TO SCURRY BEND DRIVE (STREET N)
              4          ID  DESIGN STORM 100-YEAR 6 HOUR
              5          ID
              6          ID  JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES
              7          ID
              8          ID    AREA (SQUARE MILES)       DARF
              9          ID
             10          ID         0 - 0.5              0.99
             11          ID         ESTIMATED 10-YR      0.57
             12          ID
             13          IT       5       0       0     300
             14          IO       5       0       0
             15          IN       5       0       0
             16          JR    PREC    0.99    0.57
                         *

             17          KK    3-O*
             18          KM  REFERENCED FROM ADDENDUM #1 TO UPDATE #1 FOR THE MCDS FOR SUMMERLIN WEST VILLA
             19          KM  WHICH REFERENCED SUBBASIN FROM OVERALL SWPA MPU
             20          BA 0.08050
             21          PB    3.48
             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    95.0
             31          UD   0.103
                         *

             32          KKINT-LMB1
             33          BA 0.08385
             34          PB    3.55
             35          LS       0    88.0
             36          UD   0.167
                         *

             37          KKDIV-LMB1
             38          DT  DI_DIV
             39          DI       0      68     153
             40          DQ       0       0      68
                         *
1                                                  HEC-1 INPUT                                                 PAGE  2

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

```
   41          KK  LMB-1N
   42          BA 0.00190
   43          PB    3.43
   44          LS       0    94.0
   45          UD   0.050
               *

   46          KK     CP5
   47          HC       3
               *

   48          KK  LMB-1S
   49          BA 0.00186
   50          PB    3.43
   51          LS       0    94.0
   52          UD   0.050
               *

   53          KK     CP1
   54          HC       2
               *

   55          KK  INT-J1
   56          BA 0.00973
   57          PB    3.43
   58          LS       0    88.0
   59          UD   0.100
               *

   60          KK StrJ-1E
   61          BA 0.00093
   62          PB    3.43
   63          LS       0    94.0
   64          UD   0.050
               *

   65          KK StrJ-1W
   66          BA 0.00109
   67          PB    3.43
   68          LS       0    94.0
   69          UD   0.050
               *

   70          KK     CP2
   71          HC       4
               *

   72          KK  INT-J2
   73          BA 0.02073
   74          PB    3.43
   75          LS       0    88.0
   76          UD   0.100
               *
```



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

   77          KK StrJ-2E
   78          BA 0.00071
   79          PB    3.43
   80          LS       0    94.0
   81          UD   0.050
               *

   82          KK StrJ-2W
   83          BA 0.00093
   84          PB    3.43
   85          LS       0    94.0
   86          UD   0.050
               *

   87          KK     CP3
   88          HC       4
               *

   89          KK  INT-J3
   90          BA 0.02834
   91          PB    3.43
   92          LS       0    88.0
   93          UD   0.100
               *

   94          KK StrJ-3E
   95          BA 0.00062
   96          PB    3.43
   97          LS       0    94.0
   98          UD   0.050
```

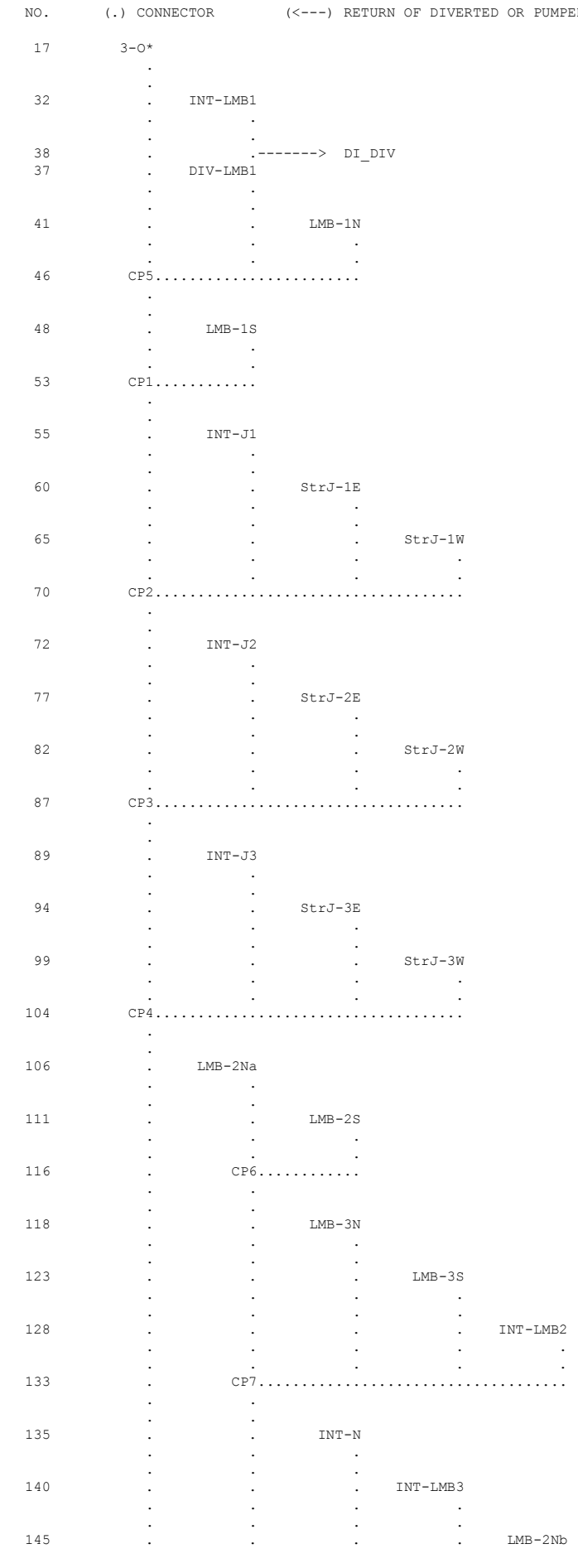
```
                     *
            99       KK StrJ-3W
           100       BA 0.00082
           101       PB    3.43
           102       LS       0    94.0
           103       UD   0.053
                     *
           104       KK     CP4
           105       HC       4
                     *
           106       KK LMB-2Na
           107       BA 0.00316
           108       PB    3.43
           109       LS       0    94.0
           110       UD   0.050
                     *
1                                          HEC-1 INPUT                                                PAGE  4

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


           111       KK  LMB-2S
           112       BA 0.00435
           113       PB    3.43
           114       LS       0    94.0
           115       UD   0.079
                     *
           116       KK     CP6
           117       HC       2
                     *
           118       KK  LMB-3N
           119       BA 0.00162
           120       PB    3.43
           121       LS       0    94.0
           122       UD   0.050
                     *
           123       KK  LMB-3S
           124       BA 0.00182
           125       PB    3.43
           126       LS       0    94.0
           127       UD   0.050
                     *
           128       KKINT-LMB2
           129       BA 0.00715
           130       PB    3.41
           131       LS       0    88.0
           132       UD   0.100
                     *
           133       KK     CP7
           134       HC       4
                     *
           135       KK   INT-N
           136       BA 0.18774
           137       PB    3.55
           138       LS       0    83.7
           139       UD   0.181
                     *
           140       KKINT-LMB3
           141       BA 0.02493
           142       PB    3.55
           143       LS       0    88.0
           144       UD   0.100
                     *
1                                          HEC-1 INPUT                                                PAGE  5

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


           145       KK LMB-2Nb
           146       BA 0.00158
           147       PB    3.55
           148       LS       0    94.0
           149       UD   0.059
                     *
           150       ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                    *****************************************
 *                                       *                    *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *    U.S. ARMY CORPS OF ENGINEERS       *
 *               JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1                *                    *          609 SECOND STREET            *
 *                                       *                    *       DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   21JUN19  TIME  10:05:01   *                    *           (916) 756-1104              *
 *                                       *                    *                                       *
 *****************************************                    *****************************************

                        TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22
                        LAKE MEAD BOULEVARD
                        DESERT FOOTHILLS DRIVE TO SCURRY BEND DRIVE (STREET N)
                        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-YR      0.57


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

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

                    COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE   24.92 HOURS

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

      JP          MULTI-PLAN OPTION
                        NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                      .99       .57
1

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


                                                                        RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1  RATIO 2
                                                        .99      .57

 HYDROGRAPH AT
+                   3-O*       .08     1   FLOW         189.     100.
                                           TIME         3.50     3.50

 HYDROGRAPH AT
+                INT-LMB1      .08     1   FLOW         153.      68.
                                           TIME         3.58     3.58

 DIVERSION TO
+                 DI_DIV       .08     1   FLOW          68.       0.
                                           TIME         3.58     3.58

 HYDROGRAPH AT
+                DIV-LMB1      .08     1   FLOW          85.      68.
                                           TIME         3.58     3.58

 HYDROGRAPH AT
+                 LMB-1N       .00     1   FLOW           5.       3.
                                           TIME         3.50     3.50
```

3 COMBINED AT						
+	CP5	.17	1	FLOW	274.	164.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	LMB-1S	.00	1	FLOW	5.	3.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP1	.17	1	FLOW	279.	166.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	INT-J1	.01	1	FLOW	19.	8.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-1E	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-1W	.00	1	FLOW	3.	2.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP2	.18	1	FLOW	304.	175.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	INT-J2	.02	1	FLOW	40.	18.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-2E	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-2W	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP3	.20	1	FLOW	348.	194.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	INT-J3	.03	1	FLOW	55.	24.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-3E	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	StrJ-3W	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP4	.23	1	FLOW	407.	220.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	LMB-2Na	.00	1	FLOW	9.	5.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	LMB-2S	.00	1	FLOW	11.	6.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP6	.01	1	FLOW	19.	10.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	LMB-3N	.00	1	FLOW	4.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	LMB-3S	.00	1	FLOW	5.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	INT-LMB2	.01	1	FLOW	14.	6.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP7	.02	1	FLOW	42.	21.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	INT-N	.19	1	FLOW	285.	111.

				TIME	3.58	3.58
HYDROGRAPH AT						
+	INT-LMB3	.02	1	FLOW	50.	22.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	LMB-2Nb	.00	1	FLOW	4.	2.
				TIME	3.50	3.50

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

B.3 2D Model Input HEC-1 Model

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   21JUN19  TIME  10:05:58  *                    *           (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 FOR SUMMERLIN WEST VILLAGE 22
              2          ID  LAKE MEAD BOULEVARD
              3          ID  DESERT FOOTHILLS DRIVE TO SCURRY BEND DRIVE (STREET N)
              4          ID  DESIGN STORM 100-YEAR 6 HOUR
              5          ID
              6          ID  JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES
              7          ID
              8          ID    AREA (SQUARE MILES)       DARF
              9          ID
             10          ID         0 - 0.5              0.99
             11          ID         ESTIMATED 10-YR      0.57
             12          ID
             13          IT       5       0       0     300
             14          IO       5       0       0
             15          IN       5       0       0
             16          JR    PREC    0.99    0.57
                         *

             17          KK    3-O*
             18          KM  REFERENCED FROM ADDENDUM #1 TO UPDATE #1 FOR THE MCDS FOR SUMMERLIN WEST VILLA
             19          KM  WHICH REFERENCED SUBBASIN FROM OVERALL SWPA MPU
             20          BA 0.08050
             21          PB    3.48
             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    95.0
             31          UD   0.103
                         *

             32          KKINT-LMB1
             33          BA 0.08385
             34          PB    3.55
             35          LS       0    88.0
             36          UD   0.167
             37          KO       1
                         *

             38          KKDIV-LMB1
             39          KM  FLOW CAPTURED FROM INT-LMB1 INTO STREET J SYSTEM UTILIZING FUTURE LAKE MEAD BO
             40          DT  DI_DIV
             41          DI       0      68     153
             42          DQ       0       0      68
             43          KO       1
                         *
```

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


             44          KK     CP1
             45          HC       2
                         *

             46          KK   COS-2
             47          KM  REFERENCED FROM VTN MASTER CDS UPDATE 1 ADD1
             48          BA  0.0159
             49          PB    3.41
             50          LS       0    89.0
             51          UD   0.100
             52          KO       1
                         *
             53          ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    17        3-O*
                 .
                 .
    32           .    INT-LMB1
                 .           .
                 .           .
    40           .           .-------->  DI_DIV
    38           .    DIV-LMB1
                 .           .
                 .           .
    44         CP1............
                 .
                 .
    46           .       COS-2

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *               JUN   1998             *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   21JUN19  TIME  10:05:58  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************
```

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22
LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO SCURRY BEND DRIVE (STREET N)
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-YR	0.57

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

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

                   COMPUTATION INTERVAL     .08 HOURS
                        TOTAL TIME BASE   24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
```

```
              STORAGE VOLUME        ACRE-FEET
              SURFACE AREA          ACRES
              TEMPERATURE           DEGREES FAHRENHEIT

     JP         MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

     JR         MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                    .99       .57



*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  32 KK     *  INT-LMB1  *
            *            *
            **************

  37 KO         OUTPUT CONTROL VARIABLES
                     IPRNT           1  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

  33 BA         SUBBASIN CHARACTERISTICS
                     TAREA         .08  SUBBASIN AREA

               PRECIPITATION DATA

  34 PB              STORM        3.55  BASIN TOTAL PRECIPITATION

  22 PI           INCREMENTAL PRECIPITATION PATTERN
                    .02       .04       .01       .02       .02       .02       .01       .00       .00       .00
                    .00       .00       .00       .01       .00       .01       .01       .01       .01       .01
                    .01       .00       .00       .00       .00       .01       .02       .01       .01       .00
                    .01       .01       .01       .00       .00       .01       .03       .03       .06       .09
                    .09       .12       .03       .04       .03       .01       .02       .02       .00       .00
                    .01       .01       .01       .02       .02       .01       .01       .02       .01       .01
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00

  35 LS         SCS LOSS RATE
                     STRTL         .27  INITIAL ABSTRACTION
                    CRVNBR       88.00  CURVE NUMBER
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

  36 UD         SCS DIMENSIONLESS UNITGRAPH
                      TLAG         .17  LAG

                                                          ***

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

                                              UNIT HYDROGRAPH
                                          12 END-OF-PERIOD ORDINATES
              60.      182.      182.      110.       55.       29.       15.        8.        4.        2.
               1.        0.

*****************************************************************************************************************************************

                                              HYDROGRAPH AT STATION INT-LMB1

*****************************************************************************************************************************************
                                                                                *
       DA MON HRMN  ORD    RAIN    LOSS  EXCESS     COMP Q                      *       DA MON HRMN  ORD    RAIN    LOSS  EXCESS     COMP Q
                                                                                *
        1     0000    1     .00     .00     .00         0.                     *        1     1230  151     .00     .00     .00         0.
        1     0005    2     .07     .07     .00         0.                     *        1     1235  152     .00     .00     .00         0.
        1     0010    3     .13     .13     .00         0.                     *        1     1240  153     .00     .00     .00         0.
        1     0015    4     .05     .05     .00         0.                     *        1     1245  154     .00     .00     .00         0.
        1     0020    5     .06     .06     .00         0.                     *        1     1250  155     .00     .00     .00         0.
        1     0025    6     .07     .07     .01         1.                     *        1     1255  156     .00     .00     .00         0.
        1     0030    7     .06     .05     .01         2.                     *        1     1300  157     .00     .00     .00         0.
        1     0035    8     .02     .02     .00         4.                     *        1     1305  158     .00     .00     .00         0.
        1     0040    9     .00     .00     .00         4.                     *        1     1310  159     .00     .00     .00         0.
        1     0045   10     .00     .00     .00         2.                     *        1     1315  160     .00     .00     .00         0.
        1     0050   11     .00     .00     .00         1.                     *        1     1320  161     .00     .00     .00         0.
        1     0055   12     .00     .00     .00         1.                     *        1     1325  162     .00     .00     .00         0.
        1     0100   13     .00     .00     .00         0.                     *        1     1330  163     .00     .00     .00         0.
        1     0105   14     .01     .01     .00         0.                     *        1     1335  164     .00     .00     .00         0.
        1     0110   15     .02     .02     .01         1.                     *        1     1340  165     .00     .00     .00         0.
        1     0115   16     .01     .01     .00         2.                     *        1     1345  166     .00     .00     .00         0.
        1     0120   17     .02     .02     .01         2.                     *        1     1350  167     .00     .00     .00         0.
        1     0125   18     .04     .02     .01         3.                     *        1     1355  168     .00     .00     .00         0.
        1     0130   19     .05     .03     .02         5.                     *        1     1400  169     .00     .00     .00         0.
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1	0135	20	.03	.02	.01	7.	*	1	1405	170	.00	.00	.00	0.
1	0140	21	.03	.02	.01	8.	*	1	1410	171	.00	.00	.00	0.
1	0145	22	.02	.01	.01	8.	*	1	1415	172	.00	.00	.00	0.
1	0150	23	.01	.00	.00	7.	*	1	1420	173	.00	.00	.00	0.
1	0155	24	.00	.00	.00	5.	*	1	1425	174	.00	.00	.00	0.
1	0200	25	.00	.00	.00	3.	*	1	1430	175	.00	.00	.00	0.
1	0205	26	.01	.01	.00	2.	*	1	1435	176	.00	.00	.00	0.
1	0210	27	.04	.02	.02	3.	*	1	1440	177	.00	.00	.00	0.
1	0215	28	.05	.03	.03	6.	*	1	1445	178	.00	.00	.00	0.
1	0220	29	.04	.02	.02	10.	*	1	1450	179	.00	.00	.00	0.
1	0225	30	.03	.01	.01	11.	*	1	1455	180	.00	.00	.00	0.
1	0230	31	.01	.00	.00	11.	*	1	1500	181	.00	.00	.00	0.
1	0235	32	.02	.01	.01	8.	*	1	1505	182	.00	.00	.00	0.
1	0240	33	.05	.02	.03	8.	*	1	1510	183	.00	.00	.00	0.
1	0245	34	.03	.01	.02	10.	*	1	1515	184	.00	.00	.00	0.
1	0250	35	.01	.00	.01	10.	*	1	1520	185	.00	.00	.00	0.
1	0255	36	.01	.00	.00	8.	*	1	1525	186	.00	.00	.00	0.
1	0300	37	.04	.02	.02	7.	*	1	1530	187	.00	.00	.00	0.
1	0305	38	.10	.04	.06	11.	*	1	1535	188	.00	.00	.00	0.
1	0310	39	.11	.04	.07	21.	*	1	1540	189	.00	.00	.00	0.
1	0315	40	.20	.06	.14	35.	*	1	1545	190	.00	.00	.00	0.
1	0320	41	.32	.08	.24	60.	*	1	1550	191	.00	.00	.00	0.
1	0325	42	.32	.07	.26	96.	*	1	1555	192	.00	.00	.00	0.
1	0330	43	.43	.07	.36	133.	*	1	1600	193	.00	.00	.00	0.
1	0335	44	.12	.02	.10	155.	*	1	1605	194	.00	.00	.00	0.
1	0340	45	.13	.02	.11	138.	*	1	1610	195	.00	.00	.00	0.
1	0345	46	.11	.01	.10	109.	*	1	1615	196	.00	.00	.00	0.
1	0350	47	.02	.00	.02	83.	*	1	1620	197	.00	.00	.00	0.
1	0355	48	.06	.01	.05	60.	*	1	1625	198	.00	.00	.00	0.
1	0400	49	.06	.01	.05	45.	*	1	1630	199	.00	.00	.00	0.
1	0405	50	.02	.00	.02	37.	*	1	1635	200	.00	.00	.00	0.
1	0410	51	.01	.00	.01	27.	*	1	1640	201	.00	.00	.00	0.
1	0415	52	.03	.00	.03	20.	*	1	1645	202	.00	.00	.00	0.
1	0420	53	.03	.00	.03	17.	*	1	1650	203	.00	.00	.00	0.
1	0425	54	.04	.00	.04	17.	*	1	1655	204	.00	.00	.00	0.
1	0430	55	.08	.01	.07	21.	*	1	1700	205	.00	.00	.00	0.
1	0435	56	.06	.01	.05	28.	*	1	1705	206	.00	.00	.00	0.
1	0440	57	.04	.00	.04	31.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.05	.00	.04	30.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.07	.01	.06	29.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.02	.00	.02	30.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.02	.00	.02	26.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	20.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	14.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	10.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	7.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	5.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	5.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	3.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	3.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	3.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	3.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	3.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	2.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	2.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	1.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	1.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	0.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.

1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.
							*							

****

TOTAL RAINFALL = 3.55, TOTAL LOSS = 1.24, TOTAL EXCESS = 2.31

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 155.	3.58		21.	5.	5.	5.
		(INCHES)	2.313	2.314	2.314	2.314
		(AC-FT)	10.	10.	10.	10.

CUMULATIVE AREA = .08 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

****

HYDROGRAPH AT STATION INT-LMB1
PLAN 1, RATIO = .99

****

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q		DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1		0000	1	.00	.00	.00	0.	*	1		1230	151	.00	.00	.00	0.
1		0005	2	.07	.07	.00	0.	*	1		1235	152	.00	.00	.00	0.
1		0010	3	.13	.13	.00	0.	*	1		1240	153	.00	.00	.00	0.
1		0015	4	.05	.05	.00	0.	*	1		1245	154	.00	.00	.00	0.
1		0020	5	.06	.06	.00	0.	*	1		1250	155	.00	.00	.00	0.
1		0025	6	.07	.07	.01	1.	*	1		1255	156	.00	.00	.00	0.
1		0030	7	.06	.05	.01	2.	*	1		1300	157	.00	.00	.00	0.
1		0035	8	.02	.02	.00	3.	*	1		1305	158	.00	.00	.00	0.
1		0040	9	.00	.00	.00	3.	*	1		1310	159	.00	.00	.00	0.
1		0045	10	.00	.00	.00	2.	*	1		1315	160	.00	.00	.00	0.
1		0050	11	.00	.00	.00	1.	*	1		1320	161	.00	.00	.00	0.
1		0055	12	.00	.00	.00	1.	*	1		1325	162	.00	.00	.00	0.
1		0100	13	.00	.00	.00	0.	*	1		1330	163	.00	.00	.00	0.
1		0105	14	.01	.01	.00	0.	*	1		1335	164	.00	.00	.00	0.
1		0110	15	.02	.02	.01	1.	*	1		1340	165	.00	.00	.00	0.
1		0115	16	.01	.01	.00	2.	*	1		1345	166	.00	.00	.00	0.
1		0120	17	.02	.02	.01	2.	*	1		1350	167	.00	.00	.00	0.
1		0125	18	.04	.02	.01	3.	*	1		1355	168	.00	.00	.00	0.
1		0130	19	.05	.03	.02	5.	*	1		1400	169	.00	.00	.00	0.
1		0135	20	.03	.02	.01	7.	*	1		1405	170	.00	.00	.00	0.
1		0140	21	.03	.02	.01	7.	*	1		1410	171	.00	.00	.00	0.
1		0145	22	.02	.01	.01	8.	*	1		1415	172	.00	.00	.00	0.

1	0150	23	.01	.00	.00	7.	*	1	1420	173	.00	.00	.00	0.
1	0155	24	.00	.00	.00	5.	*	1	1425	174	.00	.00	.00	0.
1	0200	25	.00	.00	.00	3.	*	1	1430	175	.00	.00	.00	0.
1	0205	26	.01	.01	.00	2.	*	1	1435	176	.00	.00	.00	0.
1	0210	27	.04	.02	.02	3.	*	1	1440	177	.00	.00	.00	0.
1	0215	28	.05	.03	.02	6.	*	1	1445	178	.00	.00	.00	0.
1	0220	29	.04	.02	.02	9.	*	1	1450	179	.00	.00	.00	0.
1	0225	30	.03	.01	.01	11.	*	1	1455	180	.00	.00	.00	0.
1	0230	31	.01	.00	.00	10.	*	1	1500	181	.00	.00	.00	0.
1	0235	32	.02	.01	.01	8.	*	1	1505	182	.00	.00	.00	0.
1	0240	33	.05	.02	.03	8.	*	1	1510	183	.00	.00	.00	0.
1	0245	34	.03	.01	.02	10.	*	1	1515	184	.00	.00	.00	0.
1	0250	35	.01	.00	.01	10.	*	1	1520	185	.00	.00	.00	0.
1	0255	36	.01	.00	.00	8.	*	1	1525	186	.00	.00	.00	0.
1	0300	37	.04	.02	.02	7.	*	1	1530	187	.00	.00	.00	0.
1	0305	38	.09	.04	.06	11.	*	1	1535	188	.00	.00	.00	0.
1	0310	39	.11	.04	.07	21.	*	1	1540	189	.00	.00	.00	0.
1	0315	40	.20	.06	.14	35.	*	1	1545	190	.00	.00	.00	0.
1	0320	41	.32	.08	.23	60.	*	1	1550	191	.00	.00	.00	0.
1	0325	42	.32	.07	.25	94.	*	1	1555	192	.00	.00	.00	0.
1	0330	43	.42	.07	.35	131.	*	1	1600	193	.00	.00	.00	0.
1	0335	44	.12	.02	.10	153.	*	1	1605	194	.00	.00	.00	0.
1	0340	45	.13	.02	.11	136.	*	1	1610	195	.00	.00	.00	0.
1	0345	46	.11	.01	.10	108.	*	1	1615	196	.00	.00	.00	0.
1	0350	47	.02	.00	.02	82.	*	1	1620	197	.00	.00	.00	0.
1	0355	48	.06	.01	.05	59.	*	1	1625	198	.00	.00	.00	0.
1	0400	49	.06	.01	.05	44.	*	1	1630	199	.00	.00	.00	0.
1	0405	50	.02	.00	.02	36.	*	1	1635	200	.00	.00	.00	0.
1	0410	51	.01	.00	.01	27.	*	1	1640	201	.00	.00	.00	0.
1	0415	52	.03	.00	.03	19.	*	1	1645	202	.00	.00	.00	0.
1	0420	53	.03	.00	.03	17.	*	1	1650	203	.00	.00	.00	0.
1	0425	54	.04	.00	.04	17.	*	1	1655	204	.00	.00	.00	0.
1	0430	55	.08	.01	.07	21.	*	1	1700	205	.00	.00	.00	0.
1	0435	56	.06	.01	.05	28.	*	1	1705	206	.00	.00	.00	0.
1	0440	57	.04	.00	.03	31.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.05	.00	.04	29.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.07	.01	.06	29.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.02	.00	.02	30.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.02	.00	.02	26.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	19.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	14.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	10.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	7.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	5.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	5.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	3.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	3.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	3.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	3.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	3.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	2.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	2.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	1.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	1.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	0.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.

1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

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TOTAL RAINFALL = 3.51, TOTAL LOSS = 1.23, TOTAL EXCESS = 2.28

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 153.	3.58		21.	5.	5.	5.
		(INCHES)	2.281	2.282	2.282	2.282
		(AC-FT)	10.	10.	10.	10.

CUMULATIVE AREA = .08 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

****

HYDROGRAPH AT STATION INT-LMB1
PLAN 1, RATIO = .57

****

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
								*								
1		0000	1	.00	.00	.00	0.	*	1		1230	151	.00	.00	.00	0.
1		0005	2	.04	.04	.00	0.	*	1		1235	152	.00	.00	.00	0.
1		0010	3	.07	.07	.00	0.	*	1		1240	153	.00	.00	.00	0.
1		0015	4	.03	.03	.00	0.	*	1		1245	154	.00	.00	.00	0.
1		0020	5	.03	.03	.00	0.	*	1		1250	155	.00	.00	.00	0.
1		0025	6	.04	.04	.00	0.	*	1		1255	156	.00	.00	.00	0.
1		0030	7	.03	.03	.00	0.	*	1		1300	157	.00	.00	.00	0.
1		0035	8	.01	.01	.00	0.	*	1		1305	158	.00	.00	.00	0.
1		0040	9	.00	.00	.00	0.	*	1		1310	159	.00	.00	.00	0.
1		0045	10	.00	.00	.00	0.	*	1		1315	160	.00	.00	.00	0.
1		0050	11	.00	.00	.00	0.	*	1		1320	161	.00	.00	.00	0.
1		0055	12	.00	.00	.00	0.	*	1		1325	162	.00	.00	.00	0.
1		0100	13	.00	.00	.00	0.	*	1		1330	163	.00	.00	.00	0.
1		0105	14	.01	.01	.00	0.	*	1		1335	164	.00	.00	.00	0.
1		0110	15	.01	.01	.00	0.	*	1		1340	165	.00	.00	.00	0.
1		0115	16	.00	.00	.00	0.	*	1		1345	166	.00	.00	.00	0.
1		0120	17	.01	.01	.00	0.	*	1		1350	167	.00	.00	.00	0.
1		0125	18	.02	.02	.00	0.	*	1		1355	168	.00	.00	.00	0.
1		0130	19	.03	.03	.00	0.	*	1		1400	169	.00	.00	.00	0.
1		0135	20	.02	.02	.00	1.	*	1		1405	170	.00	.00	.00	0.
1		0140	21	.02	.02	.00	1.	*	1		1410	171	.00	.00	.00	0.
1		0145	22	.01	.01	.00	1.	*	1		1415	172	.00	.00	.00	0.
1		0150	23	.00	.00	.00	1.	*	1		1420	173	.00	.00	.00	0.
1		0155	24	.00	.00	.00	1.	*	1		1425	174	.00	.00	.00	0.
1		0200	25	.00	.00	.00	1.	*	1		1430	175	.00	.00	.00	0.

1	0205	26	.01	.01	.00	1.	*	1	1435	176	.00	.00	.00	0.
1	0210	27	.02	.02	.00	1.	*	1	1440	177	.00	.00	.00	0.
1	0215	28	.03	.02	.01	1.	*	1	1445	178	.00	.00	.00	0.
1	0220	29	.02	.02	.01	2.	*	1	1450	179	.00	.00	.00	0.
1	0225	30	.02	.01	.00	3.	*	1	1455	180	.00	.00	.00	0.
1	0230	31	.00	.00	.00	3.	*	1	1500	181	.00	.00	.00	0.
1	0235	32	.01	.01	.00	2.	*	1	1505	182	.00	.00	.00	0.
1	0240	33	.03	.02	.01	2.	*	1	1510	183	.00	.00	.00	0.
1	0245	34	.02	.01	.01	3.	*	1	1515	184	.00	.00	.00	0.
1	0250	35	.01	.00	.00	3.	*	1	1520	185	.00	.00	.00	0.
1	0255	36	.00	.00	.00	3.	*	1	1525	186	.00	.00	.00	0.
1	0300	37	.02	.02	.01	2.	*	1	1530	187	.00	.00	.00	0.
1	0305	38	.05	.03	.02	4.	*	1	1535	188	.00	.00	.00	0.
1	0310	39	.06	.04	.02	7.	*	1	1540	189	.00	.00	.00	0.
1	0315	40	.12	.06	.05	13.	*	1	1545	190	.00	.00	.00	0.
1	0320	41	.18	.08	.10	23.	*	1	1550	191	.00	.00	.00	0.
1	0325	42	.18	.07	.11	38.	*	1	1555	192	.00	.00	.00	0.
1	0330	43	.24	.08	.16	56.	*	1	1600	193	.00	.00	.00	0.
1	0335	44	.07	.02	.05	68.	*	1	1605	194	.00	.00	.00	0.
1	0340	45	.07	.02	.05	62.	*	1	1610	195	.00	.00	.00	0.
1	0345	46	.06	.02	.05	50.	*	1	1615	196	.00	.00	.00	0.
1	0350	47	.01	.00	.01	39.	*	1	1620	197	.00	.00	.00	0.
1	0355	48	.03	.01	.02	28.	*	1	1625	198	.00	.00	.00	0.
1	0400	49	.03	.01	.02	21.	*	1	1630	199	.00	.00	.00	0.
1	0405	50	.01	.00	.01	18.	*	1	1635	200	.00	.00	.00	0.
1	0410	51	.01	.00	.01	13.	*	1	1640	201	.00	.00	.00	0.
1	0415	52	.02	.00	.01	10.	*	1	1645	202	.00	.00	.00	0.
1	0420	53	.02	.00	.01	8.	*	1	1650	203	.00	.00	.00	0.
1	0425	54	.02	.01	.02	8.	*	1	1655	204	.00	.00	.00	0.
1	0430	55	.04	.01	.03	11.	*	1	1700	205	.00	.00	.00	0.
1	0435	56	.03	.01	.03	14.	*	1	1705	206	.00	.00	.00	0.
1	0440	57	.02	.00	.02	15.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.03	.01	.02	15.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.04	.01	.03	15.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.01	.00	.01	15.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.01	.00	.01	13.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.00	10.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.00	.00	.00	7.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.00	.00	.00	5.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	3.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.00	3.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	2.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	2.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	1.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.00	1.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	2.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	1.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	1.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	1.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	1.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	0.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	0.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.

1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.		
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.		
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.		
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.		
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.		
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.		
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.		
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.		
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.		
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.		
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.		
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.		
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.		
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.		
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.		
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.		
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.		
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.		
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.		
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.		
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.		
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.		
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.		
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.		
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.		
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.		
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.		
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.		
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.		
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.		
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.		
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.		
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.		
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.		
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.		
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TOTAL RAINFALL = 2.02, TOTAL LOSS = 1.04, TOTAL EXCESS = .98

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 68.	3.58	9.	2.	2.	2.
		(INCHES) .984	.984	.984	.984
		(AC-FT) 4.	4.	4.	4.

CUMULATIVE AREA = .08 SQ MI

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            *            *
  38 KK     *  DIV-LMB1  *
            *            *
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43 KO OUTPUT CONTROL VARIABLES

IPRNT	1	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

DT DIVERSION

ISTAD	DI_DIV	DIVERSION HYDROGRAPH IDENTIFICATION	
DI INFLOW	.00	68.00	153.00
DQ DIVERTED FLOW	.00	.00	68.00

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DIVERSION HYDROGRAPH DI_DIV
PLAN 1, RATIO = .99

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		0615	76	0.	*	1		1230	151	0.	*	1		1845	226	0.
1		0005	2	0.	*	1		0620	77	0.	*	1		1235	152	0.	*	1		1850	227	0.
1		0010	3	0.	*	1		0625	78	0.	*	1		1240	153	0.	*	1		1855	228	0.
1		0015	4	0.	*	1		0630	79	0.	*	1		1245	154	0.	*	1		1900	229	0.
1		0020	5	0.	*	1		0635	80	0.	*	1		1250	155	0.	*	1		1905	230	0.

1	0025	6	0.	*	1	0640	81	0.	*	1	1255	156	0.	*	1	1910	231	0.
1	0030	7	0.	*	1	0645	82	0.	*	1	1300	157	0.	*	1	1915	232	0.
1	0035	8	0.	*	1	0650	83	0.	*	1	1305	158	0.	*	1	1920	233	0.
1	0040	9	0.	*	1	0655	84	0.	*	1	1310	159	0.	*	1	1925	234	0.
1	0045	10	0.	*	1	0700	85	0.	*	1	1315	160	0.	*	1	1930	235	0.
1	0050	11	0.	*	1	0705	86	0.	*	1	1320	161	0.	*	1	1935	236	0.
1	0055	12	0.	*	1	0710	87	0.	*	1	1325	162	0.	*	1	1940	237	0.
1	0100	13	0.	*	1	0715	88	0.	*	1	1330	163	0.	*	1	1945	238	0.
1	0105	14	0.	*	1	0720	89	0.	*	1	1335	164	0.	*	1	1950	239	0.
1	0110	15	0.	*	1	0725	90	0.	*	1	1340	165	0.	*	1	1955	240	0.
1	0115	16	0.	*	1	0730	91	0.	*	1	1345	166	0.	*	1	2000	241	0.
1	0120	17	0.	*	1	0735	92	0.	*	1	1350	167	0.	*	1	2005	242	0.
1	0125	18	0.	*	1	0740	93	0.	*	1	1355	168	0.	*	1	2010	243	0.
1	0130	19	0.	*	1	0745	94	0.	*	1	1400	169	0.	*	1	2015	244	0.
1	0135	20	0.	*	1	0750	95	0.	*	1	1405	170	0.	*	1	2020	245	0.
1	0140	21	0.	*	1	0755	96	0.	*	1	1410	171	0.	*	1	2025	246	0.
1	0145	22	0.	*	1	0800	97	0.	*	1	1415	172	0.	*	1	2030	247	0.
1	0150	23	0.	*	1	0805	98	0.	*	1	1420	173	0.	*	1	2035	248	0.
1	0155	24	0.	*	1	0810	99	0.	*	1	1425	174	0.	*	1	2040	249	0.
1	0200	25	0.	*	1	0815	100	0.	*	1	1430	175	0.	*	1	2045	250	0.
1	0205	26	0.	*	1	0820	101	0.	*	1	1435	176	0.	*	1	2050	251	0.
1	0210	27	0.	*	1	0825	102	0.	*	1	1440	177	0.	*	1	2055	252	0.
1	0215	28	0.	*	1	0830	103	0.	*	1	1445	178	0.	*	1	2100	253	0.
1	0220	29	0.	*	1	0835	104	0.	*	1	1450	179	0.	*	1	2105	254	0.
1	0225	30	0.	*	1	0840	105	0.	*	1	1455	180	0.	*	1	2110	255	0.
1	0230	31	0.	*	1	0845	106	0.	*	1	1500	181	0.	*	1	2115	256	0.
1	0235	32	0.	*	1	0850	107	0.	*	1	1505	182	0.	*	1	2120	257	0.
1	0240	33	0.	*	1	0855	108	0.	*	1	1510	183	0.	*	1	2125	258	0.
1	0245	34	0.	*	1	0900	109	0.	*	1	1515	184	0.	*	1	2130	259	0.
1	0250	35	0.	*	1	0905	110	0.	*	1	1520	185	0.	*	1	2135	260	0.
1	0255	36	0.	*	1	0910	111	0.	*	1	1525	186	0.	*	1	2140	261	0.
1	0300	37	0.	*	1	0915	112	0.	*	1	1530	187	0.	*	1	2145	262	0.
1	0305	38	0.	*	1	0920	113	0.	*	1	1535	188	0.	*	1	2150	263	0.
1	0310	39	0.	*	1	0925	114	0.	*	1	1540	189	0.	*	1	2155	264	0.
1	0315	40	0.	*	1	0930	115	0.	*	1	1545	190	0.	*	1	2200	265	0.
1	0320	41	0.	*	1	0935	116	0.	*	1	1550	191	0.	*	1	2205	266	0.
1	0325	42	21.	*	1	0940	117	0.	*	1	1555	192	0.	*	1	2210	267	0.
1	0330	43	50.	*	1	0945	118	0.	*	1	1600	193	0.	*	1	2215	268	0.
1	0335	44	68.	*	1	0950	119	0.	*	1	1605	194	0.	*	1	2220	269	0.
1	0340	45	55.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.
1	0345	46	32.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.
1	0350	47	12.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.
1	0355	48	0.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.
1	0400	49	0.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.
1	0405	50	0.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.
1	0410	51	0.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.
1	0415	52	0.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.
1	0420	53	0.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.
1	0425	54	0.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.
1	0430	55	0.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.
1	0435	56	0.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	0.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	0.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	0.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	0.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	0.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	0.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	0.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	0.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	0.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	0.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	0.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	0.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	0.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	0.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	0.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	0.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	0.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	0.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	0.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.
				*					*					*					

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 68.	3.58		3.	1.	1.	1.
		(INCHES)	.365	.365	.365	.365
		(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = .08 SQ MI

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HYDROGRAPH AT STATION DIV-LMB1
PLAN 1, RATIO = .99

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	1.	1		1230	151	0.	1		1845	226	0.
1		0005	2	0.	1		0620	77	0.	1		1235	152	0.	1		1850	227	0.
1		0010	3	0.	1		0625	78	0.	1		1240	153	0.	1		1855	228	0.
1		0015	4	0.	1		0630	79	0.	1		1245	154	0.	1		1900	229	0.
1		0020	5	0.	1		0635	80	0.	1		1250	155	0.	1		1905	230	0.
1		0025	6	1.	1		0640	81	0.	1		1255	156	0.	1		1910	231	0.
1		0030	7	2.	1		0645	82	0.	1		1300	157	0.	1		1915	232	0.
1		0035	8	3.	1		0650	83	0.	1		1305	158	0.	1		1920	233	0.
1		0040	9	3.	1		0655	84	0.	1		1310	159	0.	1		1925	234	0.
1		0045	10	2.	1		0700	85	0.	1		1315	160	0.	1		1930	235	0.
1		0050	11	1.	1		0705	86	0.	1		1320	161	0.	1		1935	236	0.
1		0055	12	1.	1		0710	87	0.	1		1325	162	0.	1		1940	237	0.
1		0100	13	0.	1		0715	88	0.	1		1330	163	0.	1		1945	238	0.
1		0105	14	0.	1		0720	89	0.	1		1335	164	0.	1		1950	239	0.
1		0110	15	1.	1		0725	90	0.	1		1340	165	0.	1		1955	240	0.
1		0115	16	2.	1		0730	91	0.	1		1345	166	0.	1		2000	241	0.
1		0120	17	2.	1		0735	92	0.	1		1350	167	0.	1		2005	242	0.
1		0125	18	3.	1		0740	93	0.	1		1355	168	0.	1		2010	243	0.
1		0130	19	5.	1		0745	94	0.	1		1400	169	0.	1		2015	244	0.
1		0135	20	7.	1		0750	95	0.	1		1405	170	0.	1		2020	245	0.
1		0140	21	7.	1		0755	96	0.	1		1410	171	0.	1		2025	246	0.
1		0145	22	8.	1		0800	97	0.	1		1415	172	0.	1		2030	247	0.
1		0150	23	7.	1		0805	98	0.	1		1420	173	0.	1		2035	248	0.
1		0155	24	5.	1		0810	99	0.	1		1425	174	0.	1		2040	249	0.
1		0200	25	3.	1		0815	100	0.	1		1430	175	0.	1		2045	250	0.
1		0205	26	2.	1		0820	101	0.	1		1435	176	0.	1		2050	251	0.
1		0210	27	3.	1		0825	102	0.	1		1440	177	0.	1		2055	252	0.
1		0215	28	6.	1		0830	103	0.	1		1445	178	0.	1		2100	253	0.
1		0220	29	9.	1		0835	104	0.	1		1450	179	0.	1		2105	254	0.
1		0225	30	11.	1		0840	105	0.	1		1455	180	0.	1		2110	255	0.
1		0230	31	10.	1		0845	106	0.	1		1500	181	0.	1		2115	256	0.
1		0235	32	8.	1		0850	107	0.	1		1505	182	0.	1		2120	257	0.
1		0240	33	8.	1		0855	108	0.	1		1510	183	0.	1		2125	258	0.
1		0245	34	10.	1		0900	109	0.	1		1515	184	0.	1		2130	259	0.
1		0250	35	10.	1		0905	110	0.	1		1520	185	0.	1		2135	260	0.
1		0255	36	8.	1		0910	111	0.	1		1525	186	0.	1		2140	261	0.
1		0300	37	7.	1		0915	112	0.	1		1530	187	0.	1		2145	262	0.
1		0305	38	11.	1		0920	113	0.	1		1535	188	0.	1		2150	263	0.
1		0310	39	21.	1		0925	114	0.	1		1540	189	0.	1		2155	264	0.
1		0315	40	35.	1		0930	115	0.	1		1545	190	0.	1		2200	265	0.
1		0320	41	60.	1		0935	116	0.	1		1550	191	0.	1		2205	266	0.
1		0325	42	73.	1		0940	117	0.	1		1555	192	0.	1		2210	267	0.
1		0330	43	81.	1		0945	118	0.	1		1600	193	0.	1		2215	268	0.
1		0335	44	85.	1		0950	119	0.	1		1605	194	0.	1		2220	269	0.
1		0340	45	82.	1		0955	120	0.	1		1610	195	0.	1		2225	270	0.
1		0345	46	76.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	71.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	59.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	44.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	36.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	27.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	19.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	17.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	17.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	21.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	28.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	31.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	29.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	29.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	30.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	26.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	19.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	14.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	10.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	7.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	5.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	5.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	3.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	3.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	3.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	3.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.
1		0555	72	3.	1		1210	147	0.	1		1825	222	0.	2		0040	297	0.
1		0600	73	2.	1		1215	148	0.	1		1830	223	0.	2		0045	298	0.
1		0605	74	2.	1		1220	149	0.	1		1835	224	0.	2		0050	299	0.
1		0610	75	1.	1		1225	150	0.	1		1840	225	0.	2		0055	300	0.

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PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 85.	3.58	17.	4.	4.	4.
		(INCHES) 1.916	1.917	1.917	1.917
		(AC-FT) 9.	9.	9.	9.

CUMULATIVE AREA = .08 SQ MI

DIVERSION HYDROGRAPH DI_DIV
PLAN 1, RATIO = .57

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	0.	1		1230	151	0.	1		1845	226	0.
1		0005	2	0.	1		0620	77	0.	1		1235	152	0.	1		1850	227	0.
1		0010	3	0.	1		0625	78	0.	1		1240	153	0.	1		1855	228	0.
1		0015	4	0.	1		0630	79	0.	1		1245	154	0.	1		1900	229	0.
1		0020	5	0.	1		0635	80	0.	1		1250	155	0.	1		1905	230	0.
1		0025	6	0.	1		0640	81	0.	1		1255	156	0.	1		1910	231	0.
1		0030	7	0.	1		0645	82	0.	1		1300	157	0.	1		1915	232	0.
1		0035	8	0.	1		0650	83	0.	1		1305	158	0.	1		1920	233	0.
1		0040	9	0.	1		0655	84	0.	1		1310	159	0.	1		1925	234	0.
1		0045	10	0.	1		0700	85	0.	1		1315	160	0.	1		1930	235	0.
1		0050	11	0.	1		0705	86	0.	1		1320	161	0.	1		1935	236	0.
1		0055	12	0.	1		0710	87	0.	1		1325	162	0.	1		1940	237	0.
1		0100	13	0.	1		0715	88	0.	1		1330	163	0.	1		1945	238	0.
1		0105	14	0.	1		0720	89	0.	1		1335	164	0.	1		1950	239	0.
1		0110	15	0.	1		0725	90	0.	1		1340	165	0.	1		1955	240	0.
1		0115	16	0.	1		0730	91	0.	1		1345	166	0.	1		2000	241	0.
1		0120	17	0.	1		0735	92	0.	1		1350	167	0.	1		2005	242	0.
1		0125	18	0.	1		0740	93	0.	1		1355	168	0.	1		2010	243	0.
1		0130	19	0.	1		0745	94	0.	1		1400	169	0.	1		2015	244	0.
1		0135	20	0.	1		0750	95	0.	1		1405	170	0.	1		2020	245	0.
1		0140	21	0.	1		0755	96	0.	1		1410	171	0.	1		2025	246	0.
1		0145	22	0.	1		0800	97	0.	1		1415	172	0.	1		2030	247	0.
1		0150	23	0.	1		0805	98	0.	1		1420	173	0.	1		2035	248	0.
1		0155	24	0.	1		0810	99	0.	1		1425	174	0.	1		2040	249	0.
1		0200	25	0.	1		0815	100	0.	1		1430	175	0.	1		2045	250	0.
1		0205	26	0.	1		0820	101	0.	1		1435	176	0.	1		2050	251	0.
1		0210	27	0.	1		0825	102	0.	1		1440	177	0.	1		2055	252	0.
1		0215	28	0.	1		0830	103	0.	1		1445	178	0.	1		2100	253	0.
1		0220	29	0.	1		0835	104	0.	1		1450	179	0.	1		2105	254	0.
1		0225	30	0.	1		0840	105	0.	1		1455	180	0.	1		2110	255	0.
1		0230	31	0.	1		0845	106	0.	1		1500	181	0.	1		2115	256	0.
1		0235	32	0.	1		0850	107	0.	1		1505	182	0.	1		2120	257	0.
1		0240	33	0.	1		0855	108	0.	1		1510	183	0.	1		2125	258	0.
1		0245	34	0.	1		0900	109	0.	1		1515	184	0.	1		2130	259	0.
1		0250	35	0.	1		0905	110	0.	1		1520	185	0.	1		2135	260	0.
1		0255	36	0.	1		0910	111	0.	1		1525	186	0.	1		2140	261	0.
1		0300	37	0.	1		0915	112	0.	1		1530	187	0.	1		2145	262	0.
1		0305	38	0.	1		0920	113	0.	1		1535	188	0.	1		2150	263	0.
1		0310	39	0.	1		0925	114	0.	1		1540	189	0.	1		2155	264	0.
1		0315	40	0.	1		0930	115	0.	1		1545	190	0.	1		2200	265	0.
1		0320	41	0.	1		0935	116	0.	1		1550	191	0.	1		2205	266	0.
1		0325	42	0.	1		0940	117	0.	1		1555	192	0.	1		2210	267	0.
1		0330	43	0.	1		0945	118	0.	1		1600	193	0.	1		2215	268	0.
1		0335	44	0.	1		0950	119	0.	1		1605	194	0.	1		2220	269	0.
1		0340	45	0.	1		0955	120	0.	1		1610	195	0.	1		2225	270	0.
1		0345	46	0.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	0.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	0.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	0.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	0.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	0.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	0.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	0.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	0.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	0.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	0.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	0.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	0.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	0.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	0.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	0.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	0.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	0.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	0.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	0.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	0.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	0.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	0.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	0.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	0.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	0.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.
1		0555	72	0.	1		1210	147	0.	1		1825	222	0.	2		0040	297	0.
1		0600	73	0.	1		1215	148	0.	1		1830	223	0.	2		0045	298	0.
1		0605	74	0.	1		1220	149	0.	1		1835	224	0.	2		0050	299	0.
1		0610	75	0.	1		1225	150	0.	1		1840	225	0.	2		0055	300	0.

PEAK FLOW TIME MAXIMUM AVERAGE FLOW

		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
	(CFS)				
+ 0.	3.58	0.	0.	0.	0.
	(INCHES)	.000	.000	.000	.000
	(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .08 SQ MI

HYDROGRAPH AT STATION DIV-LMB1
PLAN 1, RATIO = .57

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	0.	1		1230	151	0.	1		1845	226	0.
1		0005	2	0.	1		0620	77	0.	1		1235	152	0.	1		1850	227	0.
1		0010	3	0.	1		0625	78	0.	1		1240	153	0.	1		1855	228	0.
1		0015	4	0.	1		0630	79	0.	1		1245	154	0.	1		1900	229	0.
1		0020	5	0.	1		0635	80	0.	1		1250	155	0.	1		1905	230	0.
1		0025	6	0.	1		0640	81	0.	1		1255	156	0.	1		1910	231	0.
1		0030	7	0.	1		0645	82	0.	1		1300	157	0.	1		1915	232	0.
1		0035	8	0.	1		0650	83	0.	1		1305	158	0.	1		1920	233	0.
1		0040	9	0.	1		0655	84	0.	1		1310	159	0.	1		1925	234	0.
1		0045	10	0.	1		0700	85	0.	1		1315	160	0.	1		1930	235	0.
1		0050	11	0.	1		0705	86	0.	1		1320	161	0.	1		1935	236	0.
1		0055	12	0.	1		0710	87	0.	1		1325	162	0.	1		1940	237	0.
1		0100	13	0.	1		0715	88	0.	1		1330	163	0.	1		1945	238	0.
1		0105	14	0.	1		0720	89	0.	1		1335	164	0.	1		1950	239	0.
1		0110	15	0.	1		0725	90	0.	1		1340	165	0.	1		1955	240	0.
1		0115	16	0.	1		0730	91	0.	1		1345	166	0.	1		2000	241	0.
1		0120	17	0.	1		0735	92	0.	1		1350	167	0.	1		2005	242	0.
1		0125	18	0.	1		0740	93	0.	1		1355	168	0.	1		2010	243	0.
1		0130	19	0.	1		0745	94	0.	1		1400	169	0.	1		2015	244	0.
1		0135	20	1.	1		0750	95	0.	1		1405	170	0.	1		2020	245	0.
1		0140	21	1.	1		0755	96	0.	1		1410	171	0.	1		2025	246	0.
1		0145	22	1.	1		0800	97	0.	1		1415	172	0.	1		2030	247	0.
1		0150	23	1.	1		0805	98	0.	1		1420	173	0.	1		2035	248	0.
1		0155	24	1.	1		0810	99	0.	1		1425	174	0.	1		2040	249	0.
1		0200	25	1.	1		0815	100	0.	1		1430	175	0.	1		2045	250	0.
1		0205	26	1.	1		0820	101	0.	1		1435	176	0.	1		2050	251	0.
1		0210	27	1.	1		0825	102	0.	1		1440	177	0.	1		2055	252	0.
1		0215	28	1.	1		0830	103	0.	1		1445	178	0.	1		2100	253	0.
1		0220	29	2.	1		0835	104	0.	1		1450	179	0.	1		2105	254	0.
1		0225	30	3.	1		0840	105	0.	1		1455	180	0.	1		2110	255	0.
1		0230	31	3.	1		0845	106	0.	1		1500	181	0.	1		2115	256	0.
1		0235	32	2.	1		0850	107	0.	1		1505	182	0.	1		2120	257	0.
1		0240	33	2.	1		0855	108	0.	1		1510	183	0.	1		2125	258	0.
1		0245	34	3.	1		0900	109	0.	1		1515	184	0.	1		2130	259	0.
1		0250	35	3.	1		0905	110	0.	1		1520	185	0.	1		2135	260	0.
1		0255	36	3.	1		0910	111	0.	1		1525	186	0.	1		2140	261	0.
1		0300	37	2.	1		0915	112	0.	1		1530	187	0.	1		2145	262	0.
1		0305	38	4.	1		0920	113	0.	1		1535	188	0.	1		2150	263	0.
1		0310	39	7.	1		0925	114	0.	1		1540	189	0.	1		2155	264	0.
1		0315	40	13.	1		0930	115	0.	1		1545	190	0.	1		2200	265	0.
1		0320	41	23.	1		0935	116	0.	1		1550	191	0.	1		2205	266	0.
1		0325	42	38.	1		0940	117	0.	1		1555	192	0.	1		2210	267	0.
1		0330	43	56.	1		0945	118	0.	1		1600	193	0.	1		2215	268	0.
1		0335	44	68.	1		0950	119	0.	1		1605	194	0.	1		2220	269	0.
1		0340	45	62.	1		0955	120	0.	1		1610	195	0.	1		2225	270	0.
1		0345	46	50.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	39.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	28.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	21.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	18.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	13.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	10.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	8.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	8.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	11.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	14.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	15.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	15.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	15.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	15.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	13.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	10.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	7.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	5.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	3.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	3.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	2.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	2.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	1.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	1.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	2.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.

1	0555	72	1.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.					
1	0600	73	1.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.					
1	0605	74	1.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.					
1	0610	75	1.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.					
				*					*					*									

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 68.	3.58		9.	2.	2.	2.
		(INCHES)	.984	.984	.984	.984
		(AC-FT)	4.	4.	4.	4.

CUMULATIVE AREA = .08 SQ MI

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            **************
            *            *
  46 KK     *     COS-2  *
            *            *
            **************
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52 KO OUTPUT CONTROL VARIABLES

IPRNT	1	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

48 BA SUBBASIN CHARACTERISTICS

TAREA	.02	SUBBASIN AREA

PRECIPITATION DATA

49 PB STORM 3.41 BASIN TOTAL PRECIPITATION

22 PI INCREMENTAL PRECIPITATION PATTERN

.02	.04	.01	.02	.02	.02	.01	.00	.00	.00
.00	.00	.00	.01	.00	.01	.01	.01	.01	.01
.01	.00	.00	.00	.00	.01	.02	.01	.01	.00
.01	.01	.01	.00	.00	.01	.03	.03	.06	.09
.09	.12	.03	.04	.03	.01	.02	.02	.00	.00
.01	.01	.01	.02	.02	.01	.01	.02	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00								

50 LS SCS LOSS RATE

STRTL	.25	INITIAL ABSTRACTION
CRVNBR	89.00	CURVE NUMBER
RTIMP	.00	PERCENT IMPERVIOUS AREA

51 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	.10	LAG

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WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

UNIT HYDROGRAPH
8 END-OF-PERIOD ORDINATES

35. 52. 23. 9. 3. 1. 1. 0.

****

HYDROGRAPH AT STATION COS-2

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DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1		0000	1	.00	.00	.00	0.	1		1230	151	.00	.00	.00	0.
1		0005	2	.07	.07	.00	0.	1		1235	152	.00	.00	.00	0.
1		0010	3	.13	.13	.00	0.	1		1240	153	.00	.00	.00	0.
1		0015	4	.04	.04	.00	0.	1		1245	154	.00	.00	.00	0.
1		0020	5	.06	.06	.00	0.	1		1250	155	.00	.00	.00	0.
1		0025	6	.07	.06	.01	0.	1		1255	156	.00	.00	.00	0.
1		0030	7	.05	.04	.01	1.	1		1300	157	.00	.00	.00	0.
1		0035	8	.02	.02	.00	1.	1		1305	158	.00	.00	.00	0.
1		0040	9	.00	.00	.00	1.	1		1310	159	.00	.00	.00	0.
1		0045	10	.00	.00	.00	0.	1		1315	160	.00	.00	.00	0.
1		0050	11	.00	.00	.00	0.	1		1320	161	.00	.00	.00	0.
1		0055	12	.00	.00	.00	0.	1		1325	162	.00	.00	.00	0.
1		0100	13	.00	.00	.00	0.	1		1330	163	.00	.00	.00	0.

1	0105	14	.01	.01	.00	0.	*	1	1335	164	.00	.00	.00	0.
1	0110	15	.02	.02	.01	0.	*	1	1340	165	.00	.00	.00	0.
1	0115	16	.01	.00	.00	0.	*	1	1345	166	.00	.00	.00	0.
1	0120	17	.02	.01	.01	0.	*	1	1350	167	.00	.00	.00	0.
1	0125	18	.03	.02	.01	1.	*	1	1355	168	.00	.00	.00	0.
1	0130	19	.05	.03	.02	1.	*	1	1400	169	.00	.00	.00	0.
1	0135	20	.03	.02	.01	2.	*	1	1405	170	.00	.00	.00	0.
1	0140	21	.03	.02	.01	2.	*	1	1410	171	.00	.00	.00	0.
1	0145	22	.02	.01	.01	2.	*	1	1415	172	.00	.00	.00	0.
1	0150	23	.01	.00	.00	1.	*	1	1420	173	.00	.00	.00	0.
1	0155	24	.00	.00	.00	1.	*	1	1425	174	.00	.00	.00	0.
1	0200	25	.00	.00	.00	0.	*	1	1430	175	.00	.00	.00	0.
1	0205	26	.01	.01	.00	0.	*	1	1435	176	.00	.00	.00	0.
1	0210	27	.03	.02	.02	1.	*	1	1440	177	.00	.00	.00	0.
1	0215	28	.05	.03	.03	2.	*	1	1445	178	.00	.00	.00	0.
1	0220	29	.04	.02	.02	2.	*	1	1450	179	.00	.00	.00	0.
1	0225	30	.03	.01	.01	2.	*	1	1455	180	.00	.00	.00	0.
1	0230	31	.01	.00	.00	2.	*	1	1500	181	.00	.00	.00	0.
1	0235	32	.02	.01	.01	1.	*	1	1505	182	.00	.00	.00	0.
1	0240	33	.05	.02	.03	2.	*	1	1510	183	.00	.00	.00	0.
1	0245	34	.03	.01	.02	2.	*	1	1515	184	.00	.00	.00	0.
1	0250	35	.01	.00	.01	2.	*	1	1520	185	.00	.00	.00	0.
1	0255	36	.01	.00	.00	1.	*	1	1525	186	.00	.00	.00	0.
1	0300	37	.04	.02	.02	1.	*	1	1530	187	.00	.00	.00	0.
1	0305	38	.09	.03	.06	4.	*	1	1535	188	.00	.00	.00	0.
1	0310	39	.10	.03	.07	6.	*	1	1540	189	.00	.00	.00	0.
1	0315	40	.19	.06	.14	10.	*	1	1545	190	.00	.00	.00	0.
1	0320	41	.31	.07	.23	17.	*	1	1550	191	.00	.00	.00	0.
1	0325	42	.31	.06	.25	25.	*	1	1555	192	.00	.00	.00	0.
1	0330	43	.41	.06	.35	32.	*	1	1600	193	.00	.00	.00	0.
1	0335	44	.12	.01	.10	30.	*	1	1605	194	.00	.00	.00	0.
1	0340	45	.13	.01	.11	20.	*	1	1610	195	.00	.00	.00	0.
1	0345	46	.11	.01	.09	16.	*	1	1615	196	.00	.00	.00	0.
1	0350	47	.02	.00	.02	11.	*	1	1620	197	.00	.00	.00	0.
1	0355	48	.05	.01	.05	7.	*	1	1625	198	.00	.00	.00	0.
1	0400	49	.05	.01	.05	6.	*	1	1630	199	.00	.00	.00	0.
1	0405	50	.02	.00	.02	5.	*	1	1635	200	.00	.00	.00	0.
1	0410	51	.01	.00	.01	3.	*	1	1640	201	.00	.00	.00	0.
1	0415	52	.03	.00	.02	3.	*	1	1645	202	.00	.00	.00	0.
1	0420	53	.03	.00	.02	3.	*	1	1650	203	.00	.00	.00	0.
1	0425	54	.04	.00	.04	3.	*	1	1655	204	.00	.00	.00	0.
1	0430	55	.08	.01	.07	5.	*	1	1700	205	.00	.00	.00	0.
1	0435	56	.05	.00	.05	6.	*	1	1705	206	.00	.00	.00	0.
1	0440	57	.04	.00	.03	6.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.04	.00	.04	5.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.07	.01	.06	6.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.02	.00	.02	5.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.02	.00	.02	4.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	2.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	2.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	1.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	1.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	1.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	1.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	0.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	0.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	1.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	1.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	0.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	0.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	0.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	0.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	0.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	0.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.

1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.
							*							

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TOTAL RAINFALL = 3.41, TOTAL LOSS = 1.14, TOTAL EXCESS = 2.27

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 32.	3.50	4.	1.	1.	1.
		(INCHES) 2.274	2.274	2.274	2.274
		(AC-FT) 2.	2.	2.	2.

CUMULATIVE AREA = .02 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

****

HYDROGRAPH AT STATION COS-2
PLAN 1, RATIO = .99

****

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
								*								
1		0000	1	.00	.00	.00	0.	*	1		1230	151	.00	.00	.00	0.
1		0005	2	.07	.07	.00	0.	*	1		1235	152	.00	.00	.00	0.
1		0010	3	.12	.12	.00	0.	*	1		1240	153	.00	.00	.00	0.
1		0015	4	.04	.04	.00	0.	*	1		1245	154	.00	.00	.00	0.
1		0020	5	.06	.06	.00	0.	*	1		1250	155	.00	.00	.00	0.
1		0025	6	.07	.06	.01	0.	*	1		1255	156	.00	.00	.00	0.
1		0030	7	.05	.04	.01	1.	*	1		1300	157	.00	.00	.00	0.
1		0035	8	.02	.02	.00	1.	*	1		1305	158	.00	.00	.00	0.
1		0040	9	.00	.00	.00	1.	*	1		1310	159	.00	.00	.00	0.
1		0045	10	.00	.00	.00	0.	*	1		1315	160	.00	.00	.00	0.
1		0050	11	.00	.00	.00	0.	*	1		1320	161	.00	.00	.00	0.
1		0055	12	.00	.00	.00	0.	*	1		1325	162	.00	.00	.00	0.
1		0100	13	.00	.00	.00	0.	*	1		1330	163	.00	.00	.00	0.
1		0105	14	.01	.01	.00	0.	*	1		1335	164	.00	.00	.00	0.
1		0110	15	.02	.02	.01	0.	*	1		1340	165	.00	.00	.00	0.
1		0115	16	.01	.00	.00	0.	*	1		1345	166	.00	.00	.00	0.

1	0120	17	.02	.01	.01	0.	*	1	1350	167	.00	.00	.00	0.
1	0125	18	.03	.02	.01	1.	*	1	1355	168	.00	.00	.00	0.
1	0130	19	.05	.03	.02	1.	*	1	1400	169	.00	.00	.00	0.
1	0135	20	.03	.02	.01	2.	*	1	1405	170	.00	.00	.00	0.
1	0140	21	.03	.02	.01	2.	*	1	1410	171	.00	.00	.00	0.
1	0145	22	.02	.01	.01	1.	*	1	1415	172	.00	.00	.00	0.
1	0150	23	.01	.00	.00	1.	*	1	1420	173	.00	.00	.00	0.
1	0155	24	.00	.00	.00	1.	*	1	1425	174	.00	.00	.00	0.
1	0200	25	.00	.00	.00	0.	*	1	1430	175	.00	.00	.00	0.
1	0205	26	.01	.01	.00	0.	*	1	1435	176	.00	.00	.00	0.
1	0210	27	.03	.02	.02	1.	*	1	1440	177	.00	.00	.00	0.
1	0215	28	.05	.03	.02	2.	*	1	1445	178	.00	.00	.00	0.
1	0220	29	.04	.02	.02	2.	*	1	1450	179	.00	.00	.00	0.
1	0225	30	.03	.01	.01	2.	*	1	1455	180	.00	.00	.00	0.
1	0230	31	.01	.00	.00	2.	*	1	1500	181	.00	.00	.00	0.
1	0235	32	.02	.01	.01	1.	*	1	1505	182	.00	.00	.00	0.
1	0240	33	.05	.02	.03	2.	*	1	1510	183	.00	.00	.00	0.
1	0245	34	.03	.01	.02	2.	*	1	1515	184	.00	.00	.00	0.
1	0250	35	.01	.00	.01	2.	*	1	1520	185	.00	.00	.00	0.
1	0255	36	.01	.00	.00	1.	*	1	1525	186	.00	.00	.00	0.
1	0300	37	.04	.02	.02	1.	*	1	1530	187	.00	.00	.00	0.
1	0305	38	.09	.03	.06	3.	*	1	1535	188	.00	.00	.00	0.
1	0310	39	.10	.03	.07	6.	*	1	1540	189	.00	.00	.00	0.
1	0315	40	.19	.06	.14	10.	*	1	1545	190	.00	.00	.00	0.
1	0320	41	.30	.07	.23	17.	*	1	1550	191	.00	.00	.00	0.
1	0325	42	.31	.06	.25	24.	*	1	1555	192	.00	.00	.00	0.
1	0330	43	.41	.06	.34	31.	*	1	1600	193	.00	.00	.00	0.
1	0335	44	.11	.01	.10	29.	*	1	1605	194	.00	.00	.00	0.
1	0340	45	.12	.02	.11	20.	*	1	1610	195	.00	.00	.00	0.
1	0345	46	.10	.01	.09	15.	*	1	1615	196	.00	.00	.00	0.
1	0350	47	.02	.00	.02	11.	*	1	1620	197	.00	.00	.00	0.
1	0355	48	.05	.01	.05	7.	*	1	1625	198	.00	.00	.00	0.
1	0400	49	.05	.01	.05	6.	*	1	1630	199	.00	.00	.00	0.
1	0405	50	.02	.00	.02	5.	*	1	1635	200	.00	.00	.00	0.
1	0410	51	.01	.00	.01	3.	*	1	1640	201	.00	.00	.00	0.
1	0415	52	.03	.00	.02	2.	*	1	1645	202	.00	.00	.00	0.
1	0420	53	.03	.00	.02	3.	*	1	1650	203	.00	.00	.00	0.
1	0425	54	.04	.00	.04	3.	*	1	1655	204	.00	.00	.00	0.
1	0430	55	.07	.01	.07	5.	*	1	1700	205	.00	.00	.00	0.
1	0435	56	.05	.00	.05	6.	*	1	1705	206	.00	.00	.00	0.
1	0440	57	.04	.00	.03	6.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.04	.00	.04	5.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.07	.01	.06	6.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.02	.00	.02	5.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.02	.00	.02	4.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	2.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	2.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	1.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	1.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	1.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	1.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	0.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	0.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	1.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	1.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	0.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	0.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	0.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	0.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	0.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	0.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.

1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.
							*							

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TOTAL RAINFALL = 3.38, TOTAL LOSS = 1.13, TOTAL EXCESS = 2.24

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
	(CFS)				
+ 31.	3.50	4.	1.	1.	1.
	(INCHES)	2.242	2.243	2.243	2.243
	(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = .02 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

****

HYDROGRAPH AT STATION COS-2
PLAN 1, RATIO = .57

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DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q		DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1		0000	1	.00	.00	.00	0.	*	1		1230	151	.00	.00	.00	0.
1		0005	2	.04	.04	.00	0.	*	1		1235	152	.00	.00	.00	0.
1		0010	3	.07	.07	.00	0.	*	1		1240	153	.00	.00	.00	0.
1		0015	4	.03	.03	.00	0.	*	1		1245	154	.00	.00	.00	0.
1		0020	5	.03	.03	.00	0.	*	1		1250	155	.00	.00	.00	0.
1		0025	6	.04	.04	.00	0.	*	1		1255	156	.00	.00	.00	0.
1		0030	7	.03	.03	.00	0.	*	1		1300	157	.00	.00	.00	0.
1		0035	8	.01	.01	.00	0.	*	1		1305	158	.00	.00	.00	0.
1		0040	9	.00	.00	.00	0.	*	1		1310	159	.00	.00	.00	0.
1		0045	10	.00	.00	.00	0.	*	1		1315	160	.00	.00	.00	0.
1		0050	11	.00	.00	.00	0.	*	1		1320	161	.00	.00	.00	0.
1		0055	12	.00	.00	.00	0.	*	1		1325	162	.00	.00	.00	0.
1		0100	13	.00	.00	.00	0.	*	1		1330	163	.00	.00	.00	0.
1		0105	14	.01	.01	.00	0.	*	1		1335	164	.00	.00	.00	0.
1		0110	15	.01	.01	.00	0.	*	1		1340	165	.00	.00	.00	0.
1		0115	16	.00	.00	.00	0.	*	1		1345	166	.00	.00	.00	0.
1		0120	17	.01	.01	.00	0.	*	1		1350	167	.00	.00	.00	0.
1		0125	18	.02	.02	.00	0.	*	1		1355	168	.00	.00	.00	0.
1		0130	19	.03	.02	.00	0.	*	1		1400	169	.00	.00	.00	0.

1	0135	20	.02	.02	.00	0.	*	1	1405	170	.00	.00	.00	0.
1	0140	21	.02	.01	.00	0.	*	1	1410	171	.00	.00	.00	0.
1	0145	22	.01	.01	.00	0.	*	1	1415	172	.00	.00	.00	0.
1	0150	23	.00	.00	.00	0.	*	1	1420	173	.00	.00	.00	0.
1	0155	24	.00	.00	.00	0.	*	1	1425	174	.00	.00	.00	0.
1	0200	25	.00	.00	.00	0.	*	1	1430	175	.00	.00	.00	0.
1	0205	26	.01	.00	.00	0.	*	1	1435	176	.00	.00	.00	0.
1	0210	27	.02	.02	.00	0.	*	1	1440	177	.00	.00	.00	0.
1	0215	28	.03	.02	.01	0.	*	1	1445	178	.00	.00	.00	0.
1	0220	29	.02	.02	.01	1.	*	1	1450	179	.00	.00	.00	0.
1	0225	30	.02	.01	.00	1.	*	1	1455	180	.00	.00	.00	0.
1	0230	31	.00	.00	.00	0.	*	1	1500	181	.00	.00	.00	0.
1	0235	32	.01	.01	.00	0.	*	1	1505	182	.00	.00	.00	0.
1	0240	33	.03	.02	.01	1.	*	1	1510	183	.00	.00	.00	0.
1	0245	34	.02	.01	.01	1.	*	1	1515	184	.00	.00	.00	0.
1	0250	35	.01	.00	.00	1.	*	1	1520	185	.00	.00	.00	0.
1	0255	36	.00	.00	.00	0.	*	1	1525	186	.00	.00	.00	0.
1	0300	37	.02	.01	.01	0.	*	1	1530	187	.00	.00	.00	0.
1	0305	38	.05	.03	.02	1.	*	1	1535	188	.00	.00	.00	0.
1	0310	39	.06	.03	.03	2.	*	1	1540	189	.00	.00	.00	0.
1	0315	40	.11	.06	.05	4.	*	1	1545	190	.00	.00	.00	0.
1	0320	41	.17	.08	.10	7.	*	1	1550	191	.00	.00	.00	0.
1	0325	42	.18	.06	.11	11.	*	1	1555	192	.00	.00	.00	0.
1	0330	43	.23	.07	.16	14.	*	1	1600	193	.00	.00	.00	0.
1	0335	44	.07	.02	.05	14.	*	1	1605	194	.00	.00	.00	0.
1	0340	45	.07	.02	.05	9.	*	1	1610	195	.00	.00	.00	0.
1	0345	46	.06	.01	.05	7.	*	1	1615	196	.00	.00	.00	0.
1	0350	47	.01	.00	.01	5.	*	1	1620	197	.00	.00	.00	0.
1	0355	48	.03	.01	.02	3.	*	1	1625	198	.00	.00	.00	0.
1	0400	49	.03	.01	.02	3.	*	1	1630	199	.00	.00	.00	0.
1	0405	50	.01	.00	.01	2.	*	1	1635	200	.00	.00	.00	0.
1	0410	51	.01	.00	.01	1.	*	1	1640	201	.00	.00	.00	0.
1	0415	52	.02	.00	.01	1.	*	1	1645	202	.00	.00	.00	0.
1	0420	53	.02	.00	.01	1.	*	1	1650	203	.00	.00	.00	0.
1	0425	54	.02	.00	.02	2.	*	1	1655	204	.00	.00	.00	0.
1	0430	55	.04	.01	.03	3.	*	1	1700	205	.00	.00	.00	0.
1	0435	56	.03	.01	.02	3.	*	1	1705	206	.00	.00	.00	0.
1	0440	57	.02	.00	.02	3.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.03	.00	.02	3.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.04	.01	.03	3.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.01	.00	.01	3.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.01	.00	.01	2.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.00	1.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.00	.00	.00	1.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.00	.00	.00	1.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	0.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.00	0.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	0.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	0.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	0.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.00	0.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	0.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	0.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	0.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	0.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	0.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	0.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	0.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.

1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.
							*							

****

TOTAL RAINFALL = 1.94, TOTAL LOSS = .96, TOTAL EXCESS = .98

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 14.	3.50	2.	0.	0.	0.
		(INCHES) .981	.981	.981	.981
		(AC-FT) 1.	1.	1.	1.

CUMULATIVE AREA = .02 SQ MI

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						
+	3-O*	.08	1	FLOW	189.	100.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	INT-LMB1	.08	1	FLOW	153.	68.
				TIME	3.58	3.58
DIVERSION TO						
+	DI_DIV	.08	1	FLOW	68.	0.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	DIV-LMB1	.08	1	FLOW	85.	68.
				TIME	3.58	3.58
2 COMBINED AT						
+	CP1	.16	1	FLOW	269.	163.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	COS-2	.02	1	FLOW	31.	14.
				TIME	3.50	3.50

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

Appendix C. Hydraulics Appendix

C.1. Drop Inlet Calculations

C.2. Normal Depth Calculations

C.3. Interim Condition WSPG-W Model

C.4. Ultimate Condition WSPG-W Model

C.5. Riprap Calculations

C.1 Drop Inlet Calculations

Worksheet for SDDI #1 LMB-3S 15' Combination Inlet On Grade - 4.5% - 100-year Interim

Project Description	
Solve For	Efficiency

Input Data	
Discharge	24.69 cfs
Slope	0.045 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Local Depression	2.0 in
Local Depression Width	180.0 in
Grate Width	1.50 ft
Grate Length	12.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	15.0 ft

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results	
Efficiency	51.60 %
Intercepted Flow	12.74 cfs
Bypass Flow	11.95 cfs
Spread	17.5 ft
Depth	0.47 ft
Flow Area	3.2 ft²
Gutter Depression	1.4 in
Total Depression	3.4 in
Velocity	7.73 ft/s
Splash Over Velocity	16.48 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.185
Grate Flow Ratio	0.265
Equivalent Cross Slope	0.026 ft/ft
Active Grate Length	6.3 ft
Length Factor	0.091
Total Interception Length	96.2 ft

Messages

Worksheet for SDDI #1 LMB-3S 15' Combination Inlet On Grade - 4.5% - 100-year Interim

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).	

Worksheet for SDDI #1 LMB-3S 15' Combination Inlet On Grade - 4.5% - 100-year Ultimate

Project Description	
Solve For	Efficiency

Input Data	
Discharge	8.70 cfs
Slope	0.045 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Local Depression	2.0 in
Local Depression Width	180.0 in
Grate Width	1.50 ft
Grate Length	12.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	15.0 ft

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results	
Efficiency	71.21 %
Intercepted Flow	6.20 cfs
Bypass Flow	2.50 cfs
Spread	11.4 ft
Depth	0.35 ft
Flow Area	1.4 ft^2
Gutter Depression	1.4 in
Total Depression	3.4 in
Velocity	6.16 ft/s
Splash Over Velocity	16.48 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.255
Grate Flow Ratio	0.412
Equivalent Cross Slope	0.030 ft/ft
Active Grate Length	6.3 ft
Length Factor	0.151
Total Interception Length	57.8 ft

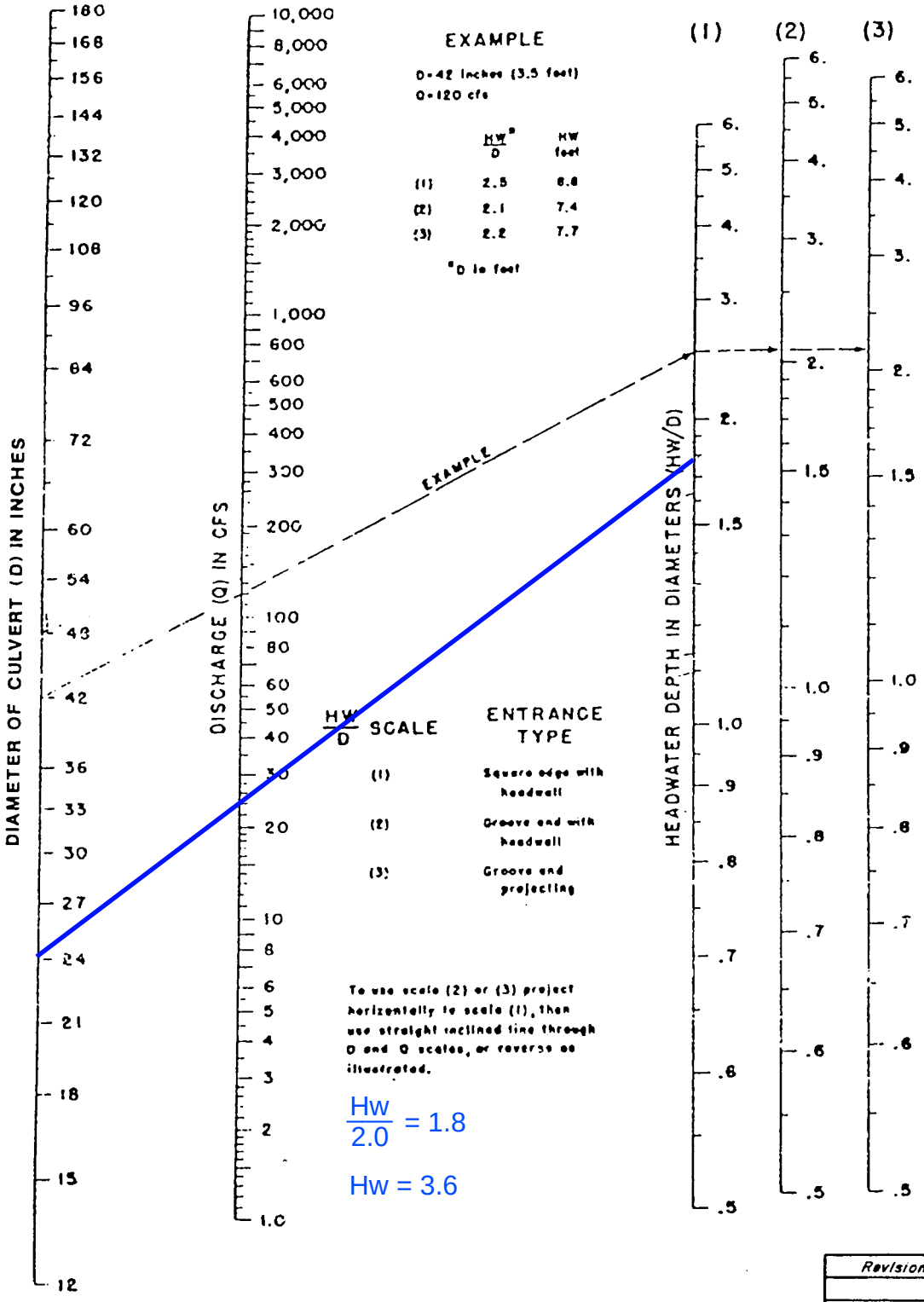
Messages

Worksheet for SDDI #1 LMB-3S 15' Combination Inlet On Grade - 4.5% - 100-year 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).	

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #1 / LMB-3S + INT-LMB2 + bypass SDDI #3



Total Discharge
Q = 24.70-CFS

24" RCP
LATERAL

$\frac{Hw}{2.0} = 1.8$

Hw = 3.6

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #2 LMB-1N 7.5 Curb Inlet on Grade - 4.5% - 100-year

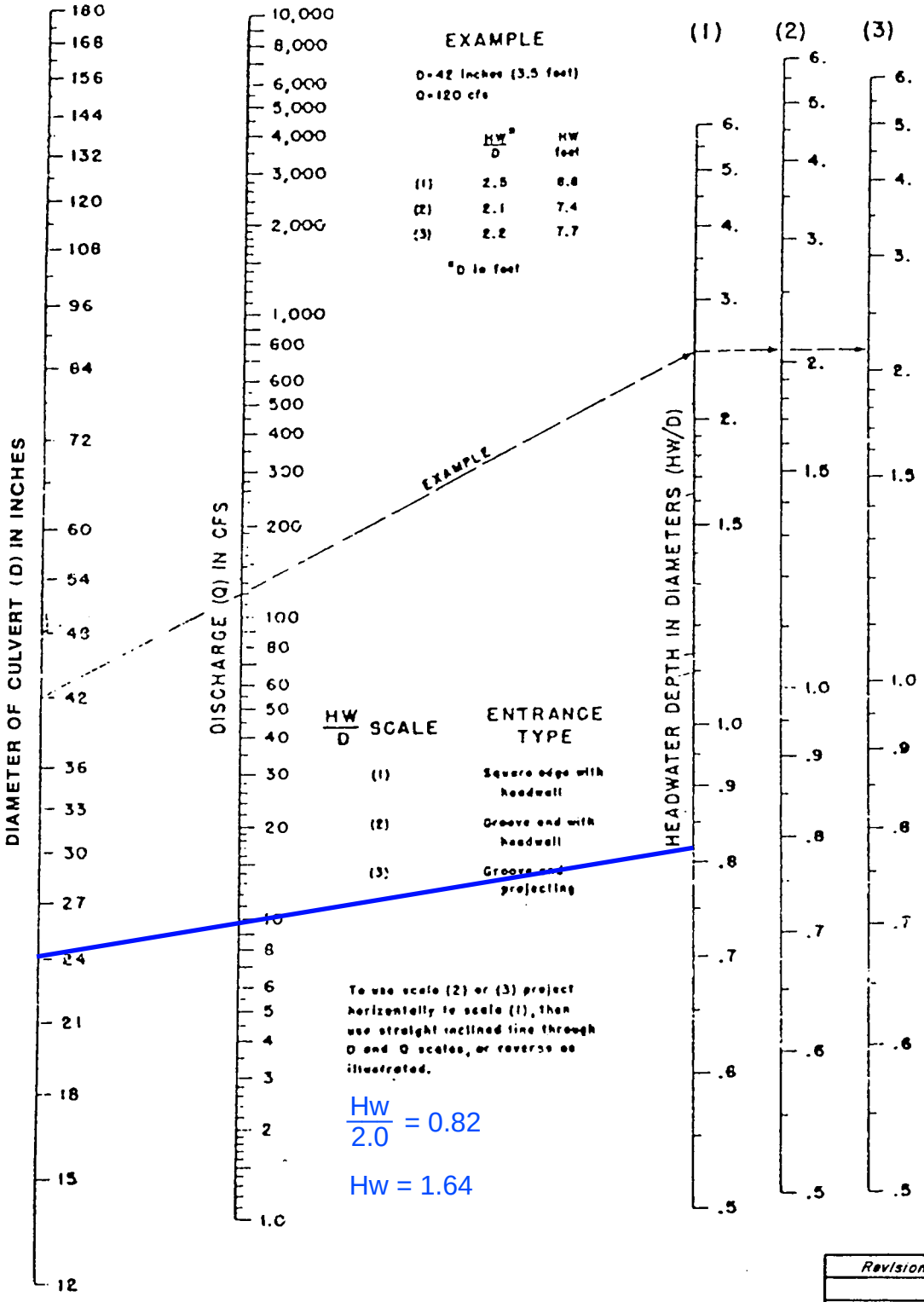
Project Description	
Solve For	Efficiency

Input Data	
Discharge	9.57 cfs
Slope	0.045 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
Curb Opening Length	15.0 ft
Local Depression	2.0 in
Local Depression Width	90.0 in

Results	
Efficiency	42.15 %
Intercepted Flow	4.03 cfs
Bypass Flow	5.54 cfs
Spread	12.2 ft
Depth	0.33 ft
Flow Area	1.6 ft²
Gutter Depression	1.1 in
Total Depression	3.1 in
Velocity	6.12 ft/s
Equivalent Cross Slope	0.032 ft/ft
Length Factor	0.262
Total Interception Length	57.2 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #2 / LMB-3N + bypass SDDI #4



Total Discharge
Q = 9.6-CFS

24" RCP
LATERAL

$\frac{Hw}{2.0} = 0.82$

Hw = 1.64

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #3 LMB-2S 15' Combination Inlet On Grade - 8.0% - 100-year

Project Description	
Solve For	Efficiency

Input Data	
Discharge	14.13 cfs
Slope	0.080 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Local Depression	2.0 in
Local Depression Width	180.0 in
Grate Width	1.50 ft
Grate Length	12.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	15.0 ft

Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None

Results	
Efficiency	59.76 %
Intercepted Flow	8.44 cfs
Bypass Flow	5.69 cfs
Spread	12.4 ft
Depth	0.37 ft
Flow Area	1.7 ft²
Gutter Depression	1.4 in
Total Depression	3.4 in
Velocity	8.55 ft/s
Splash Over Velocity	16.48 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.159
Grate Flow Ratio	0.379
Equivalent Cross Slope	0.029 ft/ft
Active Grate Length	6.3 ft
Length Factor	0.102
Total Interception Length	85.5 ft

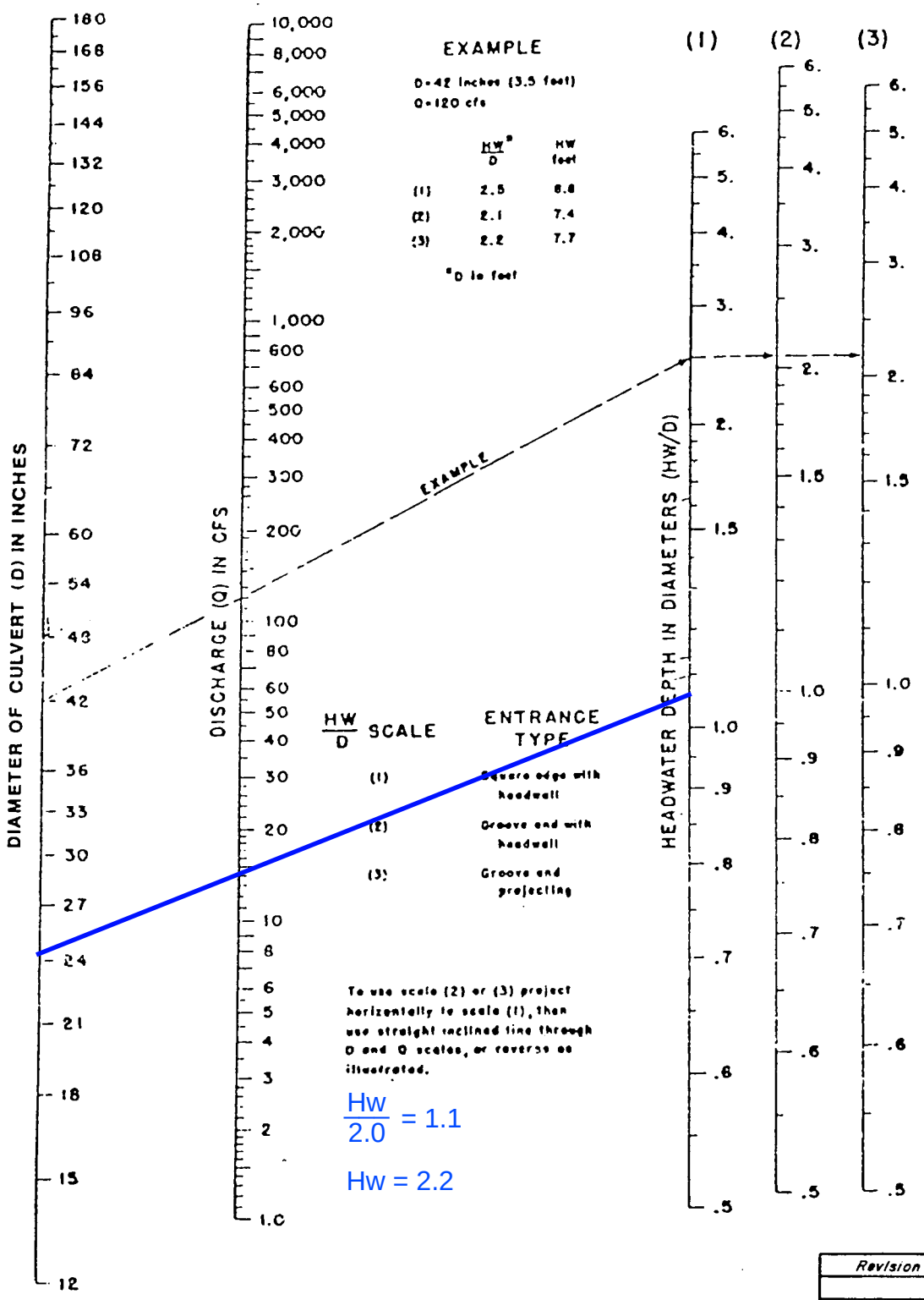
Messages

Worksheet for SDDI #3 LMB-2S 15' Combination Inlet On Grade - 8.0% - 100-year

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).	

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #3 / LMB-2S + bypass SDDI #8



Total Discharge
Q = 14.1-CFS

24" RCP
LATERAL

$\frac{Hw}{2.0} = 1.1$

Hw = 2.2

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #4 LMB-1N 7.5 Curb Inlet on Grade - 8.0% - 100-year

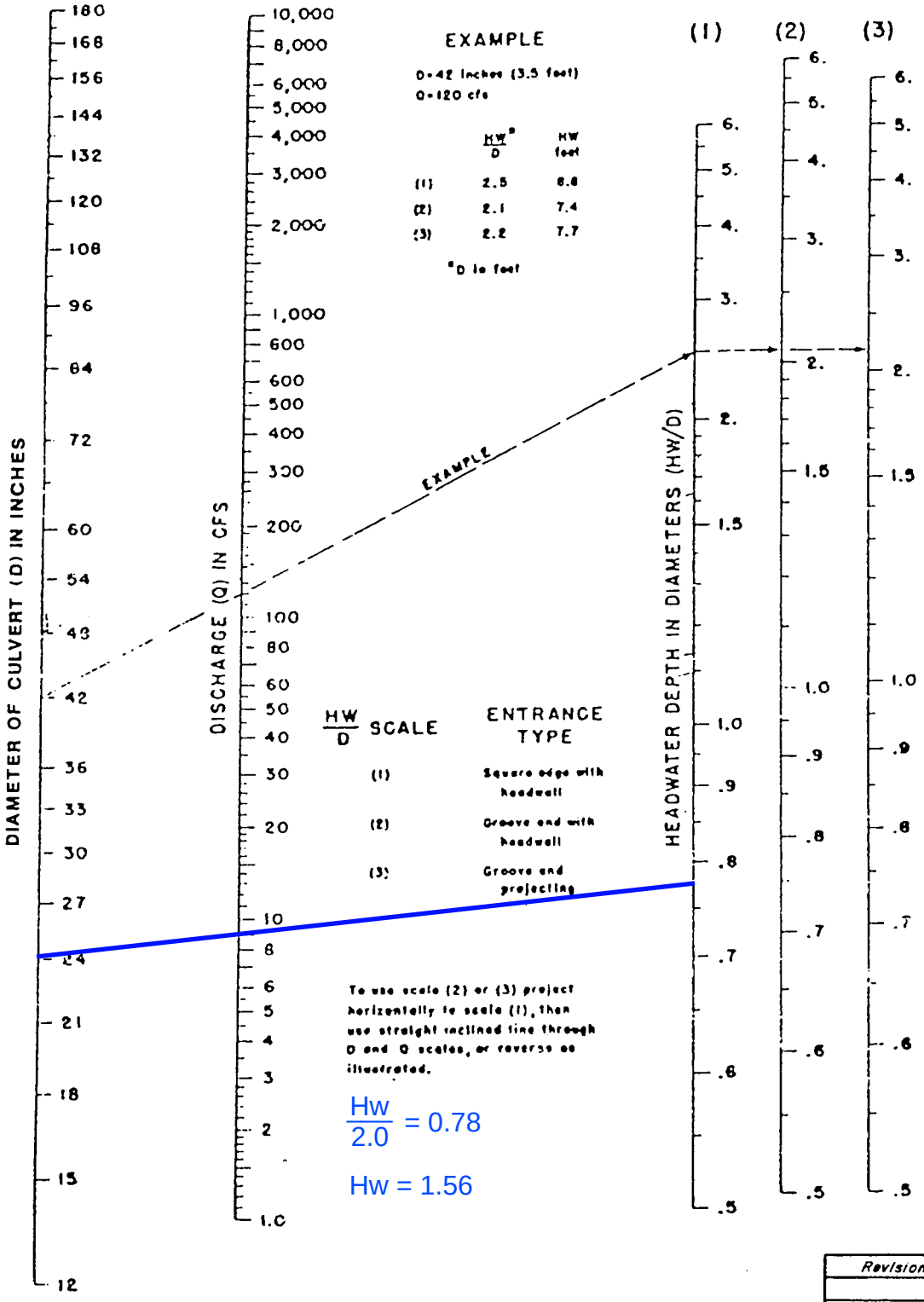
Project Description	
Solve For	Efficiency

Input Data	
Discharge	9.00 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
Curb Opening Length	15.0 ft
Local Depression	2.0 in
Local Depression Width	90.0 in

Results	
Efficiency	38.14 %
Intercepted Flow	3.43 cfs
Bypass Flow	5.57 cfs
Spread	10.6 ft
Depth	0.30 ft
Flow Area	1.2 ft^2
Gutter Depression	1.1 in
Total Depression	3.1 in
Velocity	7.55 ft/s
Equivalent Cross Slope	0.034 ft/ft
Length Factor	0.234
Total Interception Length	64.1 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #4 / LMB-2N + bypass SDDI #6



Total Discharge
Q = 9.0-CFS

24" RCP
LATERAL

$\frac{Hw}{2.0} = 0.78$

Hw = 1.56

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #5 5'x5' Ditch Inlet In Sag - 100-year Interim

Project Description	
Solve For	Spread

Input Data	
Discharge	50.00 cfs
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	0.00 ft
Grate Width	4.00 ft
Grate Length	12.0 ft
Local Depression	2.0 in
Local Depression Width	24.0 in
Grate Type	Curved Vaned
Clogging	50.0 %

Results	
Spread	6.4 ft
Depth	1.06 ft
Wetted Perimeter	6.7 ft
Top Width	6.36 ft
Open Grate Area	8.4 ft²
Active Grate Weir Length	28.0 ft

Worksheet for SDDI #5 5'x5' Ditch Inlet In Sag - 100-year Ultimate

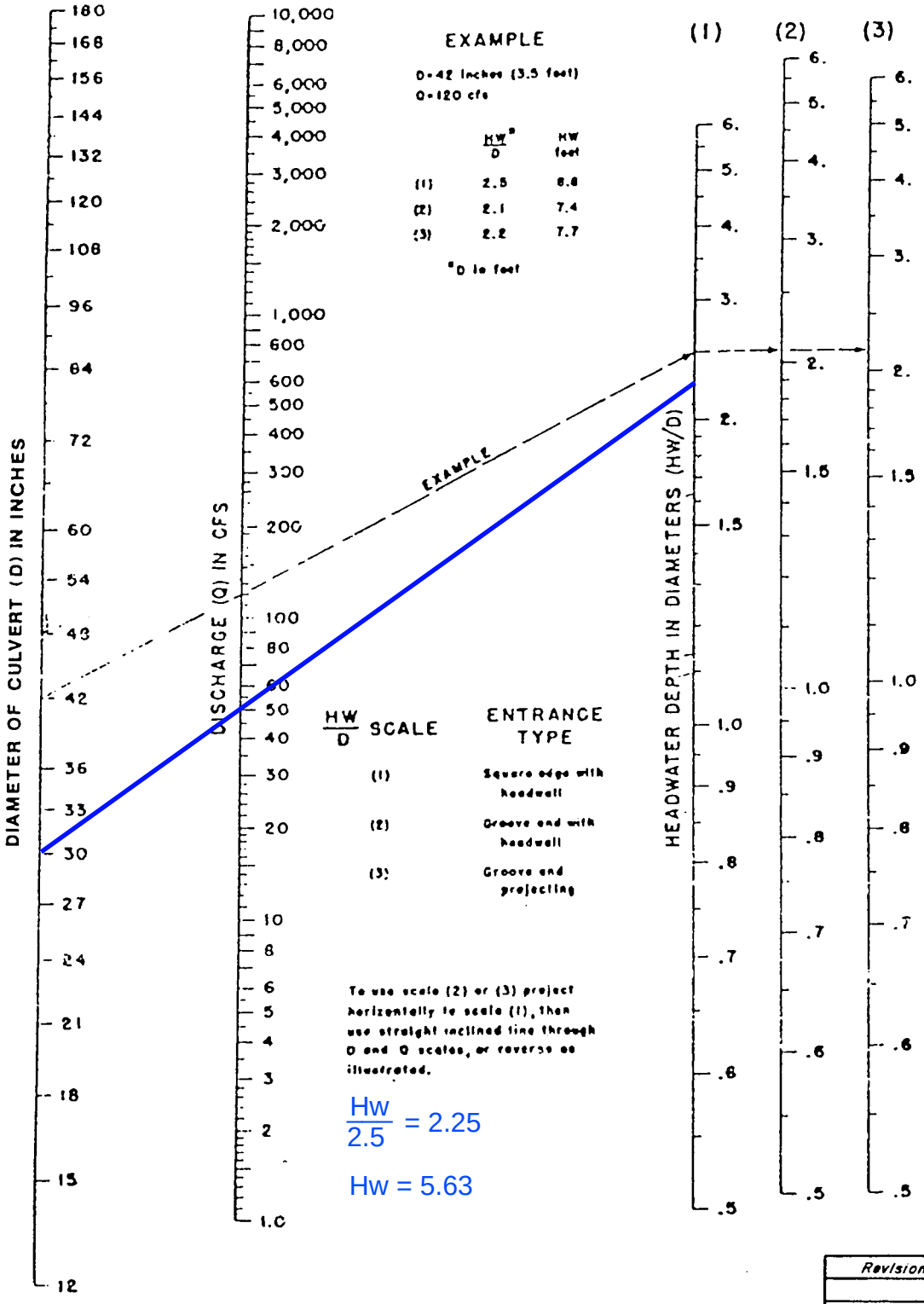
Project Description	
Solve For	Spread

Input Data	
Discharge	0.50 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	12.0 ft
Local Depression	2.0 in
Local Depression Width	24.0 in
Grate Type	Curved Vaned
Clogging	50.0 %

Results	
Spread	2.0 ft
Depth	-0.13 ft
Wetted Perimeter	-0.8 ft
Top Width	0.00 ft
Open Grate Area	8.4 ft²
Active Grate Weir Length	28.0 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #5 / INT-LMB3



Total Discharge
Q = 50-CFS

30" C-900
LATERAL

$\frac{Hw}{2.5} = 2.25$

Hw = 5.63

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #6 2x10' Combination Inlet in Sag-100-year

Project Description	
Solve For	Spread

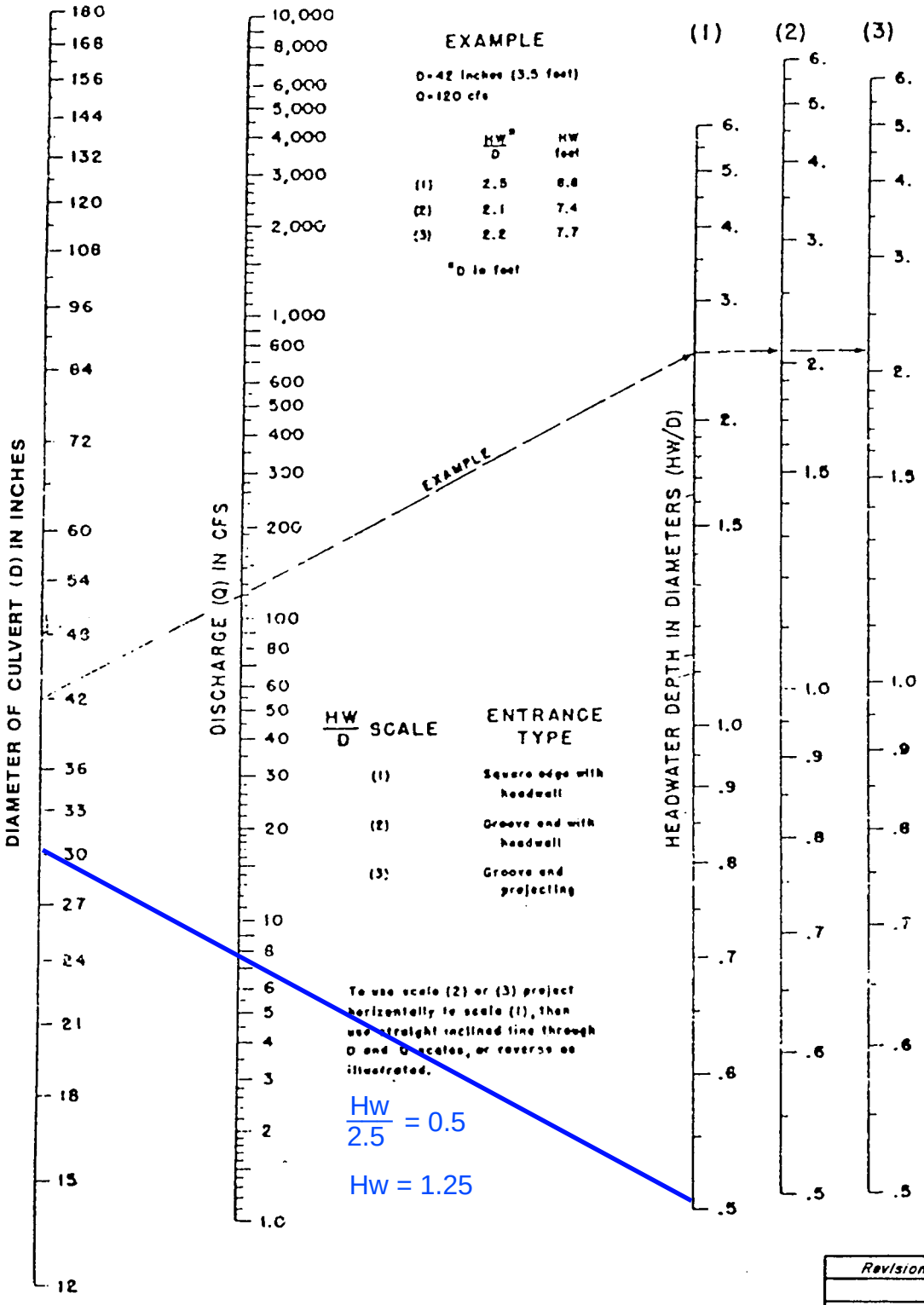
Input Data	
Discharge	7.63 cfs
Gutter Width	2.00 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Local Depression	2.0 in
Local Depression Width	90.0 in
Grate Width	1.50 ft
Grate Length	7.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	10.0 ft
Opening Height	0.3 ft
Curb Throat Type	Horizontal
Throat Incline Angle	90.00 degrees

Options	
Calculation Option	Use Both

Results	
Spread	4.3 ft
Depth	0.28 ft
Gutter Depression	1.4 in
Total Depression	3.4 in
Open Grate Area	2.0 ft²
Active Grate Weir Length	9.0 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #6 / Local + bypass SDDI #9



Total Discharge
Q = 7.6-CFS

30" C-900
LATERAL

$\frac{Hw}{2.5} = 0.5$

Hw = 1.25

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #7 2x10' Combination Inlet in Sag-100-year

Project Description	
Solve For	Spread

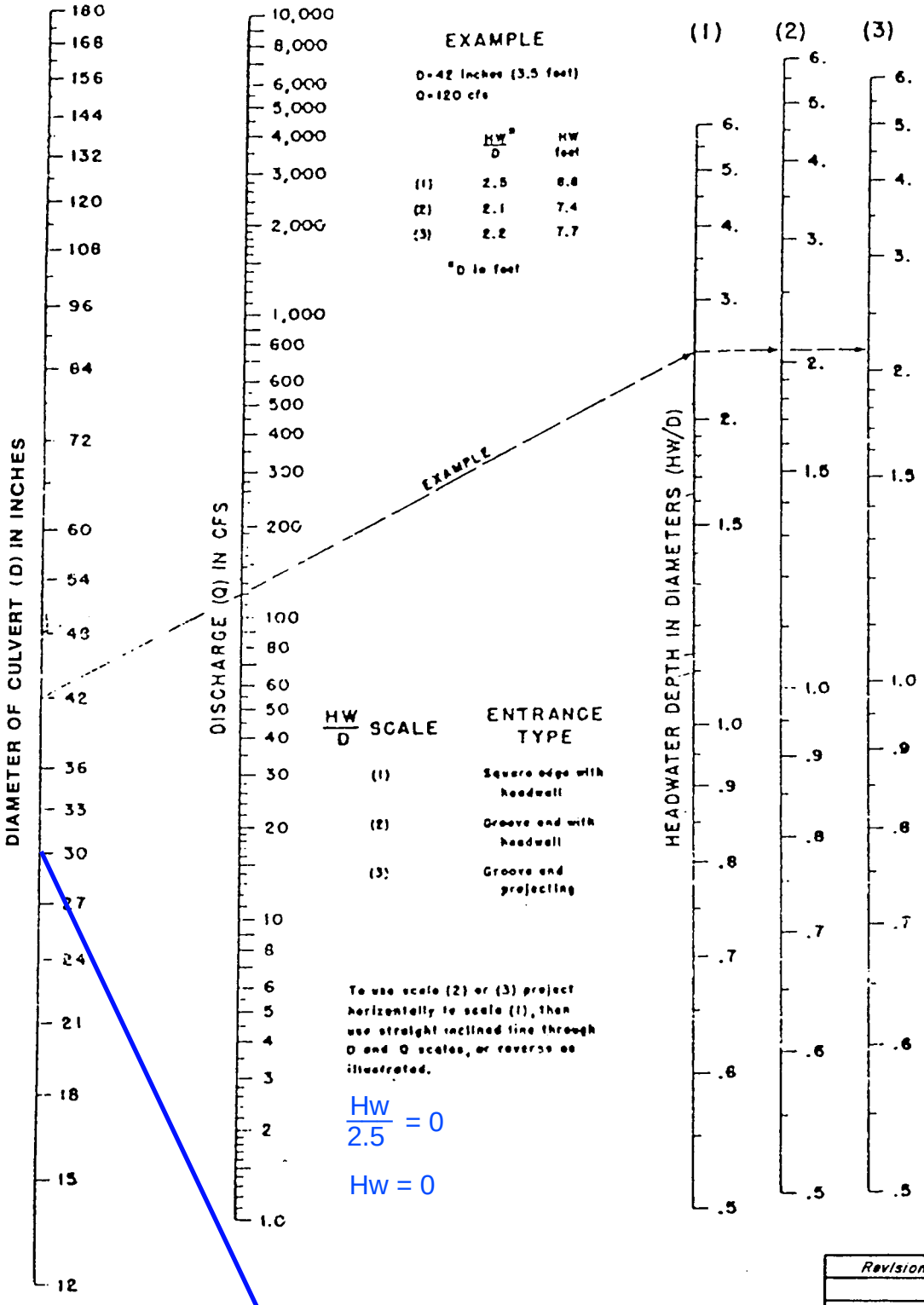
Input Data	
Discharge	0.50 cfs
Gutter Width	2.00 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Local Depression	2.0 in
Local Depression Width	90.0 in
Grate Width	1.50 ft
Grate Length	7.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	7.5 ft
Opening Height	0.3 ft
Curb Throat Type	Horizontal
Throat Incline Angle	90.00 degrees

Options	
Calculation Option	Use Both

Results	
Spread	1.5 ft
Depth	-0.02 ft
Gutter Depression	1.4 in
Total Depression	3.4 in
Open Grate Area	2.0 ft²
Active Grate Weir Length	9.0 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #7 / Local



Total Discharge
Q = 0.5-CFS

30" C-900
LATERAL

$\frac{Hw}{2.5} = 0$

Hw = 0

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #8 LMB-1N 7.5 Curb Inlet on Grade - 3.0% - 100-year

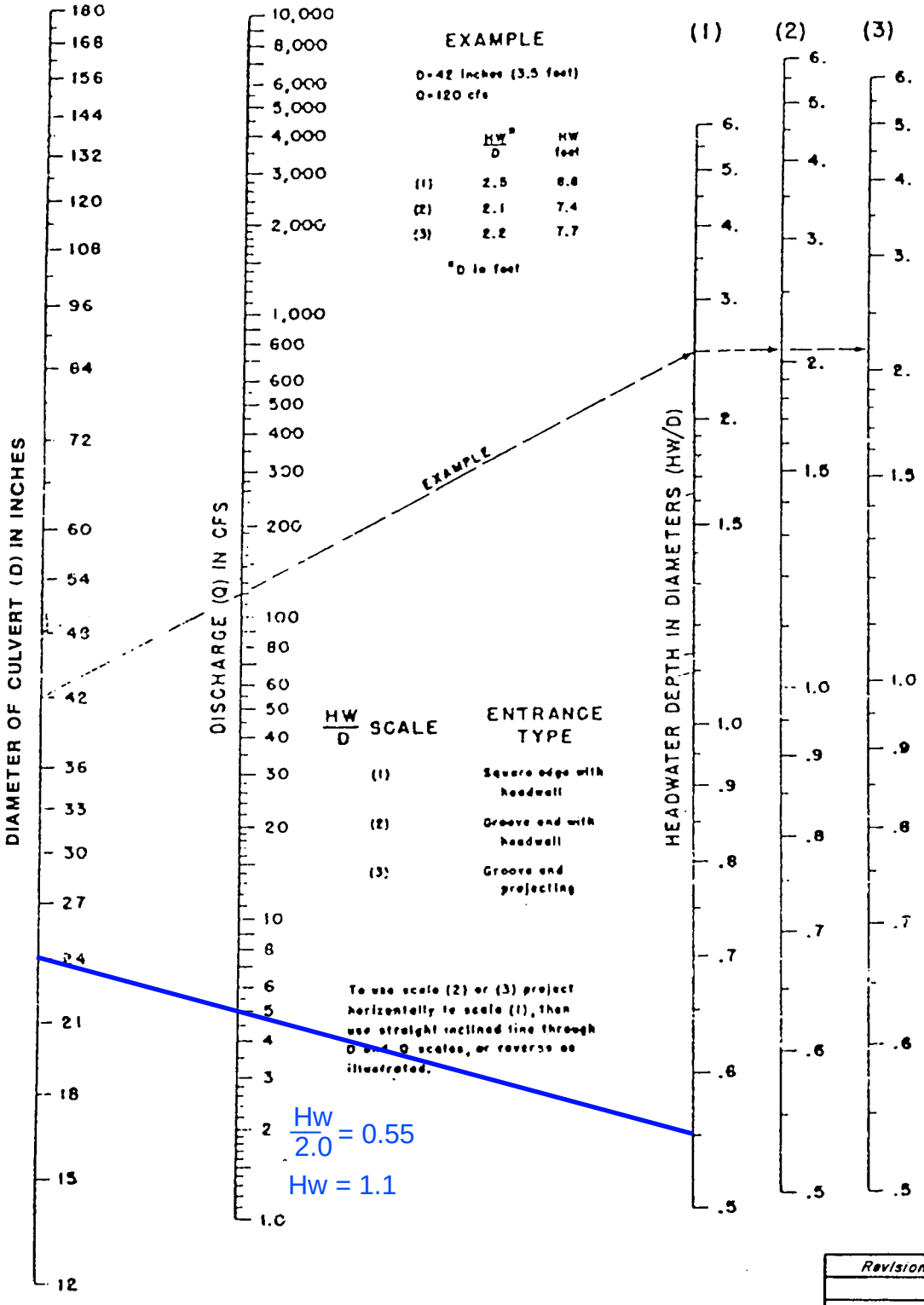
Project Description	
Solve For	Efficiency

Input Data	
Discharge	5.00 cfs
Slope	0.030 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Curb Opening Length	7.5 ft
Local Depression	2.0 in
Local Depression Width	90.0 in

Results	
Efficiency	37.32 %
Intercepted Flow	1.87 cfs
Bypass Flow	3.13 cfs
Spread	9.7 ft
Depth	0.31 ft
Flow Area	1.1 ft²
Gutter Depression	1.4 in
Total Depression	3.4 in
Velocity	4.70 ft/s
Equivalent Cross Slope	0.042 ft/ft
Length Factor	0.229
Total Interception Length	32.8 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #8 / LMB-1S



Total Discharge
Q = 5.0-CFS

24" RCP
LATERAL

$\frac{Hw}{2.0} = 0.55$

Hw = 1.1

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #9 LMB-1N 7.5 Curb Inlet on Grade - 3.0% - 100-year

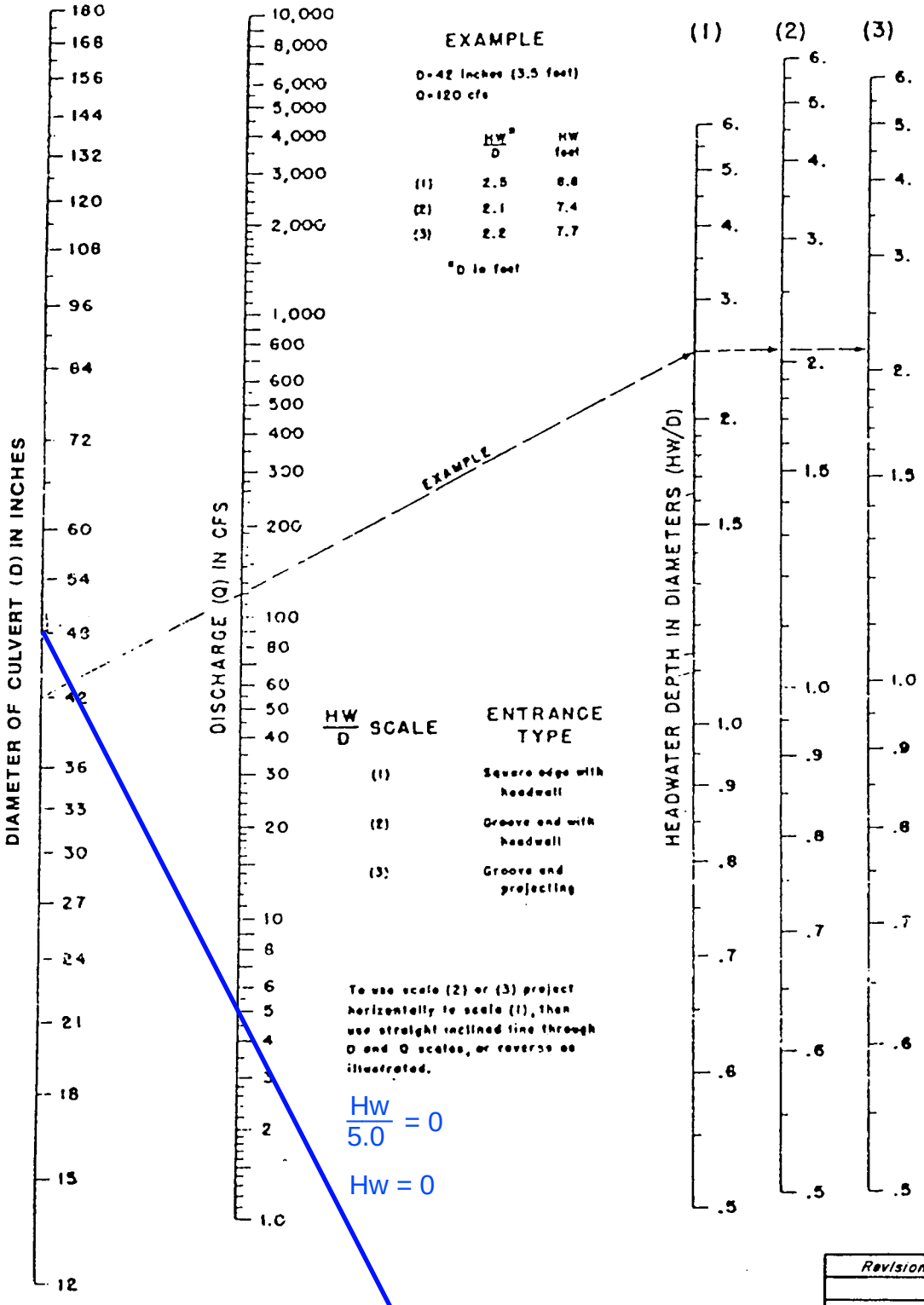
Project Description	
Solve For	Efficiency

Input Data	
Discharge	5.00 cfs
Slope	0.030 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Curb Opening Length	7.5 ft
Local Depression	2.0 in
Local Depression Width	90.0 in

Results	
Efficiency	37.32 %
Intercepted Flow	1.87 cfs
Bypass Flow	3.13 cfs
Spread	9.7 ft
Depth	0.31 ft
Flow Area	1.1 ft²
Gutter Depression	1.4 in
Total Depression	3.4 in
Velocity	4.70 ft/s
Equivalent Cross Slope	0.042 ft/ft
Length Factor	0.229
Total Interception Length	32.8 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #9 / LMB-1N



Total Discharge
Q = 5.0-CFS

48" RCP
LATERAL

$\frac{Hw}{5.0} = 0$

Hw = 0

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #10 4'x16' Ditch Inlet In Sag - 100-year

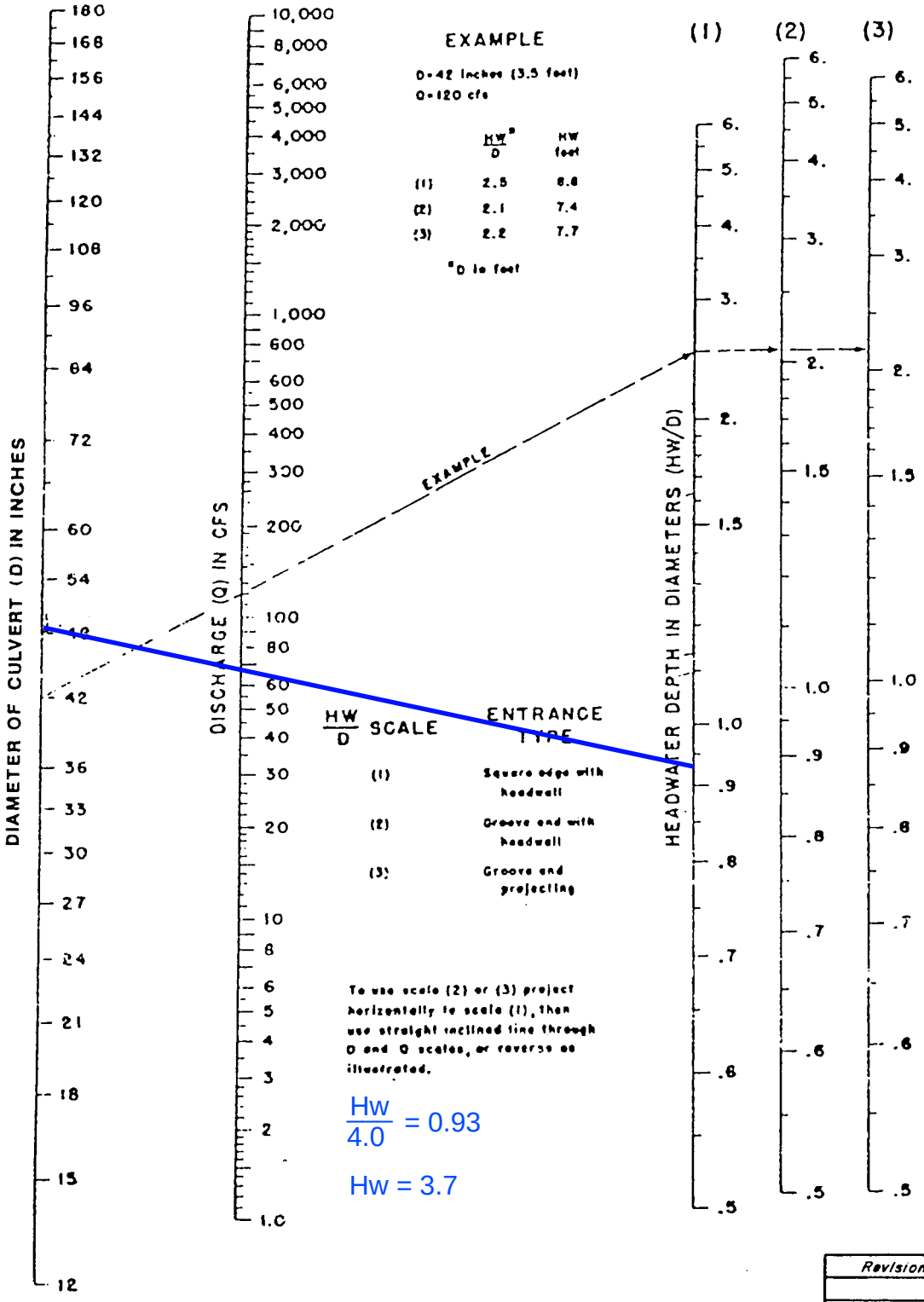
Project Description	
Solve For	Spread

Input Data	
Discharge	67.15 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	20.0 ft
Local Depression	2.0 in
Local Depression Width	24.0 in
Grate Type	Curved Vaned
Clogging	50.0 %

Results	
Spread	3.8 ft
Depth	0.63 ft
Wetted Perimeter	4.0 ft
Top Width	3.78 ft
Open Grate Area	14.0 ft²
Active Grate Weir Length	44.0 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #10 / 79% INT-LMB1 [100-yr (153) - 10-yr (68)]



Total Discharge
Q = 67.2-CFS

48" RCP
LATERAL

$\frac{Hw}{4.0} = 0.93$

Hw = 3.7

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI #11 4'x4' Ditch Inlet In Sag - 100-year

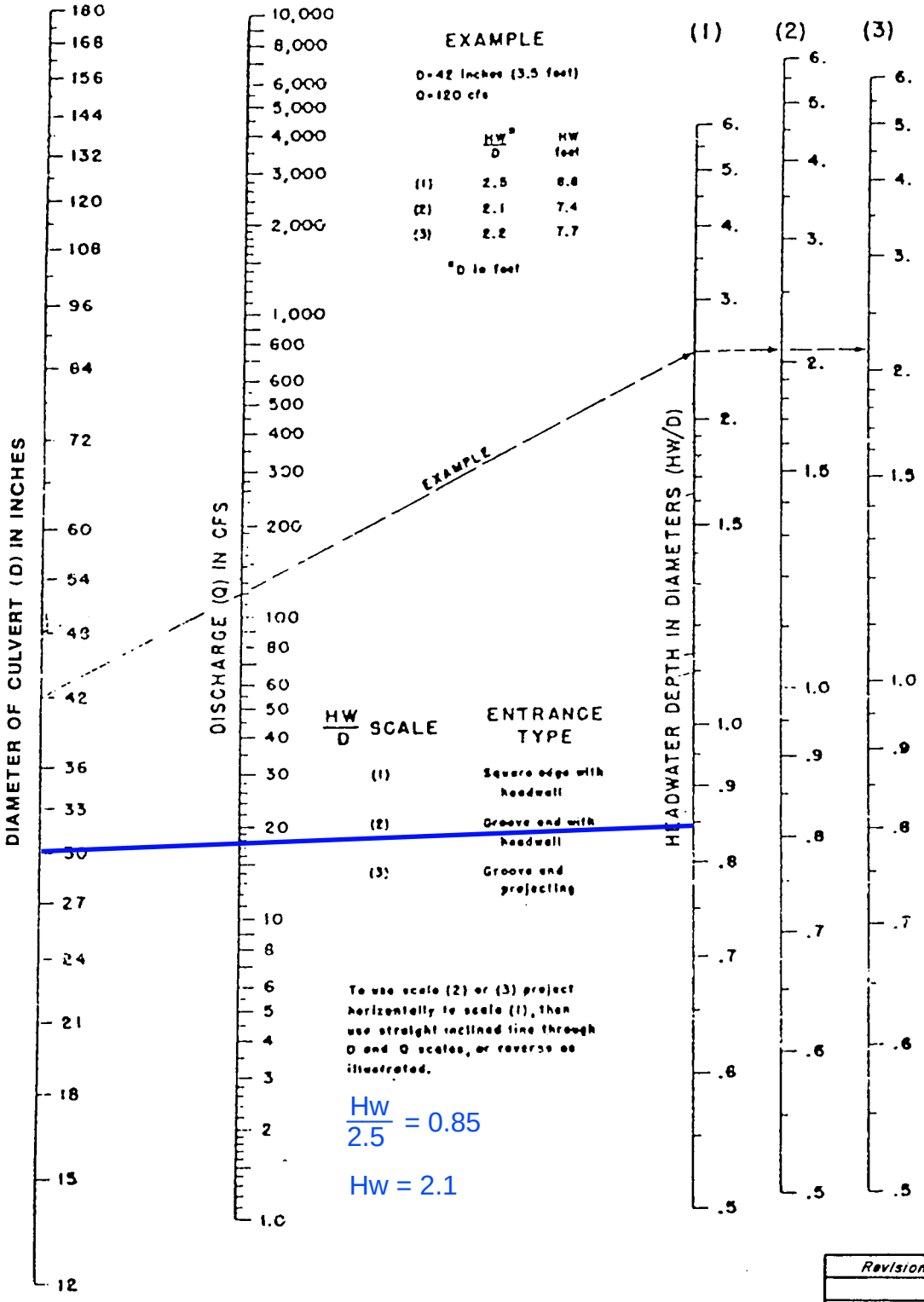
Project Description	
Solve For	Spread

Input Data	
Discharge	17.85 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	2.0 in
Local Depression Width	24.0 in
Grate Type	Curved Vaned
Clogging	50.0 %

Results	
Spread	7.4 ft
Depth	1.24 ft
Wetted Perimeter	7.8 ft
Top Width	7.44 ft
Open Grate Area	2.8 ft²
Active Grate Weir Length	12.0 ft

NOMOGRAPH – INLET CONTROL RCP

DROP INLET (SDDI) #11 / 21% INT-LMB1 [100-yr (153) - 10-yr (68)]



Total Discharge
Q = 17.9-CFS

30" RCP
LATERAL

$\frac{Hw}{2.5} = 0.85$

Hw = 2.1

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

C.2 Normal Depth Calculations

Worksheet for LMB-1N 100-year STA 144+25 - 3.0%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.030 ft/ft
Discharge	5.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+02	0.13
0+25	0.58
0+25	1.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 1.08)	0.016

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

Results	
Normal Depth	0.31 ft
Elevation Range	0.0000 to 1.0800 ft
Flow Area	1.3 ft²
Wetted Perimeter	11.4 ft
Hydraulic Radius	0.12 ft
Top Width	11.05 ft
Normal Depth	0.31 ft
Critical Depth	0.38 ft
Critical Slope	0.007 ft/ft
Velocity	3.81 ft/s
Velocity Head	0.23 ft
Specific Energy	0.54 ft
Froude Number	1.951
Flow Type	Supercritical

GVF Input Data

Worksheet for LMB-1N 100-year STA 144+25 - 3.0%

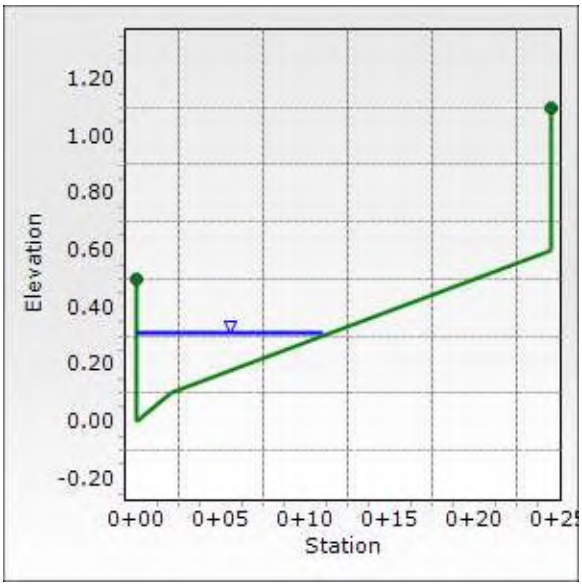
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.38 ft
Channel Slope	0.030 ft/ft
Critical Slope	0.007 ft/ft

Cross Section for LMB-1N 100-year STA 144+25 - 3.0%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.030 ft/ft
Normal Depth	0.31 ft
Discharge	5.00 cfs



Worksheet for LMB-1S 100-year STA 144+25 - 3.0%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.030 ft/ft
Discharge	5.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+02	0.13
0+25	0.58
0+25	1.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 1.08)	0.016

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

Results	
Normal Depth	0.31 ft
Elevation Range	0.0000 to 1.0800 ft
Flow Area	1.3 ft²
Wetted Perimeter	11.4 ft
Hydraulic Radius	0.12 ft
Top Width	11.05 ft
Normal Depth	0.31 ft
Critical Depth	0.38 ft
Critical Slope	0.007 ft/ft
Velocity	3.81 ft/s
Velocity Head	0.23 ft
Specific Energy	0.54 ft
Froude Number	1.951
Flow Type	Supercritical

GVF Input Data

Worksheet for LMB-1S 100-year STA 144+25 - 3.0%

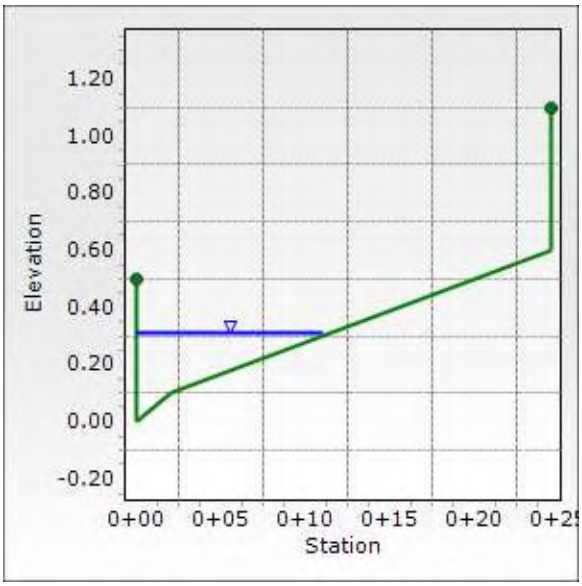
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Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.31 ft
Critical Depth	0.38 ft
Channel Slope	0.030 ft/ft
Critical Slope	0.007 ft/ft

Cross Section for LMB-1S 100-year STA 144+25 - 3.0%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.030 ft/ft
Normal Depth	0.31 ft
Discharge	5.00 cfs



Worksheet for LMB-2Na 100-year STA 124+00 - 8.0%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.080 ft/ft
Discharge	9.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+02	0.13
0+25	0.58
0+25	1.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 1.08)	0.016

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

Results	
Normal Depth	0.32 ft
Elevation Range	0.0000 to 1.0800 ft
Flow Area	1.4 ft²
Wetted Perimeter	11.8 ft
Hydraulic Radius	0.12 ft
Top Width	11.51 ft
Normal Depth	0.32 ft
Critical Depth	0.47 ft
Critical Slope	0.007 ft/ft
Velocity	6.36 ft/s
Velocity Head	0.63 ft
Specific Energy	0.95 ft
Froude Number	3.200
Flow Type	Supercritical

GVF Input Data

Worksheet for LMB-2Na 100-year STA 124+00 - 8.0%

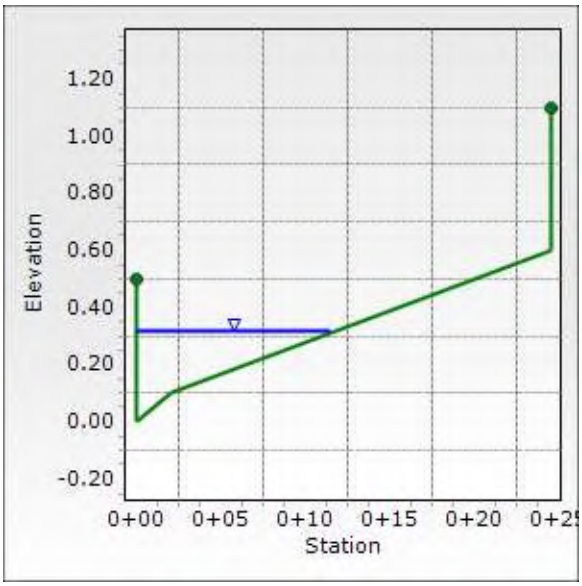
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.32 ft
Critical Depth	0.47 ft
Channel Slope	0.080 ft/ft
Critical Slope	0.007 ft/ft

Cross Section for LMB-2Na 100-year STA 124+00 - 8.0%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.080 ft/ft
Normal Depth	0.32 ft
Discharge	9.00 cfs



Worksheet for LMB-2Nb 100-year STA 144+25 - 3.85%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.039 ft/ft
Discharge	7.13 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+02	0.13
0+25	0.58
0+25	1.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 1.08)	0.016

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

Results	
Normal Depth	0.33 ft
Elevation Range	0.0000 to 1.0800 ft
Flow Area	1.6 ft²
Wetted Perimeter	12.5 ft
Hydraulic Radius	0.13 ft
Top Width	12.14 ft
Normal Depth	0.33 ft
Critical Depth	0.43 ft
Critical Slope	0.007 ft/ft
Velocity	4.56 ft/s
Velocity Head	0.32 ft
Specific Energy	0.66 ft
Froude Number	2.241
Flow Type	Supercritical

GVF Input Data

Worksheet for LMB-2Nb 100-year STA 144+25 - 3.85%

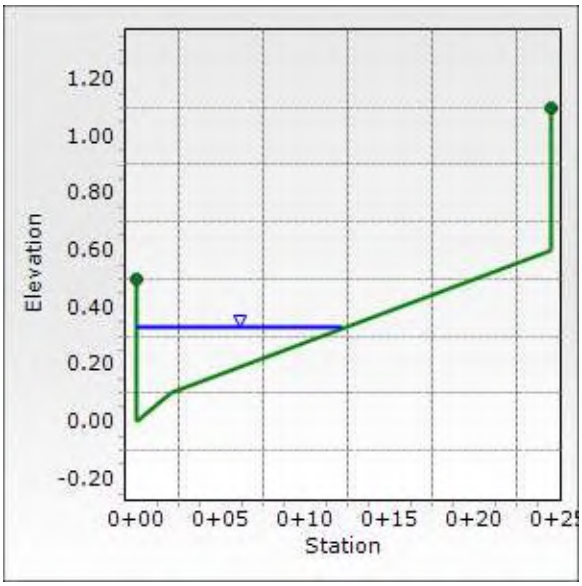
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.33 ft
Critical Depth	0.43 ft
Channel Slope	0.039 ft/ft
Critical Slope	0.007 ft/ft

Cross Section for LMB-2Nb 100-year STA 144+25 - 3.85%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.039 ft/ft
Normal Depth	0.33 ft
Discharge	7.13 cfs



Worksheet for LMB-2S 100-year STA 124+00 - 8.0%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.080 ft/ft
Discharge	14.13 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+02	0.13
0+25	0.58
0+25	1.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 1.08)	0.016

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

Results	
Normal Depth	0.37 ft
Elevation Range	0.0000 to 1.0800 ft
Flow Area	2.0 ft²
Wetted Perimeter	14.2 ft
Hydraulic Radius	0.14 ft
Top Width	13.78 ft
Normal Depth	0.37 ft
Critical Depth	0.54 ft
Critical Slope	0.006 ft/ft
Velocity	7.10 ft/s
Velocity Head	0.78 ft
Specific Energy	1.15 ft
Froude Number	3.296
Flow Type	Supercritical

GVF Input Data

Worksheet for LMB-2S 100-year STA 124+00 - 8.0%

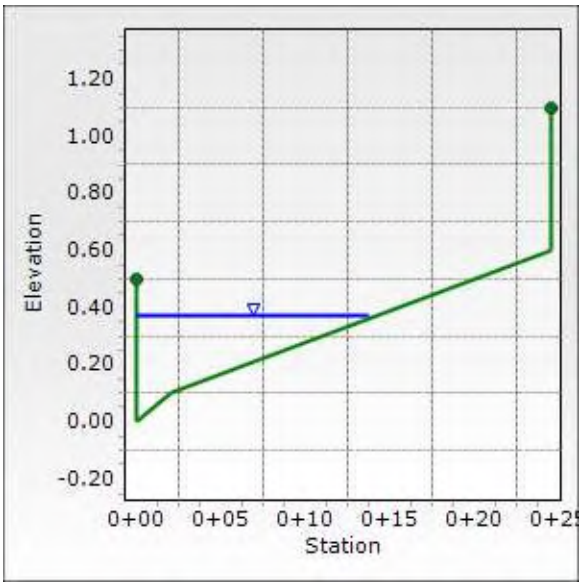
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.37 ft
Critical Depth	0.54 ft
Channel Slope	0.080 ft/ft
Critical Slope	0.006 ft/ft

Cross Section for LMB-2S 100-year STA 124+00 - 8.0%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.080 ft/ft
Normal Depth	0.37 ft
Discharge	14.13 cfs



Worksheet for LMB-3N 100-year STA 117+50 - 4.5%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.045 ft/ft
Discharge	9.57 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+02	0.13
0+25	0.58
0+25	1.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 1.08)	0.016

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

Results	
Normal Depth	0.35 ft
Elevation Range	0.0000 to 1.0800 ft
Flow Area	1.8 ft²
Wetted Perimeter	13.6 ft
Hydraulic Radius	0.14 ft
Top Width	13.25 ft
Normal Depth	0.35 ft
Critical Depth	0.48 ft
Critical Slope	0.007 ft/ft
Velocity	5.19 ft/s
Velocity Head	0.42 ft
Specific Energy	0.77 ft
Froude Number	2.450
Flow Type	Supercritical

GVF Input Data

Worksheet for LMB-3N 100-year STA 117+50 - 4.5%

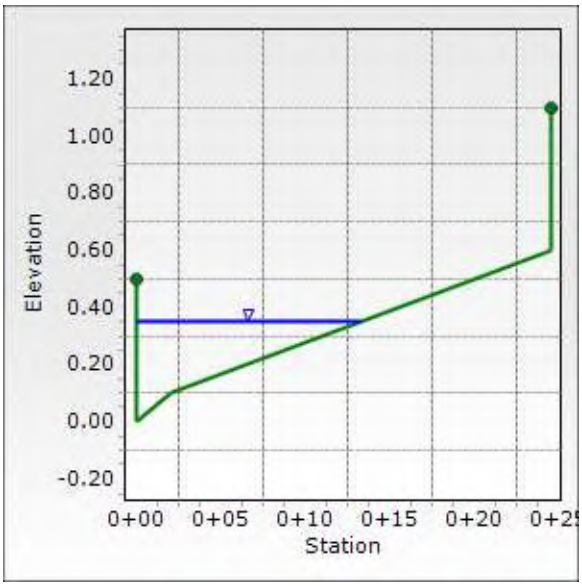
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Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.35 ft
Critical Depth	0.48 ft
Channel Slope	0.045 ft/ft
Critical Slope	0.007 ft/ft

Cross Section for LMB-3N 100-year STA 117+50 - 4.5%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.045 ft/ft
Normal Depth	0.35 ft
Discharge	9.57 cfs



Worksheet for LMB-3S 100-year STA 117+50 - 4.5%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.045 ft/ft
Discharge	10.69 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+02	0.13
0+25	0.58
0+25	1.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 1.08)	0.016

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

Results	
Normal Depth	0.37 ft
Elevation Range	0.0 to 1.1 ft
Flow Area	2.0 ft²
Wetted Perimeter	14.2 ft
Hydraulic Radius	0.14 ft
Top Width	13.83 ft
Normal Depth	0.37 ft
Critical Depth	0.49 ft
Critical Slope	0.007 ft/ft
Velocity	5.34 ft/s
Velocity Head	0.44 ft
Specific Energy	0.81 ft
Froude Number	2.473
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.00 ft

Worksheet for LMB-3S 100-year STA 117+50 - 4.5%

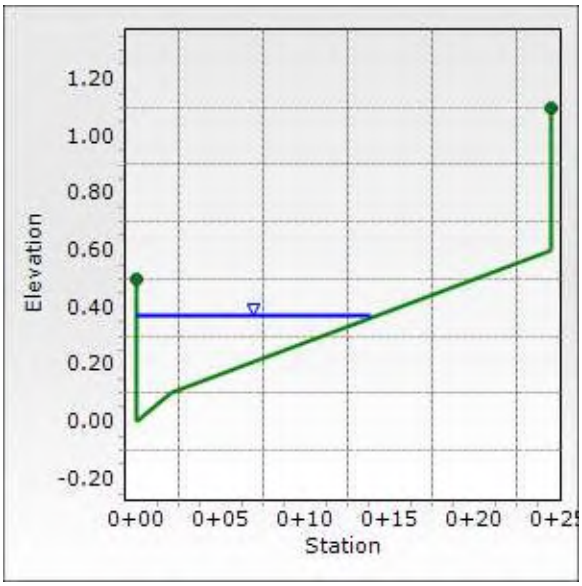
GVF Input Data	
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.37 ft
Critical Depth	0.49 ft
Channel Slope	0.045 ft/ft
Critical Slope	0.007 ft/ft

Cross Section for LMB-3S 100-year STA 117+50 - 4.5%

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.045 ft/ft
Normal Depth	0.37 ft
Discharge	10.69 cfs



C.3 Interim Condition WSPG-W Model

```
T1 SUMMERLIN WEST VILLAGE 22    LMB-J-INTERIM.WSW                                0
T2 LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)
T3 ATKINS / INTERIM CONDITIONS
SO   0000.0003447.140 54                        3451.900
R    0129.0503451.320 54      .013                                      -89.2 1
R    0134.0503451.520 54      .013                                0.000      0 0
R    0179.1603452.520 54      .013                                     06.7 1
JX   0181.1603452.620 54 48 24.013     88.0    70.0 3452.72 3452.72 82.3  -86.6
R    0183.1603452.720 54      .013                                          0
R    0228.7203455.844 54      .013                                          0
SH   0228.7203455.844 54
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
CD  54  4   0    .000   4.500     .000  .000  .000   .00
Q           001.00    .0
```

FILE: LMB-J.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time: 9: 1: 3

SUMMERLIN WEST VILLAGE 22 LMB-J-INTERIM.WSW

LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3447.140	2.310	3449.450	159.00	19.34	5.81	3455.26	.00	3.69	4.50	4.500	.000	.00	0 .0
3.031	.0324					.0238	.07	2.31	2.52	2.11	.013	.00	.00	PIPE
3.031	3447.238	2.315	3449.553	159.00	19.28	5.77	3455.33	.00	3.69	4.50	4.500	.000	.00	0 .0
43.372	.0324					.0223	.97	2.32	2.51	2.11	.013	.00	.00	PIPE
46.403	3448.643	2.404	3451.047	159.00	18.39	5.25	3456.30	.00	3.69	4.49	4.500	.000	.00	0 .0
30.196	.0324					.0197	.59	2.40	2.33	2.11	.013	.00	.00	PIPE
76.599	3449.621	2.498	3452.119	159.00	17.53	4.77	3456.89	.00	3.69	4.47	4.500	.000	.00	0 .0
22.260	.0324					.0174	.39	2.50	2.17	2.11	.013	.00	.00	PIPE
98.859	3450.342	2.598	3452.940	159.00	16.71	4.34	3457.28	.00	3.69	4.45	4.500	.000	.00	0 .0
17.065	.0324					.0154	.26	2.60	2.01	2.11	.013	.00	.00	PIPE
115.924	3450.895	2.702	3453.597	159.00	15.94	3.94	3457.54	.00	3.69	4.41	4.500	.000	.00	0 .0
13.126	.0324					.0136	.18	2.70	1.87	2.11	.013	.00	.00	PIPE
129.050	3451.320	2.814	3454.134	159.00	15.20	3.59	3457.72	.00	3.69	4.36	4.500	.000	.00	0 .0
5.000	.0400					.0123	.06	2.81	1.73	1.99	.013	.00	.00	PIPE
134.050	3451.520	2.889	3454.408	159.00	14.74	3.37	3457.78	.00	3.69	4.31	4.500	.000	.00	0 .0
7.264	.0222					.0116	.08	2.89	1.64	2.36	.013	.00	.00	PIPE
141.314	3451.681	2.936	3454.617	159.00	14.47	3.25	3457.87	.00	3.69	4.29	4.500	.000	.00	0 .0
14.743	.0222					.0107	.16	2.94	1.59	2.36	.013	.00	.00	PIPE

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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time: 9: 1: 3

SUMMERLIN WEST VILLAGE 22 LMB-J-INTERIM.WSW

LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
156.057	3452.008	3.062	3455.070	159.00	13.79	2.95	3458.02	.00	3.69	4.20	4.500	.000	.00	0 .0
10.470	.0222					.0095	.10	3.06	1.47	2.36	.013	.00	.00	PIPE
166.528	3452.240	3.198	3455.438	159.00	13.15	2.69	3458.12	.00	3.69	4.08	4.500	.000	.00	0 .0
7.104	.0222					.0085	.06	3.20	1.35	2.36	.013	.00	.00	PIPE
173.632	3452.397	3.345	3455.743	159.00	12.54	2.44	3458.18	.00	3.69	3.93	4.500	.000	.00	0 .0
4.121	.0222					.0076	.03	3.35	1.23	2.36	.013	.00	.00	PIPE
177.752	3452.489	3.507	3455.996	159.00	11.96	2.22	3458.22	.00	3.69	3.73	4.500	.000	.00	0 .0
1.408	.0222					.0069	.01	3.51	1.12	2.36	.013	.00	.00	PIPE
179.160	3452.520	3.688	3456.208	159.00	11.40	2.02	3458.23	.00	3.69	3.46	4.500	.000	.00	0 .0
JUNCT STR	.0500					.0033	.01	3.69	1.00		.013	.00	.00	PIPE
181.160	3452.620	6.966	3459.586	1.00	.06	.00	3459.59	.00	.28	.00	4.500	.000	.00	0 .0
2.000	.0499					.0000	.00	6.97	.00	.16	.013	.00	.00	PIPE
183.160	3452.720	6.866	3459.586	1.00	.06	.00	3459.59	.00	.28	.00	4.500	.000	.00	0 .0
34.512	.0686					.0000	.00	6.87	.00	.15	.013	.00	.00	PIPE
217.672	3455.086	4.500	3459.586	1.00	.06	.00	3459.59	.00	.28	.00	4.500	.000	.00	0 .0
6.080	.0686					.0000	.00	4.50	.00	.15	.013	.00	.00	PIPE
223.752	3455.503	4.082	3459.585	1.00	.07	.00	3459.59	.00	.28	2.61	4.500	.000	.00	0 .0
3.529	.0686					.0000	.00	4.08	.00	.15	.013	.00	.00	PIPE

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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time: 9: 1: 3

SUMMERLIN WEST VILLAGE 22 LMB-J-INTERIM.WSW

LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
227.281	3455.745	3.840	3459.585	1.00	.07	.00	3459.59	.00	.28	3.18	4.500	.000	.00	0 .0
1.439	.0686					.0000	.00	3.84	.01	.15	.013	.00	.00	PIPE
228.720	3455.844	3.741	3459.585	1.00	.07	.00	3459.59	.00	.28	3.37	4.500	.000	.00	0 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                0
T2 Desert Foothills Drive to STREET 27
T3 ATKINS / INTERIM CONDITIONS
SO      0.0003289.090  30                        3300.40
R      39.7603293.620  30     .013                                .000  -9.188 1
R      43.7603293.820  30     .013                                .000    .000 0
R     122.2103296.880  30     .013                                .000    .000 1
JX    124.2103296.980  30 2  2.013    11.00    12.0 3297.0753297.075-60.6 74.7
R     126.2103297.080  2      .013                                .000    .000 0
R     269.6803302.880  2      .013                                .000  -5.789 1
R     273.6803303.080  2      .013                                .000    .000 0
R     439.5003313.090  2      .013                                .000  -2.856 1
R     443.5003313.290  2      .013                                .000    .000 0
R     615.8003327.400  2      .013                                .000  -3.368 1
R     619.8003327.600  2      .013                                .000    .000 0
R     765.9203339.300  2      .013                                .000    .000 1
SH    765.9203339.300  2
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   30 4   1    .000   2.500     .000  .000  .000   .00
Q            19.000   .0
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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time: 4:52:37

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3289.090	11.310	3300.400	42.00	8.56	1.14	3301.54	.00	2.17	.00	2.500	.000	.00	1 .0
39.760	.1139					.0105	.42	11.31	.00	.94	.013	.00	.00	PIPE
39.760	3293.620	7.288	3300.908	42.00	8.56	1.14	3302.04	.00	2.17	.00	2.500	.000	.00	1 .0
4.000	.0500					.0105	.04	7.29	.00	1.19	.013	.00	.00	PIPE
43.760	3293.820	7.130	3300.950	42.00	8.56	1.14	3302.09	.00	2.17	.00	2.500	.000	.00	1 .0
78.450	.0390					.0105	.82	7.13	.00	1.28	.013	.00	.00	PIPE
122.210	3296.880	4.950	3301.830	42.00	8.56	1.14	3302.97	.00	2.17	.00	2.500	.000	.00	1 .0
JUNCT STR	.0500					.0063	.01	4.95	.00		.013	.00	.00	PIPE
124.210	3296.980	6.474	3303.454	19.00	6.05	.57	3304.02	.00	1.57	.00	2.000	.000	.00	1 .0
2.000	.0500					.0071	.01	6.47	.00	.85	.013	.00	.00	PIPE
126.210	3297.080	6.388	3303.469	19.00	6.05	.57	3304.04	.00	1.57	.00	2.000	.000	.00	1 .0
108.071	.0404					.0071	.76	6.39	.00	.90	.013	.00	.00	PIPE
234.281	3301.449	2.812	3304.261	19.00	6.05	.57	3304.83	.00	1.57	.00	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
234.281	3301.449	.851	3302.300	19.00	14.92	3.46	3305.76	.00	1.57	1.98	2.000	.000	.00	1 .0
14.081	.0404					.0510	.72	.85	3.28	.90	.013	.00	.00	PIPE
248.362	3302.018	.838	3302.856	19.00	15.20	3.59	3306.44	.00	1.57	1.97	2.000	.000	.00	1 .0
21.318	.0404					.0559	1.19	.84	3.37	.90	.013	.00	.00	PIPE

FILE: LMB-DFD_27-INTERIM.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time: 4:52:37

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
269.680	3302.880	.809	3303.689	19.00	15.94	3.95	3307.64	.00	1.57	1.96	2.000	.000	.00	1 .0
4.000	.0500					.0600	.24	.81	3.61	.85	.013	.00	.00	PIPE
273.680	3303.080	.806	3303.886	19.00	16.04	3.99	3307.88	.00	1.57	1.96	2.000	.000	.00	1 .0
55.620	.0604					.0606	3.37	.81	3.64	.81	.013	.00	.00	PIPE
329.300	3306.438	.804	3307.242	19.00	16.07	4.01	3311.25	.00	1.57	1.96	2.000	.000	.00	1 .0
80.100	.0604					.0650	5.21	.80	3.65	.81	.013	.00	.00	PIPE
409.400	3311.273	.776	3312.049	19.00	16.85	4.41	3316.46	.00	1.57	1.95	2.000	.000	.00	1 .0
30.100	.0604					.0741	2.23	.78	3.90	.81	.013	.00	.00	PIPE
439.500	3313.090	.750	3313.840	19.00	17.67	4.85	3318.69	.00	1.57	1.94	2.000	.000	.00	1 .0
4.000	.0500					.0805	.32	.75	4.18	.85	.013	.00	.00	PIPE
443.500	3313.290	.742	3314.032	19.00	17.91	4.98	3319.01	.00	1.57	1.93	2.000	.000	.00	1 .0
87.430	.0819					.0819	7.16	.74	4.26	.74	.013	.00	.00	PIPE
530.930	3320.450	.742	3321.192	19.00	17.91	4.98	3326.17	.00	1.57	1.93	2.000	.000	.00	1 .0
84.870	.0819					.0787	6.68	.74	4.26	.74	.013	.00	.00	PIPE
615.800	3327.400	.759	3328.159	19.00	17.38	4.69	3332.85	.00	1.57	1.94	2.000	.000	.00	1 .0
4.000	.0500					.0767	.31	.76	4.08	.85	.013	.00	.00	PIPE
619.800	3327.600	.752	3328.352	19.00	17.59	4.81	3333.16	.00	1.57	1.94	2.000	.000	.00	1 .0
55.138	.0801					.0743	4.10	.75	4.15	.75	.013	.00	.00	PIPE

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time: 4:52:37

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
674.938	3332.015	.772	3332.788	19.00	16.96	4.47	3337.26	.00	1.57	1.95	2.000	.000	.00	1 .0
27.317	.0801					.0662	1.81	.77	3.94	.75	.013	.00	.00	PIPE
702.255	3334.203	.800	3335.003	19.00	16.17	4.06	3339.06	.00	1.57	1.96	2.000	.000	.00	1 .0
15.503	.0801					.0581	.90	.80	3.68	.75	.013	.00	.00	PIPE
717.758	3335.444	.829	3336.273	19.00	15.42	3.69	3339.97	.00	1.57	1.97	2.000	.000	.00	1 .0
10.497	.0801					.0510	.54	.83	3.44	.75	.013	.00	.00	PIPE
728.255	3336.284	.860	3337.145	19.00	14.70	3.36	3340.50	.00	1.57	1.98	2.000	.000	.00	1 .0
7.758	.0801					.0449	.35	.86	3.21	.75	.013	.00	.00	PIPE
736.012	3336.906	.892	3337.798	19.00	14.02	3.05	3340.85	.00	1.57	1.99	2.000	.000	.00	1 .0
6.014	.0801					.0394	.24	.89	2.99	.75	.013	.00	.00	PIPE
742.026	3337.387	.925	3338.312	19.00	13.37	2.77	3341.09	.00	1.57	1.99	2.000	.000	.00	1 .0
4.805	.0801					.0347	.17	.93	2.79	.75	.013	.00	.00	PIPE
746.832	3337.772	.959	3338.731	19.00	12.75	2.52	3341.25	.00	1.57	2.00	2.000	.000	.00	1 .0
3.879	.0801					.0305	.12	.96	2.60	.75	.013	.00	.00	PIPE
750.710	3338.082	.996	3339.078	19.00	12.15	2.29	3341.37	.00	1.57	2.00	2.000	.000	.00	1 .0
3.203	.0801					.0269	.09	1.00	2.42	.75	.013	.00	.00	PIPE
753.914	3338.339	1.034	3339.373	19.00	11.59	2.08	3341.46	.00	1.57	2.00	2.000	.000	.00	1 .0
2.651	.0801					.0237	.06	1.03	2.25	.75	.013	.00	.00	PIPE

FILE: LMB-DFD_27-INTERIM.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 4

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time: 4:52:37

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
756.564	3338.551	1.074	3339.625	19.00	11.05	1.90	3341.52	.00	1.57	1.99	2.000	.000	.00	1 .0
2.201	.0801					.0209	.05	1.07	2.10	.75	.013	.00	.00	PIPE
758.765	3338.727	1.116	3339.844	19.00	10.53	1.72	3341.57	.00	1.57	1.99	2.000	.000	.00	1 .0
1.811	.0801					.0184	.03	1.12	1.95	.75	.013	.00	.00	PIPE
760.576	3338.872	1.161	3340.033	19.00	10.04	1.57	3341.60	.00	1.57	1.97	2.000	.000	.00	1 .0
1.496	.0801					.0163	.02	1.16	1.81	.75	.013	.00	.00	PIPE
762.072	3338.992	1.208	3340.200	19.00	9.58	1.42	3341.62	.00	1.57	1.96	2.000	.000	.00	1 .0
1.210	.0801					.0144	.02	1.21	1.68	.75	.013	.00	.00	PIPE
763.282	3339.089	1.258	3340.347	19.00	9.13	1.29	3341.64	.00	1.57	1.93	2.000	.000	.00	1 .0
.961	.0801					.0128	.01	1.26	1.55	.75	.013	.00	.00	PIPE
764.243	3339.166	1.311	3340.477	19.00	8.71	1.18	3341.65	.00	1.57	1.90	2.000	.000	.00	1 .0
.742	.0801					.0114	.01	1.31	1.43	.75	.013	.00	.00	PIPE
764.985	3339.225	1.367	3340.593	19.00	8.30	1.07	3341.66	.00	1.57	1.86	2.000	.000	.00	1 .0
.518	.0801					.0101	.01	1.37	1.32	.75	.013	.00	.00	PIPE
765.503	3339.267	1.428	3340.695	19.00	7.91	.97	3341.67	.00	1.57	1.81	2.000	.000	.00	1 .0
.315	.0801					.0091	.00	1.43	1.21	.75	.013	.00	.00	PIPE
765.819	3339.292	1.494	3340.786	19.00	7.55	.88	3341.67	.00	1.57	1.74	2.000	.000	.00	1 .0
.101	.0801					.0081	.00	1.49	1.10	.75	.013	.00	.00	PIPE

FILE: LMB-DFD_27-INTERIM.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 5

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time: 4:52:37

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
765.920	3339.300	1.568	3340.868	19.00	7.19	.80	3341.67	.00	1.57	1.65	2.000	.000	.00	1 .0

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T1 Summerlin Village 22 - Lake Mead Boulevard
T2 Desert Foothills Drive to STREET 27 - Tunnel
T3 ATKINS / INTERIM CONDITIONS
SO   0000.0003448.910  1                          3348.910
R    0000.0003448.910  1       .013
R    0152.0003456.340  1       .013
SH   0152.0003456.340  1
CD   1  3   0    .000   10.00    12.00  .000  .000
Q             69.000   .0
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0
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FILE: LMB-Tunnel.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1
Program Package Serial Number: 1615
WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 3:52: 2

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27 - Tunnel
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3448.909	.366	3449.276	69.00	15.69	3.82	3453.10	.00	1.01	12.00	10.000	12.000	.00	0 .0
21.896	.0489					.0452	.99	.37	4.57	.36	.010	.00	.00	BOX
21.896	3449.980	.370	3450.350	69.00	15.52	3.74	3454.09	.00	1.01	12.00	10.000	12.000	.00	0 .0
42.016	.0489					.0412	1.73	.37	4.49	.36	.010	.00	.00	BOX
63.911	3452.034	.389	3452.422	69.00	14.80	3.40	3455.82	.00	1.01	12.00	10.000	12.000	.00	0 .0
21.366	.0489					.0353	.75	.39	4.18	.36	.010	.00	.00	BOX
85.277	3453.078	.408	3453.486	69.00	14.11	3.09	3456.58	.00	1.01	12.00	10.000	12.000	.00	0 .0
14.007	.0489					.0302	.42	.41	3.90	.36	.010	.00	.00	BOX
99.283	3453.763	.427	3454.190	69.00	13.45	2.81	3457.00	.00	1.01	12.00	10.000	12.000	.00	0 .0
10.211	.0489					.0259	.26	.43	3.63	.36	.010	.00	.00	BOX
109.495	3454.262	.448	3454.710	69.00	12.83	2.55	3457.27	.00	1.01	12.00	10.000	12.000	.00	0 .0
7.884	.0489					.0222	.18	.45	3.38	.36	.010	.00	.00	BOX
117.379	3454.647	.470	3455.118	69.00	12.23	2.32	3457.44	.00	1.01	12.00	10.000	12.000	.00	0 .0
6.303	.0489					.0190	.12	.47	3.14	.36	.010	.00	.00	BOX
123.682	3454.956	.493	3455.449	69.00	11.66	2.11	3457.56	.00	1.01	12.00	10.000	12.000	.00	0 .0
5.154	.0489					.0163	.08	.49	2.93	.36	.010	.00	.00	BOX
128.837	3455.208	.517	3455.725	69.00	11.12	1.92	3457.64	.00	1.01	12.00	10.000	12.000	.00	0 .0
4.277	.0489					.0140	.06	.52	2.72	.36	.010	.00	.00	BOX

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27 - Tunnel
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
133.114	3455.417	.542	3455.959	69.00	10.60	1.75	3457.70	.00	1.01	12.00	10.000	12.000	.00	0 .0
3.583	.0489					.0120	.04	.54	2.54	.36	.010	.00	.00	BOX
136.696	3455.592	.569	3456.160	69.00	10.11	1.59	3457.75	.00	1.01	12.00	10.000	12.000	.00	0 .0
3.017	.0489					.0103	.03	.57	2.36	.36	.010	.00	.00	BOX
139.713	3455.739	.597	3456.336	69.00	9.64	1.44	3457.78	.00	1.01	12.00	10.000	12.000	.00	0 .0
2.546	.0489					.0088	.02	.60	2.20	.36	.010	.00	.00	BOX
142.260	3455.864	.626	3456.489	69.00	9.19	1.31	3457.80	.00	1.01	12.00	10.000	12.000	.00	0 .0
2.146	.0489					.0076	.02	.63	2.05	.36	.010	.00	.00	BOX
144.406	3455.969	.656	3456.625	69.00	8.76	1.19	3457.82	.00	1.01	12.00	10.000	12.000	.00	0 .0
1.801	.0489					.0065	.01	.66	1.91	.36	.010	.00	.00	BOX
146.206	3456.057	.688	3456.745	69.00	8.35	1.08	3457.83	.00	1.01	12.00	10.000	12.000	.00	0 .0
1.499	.0489					.0056	.01	.69	1.77	.36	.010	.00	.00	BOX
147.705	3456.130	.722	3456.852	69.00	7.96	.99	3457.84	.00	1.01	12.00	10.000	12.000	.00	0 .0
1.232	.0489					.0048	.01	.72	1.65	.36	.010	.00	.00	BOX
148.937	3456.190	.757	3456.947	69.00	7.59	.90	3457.84	.00	1.01	12.00	10.000	12.000	.00	0 .0
.993	.0489					.0041	.00	.76	1.54	.36	.010	.00	.00	BOX
149.930	3456.239	.794	3457.033	69.00	7.24	.81	3457.85	.00	1.01	12.00	10.000	12.000	.00	0 .0
.777	.0489					.0035	.00	.79	1.43	.36	.010	.00	.00	BOX

FILE: LMB-Tunnel.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 3

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 3:52: 2

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27 - Tunnel
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
150.708	3456.277	.833	3457.110	69.00	6.90	.74	3457.85	.00	1.01	12.00	10.000	12.000	.00	0 .0
.581	.0489					.0030	.00	.83	1.33	.36	.010	.00	.00	BOX
151.289	3456.305	.874	3457.179	69.00	6.58	.67	3457.85	.00	1.01	12.00	10.000	12.000	.00	0 .0
.400	.0489					.0026	.00	.87	1.24	.36	.010	.00	.00	BOX
151.689	3456.325	.916	3457.241	69.00	6.28	.61	3457.85	.00	1.01	12.00	10.000	12.000	.00	0 .0
.233	.0489					.0023	.00	.92	1.16	.36	.010	.00	.00	BOX
151.922	3456.336	.961	3457.297	69.00	5.98	.56	3457.85	.00	1.01	12.00	10.000	12.000	.00	0 .0
.078	.0489					.0019	.00	.96	1.08	.36	.010	.00	.00	BOX
152.000	3456.340	1.009	3457.349	69.00	5.70	.50	3457.85	.00	1.01	12.00	10.000	12.000	.00	0 .0

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T1 Summerlin Village 22 - Lake Mead Boulevard                                   0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#2 S to SDDI#2
T3 ATKINS / INTERIM CONDITIONS
SO    124.2103297.080  2                          3303.846
R     188.3503302.490  2       .013
SH    188.3503302.490  2                          3303.000
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q             4.000   .0
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FILE: LMB-SDL1N.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:50:32

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#2 S to SDDI#2

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
124.210	3297.080	6.766	3303.846	4.00	1.27	.03	3303.87	.00	.70	.00	2.000	.000	.00	1 .0
56.628	.0843					.0002	.01	6.77	.00	.29	.010	.00	.00	PIPE
180.838	3301.856	2.000	3303.856	4.00	1.27	.03	3303.88	.00	.70	.00	2.000	.000	.00	1 .0
2.167	.0843					.0002	.00	2.00	.00	.29	.010	.00	.00	PIPE
183.005	3302.039	1.814	3303.854	4.00	1.34	.03	3303.88	.00	.70	1.16	2.000	.000	.00	1 .0
1.250	.0843					.0002	.00	1.81	.15	.29	.010	.00	.00	PIPE
184.255	3302.145	1.706	3303.851	4.00	1.40	.03	3303.88	.00	.70	1.42	2.000	.000	.00	1 .0
1.009	.0843					.0002	.00	1.71	.17	.29	.010	.00	.00	PIPE
185.265	3302.230	1.618	3303.848	4.00	1.47	.03	3303.88	.00	.70	1.57	2.000	.000	.00	1 .0
.887	.0843					.0002	.00	1.62	.20	.29	.010	.00	.00	PIPE
186.152	3302.305	1.540	3303.845	4.00	1.54	.04	3303.88	.00	.70	1.68	2.000	.000	.00	1 .0
.788	.0843					.0002	.00	1.54	.22	.29	.010	.00	.00	PIPE
186.940	3302.371	1.470	3303.841	4.00	1.62	.04	3303.88	.00	.70	1.77	2.000	.000	.00	1 .0
.713	.0843					.0002	.00	1.47	.24	.29	.010	.00	.00	PIPE
187.653	3302.431	1.406	3303.837	4.00	1.69	.04	3303.88	.00	.70	1.83	2.000	.000	.00	1 .0
.661	.0843					.0003	.00	1.41	.26	.29	.010	.00	.00	PIPE
188.314	3302.487	1.346	3303.833	4.00	1.78	.05	3303.88	.00	.70	1.88	2.000	.000	.00	1 .0
.036	.0843					.0003	.00	1.35	.29	.29	.010	.00	.00	PIPE

FILE: LMB-SDL1N.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:50:32

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#2 S to SDDI#2

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
188.350	3302.490	1.343	3303.833	4.00	1.78	.05	3303.88	.00	.70	1.88	2.000	.000	.00	1 .0

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T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#2  to SDDI#1
T3 ATKINS / INTERIM CONDITIONS
SO    124.2103297.080  2                          3303.846
R     151.2803302.490  2       .013
SH    151.2803302.490  2                          3303.000
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q             19.000   .0
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FILE: LMB-SDL1S.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:50:16

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#2 to SDDI#1

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
124.210	3297.080	6.766	3303.846	19.00	6.05	.57	3304.41	.00	1.57	.00	2.000	.000	.00	1 .0
6.292	.1998					.0042	.03	6.77	.00	.51	.010	.00	.00	PIPE
130.502	3298.338	5.532	3303.870	19.00	6.05	.57	3304.44	.00	1.57	.00	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
130.502	3298.338	.512	3298.850	19.00	29.93	13.91	3312.76	.00	1.57	1.75	2.000	.000	.00	1 .0
20.778	.1998					.2042	4.24	.51	8.75	.51	.010	.00	.00	PIPE
151.280	3302.490	.510	3303.000	19.00	30.08	14.05	3317.05	.00	1.57	1.74	2.000	.000	.00	1 .0

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T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#4
T3 ATKINS / INTERIM CONDITIONS
SO    765.9203339.500  2                          3340.980
R     765.9203339.500  2
R     816.9403341.240  2       .013
SH    816.9403341.240  2
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q             12.000   .0
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FILE: LMB-SDL2N.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time:11:50:42

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#4

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
765.920	3339.500	.729	3340.229	12.00	11.59	2.08	3342.31	.00	1.24	1.93	2.000	.000	.00	1 .0
4.456	.0341					.0202	.09	.73	2.78	.64	.010	.00	.00	PIPE
770.376	3339.652	.738	3340.390	12.00	11.39	2.02	3342.41	.00	1.24	1.93	2.000	.000	.00	1 .0
10.084	.0341					.0185	.19	.74	2.72	.64	.010	.00	.00	PIPE
780.460	3339.996	.764	3340.760	12.00	10.86	1.83	3342.59	.00	1.24	1.94	2.000	.000	.00	1 .0
7.756	.0341					.0162	.13	.76	2.54	.64	.010	.00	.00	PIPE
788.216	3340.260	.792	3341.052	12.00	10.36	1.67	3342.72	.00	1.24	1.96	2.000	.000	.00	1 .0
6.168	.0341					.0143	.09	.79	2.37	.64	.010	.00	.00	PIPE
794.383	3340.471	.821	3341.292	12.00	9.88	1.51	3342.81	.00	1.24	1.97	2.000	.000	.00	1 .0
4.987	.0341					.0125	.06	.82	2.21	.64	.010	.00	.00	PIPE
799.370	3340.641	.851	3341.492	12.00	9.42	1.38	3342.87	.00	1.24	1.98	2.000	.000	.00	1 .0
4.073	.0341					.0110	.04	.85	2.07	.64	.010	.00	.00	PIPE
803.444	3340.780	.882	3341.662	12.00	8.98	1.25	3342.91	.00	1.24	1.99	2.000	.000	.00	1 .0
3.304	.0341					.0097	.03	.88	1.93	.64	.010	.00	.00	PIPE
806.748	3340.893	.915	3341.808	12.00	8.56	1.14	3342.95	.00	1.24	1.99	2.000	.000	.00	1 .0
2.711	.0341					.0085	.02	.92	1.80	.64	.010	.00	.00	PIPE
809.458	3340.985	.949	3341.934	12.00	8.16	1.03	3342.97	.00	1.24	2.00	2.000	.000	.00	1 .0
2.179	.0341					.0075	.02	.95	1.68	.64	.010	.00	.00	PIPE

FILE: LMB-SDL2N.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time:11:50:42

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#4

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
811.637	3341.059	.985	3342.044	12.00	7.78	.94	3342.98	.00	1.24	2.00	2.000	.000	.00	1 .0
1.725	.0341					.0066	.01	.99	1.56	.64	.010	.00	.00	PIPE
813.362	3341.118	1.023	3342.141	12.00	7.42	.85	3343.00	.00	1.24	2.00	2.000	.000	.00	1 .0
1.367	.0341					.0058	.01	1.02	1.45	.64	.010	.00	.00	PIPE
814.730	3341.165	1.062	3342.227	12.00	7.07	.78	3343.00	.00	1.24	2.00	2.000	.000	.00	1 .0
.988	.0341					.0051	.01	1.06	1.35	.64	.010	.00	.00	PIPE
815.718	3341.198	1.104	3342.302	12.00	6.75	.71	3343.01	.00	1.24	1.99	2.000	.000	.00	1 .0
.683	.0341					.0045	.00	1.10	1.26	.64	.010	.00	.00	PIPE
816.401	3341.222	1.148	3342.370	12.00	6.43	.64	3343.01	.00	1.24	1.98	2.000	.000	.00	1 .0
.411	.0341					.0040	.00	1.15	1.17	.64	.010	.00	.00	PIPE
816.812	3341.236	1.194	3342.430	12.00	6.13	.58	3343.01	.00	1.24	1.96	2.000	.000	.00	1 .0
.128	.0341					.0035	.00	1.19	1.08	.64	.010	.00	.00	PIPE
816.940	3341.240	1.244	3342.484	12.00	5.84	.53	3343.01	.00	1.24	1.94	2.000	.000	.00	1 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#3
T3 ATKINS / INTERIM CONDITIONS
SO    765.9203339.500  2                          3340.980
R     765.9203339.500  2       .013
R     803.0603346.860  2       .013
SH    803.0603346.861  2
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q             11.000   .0
```

FILE: LMB-SDL2S.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time:11:51: 2

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#3

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
765.920	3339.500	.457	3339.957	11.00	20.35	6.43	3346.39	.00	1.19	1.68	2.000	.000	.00	1 .0
5.115	.1982					.1009	.52	.46	6.32	.39	.010	.00	.00	PIPE
771.034	3340.513	.470	3340.984	11.00	19.52	5.92	3346.90	.00	1.19	1.70	2.000	.000	.00	1 .0
4.784	.1982					.0890	.43	.47	5.97	.39	.010	.00	.00	PIPE
775.818	3341.461	.486	3341.948	11.00	18.62	5.38	3347.33	.00	1.19	1.72	2.000	.000	.00	1 .0
3.925	.1982					.0779	.31	.49	5.59	.39	.010	.00	.00	PIPE
779.743	3342.239	.503	3342.742	11.00	17.75	4.89	3347.63	.00	1.19	1.74	2.000	.000	.00	1 .0
3.288	.1982					.0681	.22	.50	5.23	.39	.010	.00	.00	PIPE
783.031	3342.891	.520	3343.411	11.00	16.92	4.45	3347.86	.00	1.19	1.75	2.000	.000	.00	1 .0
2.787	.1982					.0596	.17	.52	4.90	.39	.010	.00	.00	PIPE
785.818	3343.443	.538	3343.981	11.00	16.14	4.04	3348.02	.00	1.19	1.77	2.000	.000	.00	1 .0
2.386	.1982					.0521	.12	.54	4.59	.39	.010	.00	.00	PIPE
788.204	3343.916	.557	3344.473	11.00	15.38	3.68	3348.15	.00	1.19	1.79	2.000	.000	.00	1 .0
2.065	.1982					.0456	.09	.56	4.29	.39	.010	.00	.00	PIPE
790.270	3344.325	.576	3344.902	11.00	14.67	3.34	3348.24	.00	1.19	1.81	2.000	.000	.00	1 .0
1.793	.1982					.0399	.07	.58	4.02	.39	.010	.00	.00	PIPE
792.062	3344.681	.596	3345.277	11.00	13.99	3.04	3348.31	.00	1.19	1.83	2.000	.000	.00	1 .0
1.563	.1982					.0349	.05	.60	3.76	.39	.010	.00	.00	PIPE

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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time:11:51: 2

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#3

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
793.625	3344.990	.617	3345.608	11.00	13.33	2.76	3348.37	.00	1.19	1.85	2.000	.000	.00	1 .0
1.367	.1982					.0306	.04	.62	3.52	.39	.010	.00	.00	PIPE
794.992	3345.261	.639	3345.900	11.00	12.71	2.51	3348.41	.00	1.19	1.87	2.000	.000	.00	1 .0
1.203	.1982					.0268	.03	.64	3.29	.39	.010	.00	.00	PIPE
796.195	3345.500	.661	3346.161	11.00	12.12	2.28	3348.44	.00	1.19	1.88	2.000	.000	.00	1 .0
1.050	.1982					.0235	.02	.66	3.08	.39	.010	.00	.00	PIPE
797.245	3345.708	.685	3346.393	11.00	11.56	2.07	3348.47	.00	1.19	1.90	2.000	.000	.00	1 .0
.927	.1982					.0206	.02	.69	2.88	.39	.010	.00	.00	PIPE
798.172	3345.891	.709	3346.600	11.00	11.02	1.89	3348.49	.00	1.19	1.91	2.000	.000	.00	1 .0
.813	.1982					.0180	.01	.71	2.69	.39	.010	.00	.00	PIPE
798.985	3346.052	.734	3346.787	11.00	10.51	1.71	3348.50	.00	1.19	1.93	2.000	.000	.00	1 .0
.707	.1982					.0158	.01	.73	2.51	.39	.010	.00	.00	PIPE
799.692	3346.193	.761	3346.954	11.00	10.02	1.56	3348.51	.00	1.19	1.94	2.000	.000	.00	1 .0
.622	.1982					.0139	.01	.76	2.35	.39	.010	.00	.00	PIPE
800.314	3346.316	.788	3347.104	11.00	9.55	1.42	3348.52	.00	1.19	1.95	2.000	.000	.00	1 .0
.537	.1982					.0122	.01	.79	2.19	.39	.010	.00	.00	PIPE
800.851	3346.422	.817	3347.240	11.00	9.11	1.29	3348.53	.00	1.19	1.97	2.000	.000	.00	1 .0
.465	.1982					.0107	.00	.82	2.05	.39	.010	.00	.00	PIPE

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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time:11:51: 2

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#3

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
801.315	3346.514	.847	3347.362	11.00	8.68	1.17	3348.53	.00	1.19	1.98	2.000	.000	.00	1 .0
.400	.1982					.0094	.00	.85	1.91	.39	.010	.00	.00	PIPE
801.715	3346.594	.878	3347.472	11.00	8.28	1.06	3348.54	.00	1.19	1.99	2.000	.000	.00	1 .0
.336	.1982					.0083	.00	.88	1.78	.39	.010	.00	.00	PIPE
802.051	3346.660	.911	3347.571	11.00	7.89	.97	3348.54	.00	1.19	1.99	2.000	.000	.00	1 .0
.283	.1982					.0073	.00	.91	1.66	.39	.010	.00	.00	PIPE
802.334	3346.716	.945	3347.661	11.00	7.53	.88	3348.54	.00	1.19	2.00	2.000	.000	.00	1 .0
.235	.1982					.0064	.00	.95	1.55	.39	.010	.00	.00	PIPE
802.568	3346.763	.980	3347.743	11.00	7.18	.80	3348.54	.00	1.19	2.00	2.000	.000	.00	1 .0
.180	.1982					.0056	.00	.98	1.44	.39	.010	.00	.00	PIPE
802.749	3346.798	1.018	3347.816	11.00	6.84	.73	3348.54	.00	1.19	2.00	2.000	.000	.00	1 .0
.140	.1982					.0049	.00	1.02	1.34	.39	.010	.00	.00	PIPE
802.889	3346.826	1.057	3347.883	11.00	6.52	.66	3348.54	.00	1.19	2.00	2.000	.000	.00	1 .0
.099	.1982					.0044	.00	1.06	1.25	.39	.010	.00	.00	PIPE
802.987	3346.846	1.098	3347.944	11.00	6.22	.60	3348.54	.00	1.19	1.99	2.000	.000	.00	1 .0
.055	.1982					.0039	.00	1.10	1.16	.39	.010	.00	.00	PIPE
803.042	3346.856	1.142	3347.999	11.00	5.93	.55	3348.54	.00	1.19	1.98	2.000	.000	.00	1 .0
.018	.1982					.0034	.00	1.14	1.08	.39	.010	.00	.00	PIPE

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Program Package Serial Number: 1615

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Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#3

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
803.060	3346.860	1.189	3348.049	11.00	5.65	.50	3348.54	.00	1.19	1.96	2.000	.000	.00	1 .0

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T1 SUMMERLIN VILLAGE 22 - STREET 27                                          0
T2 CROSSING AT LAKE MEAD BLVD SSDI#5 TO OUTLET AT FLOODWALL
T3 ATKINS / INTERIM CONDITIONS
SO       .0003441.040  1                          3441.040
R     186.5433441.990  1      .013                              .000  -82.98 1
TS    190.5433442.190  2      .013                              .000
R     237.3443442.450  2      .013
JX    242.3443442.550  2  3   .013    0.50          3442.65       00.00
R     244.4243442.650  2      .013                            0.000    86.79 1
R     281.0903442.860  2      .013
JX    283.0903442.960  2  3   .013    0.50          3443.06       00.00
R     285.2603443.060  2      .013                            0.000     5.52 1
R     309.7243443.220  2      .013                              .000    .000 0
SH    309.7243443.220  2                          3443.190
CD   1  4   1    .000   3.000     .000  .000  .000   .00
CD   2  4   1    .000   3.000     .000  .000  .000   .00
CD   3  2   0    .000   4.000    6.000
Q            51.000   .0
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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:49:34

SUMMERLIN VILLAGE 22 - STREET 27
CROSSING AT LAKE MEAD BLVD SSDI#5 TO OUTLET AT FLOODWALL
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3441.040	2.345	3443.385	52.00	8.77	1.20	3444.58	.00	2.34	2.48	3.000	.000	.00	1 .0
9.195	.0051					.0064	.06	2.34	1.00	3.00	.013	.00	.00	PIPE
9.195	3441.087	2.465	3443.552	52.00	8.36	1.09	3444.64	.00	2.34	2.30	3.000	.000	.00	1 .0
58.366	.0051					.0058	.34	2.47	.90	3.00	.013	.00	.00	PIPE
67.561	3441.384	2.605	3443.989	52.00	7.98	.99	3444.98	.00	2.34	2.03	3.000	.000	.00	1 .0
117.437	.0051					.0055	.64	2.61	.78	3.00	.013	.00	.00	PIPE
184.998	3441.982	2.702	3444.684	52.00	7.76	.93	3445.62	.00	2.34	1.80	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
184.998	3441.982	2.016	3443.998	52.00	10.29	1.65	3445.64	.00	2.34	2.82	3.000	.000	.00	1 .0
1.545	.0051					.0097	.01	2.02	1.35	3.00	.013	.00	.00	PIPE
186.543	3441.990	2.016	3444.006	52.00	10.29	1.65	3445.65	.00	2.34	2.82	3.000	.000	.00	1 .0
TRANS STR	.0500					.0082	.03	2.02	1.35		.013	.00	.00	PIPE
190.543	3442.190	2.345	3444.535	52.00	8.77	1.20	3445.73	.00	2.34	2.48	3.000	.000	.00	1 .0
14.506	.0056					.0064	.09	2.34	1.00	2.61	.013	.00	.00	PIPE
205.049	3442.271	2.465	3444.736	52.00	8.36	1.09	3445.82	.00	2.34	2.30	3.000	.000	.00	1 .0
3.039	.0056					.0060	.02	2.47	.90	2.61	.013	.00	.00	PIPE
208.088	3442.287	2.465	3444.752	52.00	8.37	1.09	3445.84	.00	2.34	2.30	3.000	.000	.00	1 .0
HYDRAULIC JUMP														

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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:49:34

SUMMERLIN VILLAGE 22 - STREET 27
CROSSING AT LAKE MEAD BLVD SSDI#5 TO OUTLET AT FLOODWALL
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
208.088	3442.287	2.239	3444.526	52.00	9.19	1.31	3445.84	.00	2.34	2.61	3.000	.000	.00	1 .0
12.522	.0056					.0078	.10	2.24	1.10	2.61	.013	.00	.00	PIPE
220.610	3442.357	2.140	3444.497	52.00	9.64	1.44	3445.94	.00	2.34	2.71	3.000	.000	.00	1 .0
16.734	.0056					.0088	.15	2.14	1.20	2.61	.013	.00	.00	PIPE
237.344	3442.450	2.049	3444.499	52.00	10.11	1.59	3446.09	.00	2.34	2.79	3.000	.000	.00	1 .0
JUNCT STR	.0200					.0092	.05	2.05	1.31		.013	.00	.00	PIPE
242.344	3442.550	2.040	3444.590	51.50	10.06	1.57	3446.16	.00	2.33	2.80	3.000	.000	.00	1 .0
1.241	.0480					.0087	.01	2.04	1.31	1.23	.013	.00	.00	PIPE
243.585	3442.610	2.121	3444.731	51.50	9.64	1.44	3446.17	.00	2.33	2.73	3.000	.000	.00	1 .0
.839	.0480					.0078	.01	2.12	1.21	1.23	.013	.00	.00	PIPE
244.424	3442.650	2.219	3444.868	51.50	9.19	1.31	3446.18	.00	2.33	2.63	3.000	.000	.00	1 .0
2.202	.0057					.0075	.02	2.22	1.11	2.52	.013	.00	.00	PIPE
246.626	3442.662	2.203	3444.865	51.50	9.26	1.33	3446.20	.00	2.33	2.65	3.000	.000	.00	1 .0
16.469	.0057					.0080	.13	2.20	1.13	2.52	.013	.00	.00	PIPE
263.095	3442.757	2.107	3444.864	51.50	9.71	1.46	3446.33	.00	2.33	2.74	3.000	.000	.00	1 .0
17.995	.0057					.0089	.16	2.11	1.23	2.52	.013	.00	.00	PIPE
281.090	3442.860	2.019	3444.879	51.50	10.18	1.61	3446.49	.00	2.33	2.82	3.000	.000	.00	1 .0
JUNCT STR	.0499					.0092	.02	2.02	1.34		.013	.00	.00	PIPE

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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:49:34

SUMMERLIN VILLAGE 22 - STREET 27
CROSSING AT LAKE MEAD BLVD SSDI#5 TO OUTLET AT FLOODWALL
ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
283.090	3442.960	2.047	3445.007	51.00	9.93	1.53	3446.54	.00	2.32	2.79	3.000	.000	.00	1 .0
1.068	.0461				.0085	.01	2.05	1.29	1.24	.013	.00	.00	PIPE	
284.158	3443.009	2.118	3445.127	51.00	9.56	1.42	3446.55	.00	2.32	2.73	3.000	.000	.00	1 .0
.832	.0461				.0077	.01	2.12	1.21	1.24	.013	.00	.00	PIPE	
284.989	3443.048	2.215	3445.263	51.00	9.11	1.29	3446.55	.00	2.32	2.64	3.000	.000	.00	1 .0
.271	.0461				.0069	.00	2.22	1.10	1.24	.013	.00	.00	PIPE	
285.260	3443.060	2.323	3445.383	51.00	8.68	1.17	3446.55	.00	2.32	2.51	3.000	.000	.00	1 .0
.153	.0065				.0065	.00	2.32	1.00	2.32	.013	.00	.00	PIPE	
285.413	3443.061	2.324	3445.385	51.00	8.68	1.17	3446.55	.00	2.32	2.51	3.000	.000	.00	1 .0
24.311	.0065				.0065	.16	2.32	1.00	2.32	.013	.00	.00	PIPE	
309.724	3443.220	2.324	3445.544	51.00	8.68	1.17	3446.71	.00	2.32	2.51	3.000	.000	.00	1 .0

Worksheet for Circular Pipe 36" Equivalent

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	3.00 ft
Diameter	36.0 in
Discharge	47.16 cfs

Results	
Discharge	47.16 cfs
Normal Depth	3.00 ft
Flow Area	7.1 ft²
Wetted Perimeter	9.4 ft
Hydraulic Radius	0.75 ft
Top Width	0.00 ft
Critical Depth	2.24 ft
Percent Full	100.0 %
Critical Slope	0.006 ft/ft
Velocity	6.67 ft/s
Velocity Head	0.69 ft
Specific Energy	3.69 ft
Froude Number	(N/A)
Maximum Discharge	50.73 cfs
Discharge Full	47.16 cfs
Slope Full	0.005 ft/ft
Flow Type	SubCritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	3.00 ft
Critical Depth	2.24 ft
Channel Slope	0.005 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for Elliptical Pipe 45" x 29"

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Rise	2.4 ft
Span	3.8 ft

Results	
Discharge	46.51 cfs
Normal Depth	2.42 ft
Flow Area	7.1 ft²
Wetted Perimeter	9.8 ft
Hydraulic Radius	0.73 ft
Top Width	0.00 ft
Critical Depth	1.88 ft
Percent Full	100.0 %
Critical Slope	0.005 ft/ft
Velocity	6.53 ft/s
Velocity Head	0.66 ft
Specific Energy	3.08 ft
Froude Number	(N/A)
Maximum Discharge	49.65 cfs
Discharge Full	46.48 cfs
Slope Full	0.005 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.42 ft
Critical Depth	1.88 ft
Channel Slope	0.005 ft/ft
Critical Slope	0.005 ft/ft

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#9 & #10
T3 ATKINS / INTERIM CONDITIONS
SO    181.1603452.720  2                         3459.586
R     227.6403452.910  2      .013                              0.000     02.9 0
JX    228.6403453.010  2  2   .013   04.00          3452.91          90.00
R     229.6403453.110  2
R     308.9803453.430  2      .013
SH    308.9803453.430  2
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   4.000     .000  .000  .000   .00
Q            84.000   .0
```

FILE: LMB-SDL5N.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:49:19

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#9 & #1
0 ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
181.160	3452.720	6.866	3459.586	88.00	7.00	.76	3460.35	.00	2.84	.00	4.000	.000	.00	1 .0
46.480	.0041				.0038	.17	6.87	.00	3.14	.013		.00	.00	PIPE
227.640	3452.910	6.858	3459.768	88.00	7.00	.76	3460.53	.00	2.84	.00	4.000	.000	.00	1 .0
JUNCT STR	.1001				.0036	.00	6.86	.00		.013		.00	.00	PIPE
228.640	3453.010	6.897	3459.906	84.00	6.68	.69	3460.60	.00	2.78	.00	4.000	.000	.00	1 .0
1.000	.1001				.0040	.00	6.90	.00	1.21	.014		.00	.00	PIPE
229.640	3453.110	6.800	3459.910	84.00	6.68	.69	3460.60	.00	2.78	.00	4.000	.000	.00	1 .0
79.340	.0040				.0034	.27	6.80	.00	3.03	.013		.00	.00	PIPE
308.980	3453.430	6.752	3460.182	84.00	6.68	.69	3460.88	.00	2.78	.00	4.000	.000	.00	1 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#8
T3 ATKINS / INTERIM CONDITIONS
SO    181.1603452.720  2                          3459.586
R     181.1603452.720  2
R     201.6603457.840  2       .013
SH    201.6603357.840  2
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q             5.000   .0
```

FILE: LMB-SDL5S.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time: 9:45:10

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#8

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
181.160	3452.720	6.866	3459.586	5.00	1.59	.04	3459.63	.00	.79	.00	2.000	.000	.00	1 .0
19.505	.2498					.0003	.01	6.87	.00	.25	.010	.00	.00	PIPE
200.665	3457.592	2.000	3459.592	5.00	1.59	.04	3459.63	.00	.79	.00	2.000	.000	.00	1 .0
.725	.2498					.0003	.00	2.00	.00	.25	.010	.00	.00	PIPE
201.390	3457.773	1.814	3459.587	5.00	1.67	.04	3459.63	.00	.79	1.16	2.000	.000	.00	1 .0
.270	.2498					.0003	.00	1.81	.18	.25	.010	.00	.00	PIPE
201.660	3457.840	1.744	3459.584	5.00	1.72	.05	3459.63	.00	.79	1.34	2.000	.000	.00	1 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDDI#10 to SDDI#11
T3 ATKINS / INTERIM CONDITIONS
SO    308.9803453.630  2                          3460.178
R     308.9803453.630  2
R     390.8003454.040  2       .013
SH    390.8003454.040  2
CD   2  4   1    .000   2.500     .000  .000  .000   .00
Q             18.000   .0
```

FILE: LMB-SDL6.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-24-2019 Time: 9:47:17

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDDI#10 to SDDI#11

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
308.980	3453.630	6.548	3460.178	18.00	3.67	.21	3460.39	.00	1.44	.00	2.500	.000	.00	1 .0
81.820	.0050					.0011	.09	6.55	.00	1.22	.010	.00	.00	PIPE

C.4 Ultimate Condition WSPG-W Model

```
T1 SUMMERLIN WEST VILLAGE 22    LMB-J-ULT.WSW                                  0
T2 LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)
T3 ATKINS / ULTIMATE CONDITIONS
SO   0000.0003447.113 54                        3447.462
R    0125.5503451.322 54      .013
R    0126.5503451.355 54      .013                                  0.000     15.0 0
R    0127.5503451.388 54      .013                                  0.000     15.0 0
R    0128.5503451.421 54      .013                                  0.000     15.0 0
R    0129.5503451.454 54      .013                                  0.000     15.0 0
R    0130.5503451.520 54      .013                                  0.000     15.0 0
R    0131.5503451.522 54      .013                                  0.000     14.0 0
R    0176.1603452.460 54      .013
R    0177.1603452.470 54      .013                                             06.7 1
JX   0179.1603452.59054 48 24 .013     88.0    5.0 3452.72 3452.72 82.3  -86.6
R    0181.1603452.720 54      .013                                                  0
R    0224.7203455.844 54      .013                                                  0
SH   0228.7203455.844 54
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
CD  54  4   0    .000   4.500     .000  .000  .000   .00
Q           189.00    .0
```

FILE: LMB-J-ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:10:12:35

SUMMERLIN WEST VILLAGE 22 LMB-J-ULT.WSW

LAKE MEAD BLVD 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3447.113	3.353	3450.466	282.03	22.19	7.65	3458.11	.00	4.36	3.92	4.500	.000	.00	0 .0
20.035	.0335					.0247	.49	3.35	2.17	3.00	.013	.00	.00	PIPE
20.035	3447.785	3.402	3451.187	282.03	21.86	7.42	3458.61	.00	4.36	3.87	4.500	.000	.00	0 .0
48.616	.0335					.0231	1.12	3.40	2.11	3.00	.013	.00	.00	PIPE
68.652	3449.415	3.569	3452.984	282.03	20.84	6.75	3459.73	.00	4.36	3.65	4.500	.000	.00	0 .0
33.600	.0335					.0209	.70	3.57	1.91	3.00	.013	.00	.00	PIPE
102.251	3450.541	3.758	3454.299	282.03	19.87	6.13	3460.43	.00	4.36	3.34	4.500	.000	.00	0 .0
23.299	.0335					.0192	.45	3.76	1.70	3.00	.013	.00	.00	PIPE
125.550	3451.322	3.981	3455.303	282.03	18.95	5.58	3460.88	.00	4.36	2.88	4.500	.000	.00	0 .0
1.000	.0330					.0184	.02	3.98	1.47	3.02	.013	.00	.00	PIPE
126.550	3451.355	3.994	3455.349	282.03	18.90	5.55	3460.90	.00	4.36	2.84	4.500	.000	.00	0 .0
1.000	.0330					.0183	.02	3.99	1.45	3.02	.013	.00	.00	PIPE
127.550	3451.388	4.006	3455.394	282.03	18.86	5.52	3460.92	.00	4.36	2.81	4.500	.000	.00	0 .0
1.000	.0330					.0183	.02	4.01	1.44	3.02	.013	.00	.00	PIPE
128.550	3451.421	4.020	3455.441	282.03	18.81	5.49	3460.93	.00	4.36	2.78	4.500	.000	.00	0 .0
1.000	.0332					.0182	.02	4.02	1.43	3.01	.013	.00	.00	PIPE
129.550	3451.454	4.035	3455.489	282.03	18.76	5.46	3460.95	.00	4.36	2.74	4.500	.000	.00	0 .0
1.000	.0659					.0181	.02	4.04	1.41	2.40	.013	.00	.00	PIPE

FILE: LMB-J-ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:10:12:35

SUMMERLIN WEST VILLAGE 22 LMB-J-ULT.WSW

LAKE MEAD BLVD 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
130.550	3451.520	4.087	3455.607	282.03	18.58	5.36	3460.97	.00	4.36	2.60	4.500	.000	.00	0 .0
1.000	.0020					.0180	.02	4.09	1.35	4.50	.013	.00	.00	PIPE
131.550	3451.522	4.069	3455.591	282.03	18.64	5.40	3460.99	.00	4.36	2.65	4.500	.000	.00	0 .0
44.610	.0210					.0181	.81	4.07	1.38	3.64	.013	.00	.00	PIPE
176.160	3452.460	4.356	3456.816	282.03	17.91	4.98	3461.79	.00	4.36	1.58	4.500	.000	.00	0 .0
1.000	.0100					.0183	.02	4.36	1.00	4.50	.013	.00	.00	PIPE
177.160	3452.470	4.421	3456.891	282.03	17.80	4.92	3461.81	.00	4.36	1.18	4.500	.000	.00	0 .0
JUNCT STR	.0601					.0139	.03	4.42	.86		.013	.00	.00	PIPE
179.160	3452.590	8.552	3461.142	189.00	11.88	2.19	3463.34	.00	3.96	.00	4.500	.000	.00	0 .0
2.000	.0649					.0092	.02	8.55	.00	1.92	.013	.00	.00	PIPE
181.160	3452.720	8.441	3461.161	189.00	11.88	2.19	3463.35	.00	3.96	.00	4.500	.000	.00	0 .0
43.560	.0717					.0092	.40	8.44	.00	1.86	.013	.00	.00	PIPE
224.720	3455.844	5.719	3461.563	189.00	11.88	2.19	3463.76	.00	3.96	.00	4.500	.000	.00	0 .0
4.000	.0717					.0166	.72	5.72	.00	1.86	.013	.00	.00	PIPE
228.720	3455.844	5.719	3461.563	189.00	11.88	2.19	3463.76	.00	3.96	.00	4.500	.000	.00	0 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                0
T2 Desert Foothills Drive to STREET 27
T3 ATKINS / ULTIMATE CONDITIONS
SO      0.0003289.090  2                        3300.40
R      00.0003288.900  2
R      41.7603293.620  2      .013                                  .000  -9.188 1
R      45.7603293.820  2      .013                                  .000    .000 0
R     120.2103296.880  2      .013                                  .000    .000 1
JX    122.2103296.980  2  2  2.013    5.00    4.0 3297.0753297.075-60.6 74.7
R     124.2103297.080  2      .013                                  .000    .000 0
R     267.6803302.880  2      .013                                  .000  -5.789 1
R     271.6803303.080  2      .013                                  .000    .000 0
R     437.5003313.090  2      .013                                  .000  -2.856 1
R     441.5003313.290  2      .013                                  .000    .000 0
R     613.8003327.390  2      .013                                  .000  -3.368 1
R     617.8003327.600  2      .013                                  .000    .000 0
R     765.9203339.300  2      .013                                  .000    .000 1
SH    765.9203339.500  2
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q            32.000   .0
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FILE: LMB-DFD_27-ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1
Program Package Serial Number: 1615
WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 5:15:56
Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27
ATKINS / ULTIMATE CONDITIONS

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
.000	3289.090	11.310	3300.400	41.03	13.06	2.65	3303.05	.00	1.96	.00	2.000	.000	.00	1 .0
.000	3288.900	11.500	3300.400	41.03	13.06	2.65	3303.05	.00	1.96	.00	2.000	.000	.00	1 .0
41.760	.1130					.0329	1.37	11.50	.00	1.05	.013	.00	.00	PIPE
41.760	3293.620	8.366	3301.987	41.03	13.06	2.65	3304.64	.00	1.96	.00	2.000	.000	.00	1 .0
4.000	.0500					.0329	.13	8.37	.00	1.37	.013	.00	.00	PIPE
45.760	3293.820	8.298	3302.118	41.03	13.06	2.65	3304.77	.00	1.96	.00	2.000	.000	.00	1 .0
74.450	.0411					.0329	2.45	8.30	.00	1.48	.013	.00	.00	PIPE
120.210	3296.880	7.820	3304.700	41.03	13.06	2.65	3307.35	.00	1.96	.00	2.000	.000	.00	1 .0
JUNCT STR	.0500					.0265	.05	7.82	.00		.013	.00	.00	PIPE
122.210	3296.980	9.719	3306.699	32.00	10.19	1.61	3308.31	.00	1.89	.00	2.000	.000	.00	1 .0
2.000	.0500					.0200	.04	9.72	.00	1.15	.013	.00	.00	PIPE
124.210	3297.080	9.659	3306.739	32.00	10.19	1.61	3308.35	.00	1.89	.00	2.000	.000	.00	1 .0
143.470	.0404					.0200	2.87	9.66	.00	1.24	.013	.00	.00	PIPE
267.680	3302.880	6.841	3309.721	32.00	10.19	1.61	3311.33	.00	1.89	.00	2.000	.000	.00	1 .0
4.000	.0500					.0200	.08	6.84	.00	1.15	.013	.00	.00	PIPE
271.680	3303.080	6.721	3309.801	32.00	10.19	1.61	3311.41	.00	1.89	.00	2.000	.000	.00	1 .0
69.274	.0604					.0200	1.39	6.72	.00	1.09	.013	.00	.00	PIPE
340.954	3307.262	3.964	3311.226	32.00	10.19	1.61	3312.84	.00	1.89	.00	2.000	.000	.00	1 .0

HYDRAULIC JUMP

FILE: LMB-DFD_27-ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2
Program Package Serial Number: 1615
WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 5:15:56
Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27
ATKINS / ULTIMATE CONDITIONS

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
340.954	3307.262	1.064	3308.326	32.00	18.84	5.51	3313.83	.00	1.89	2.00	2.000	.000	.00	1 .0
58.910	.0604				.0676	3.98	1.06	3.60	1.09	.013	.00	.00	PIPE	
399.864	3310.818	1.039	3311.857	32.00	19.39	5.84	3317.69	.00	1.89	2.00	2.000	.000	.00	1 .0
37.636	.0604				.0749	2.82	1.04	3.76	1.09	.013	.00	.00	PIPE	
437.500	3313.090	1.001	3314.092	32.00	20.33	6.42	3320.51	.00	1.89	2.00	2.000	.000	.00	1 .0
4.000	.0500				.0807	.32	1.00	4.04	1.15	.013	.00	.00	PIPE	
441.500	3313.290	.993	3314.283	32.00	20.54	6.55	3320.84	.00	1.89	2.00	2.000	.000	.00	1 .0
57.540	.0818				.0818	4.71	.99	4.10	.99	.013	.00	.00	PIPE	
499.040	3317.999	.993	3318.992	32.00	20.54	6.55	3325.55	.00	1.89	2.00	2.000	.000	.00	1 .0
114.760	.0818				.0771	8.85	.99	4.10	.99	.013	.00	.00	PIPE	
613.800	3327.390	1.030	3328.420	32.00	19.62	5.98	3334.40	.00	1.89	2.00	2.000	.000	.00	1 .0
4.000	.0526				.0732	.29	1.03	3.83	1.14	.013	.00	.00	PIPE	
617.800	3327.600	1.024	3328.624	32.00	19.77	6.07	3334.69	.00	1.89	2.00	2.000	.000	.00	1 .0
32.674	.0790				.0718	2.35	1.02	3.87	1.00	.013	.00	.00	PIPE	
650.474	3330.181	1.041	3331.222	32.00	19.35	5.81	3337.04	.00	1.89	2.00	2.000	.000	.00	1 .0
36.585	.0790				.0656	2.40	1.04	3.75	1.00	.013	.00	.00	PIPE	
687.059	3333.071	1.081	3334.152	32.00	18.45	5.28	3339.44	.00	1.89	1.99	2.000	.000	.00	1 .0
20.749	.0790				.0579	1.20	1.08	3.49	1.00	.013	.00	.00	PIPE	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
707.808	3334.710	1.124	3335.834	32.00	17.59	4.80	3340.64	.00	1.89	1.98	2.000	.000	.00	1 .0
14.074	.0790				.0512	.72	1.12	3.24	1.00	.013	.00	.00	PIPE	
721.882	3335.822	1.169	3336.991	32.00	16.77	4.37	3341.36	.00	1.89	1.97	2.000	.000	.00	1 .0
10.369	.0790				.0452	.47	1.17	3.00	1.00	.013	.00	.00	PIPE	
732.251	3336.641	1.216	3337.857	32.00	15.99	3.97	3341.83	.00	1.89	1.95	2.000	.000	.00	1 .0
7.961	.0790				.0401	.32	1.22	2.78	1.00	.013	.00	.00	PIPE	
740.212	3337.270	1.267	3338.537	32.00	15.25	3.61	3342.15	.00	1.89	1.93	2.000	.000	.00	1 .0

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      -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-     
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```
T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#2 S to SDDI#2
T3 ATKINS / ULTIMATE CONDITIONS
SO    000.0003296.880  2                          3306.740
R     064.1403297.720  2       .013
SH    064.1403297.720  2                          3303.000
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q            4.000   .0
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FILE: LMB-SDL1N_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:47:41

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#2 S to 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
.000	3296.880	9.860	3306.740	4.00	1.27	.03	3306.77	.00	.70	.00	2.000	.000	.00	1 .0
64.140	.0131				.0002	.01	9.86	.00	.47	.010	.00	.00	PIPE	
64.140	3297.720	9.032	3306.752	4.00	1.27	.03	3306.78	.00	.70	.00	2.000	.000	.00	1 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                   0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#2  to SDDI#1
T3 ATKINS / ULTIMATE CONDITIONS
SO    000.0003297.080  2                          3306.74
R     000.0003297.080  2
R     027.0703302.490  2       .013
SH    027.0703302.490  2                          3303.000
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q            5.000   .0
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FILE: LMB-SDL1S_ULT.WSW                    W S P G W - CIVILDESIGN Version 14.06                                    PAGE    1
                                Program Package Serial Number: 1615
                                                WATER SURFACE PROFILE LISTING                    Date: 6-12-2019  Time: 6:33:28
                                  Summerlin Village 22 - Lake Mead Boulevard
                                    Desert Foothills Drive to STREET 27 - Lateral at SDMH#2  to SDDI#1
                                      ATKINS / ULTIMATE CONDITIONS
************************************************************************************************************************** ********
         | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|      |No Wth
 Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-       -|-      -|-     -|-     -|-    -|
 L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |         |         |               |         |       |        |        |       |       |      |
     .000  3297.080    9.660  3306.740      5.00    1.59     .04  3306.78     .00     .79      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-       -|-      -|-     -|-     -|-    -|-
   27.070    .1998                                        .0003      .01     9.66     .00     .27    .010       .00   .00  PIPE
         |         |        |
```

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                   0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#4
T3 ATKINS / ULTIMATE CONDITIONS
SO    000.0003339.500  2                          3341.009
R     000.0003339.500  2
R     051.0203341.240  2       .013
SH    051.0203341.240  2
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q            12.000   .0
```

FILE: LMB-SDL2N_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1
Program Package Serial Number: 1615
WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 6:34:52
Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3339.500	.729	3340.229	12.00	11.59	2.08	3342.31	.00	1.24	1.93	2.000	.000	.00	1 .0
4.456	.0341					.0202	.09	.73	2.78	.64	.010	.00	.00	PIPE
4.456	3339.652	.738	3340.390	12.00	11.39	2.02	3342.41	.00	1.24	1.93	2.000	.000	.00	1 .0
10.084	.0341					.0185	.19	.74	2.72	.64	.010	.00	.00	PIPE
14.540	3339.996	.764	3340.760	12.00	10.86	1.83	3342.59	.00	1.24	1.94	2.000	.000	.00	1 .0
7.756	.0341					.0162	.13	.76	2.54	.64	.010	.00	.00	PIPE
22.296	3340.260	.792	3341.052	12.00	10.36	1.67	3342.72	.00	1.24	1.96	2.000	.000	.00	1 .0
6.168	.0341					.0143	.09	.79	2.37	.64	.010	.00	.00	PIPE
28.464	3340.471	.821	3341.292	12.00	9.88	1.51	3342.81	.00	1.24	1.97	2.000	.000	.00	1 .0
4.987	.0341					.0125	.06	.82	2.21	.64	.010	.00	.00	PIPE
33.450	3340.641	.851	3341.492	12.00	9.42	1.38	3342.87	.00	1.24	1.98	2.000	.000	.00	1 .0
4.073	.0341					.0110	.04	.85	2.07	.64	.010	.00	.00	PIPE
37.524	3340.780	.882	3341.662	12.00	8.98	1.25	3342.91	.00	1.24	1.99	2.000	.000	.00	1 .0
3.304	.0341					.0097	.03	.88	1.93	.64	.010	.00	.00	PIPE
40.828	3340.893	.915	3341.808	12.00	8.56	1.14	3342.95	.00	1.24	1.99	2.000	.000	.00	1 .0
2.711	.0341					.0085	.02	.92	1.80	.64	.010	.00	.00	PIPE
43.539	3340.985	.949	3341.934	12.00	8.16	1.03	3342.97	.00	1.24	2.00	2.000	.000	.00	1 .0
2.179	.0341					.0075	.02	.95	1.68	.64	.010	.00	.00	PIPE

FILE: LMB-SDL2N_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 6:34:52

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
45.717	3341.059	.985	3342.044	12.00	7.78	.94	3342.98	.00	1.24	2.00	2.000	.000	.00	1 .0
1.725	.0341					.0066	.01	.99	1.56	.64	.010	.00	.00	PIPE
47.442	3341.118	1.023	3342.141	12.00	7.42	.85	3343.00	.00	1.24	2.00	2.000	.000	.00	1 .0
1.367	.0341					.0058	.01	1.02	1.45	.64	.010	.00	.00	PIPE
48.810	3341.165	1.062	3342.227	12.00	7.07	.78	3343.00	.00	1.24	2.00	2.000	.000	.00	1 .0
.988	.0341					.0051	.01	1.06	1.35	.64	.010	.00	.00	PIPE
49.798	3341.198	1.104	3342.302	12.00	6.75	.71	3343.01	.00	1.24	1.99	2.000	.000	.00	1 .0
.683	.0341					.0045	.00	1.10	1.26	.64	.010	.00	.00	PIPE
50.481	3341.222	1.148	3342.370	12.00	6.43	.64	3343.01	.00	1.24	1.98	2.000	.000	.00	1 .0
.411	.0341					.0040	.00	1.15	1.17	.64	.010	.00	.00	PIPE
50.892	3341.236	1.194	3342.430	12.00	6.13	.58	3343.01	.00	1.24	1.96	2.000	.000	.00	1 .0
.128	.0341					.0035	.00	1.19	1.08	.64	.010	.00	.00	PIPE
51.020	3341.240	1.244	3342.484	12.00	5.84	.53	3343.01	.00	1.24	1.94	2.000	.000	.00	1 .0

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T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#3
T3 ATKINS / ULTIMATE CONDITIONS
SO    000.0003339.500  2                          3341.009
R     000.0003339.501  2       .013
R     037.1403346.860  2       .013
SH    037.1403346.861  2
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q             11.000   .0
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FILE: LMB-SDL2S_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1
Program Package Serial Number: 1615
WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 6:35:24
Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3339.501	.457	3339.958	11.00	20.35	6.43	3346.39	.00	1.19	1.68	2.000	.000	.00	1 .0
5.109	.1981					.1009	.52	.46	6.32	.39	.010	.00	.00	PIPE
5.109	3340.513	.470	3340.984	11.00	19.52	5.92	3346.90	.00	1.19	1.70	2.000	.000	.00	1 .0
4.785	.1981					.0890	.43	.47	5.97	.39	.010	.00	.00	PIPE
9.894	3341.461	.486	3341.948	11.00	18.62	5.38	3347.33	.00	1.19	1.72	2.000	.000	.00	1 .0
3.926	.1981					.0779	.31	.49	5.59	.39	.010	.00	.00	PIPE
13.819	3342.239	.503	3342.742	11.00	17.75	4.89	3347.63	.00	1.19	1.74	2.000	.000	.00	1 .0
3.289	.1981					.0681	.22	.50	5.23	.39	.010	.00	.00	PIPE
17.108	3342.891	.520	3343.411	11.00	16.92	4.45	3347.86	.00	1.19	1.75	2.000	.000	.00	1 .0
2.787	.1981					.0596	.17	.52	4.90	.39	.010	.00	.00	PIPE
19.895	3343.443	.538	3343.981	11.00	16.14	4.04	3348.02	.00	1.19	1.77	2.000	.000	.00	1 .0
2.387	.1981					.0521	.12	.54	4.59	.39	.010	.00	.00	PIPE
22.282	3343.916	.557	3344.473	11.00	15.38	3.68	3348.15	.00	1.19	1.79	2.000	.000	.00	1 .0
2.066	.1981					.0456	.09	.56	4.29	.39	.010	.00	.00	PIPE
24.348	3344.325	.576	3344.902	11.00	14.67	3.34	3348.24	.00	1.19	1.81	2.000	.000	.00	1 .0
1.793	.1981					.0399	.07	.58	4.02	.39	.010	.00	.00	PIPE
26.141	3344.681	.596	3345.277	11.00	13.99	3.04	3348.31	.00	1.19	1.83	2.000	.000	.00	1 .0
1.563	.1981					.0349	.05	.60	3.76	.39	.010	.00	.00	PIPE

FILE: LMB-SDL2S_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 2

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 6:35:24

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
27.704	3344.990	.617	3345.608	11.00	13.33	2.76	3348.37	.00	1.19	1.85	2.000	.000	.00	1 .0
1.367	.1981					.0306	.04	.62	3.52	.39	.010	.00	.00	PIPE
29.071	3345.261	.639	3345.900	11.00	12.71	2.51	3348.41	.00	1.19	1.87	2.000	.000	.00	1 .0
1.203	.1981					.0268	.03	.64	3.29	.39	.010	.00	.00	PIPE
30.274	3345.500	.661	3346.161	11.00	12.12	2.28	3348.44	.00	1.19	1.88	2.000	.000	.00	1 .0
1.050	.1981					.0235	.02	.66	3.08	.39	.010	.00	.00	PIPE
31.325	3345.708	.685	3346.393	11.00	11.56	2.07	3348.47	.00	1.19	1.90	2.000	.000	.00	1 .0
.927	.1981					.0206	.02	.69	2.88	.39	.010	.00	.00	PIPE
32.252	3345.891	.709	3346.600	11.00	11.02	1.89	3348.49	.00	1.19	1.91	2.000	.000	.00	1 .0
.813	.1981					.0180	.01	.71	2.69	.39	.010	.00	.00	PIPE
33.065	3346.052	.734	3346.787	11.00	10.51	1.71	3348.50	.00	1.19	1.93	2.000	.000	.00	1 .0
.707	.1981					.0158	.01	.73	2.51	.39	.010	.00	.00	PIPE
33.772	3346.193	.761	3346.954	11.00	10.02	1.56	3348.51	.00	1.19	1.94	2.000	.000	.00	1 .0
.622	.1981					.0139	.01	.76	2.35	.39	.010	.00	.00	PIPE
34.394	3346.316	.788	3347.104	11.00	9.55	1.42	3348.52	.00	1.19	1.95	2.000	.000	.00	1 .0
.537	.1981					.0122	.01	.79	2.19	.39	.010	.00	.00	PIPE
34.931	3346.422	.817	3347.240	11.00	9.11	1.29	3348.53	.00	1.19	1.97	2.000	.000	.00	1 .0
.465	.1981					.0107	.00	.82	2.05	.39	.010	.00	.00	PIPE

FILE: LMB-SDL2S_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 3

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 6:35:24

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
35.395	3346.514	.847	3347.362	11.00	8.68	1.17	3348.53	.00	1.19	1.98	2.000	.000	.00	1 .0
.400	.1981					.0094	.00	.85	1.91	.39	.010	.00	.00	PIPE
35.795	3346.594	.878	3347.472	11.00	8.28	1.06	3348.54	.00	1.19	1.99	2.000	.000	.00	1 .0
.336	.1981					.0083	.00	.88	1.78	.39	.010	.00	.00	PIPE
36.131	3346.660	.911	3347.571	11.00	7.89	.97	3348.54	.00	1.19	1.99	2.000	.000	.00	1 .0
.283	.1981					.0073	.00	.91	1.66	.39	.010	.00	.00	PIPE
36.414	3346.716	.945	3347.661	11.00	7.53	.88	3348.54	.00	1.19	2.00	2.000	.000	.00	1 .0
.235	.1981					.0064	.00	.95	1.55	.39	.010	.00	.00	PIPE
36.648	3346.763	.980	3347.743	11.00	7.18	.80	3348.54	.00	1.19	2.00	2.000	.000	.00	1 .0
.180	.1981					.0056	.00	.98	1.44	.39	.010	.00	.00	PIPE
36.829	3346.798	1.018	3347.816	11.00	6.84	.73	3348.54	.00	1.19	2.00	2.000	.000	.00	1 .0
.140	.1981					.0049	.00	1.02	1.34	.39	.010	.00	.00	PIPE
36.969	3346.826	1.057	3347.883	11.00	6.52	.66	3348.54	.00	1.19	2.00	2.000	.000	.00	1 .0
.099	.1981					.0044	.00	1.06	1.25	.39	.010	.00	.00	PIPE
37.067	3346.846	1.098	3347.944	11.00	6.22	.60	3348.54	.00	1.19	1.99	2.000	.000	.00	1 .0
.055	.1981					.0039	.00	1.10	1.16	.39	.010	.00	.00	PIPE
37.122	3346.856	1.142	3347.999	11.00	5.93	.55	3348.54	.00	1.19	1.98	2.000	.000	.00	1 .0
.018	.1981					.0034	.00	1.14	1.08	.39	.010	.00	.00	PIPE

FILE: LMB-SDL2S_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 4

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 6-12-2019 Time: 6:35:24

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#6 N to SDDI#3

ATKINS / ULTIMATE CONDITIONS

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch

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T1 Summerlin Village 22 - Lake Mead Boulevard                                    0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#9 & #10
T3 ATKINS / ULTIMATE CONDITIONS
SO   0000.0003452.700  2                          3461.160
R    0046.4803452.910  2      .013                                0.000     05.0 0
JX   0048.4803452.910  2  2   .013   04.00          3452.91          90.00
R    0048.4803453.110  2
R    0127.8203453.430  2      .013
SH   0127.8203453.630  2
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   4.000     .000  .000  .000   .00
Q            44.000   .0
```

FILE: LMB-SDL5N_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:47: 9

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#9 & #1

0 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
.000	3452.700	8.460	3461.160	48.00	3.82	.23	3461.39	.00	2.08	.00	4.000	.000	.00	1 .0
46.480	.0045					.0011	.05	8.46	.00	1.99	.013	.00	.00	PIPE
46.480	3452.910	8.306	3461.216	48.00	3.82	.23	3461.44	.00	2.08	.00	4.000	.000	.00	1 .0
JUNCT STR	.0000					.0010	.00	8.31	.00		.013	.00	.00	PIPE
48.480	3452.910	8.380	3461.290	44.00	3.50	.19	3461.48	.00	1.98	.00	4.000	.000	.00	1 .0
48.480	3453.110	8.180	3461.290	44.00	3.50	.19	3461.48	.00	1.98	.00	4.000	.000	.00	1 .0
79.340	.0040					.0009	.07	8.18	.00	1.96	.013	.00	.00	PIPE
127.820	3453.430	7.935	3461.365	44.00	3.50	.19	3461.55	.00	1.98	.00	4.000	.000	.00	1 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#8
T3 ATKINS / ULTIMATE CONDITIONS
SO   0000.0003452.720  2                          3461.160
R    0020.5003457.840  2       .013
SH   0020.5003457.840  2
CD   1  3   0    .000   8.000    6.000  .000  .000  -.08
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q             5.000   .0
```

FILE: LMB-SDL5S_ULT.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING Date: 7-15-2019 Time:11:46:47

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#8

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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
.000	3452.720	8.440	3461.160	5.00	1.59	.04	3461.20	.00	.79	.00	2.000	.000	.00	1 .0
20.500	.2498				.0003	.01	8.44	.00	.25	.010		.00	.00	PIPE
20.500	3457.840	3.326	3461.166	5.00	1.59	.04	3461.21	.00	.79	.00	2.000	.000	.00	1 .0

C.5 Riprap Calculations

HEC-11 RIPRAP SIZING CALCULATIONS

Location: Lake Mead Boulevard swale
Conditions: Q > 50 cfs

Equations:

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

d_{avg}= Flow Area/ Top Width

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

(slopes > 0.002 ft/ft and D50 > 0.2 ft)

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

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

$C_{sf} = (SF/1.2)^{1.5}$ (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

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

$D'_{50} = CD_{50}$

Input Variables:

Channel BW =	5	ft	
Enery Grade Slope "S_f" =	0.02223	ft/ft	
Hydraulic Radius "R" =	0.76	ft	
Flow area =	9	sqft	Balance w/ Manning's n until
Wetted perimeter =	11.9	ft	results match input FlowMaster
Top width =	11.55	ft	
Average channel velocity =	5.65	fps	
Depth of flow =	1.09	ft	
Side slope horizontal (H:1) =	3		
Riprap angle of repose "Φ" =	41	degrees	(Chart 4, pg. 129 HEC-11)
Rock riprap specific gravity =	2.65		
Stability Factor =	1.3		
D_{50} =	0.67	ft	

Calculations:

θ =	18.4	degrees
K_1 =	0.876	
d_{avg} =	0.78	ft
Manning's n =	0.096	
Bank D_{50} =	0.17	ft
Bed D_{50} =	0.20	
C_{sf} =	1.128	
C_{sg} =	1.000	
C =	1.128	
Bank D'_{50} =	0.19	ft
Bed D'_{50} =	0.23	ft
Stable?	**Yes**	
t_o =	1.0	lb/ft^2 (average shear stress on channel)
t_c =	2.8	lb/ft^2 (critical shear stress-resistance to movement)
Stable?	**Yes**	

CCRFCD Equations (d_{50} Eq.s use Eq. 732 for Manning's n)

R_h =	0.76	ft (Eq. 732 for $R_h > 2d_{50}$)
n =	0.037	Formula Under Predicts n Value
Y/d_{50} =	1.6	(Eq. 733 for $1.5 < Y/d_{50} < 185$)
n =	0.079	Yes
d_{50} =	0.36	ft (Eq. 734)
d_{50} =	0.68	ft (Eq. 735, generally larger sizes)
d_{50} =	0.51	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

Worksheet for Swale - RipRap Calculations

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.029 ft/ft
Discharge	51.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.33
0+07	0.00
0+12	0.00
0+18	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.33)	(0+18, 2.00)	0.037

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	1.09 ft
Elevation Range	0.0000 to 2.3333 ft
Flow Area	9.0 ft²
Wetted Perimeter	11.9 ft
Hydraulic Radius	0.76 ft
Top Width	11.55 ft
Normal Depth	1.09 ft
Critical Depth	1.17 ft
Critical Slope	0.022 ft/ft
Velocity	5.65 ft/s
Velocity Head	0.50 ft
Specific Energy	1.59 ft
Froude Number	1.126
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.00 ft

Worksheet for Swale - RipRap Calculations

GVF Input Data	
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.09 ft
Critical Depth	1.17 ft
Channel Slope	0.029 ft/ft
Critical Slope	0.022 ft/ft

Appendix D. Proposed Improvement Plans

SUMMERLIN VILLAGE 22
IMPROVEMENT PLANS FOR:

LAKE MEAD BOULEVARD

DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
FUTURE SID PROJECT

LAKE MEAD BOULEVARD ROUGH GRADE

KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

SUMMERLIN®

SHEET INDEX

1	COVER SHEET	
2	LEGEND AND ABBREVIATIONS	
3	GENERAL NOTES	
4	DEMOLITION PLAN	
5	HORIZONTAL CONTROL PLAN 1	
6	HORIZONTAL CONTROL PLAN 2	
7	OVERALL DRAINAGE PLAN	
8–9	MASTER DRAINAGE PLAN	
10–11	MASTER WATER PLAN	
12–13	MASTER SEWER PLAN	
14	ROADWAY GRADING PLAN	STA. 148+50 TO END
15	ROADWAY PLAN AND PROFILE	STA. 148+50 TO END
16	ROADWAY GRADING PLAN	STA. 144+50 TO STA. 148+50
17	ROADWAY PLAN AND PROFILE	STA. 144+50 TO STA. 148+50
18	ROADWAY GRADING PLAN	STA. 140+00 TO STA. 144+50
19	ROADWAY PLAN AND PROFILE	STA. 140+00 TO STA. 144+50
20	ROADWAY GRADING PLAN	STA. 135+25 TO STA. 140+00
21	ROADWAY PLAN AND PROFILE	STA. 135+25 TO STA. 140+00
22	ROADWAY GRADING PLAN	STA. 132+00 TO STA. 135+25
23	ROADWAY PLAN AND PROFILE	STA. 132+00 TO STA. 135+50
24	ROADWAY GRADING PLAN	STA. 129+00 TO STA. 132+00
25	ROADWAY PLAN AND PROFILE	STA. 129+00 TO STA. 132+00
26	ROADWAY GRADING PLAN	STA. 126+00 TO STA. 129+00
27	ROADWAY PLAN AND PROFILE	STA. 126+00 TO STA. 129+00
28	ROADWAY GRADING PLAN	STA. 122+00 TO STA. 126+00
29	ROADWAY PLAN AND PROFILE	STA. 122+00 TO STA. 126+00
30	ROADWAY GRADING PLAN	STA. 119+00 TO STA. 122+00
31	ROADWAY PLAN AND PROFILE	STA. 119+00 TO STA. 122+00
32	ROADWAY GRADING PLAN	BEGIN TO STA. 119+00
33	ROADWAY PLAN AND PROFILE	BEGIN TO STA. 119+00
34	KETTLE RIDGE DRIVE PLAN AND PROFILE	
35–36	STORM DRAIN LATERAL PROFILES	
37	OFFSITE STORM DRAIN PLAN AND PROFILE	
38	PEDESTRIAN TUNNEL PLAN & PROFILE	
39	FLOODWALL PLAN AND PROFILE	STA. 21+00 TO END
40	FLOODWALL PLAN AND PROFILE	STA. 17+00 TO STA. 21+00
41	FLOODWALL PLAN AND PROFILE	STA. 13+00 TO STA. 17+00
42	FLOODWALL PLAN AND PROFILE	BEGIN TO STA. 13+00
43–44	STREETLIGHT PLAN	
45–46	SIGNAGE AND STRIPING PLAN	
47	TYPICAL SECTIONS	
48	WATER DETAILS	
49	SEWER DETAILS	
50	INTERSECTION DETAIL	LAKE MEAD BLVD AND KETTLE RIDGE DR
51	INTERSECTION DETAIL	LAKE MEAD BLVD AND STREET K
52	INTERSECTION DETAIL	LAKE MEAD BLVD AND DESERT FOOTHILLS DR
53	TUNNEL TYPICAL SECTION AND GENERAL NOTES	
54	TUNNEL PLAN AND ELEVATION	
55	TUNNEL GEOMETRICS	
56	TUNNEL FOOTING DETAILS SHEET 1 OF 2	
57	TUNNEL FOOTING DETAILS SHEET 2 OF 2	
58	WINGWALLS 1 AND 2	
59	WINGWALLS 3 AND 4	
60	FLOOD WALL 01 PLAN AND ELEVATION	
61	FLOOD WALL 02 PLAN AND ELEVATION SHEET 1 OF 4	
62	FLOOD WALL 02 PLAN AND ELEVATION SHEET 2 OF 4	
63	FLOOD WALL 02 PLAN AND ELEVATION SHEET 3 OF 4	
64	FLOOD WALL 02 PLAN AND ELEVATION SHEET 4 OF 4	
65	FLOOD WALL 03 PLAN AND ELEVATION	
66	WALL TYPICAL SECTION AND GENERAL NOTES	

UTILITY NOTE

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.

CALL BEFORE YOU DIG: 1-800-642-2444

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE) PRESSURE REDUCING VALVES BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY AND WILL NOTE BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF THE LAS VEGAS VALLEY WATER DISTRICT FACILITIES.

NOTICE OF INTENT NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: HTTP://WWW.STATE.NV.US/BWPC/STORM01.HTM PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH APPROPRIATE FILLING FEE.

PROPOSED RIGHT-OF-WAY ACREAGE
5.73 AC.

PROPOSED DISTURBED AREA ACREAGE
17.08

GEOTECHNICAL ENGINEER
PREPARED BY: NOVA GEOTECHNICAL & INSPECTION SERVICES
4480 W. HACIENDA AVENUE, SUITE 104, LAS VEGAS, NV 89118
PHONE: 702-873-3478
PROJECT NO.: G-18-176
DATED: DECEMBER 3, 2018

OWNER /DEVELOPER

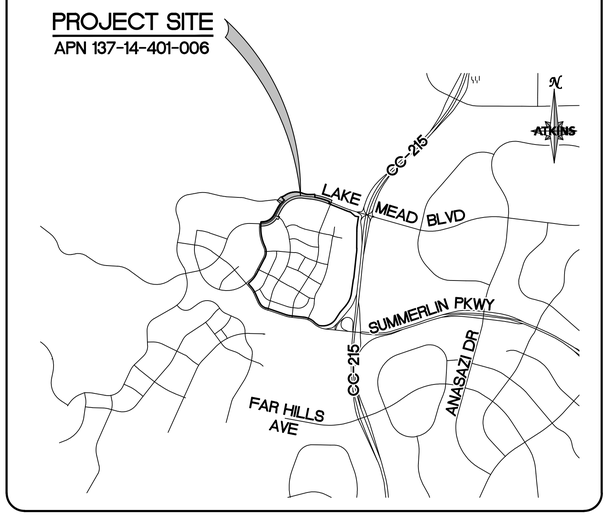
OWNER

CONTACT: KEVIN ORROCK
HOWARD HUGHES COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY
10845 GRIFFITH PEAK DRIVE, SUITE 160
LAS VEGAS, NV 89135

NPDES PERMIT NOTE

THE ENGINEER SHOULD CONTACT THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) TO OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PRIOR TO CONSTRUCTION. ALL CONSTRUCTION PROJECTS ONE ACRE OR LARGER MUST APPLY FOR THE PERMIT THROUGH NDEP. ALL QUESTIONS REGARDING THE NPDES PERMIT REQUIREMENTS SHOULD BE DIRECTED TO THE NDEP AT (775) 687-9429.

LOCATION MAP



ENGINEER / CONSULTANT

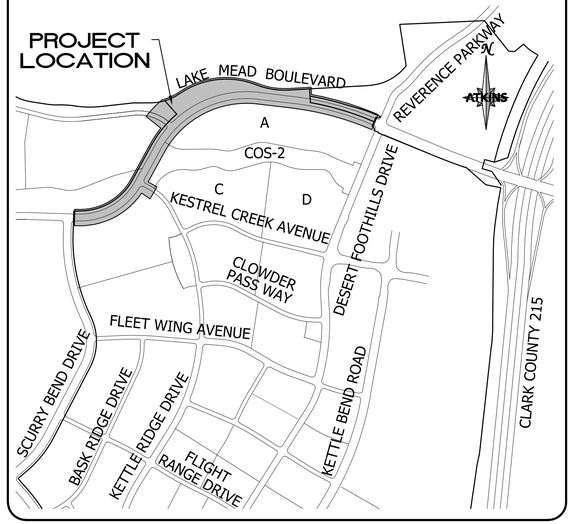
CIVIL

CONTACT: DAVID WILSON P.E.
ATKINS
2270 CORPORATE CIRCLE SUITE 200
HENDERSON, NEVADA 89074
(702) 263-7275

FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2150E, DATED 9/27/2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

VICINITY MAP



APPROVALS

HOWARD HUGHES COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY

KEVIN T. ORROCK, VICE PRESIDENT — DATE

ALLEN PAVELKA, P.E. #9029 — DATE
CITY ENGINEER

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

CITY OF LAS VEGAS PLANNING DEPARTMENT — DATE

NOTE:
THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

LAS VEGAS FIRE AND RESCUE — DATE

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK — DATE

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

SHEETS: _____

NV ENERGY — DATE

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

SOUTHWEST GAS CORPORATION — DATE

COX COMMUNICATIONS OF LAS VEGAS, INC — 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.

LINEAR UNIT: US SURVEY FOOT (FTUS)
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00
SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)
ZONE: LAS VEGAS HIGH ELEVATION ZONE
PROJECTION: TRANSVERSE MERCATOR STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID OF ORIGIN: 400,000.00 M (1,312,333.3333 FTUS)
EASTING AT CENTRAL MERIDIAN: 300,000 M (984,250.0000 FTUS)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.000135 (EXACT)
NOTES:

1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO "GROUND" DISTANCES IN THE PROJECTED AREA
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

BENCHMARK

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
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

LEGAL DESCRIPTION

BEING A PORTION OF LOT 2 AS SHOWN ON THE MAP THEREOF IN BOOK 123 OF PLATS, PAGE 36, OFFICIAL RECORDS, CITY OF LAS VEGAS CLARK COUNTY, NEVADA.

FAST Call before you UnderGround 1-702-432-5300 FIBERNET AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

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

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18123 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

COVER SHEET

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
QA BY: HORIZ.: NONE VERT.: NONE

JOB NO. 100606653
DATE: JULY, 2019
DRAWING NO. 1 / 66
CLV

X:\Projects\SummerWest\Village 22\100606653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\606653-01-TITL-C1.dwg LAYOUT: C-1 Jul 15, 2019 - 4:07PM

@	AT
#	NUMBER
AB	ABANDONED
AC	ASPHALTIC CONCRETE
ACP	ASBESTOS CEMENT PIPE
AGG	AGGREGATE
AIP	ABANDON IN PLACE
ALT	ALTERNATE
AP	ANGLE POINT
APPROX	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL
AV/AR	AIR VACUUM AIR RELIEF VALVE
BC	BACK OF CURB
BCR	BACK OF CURB RETURN
BLK	BLOCK
BLVD	BOULEVARD
BM	BENCHMARK
BO	BLOW OFF
BP	BOTTOM OF PIPE
BSW	BACK OF SIDEWALK
BVC	BEGIN VERTICAL CURVE
BVCE	BEGINNING OF VERTICAL CURVE ELEVATION
BVCS	BEGINNING OF VERTICAL CURVE STATION
BW	BOTTOM WIDTH
C&G	CURB AND GUTTER
C–C	CENTER TO CENTER
CATV	CABLE TELEVISION
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT
CF	CUBIC FOOT
CIP	CAST IRON PIPE OR CAST IN PLACE
CL	CENTERLINE
CLR	CLEAR
CLV	CITY OF LAS VEGAS
CM	CONSTRUCTION MANAGER
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNDT	CONDUIT
CNLV	CITY OF NORTH LAS VEGAS
CO	CLEANOUT
COH	CITY OF HENDERSON
COL	COLUMN
CON'T	CONTINUATION
CONC	CONCRETE
CONST	CONSTRUCT OR CONSTRUCTION
COR	CORNER
COS	COMMUNITY OPEN SPACE
CPP	CORRUGATED PLASTIC PIPE
CSP	CORRUGATED STEEL PIPE
CU	CUBIC
CULV	CULVERT
CY	CUBIC YARD
D	DEPTH
DCSWCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS
DET, DTL	DETAIL
DEPT	DEPARTMENT
DG	DESIGN GRADE
DI	DROP INLET
DIA	DIAMETER
DIAG	DIAGONAL
DIP	DUCTILE IRON PIPE
DOC	DOCUMENT
DW	DRIVEWAY
DWG	DRAWING
E	EAST
EA	EACH
EB	EASTBOUND
EC	END OF CURVE
ECR	END CURB RETURN
EF	EACH FACE
EG	EXISTING GROUND
ELEC	ELECTRICAL
ELEV	ELEVATION
EMBK	EMBANKMENT
EOP	EDGE OF PAVEMENT
EP	EDGE OF PAVEMENT ALIGNMENT END
EQ	EQUAL
ESMT	EASEMENT
EVC	END VERTICAL CURVE
EVCS	END VERTICAL CURVE STATION
EW	EACH WAY
EX, EXST	EXISTING
EXP, JT	EXPANSION JOINT
FA	FIRE ALARM
FC	FACE OF CURB
FF	FINISHED FLOOR ELEVATION
FH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTIC
FT	FOOT OR FEET
G	GAS LINE
GALV	GALVANIZED
GB	GRADE BREAK
GL	GRATE LENGTH
GM	GAS METER
GUT	GUTTER
GV	GATE VALVE
H	HEIGHT
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HDWL	HEADWALL
HE	HORIZONTAL ELLIPTICAL
HGL	HYDRAULIC GRADE LINE
HOA	HOMEOWNER'S ASSOCIATION
HOR	HORIZONTAL
HP	HIGH POINT
ID	INSIDE DIAMETER
IN	INCH(ES)
INT	INTERSECTION
INV	INVERT
IQAC	INTERAGENCY QUALITY ASSURANCE COMMITTEE
IRR	IRRIGATION
ISL	ISLAND
JB	JUNCTION BOX
JCT	JUNCTION
JT	JOINT
K	VERTICAL CURVE K VALUE
L	LENGTH
LB	POUND(S)
LF	LINEAR FEET
LIN	LINEAR
LIN #	CCWRD MANHOLE NUMBER
LOC	LENGTH OF CURVE
LOL	LAYOUT LINE
LP	LOW POINT
LS	LANDSCAPE
LT	LEFT
LVC	LENGTH OF VERTICAL CURVE
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAS	MASONRY
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MON	MONOLITHIC, MONUMENT
MTL	MATERIAL
ME	MATCH EXISTING
MUE	MUNICIPAL UTILITY EASEMENT
N	NORTH
NAP	NOT A PART
NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
NF	NEAR FACE
NG	NUMBER OF GRATES, NATURAL GRADE
NIC	NOT IN CONTRACT
No.	NUMBER
NTS	NOT TO SCALE
NVE	NV ENERGY
OC	ON CENTER
OD	OUTSIDE DIAMETER
OG	OPEN GRADE
OH	OVERHEAD
OHP	OVERHEAD POWER
OS	OFFSET
P	POWER
PB	PULL BOX
PBS	PLANTMIX BITUMINOUS SURFACE
PC	POINT OF CURVATURE
PCC	PORTLAND CEMENT CONCRETE OR POINT OF COMPOUND CURVATURE
PE	POLYETHYLENE
PG	PROPOSED GRADE
PGL	PROFILE GRADE LINE
PH	POT HOLE
PI	POINT OF INTERSECTION
PIP	PROTECT IN PLACE
PL	PROPERTY LINE
PLCS	PLACES
PMF	PAVEMENT MARKING FILM
POC	POINT OF CONNECTION
PP	POWER POLE
PRC	POINT OF REVERSE CURVATURE
PROP	PROPOSED
PSI	POUNDS PER SQUARE INCH
PT	POINT, POINT OF TANGENCY
PUE	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
QTY	QUANTITY
Q100,INT.	INTERIM 100 YEAR STORM FLOW RATE
Q100,ULT.	ULTIMATE 100 YEAR STORM FLOW RATE
(R)	RADIAL
R/W,ROW	RIGHT OF WAY
R	RADIUS
RC	REINFORCED CONCRETE
RCB	REINFORCED CONCRETE BOX
RCC	ROLLER COMPACTED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
REINF	REINFORCED OR REINFORCEMENT
RELOC	RELOCATE
REV	REVISION
RG	ROUGH GRADE
RP	RADIUS POINT
RPM	RAISED PAVEMENT MARKER
RR	RAILROAD
RT	RIGHT
SCHED	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SF	SQUARE FOOT/SQUARE FEET
SHLD	SHOULDER
SHT	SHEET
SHP	STEEL HIGH PRESSURE PIPE
SMFO	SINGLE MODE FIBER OPTIC
SNWA	SOUTHERN NEVADA WATER AUTHORITY
SQ	SQUARE
SS	SANITARY SEWER OR SIDE SLOPE
SSD	SUMMERLIN STANDARD DRAWING
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STLT	STREETLIGHT
SDHW	STORM DRAIN HEADWALL
STRUCT	STRUCTURAL OR STRUCTURE
SUM #	CCWRD MANHOLE NUMBER
SURV	SURVEY
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
SY	SQUARE YARD
T	TELEPHONE LINE
TAN	TANGENT
TB	TOP OF BOX
TBA	TO BE ADJUSTED
TBC	TOP OF BACK OF CURB
TBR	TO BE REMOVED
TC	TOP OF CURB
TCD	TRAFFIC CONTROL DEVICE
TDS	TECHNICAL DRAINAGE STUDY
TEL	TELEPHONE
TEMP	TEMPORARY
TF	TOP OF FOOTING
THK	THICK
THR	THRUST
THW	TOP OF HEADWALL
TOF	TOP OF FACE
TW/TOW	TOP OF WALL
TP	TOP OF PIPE
TRANS	TRANSITION
TS	TRAFFIC SIGNAL
TSI	TRAFFIC SIGNAL INTERCONNECT
TW	TOP OF WALL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS
UG	UNDERGROUND
UGP	UNDERGROUND POWER
UIE	UPPER INVERT ELEVATION
UNO	UNLESS NOTED OTHERWISE
UPRR	UNION PACIFIC RAILROAD
USD	UNIFORM STANDARD DRAWING
UTACS	ULTRA THIN ASPHALT CONCRETE SURFACE
USTCDE	UTILITY, STREETLIGHT, TRAFFIC CONTROL DEVICE EASEMENT
V	VOLT
VAR	VARIABLE
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VG	VALLEY GUTTER
W	WEST, WATER
W/	WITH
WB	WEST BOUND
WL	WATER LINE
WM	WATER METER
W/O	WITHOUT
WPJ	WEAKENED PLANE JOINT
WV	WATER VALVE
WW	WING WALL
YD	YARD(S)

	EXISTING	PROPOSED
DAYLIGHT LINE		
FLOWLINE		
CENTERLINE		
PARCEL LINE		
RIGHT OF WAY		
PAVEMENT STRIPING		
OVERHEAD POWER	—OHP—	—OHP—
UNDERGROUND POWER	—UGP—	—UGP—
SANITARY SEWER	—S—	15" SS
WATER		24"W (3550)
STORM DRAIN		
GAS	—G—	—G—
CABLE T.V.	—CATV—	—CATV—
TELEPHONE	—T—	—T—
STREETLIGHT CONDUIT	—STLT—	STLT
STOP BAR		
CONCRETE ENCASEMENT		
FENCE		
BLOCK WALL		
RETAINING WALL		
SAWCUT PAVEMENT		
CONTOUR	(3005)	3005
SPOT ELEVATION	x 3011.6	x 3011.6
CURB AND GUTTER		
EDGE OF PAVEMENT		
EASEMENT		
MATCHLINE		
SIGN		
DOUBLE POST SIGN		
STORM DRAIN MANHOLE	SD	
STORM DRAIN STRUCTURE		
DROP INLET		
BEEHIVE INLET		
SEWER MANHOLE	S	S
FIRE HYDRANT		
CAP AND BLOWOFF		
GATE VALVE		
REDUCER		
STREETLIGHT	OR	
PULLBOX		
SIGNAL POLE		
ELEVATION	(00.0) FG	00.0 FG
WATER PRESSURE ZONE BOUNDARY		
WATER PRESSURE ZONE		3550
		FUTURE
SIDEWALK		

ROADWAY ALIGNMENT DESIGNATIONS

"LMB" = LAKE MEAD BOULEVARD
"DFD" = DESERT FOOTHILLS DRIVE
"KCA" = KESTREL CREEK AVENUE (STREET I)
"KRD" = KETTLE RIDGE DRIVE (STREET J)
"SBD" = SCURRY BEND DRIVE (STREET N)
"SK" = STREET K
"FW" = FLOOD WALL

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 EMERGENCY AND NOTIFICATION SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DIG OVERHEAD 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.

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
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SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD – DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE – KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

LEGEND AND ABBREVIATIONS

DESIGNED BY: N. BARCOS
DRAWN BY: L. MANACLAY
CHECKED BY: P. BATES
HORIZ.: NONE
VERT.: NONE

JOB NO. 100606663
DATE: JULY, 2019
DRAWING NO. 2 / 66

CLV

X:\Projects\SummWest\Village 22\100606663 – V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653–02–LGND–C2.dwg LAYOUT: C–2 Jul 15, 2019 – 4:08PM

CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY NOVA GEOTECHNICAL & INSPECTION SERVICES, PROJECT NO.: G-18-176, DATED: DECEMBER 3, 2018 APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH 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 APRONS, 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 INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF 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. AFTER HAUNCHING AND PRIOR TO BACKFILL OPERATIONS WHICH WOULD COVER SANITARY SEWER AND STORM DRAIN FACILITIES, CONTRACTOR IS REQUIRED TO SCHEDULE CLV OPEN-TRENCH UTILITY SURVEY INSPECTION FOR DETERMINATION OF FINAL LOCATION COORDINATES. FACILITIES TO BE LOCATED BY CLV SHALL INCLUDE AT A MINIMUM THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS.
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED 06/04/2018

CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

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

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.

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

REVISED 04/15/10

PLAN CONCURRENCE NOTES

THE FOLLOWING SEPARATE VILLAGE 22 ROADWAY IMPROVEMENT PLANS ARE 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 AVENUE (STREET I) (DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE)
4. CLOWDER PASS WAY (STREET H) (DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE)

CITY OF LAS VEGAS FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE # 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 FORM SHALL 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 FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. IFC § 3310, § 3312
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. IFC § 507.5.7.3
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. IFC § 1063
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. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. IFC § 507
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: IFC § C102
    - RESIDENTIAL -500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    - COMMERCIAL -300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. IFC § C102.8
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. 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 ROUTE. IFC § C102.4
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. IFC § C102.7
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. IFC § C102.6
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE 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 SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD-INS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. FOR SYSTEMS PERMITTED TO HAVE ONE SOURCE OF WATER SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 3 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD-INS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. IFC § C104
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. IFC § 503.2.3
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. IFC § 503.2.7, § 503.2.8
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING IFC § 503.2.4
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. IFC § 503.2.1
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 33 FT WITH PARKING ON BOTH SIDES MEASURED TO FACE OF CURB. NOT LESS THAN 28 FT WIDE WITH PARKING RESTRICTED TO ONE SIDE MEASURED TO FACE OF CURB, NOT LESS THAN 24 FT WIDE WITH NO PARKING ON EITHER SIDE MEASURED TO FACE OF CURB. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. IFC § 503.2.1.1
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. IFC § 503.1.1
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 200 OR MORE DWELLING UNITS, ROAD(S) WITH DEADENDS OR A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. CLV REGULATION AND MOU
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. CLV REGULATION
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. IFC § 503.3
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER IFC § 503.6
29. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS, OR HAVING FOUR OR MORE TRAVEL LANES AND A TRAFFIC COUNT OF MORE THAN 30,000 VEHICLES PER DAY, ALL HYDRANTS BEING UTILIZED TO DELIVER FIRE FLOW TO THE PROPOSED LOCATION SHALL BE LOCATED ON THE SAME SIDE OF THE STREET AS THE PROPOSED DEVELOPMENT. CLV REGULATION

REVISED 02/04/19

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN 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 THE TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIAL 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 CCAUSS 627 AND 716 AND SHALL HAVE AN ANTI-GRAFFITI PROTECTIVE OVERLAY FILM THAT IS A MATCHING COMPONENT TO, AND OF THE SAME MANUFACTURER AS THE RETROREFLECTIVE SHEETING TO WHICH IT IS APPLIED. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROADWAY 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 TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA (RTC) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED JUNE 4, 2018

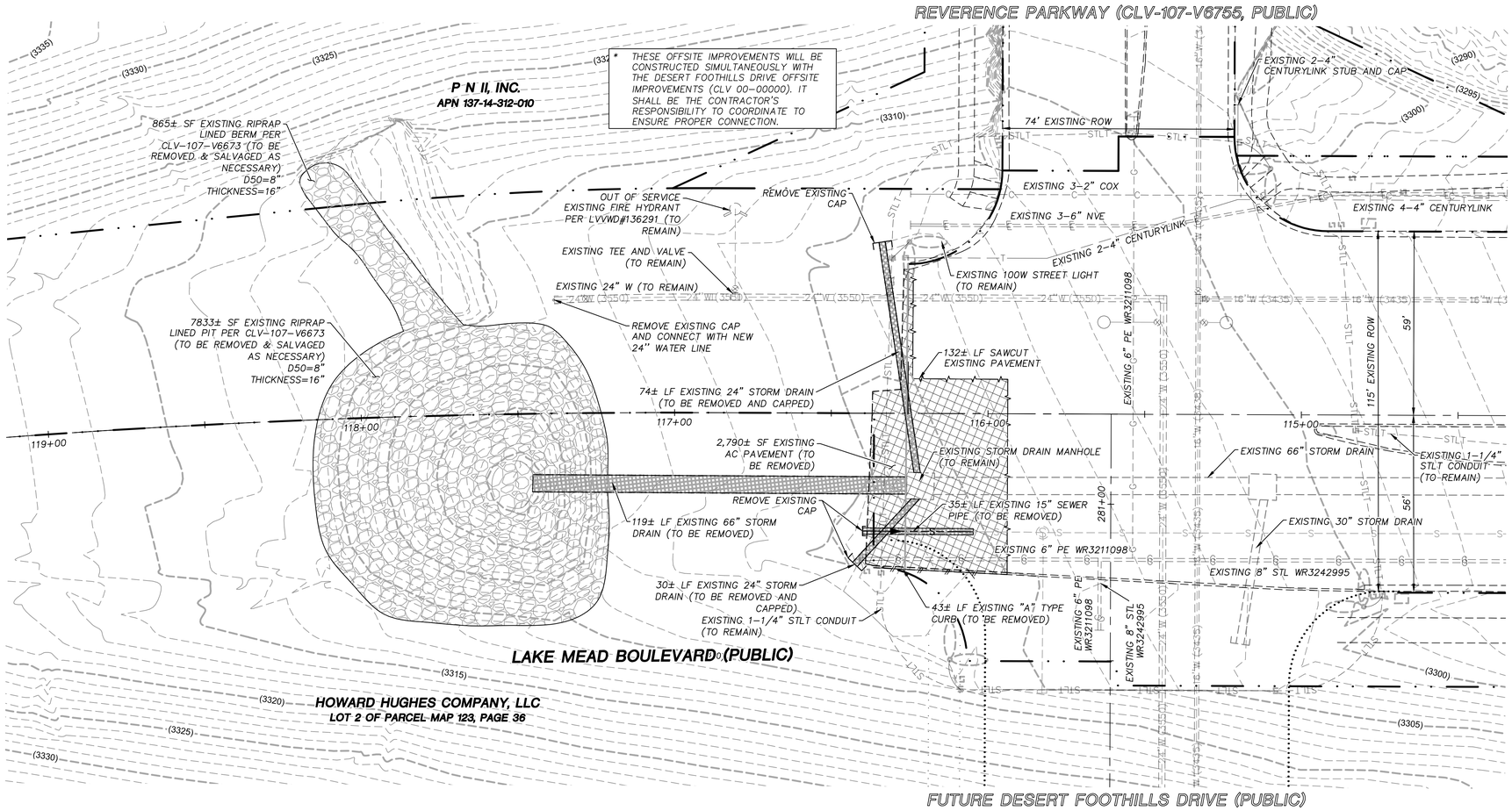
CITY OF LAS VEGAS SEWER NOTES

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

REVISED 04/15/10

CITY OF LAS VEGAS STREET LIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION (USS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.
2. DESIGN PROFESSIONAL AND CONTRACTOR SHALL VERIFY CITY'S LATEST LED FIXTURE SPECIFICATIONS AND APPROVED FIXTURES PER CLV WEBSITE, UNDER BUILDING AND SAFETY FORMS, PRIOR TO ORDERING MATERIALS.
3. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS, ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE USS.
4. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623 G.03.01 OF THE USS.
5. ALL EMPTY CONDUIT SHALL HAVE AT LEAST ONE GREEN NO. #8 AWG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623 G.02.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.
6. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAI



SUMMARY OF QUANTITIES

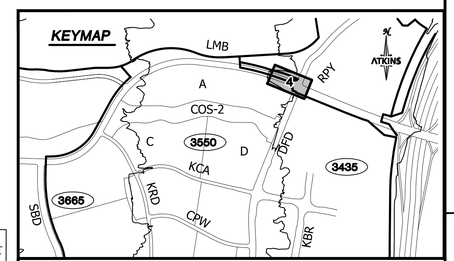
DESCRIPTION	QUANTITY	UNIT
DEMOLITION		
66" RCP STORM DRAIN REMOVED	119	LF
AC PAVEMENT REMOVED	2790	SF
RIP-RAP REMOVED AND SALVAGED	8698	SF
24" STORM DRAIN REMOVED	104	LF
15" SEWER PIPE REMOVED	35	LF
SAWCUT PAVEMENT	132	LF
"A" TYPE CURB REMOVED	43	LF
CAP REMOVED	4	EACH

LEGEND

- REMOVE & SALVAGE EXISTING RIPRAP
- REMOVE EXISTING AC PAVEMENT
- REMOVE EXISTING STORM DRAIN
- REMOVE EXISTING CURB AND GUTTER
- SAWCUT EXISTING PAVEMENT

SOUTHWEST GAS CORPORATION DATE

KEYMAP



CONTRACTOR SHALL EXERCISE CARE WITH ALL SALVAGED ITEMS AND SHALL ASSUME THAT ITEMS WILL BE RE-USED AGAIN BY THE HOWARD HUGHES COMPANY

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig NVCGA/USA/UNDERGROUND UTILITY PROTECTION SERVICE Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 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.

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

DEMOLITION PLAN

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 4 /66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-04-DEMO-R1.dwg LAYOUT: R-1 Jul 15, 2019 - 4:08PM

RED ROCK CANYON
NATIONAL CONSERVATION AREA
UNITED STATES OF AMERICA
APN 137-15-000-003

P N II INC
APN 137-14-715-038

REVERENCE PARKWAY / VILLAGE 26

FUTURE PARCEL COS-2

LAKE MEAD BOULEVARD

FUTURE STREET K

FUTURE PARCEL A

FUTURE PARCEL A

FUTURE COS-2

VILLAGE 27

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

HOWARD HUGHES COMPANY, LLC
LOT 2 OF PARCEL MAP 4, PAGE 51

FUTURE PARCEL LM47

FUTURE PARCEL C

FUTURE PARCEL D

FUTURE PARCEL B

FUTURE DESERT FOOTHILLS DRIVE

FUTURE KESTREL CREEK AVENUE

VILLAGE 22

FUTURE PARCEL E

FUTURE SCURRY BEND DRIVE

FUTURE KETTLE RIDGE DRIVE

FUTURE PARCEL G

FUTURE PARCEL H

FUTURE CLOWDER PASS WAY

FUTURE PARCEL I

FUTURE PARCEL F

FUTURE PARCEL HS-1

FUTURE PARCEL J

FUTURE FLEET WING AVENUE

FUTURE PARCEL K

FUTURE DESERT FOOTHILLS DRIVE

FUTURE KETTLE BEND ROAD

VILLAGE 25

FUTURE PARCEL L

FUTURE PARCEL N

FUTURE SCURRY BEND DRIVE

FUTURE BASK RIDGE DRIVE

FUTURE PARCEL M

FUTURE HIVE BLUFF LANE

FUTURE PARCEL O

FUTURE KETTLE RIDGE DRIVE

FUTURE FLIGHT RANGE DRIVE

FUTURE PARCEL Q

FUTURE PARCEL S

GRAPHIC SCALE
200 0 100 200 400
HORIZONTAL: 1"= 200'

SOILS REPORT

BY NOVA
PROJECT NO. G-18-176
DATED 12/03/18
EARTHWORK QUANTITIES (RAW):
CUT= 40,570 CU YDS
FILL= 86,860 CU YDS

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

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T21S,R59E,S03

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Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

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PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL BATES
No. 18723
CIVIL
7/15/19

MASTER PLAN NOTE

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

N

ATKINS

PLAN SHEET REFRENCES

LAKE MEAD BOULEVARD ROUGH GRADING:
– SEE SHEETS 14 THROUGH 17
LAKE MEAD BOULEVARD ROADWAY PLANS:
– SEE SHEETS 18 THROUGH 33
KETTLE RIDGE DRIVE ROADWAY PLANS:
– SEE SHEETS 18 AND 34
PEDESTRIAN TUNNEL:
–SEE SHEETS 8, 18, 19, AND 38
FLOOD WALL PLANS:
– SEE SHEETS 39 THROUGH 42

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

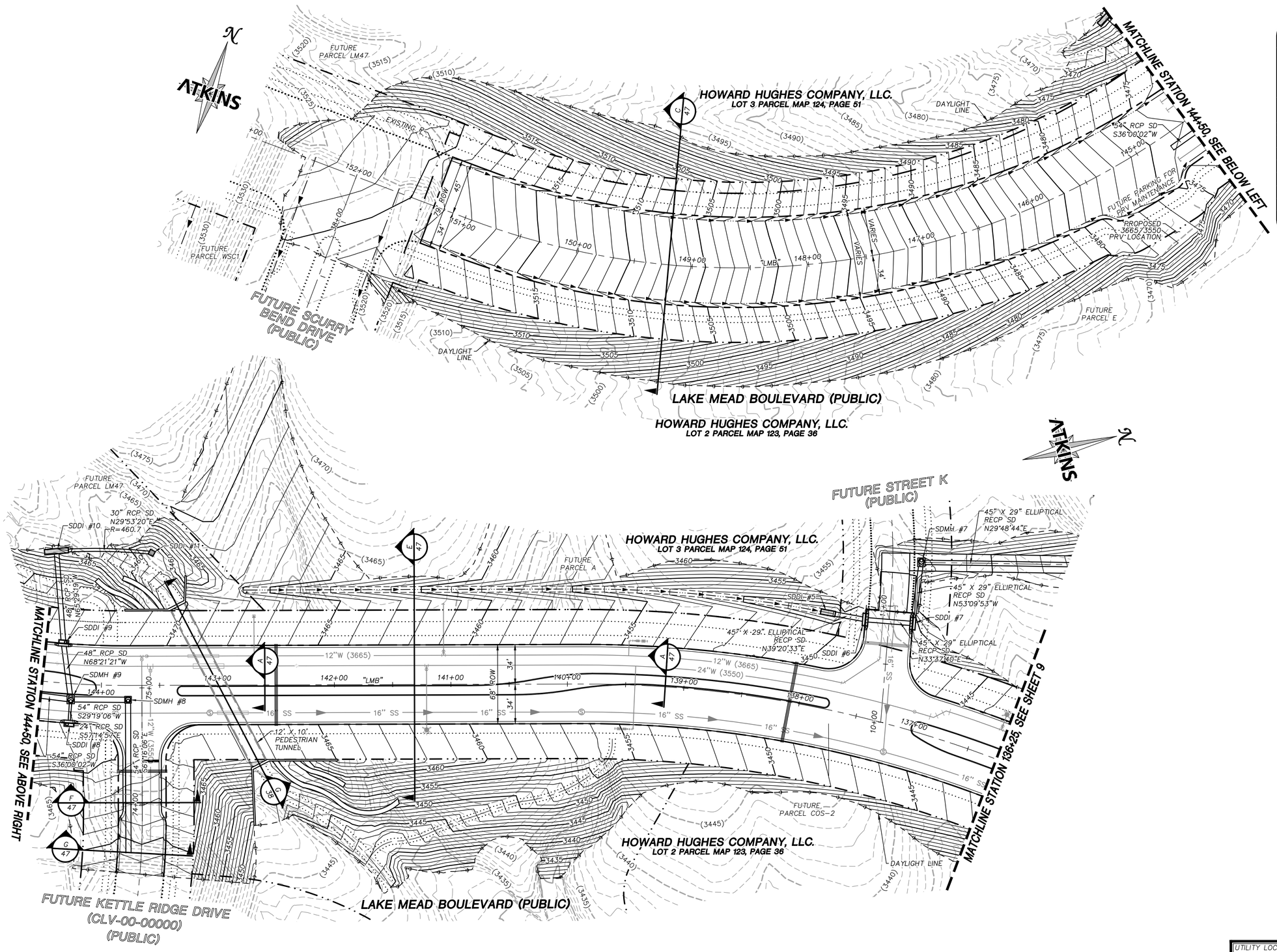
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD – DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE – KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

OVERALL DRAINAGE PLAN

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=200'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 7 /66
CLV

X:\Projects\SummWest\Village 22\100060653 – V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-05A-OVERALL DRAIN – New.dwg LAYOUT: OD Jul 15, 2019 – 4:09PM



SUMMARY OF QUANTITIES

DESCRIPTION	QUANTITY	UNIT
DRAINAGE		

MASTER PLAN NOTE

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STORM DRAIN NOTES

1. SEE PROFILE SHEETS FOR CONSTRUCTION NOTES AND INFORMATION RELATED TO PIPE SIZE (INNER DIAMETER), MANHOLE BASE SIZE (INSIDE DIMENSIONS), AND DROP INLET LENGTHS (CURB OPENINGS).
2. ALL STORM DRAIN MATERIAL TO BE CLASS III REINFORCED CONCRETE PIPE, UNLESS OTHERWISE NOTED IN PROFILES
3. CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.

GRAPHIC SCALE
40 0 20 40 80
HORIZONTAL: 1"= 40'

SOILS REPORT

BY NOVA
PROJECT NO. G-18-176
DATED 12/03/18
EARTHWORK QUANTITIES (RAW):
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FILL= 86,860 CU YDS

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DS#XXX-0000

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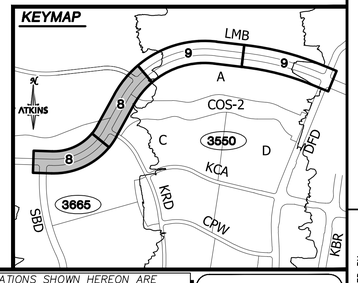
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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

KEYMAP



REV.	DESCRIPTION	BY	DATE	APPROVAL
	REVISIONS			

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

SUMMERLIN

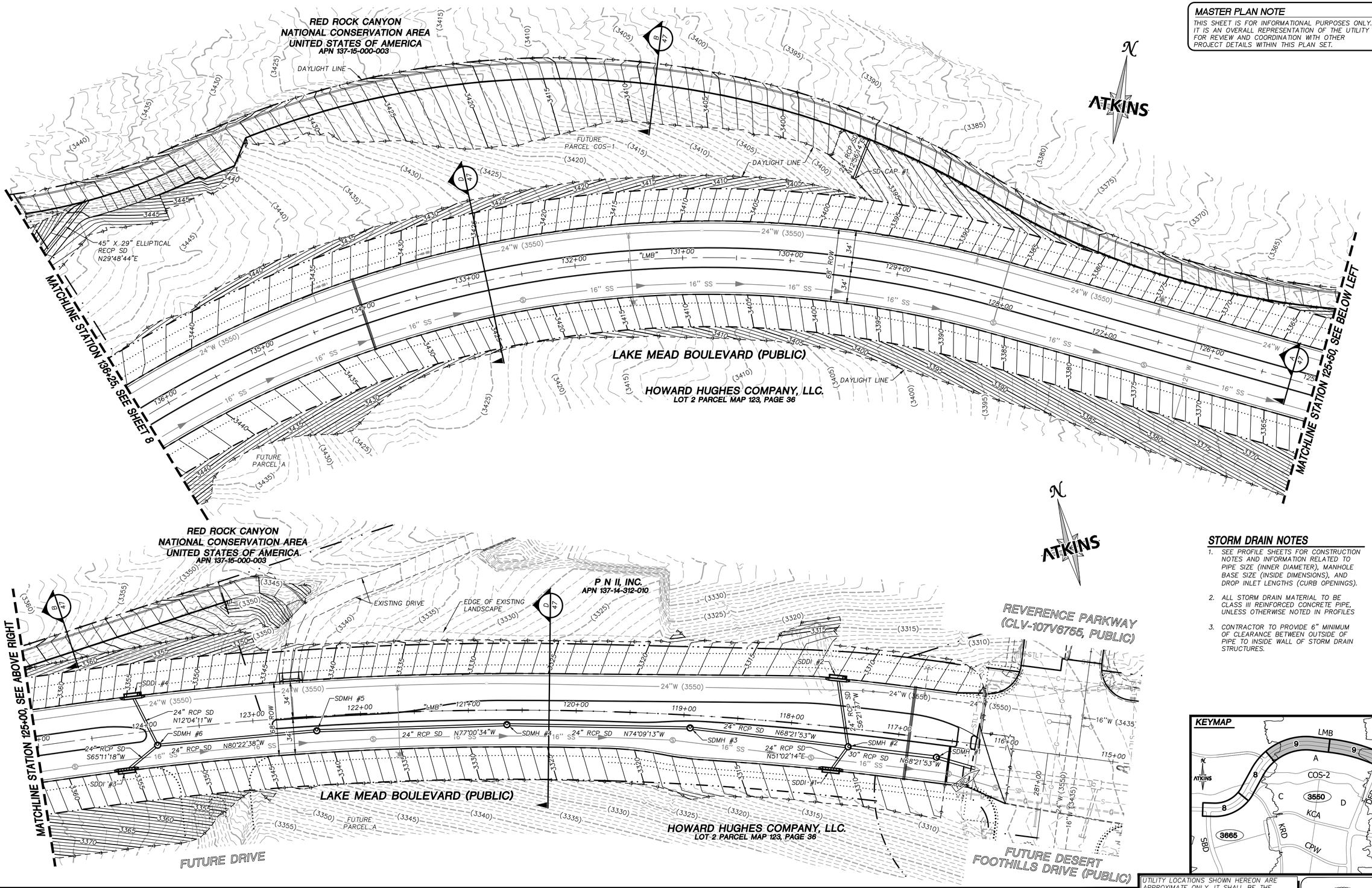
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LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

MASTER DRAINAGE PLAN

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=40'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 8 /66
CLV 18-19262

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-05-STRM-SD1.dwg LAYOUT: SD-1 Jul 15, 2019 - 4:10PM

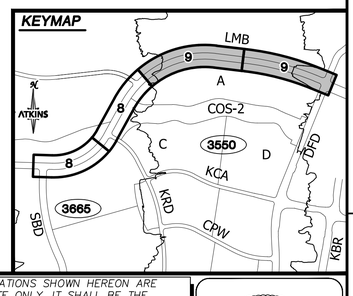


MASTER PLAN NOTE

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

STORM DRAIN NOTES

1. SEE PROFILE SHEETS FOR CONSTRUCTION NOTES AND INFORMATION RELATED TO PIPE SIZE (INNER DIAMETER), MANHOLE BASE SIZE (INSIDE DIMENSIONS), AND DROP INLET LENGTHS (CURB OPENINGS).
2. ALL STORM DRAIN MATERIAL TO BE CLASS III REINFORCED CONCRETE PIPE, UNLESS OTHERWISE NOTED IN PROFILES
3. CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.



GRAPHIC SCALE
40 0 20 40 80
HORIZONTAL: 1"= 40'

SOILS REPORT

BY NOVA
PROJECT NO. C-18-176
DATED 12/03/18
EARTHWORK QUANTITIES (RAW):
CUT= 40,570 CU YDS
FILL= 86,860 CU YDS

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FEDERAL AND NATIONAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID BURIED UTILITIES BEFORE YOU DIG! Call 811 1-800-642-2444

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

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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A. BATES
No. 18723
CIVIL
7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=40'
VERT.: NONE

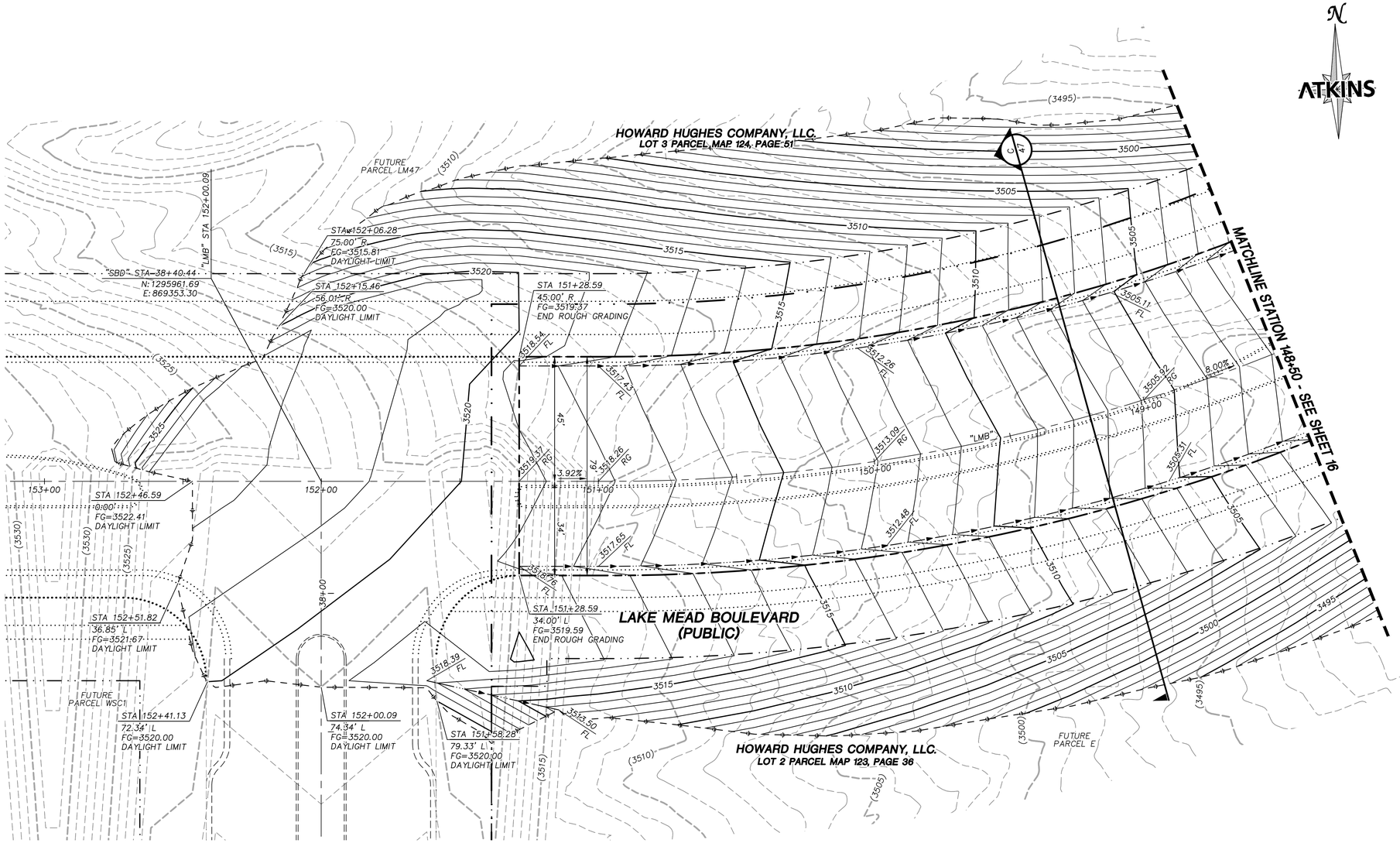
JOB NO. 100606653
DATE: JULY, 2019
DRAWING NO. 9 / 66

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

MASTER DRAINAGE PLAN

CLV 18-19262

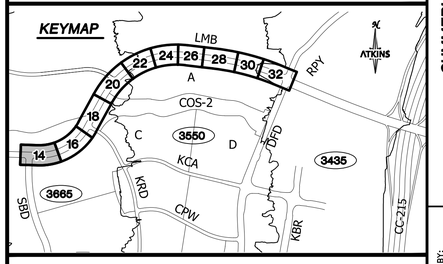
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STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403
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9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
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11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

NOTE:
THIS SECTION OF LAKE MEAD BOULEVARD TO BE ROUGH GRADED ONLY TO ACT AS INTERIM DIVERSION CHANNEL.



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

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PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL BATES
No. 18723
CIVIL
7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

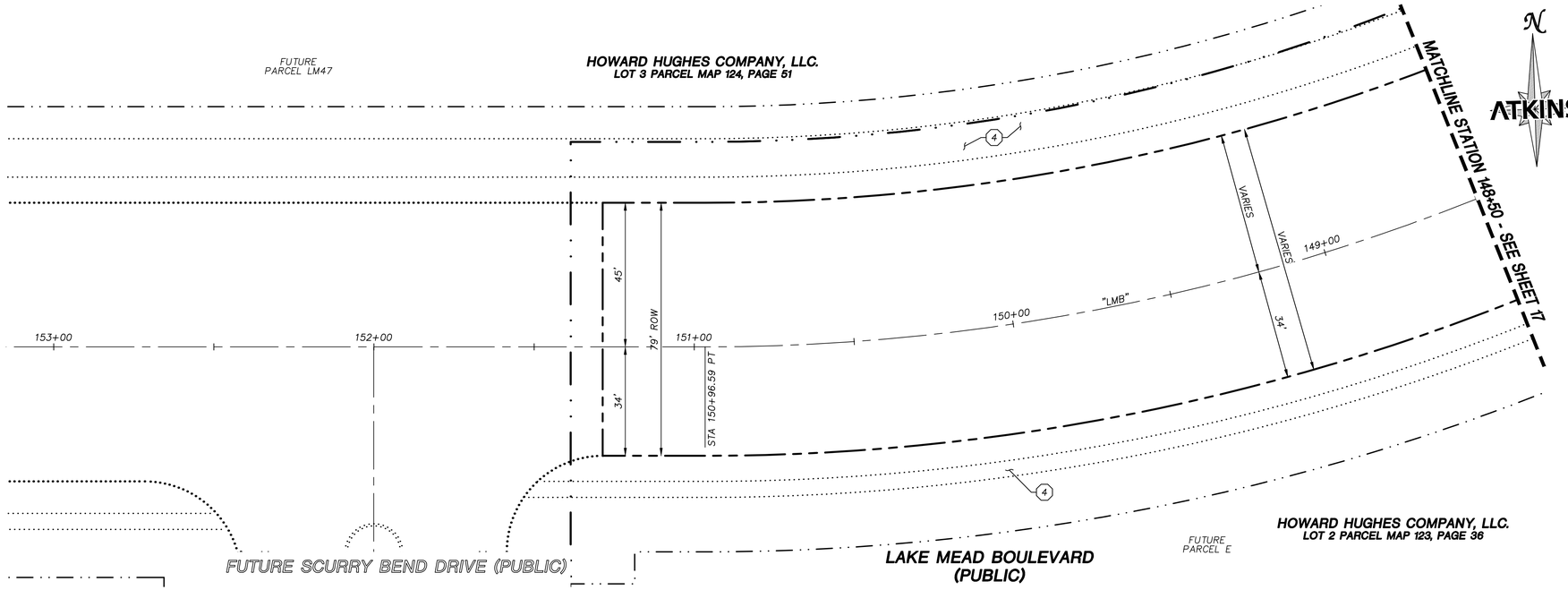
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOUNDATIONS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET M)

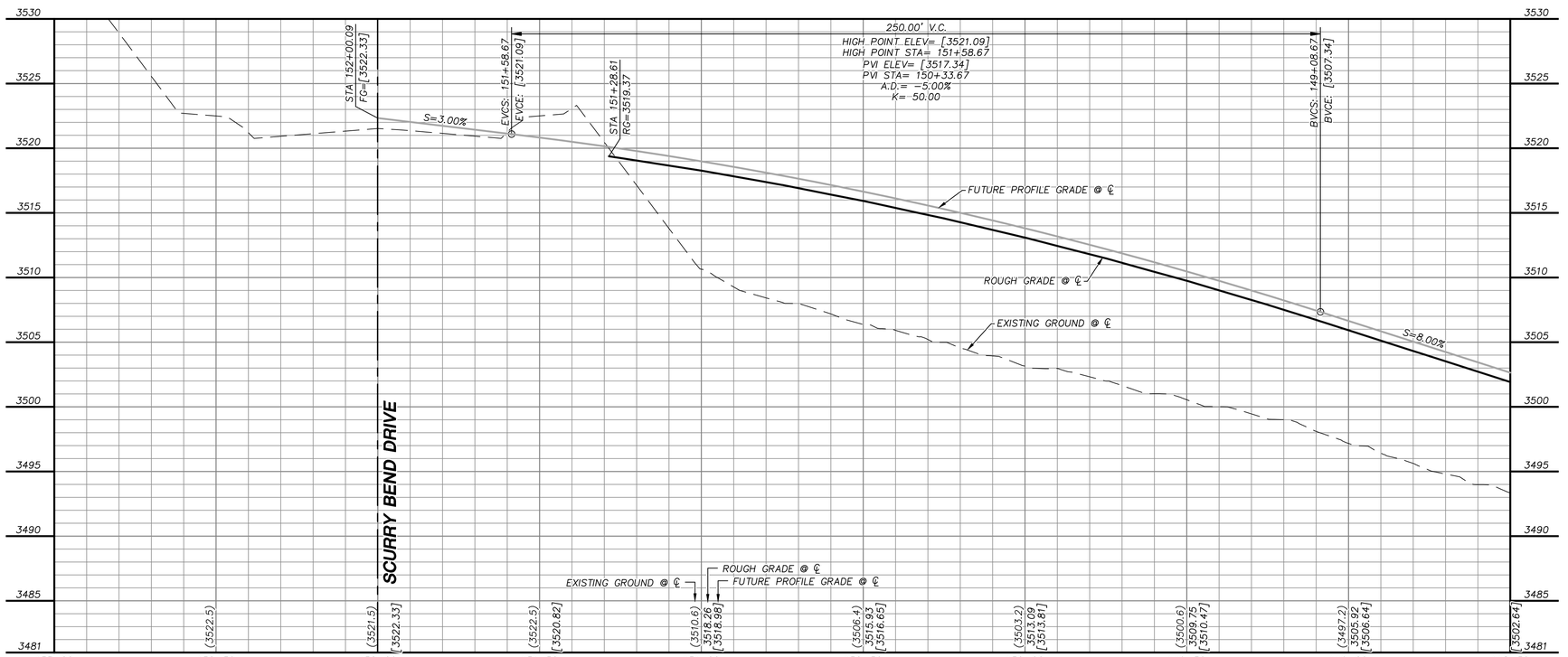
ROADWAY GRADING PLAN
STA. 148+50 TO END

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 14/66
CLV

K:\Projects\SummerWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 14 Jul 15, 2019 - 4:11PM





GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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DS#XXX-0000

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STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

SEWER CONSTRUCTION NOTES

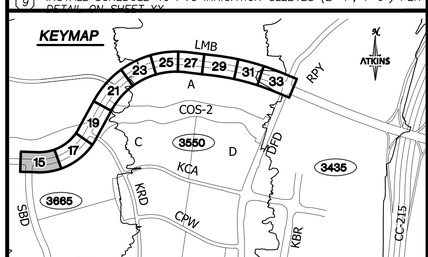
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
5. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
6. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE #31
7. INSTALL 22.5° HORIZONTAL BEND PER UDACS PLATE #31
8. INSTALL IN-LINE REDUCER PER UDACS PLATE #30
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.
11. INSTALL AIR VALVE ASSEMBLY AND VALVE BOX PER UDACS PLATES #38 AND #39

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 PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES 07-29-19 CIVIL No. 18725

7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

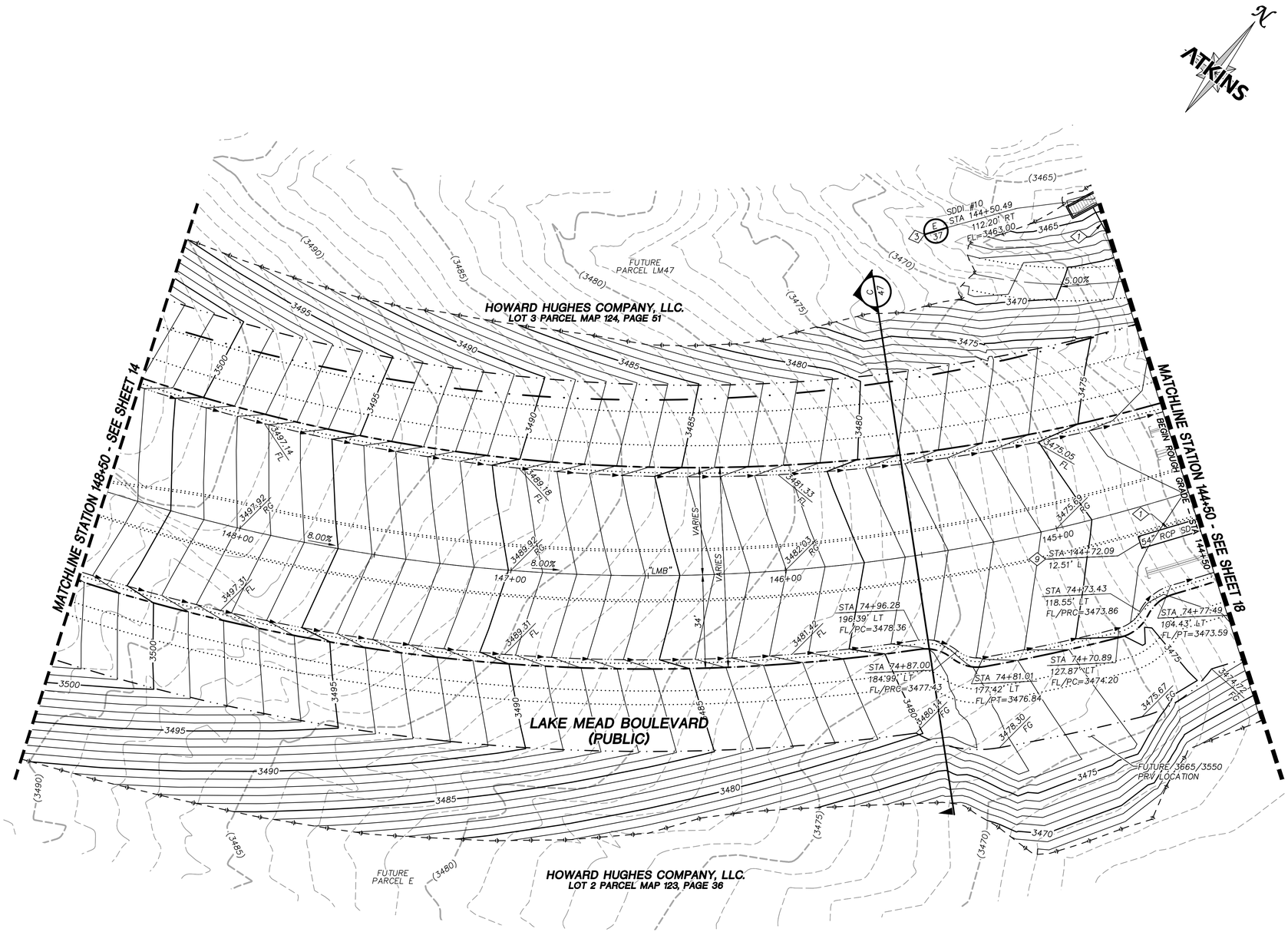
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY PLAN AND PROFILE
STA. 148+50 TO END

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 15/66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 15 Jul 15, 2019 - 6:56PM



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

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T21S,R59E,S03

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Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

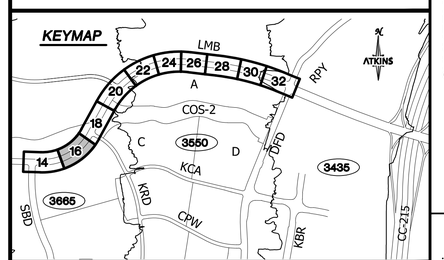
AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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NOTE:
THIS SECTION OF LAKE MEAD BOULEVARD TO BE ROUGH GRADED ONLY TO ACT AS INTERIM DIVERSION CHANNEL.

KEYMAP



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PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL BATES
No. 18723
CIVIL
7/15/19

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

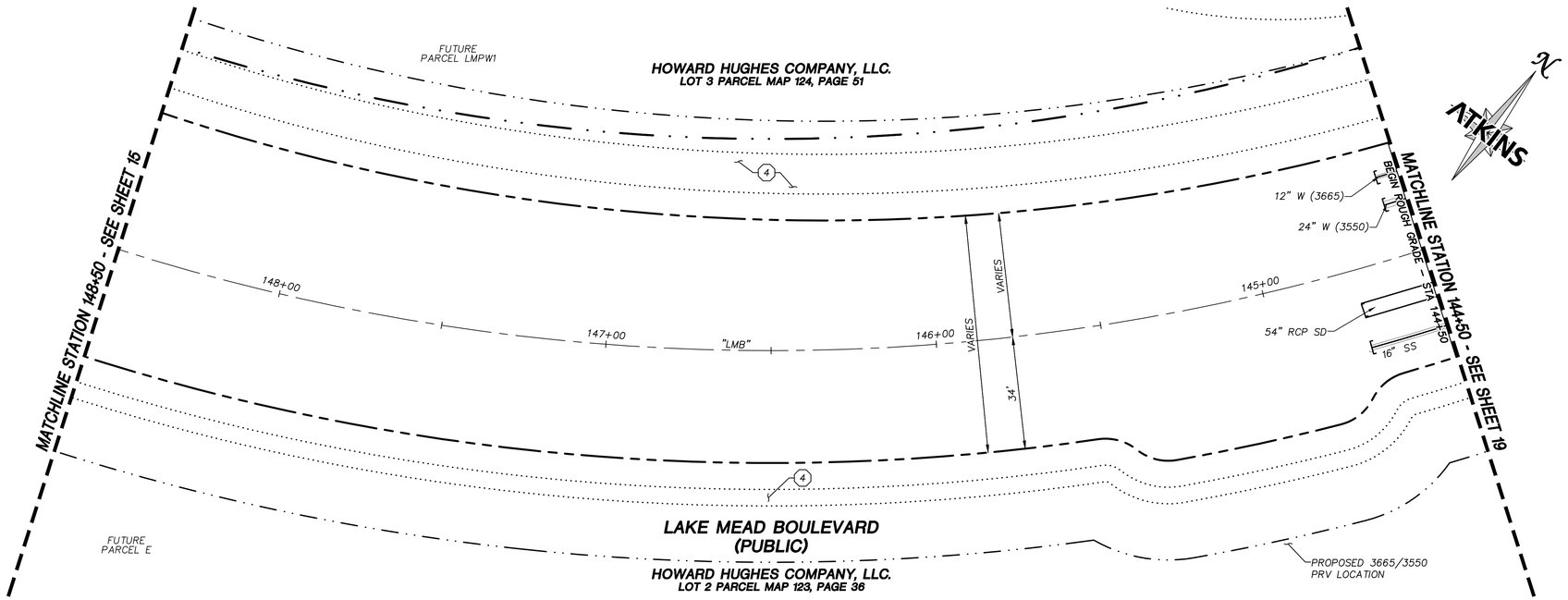
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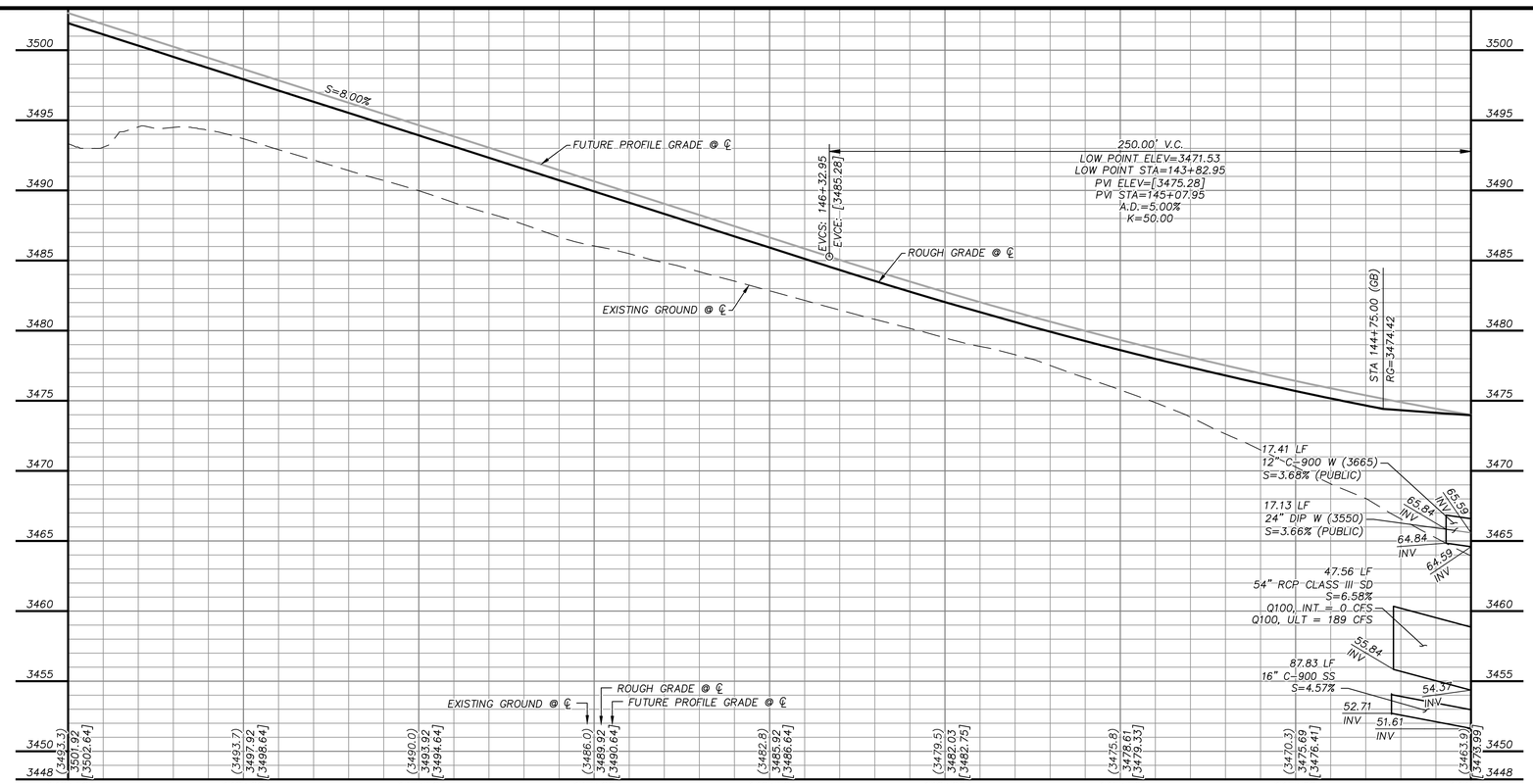
ROADWAY GRADING PLAN
STA. 144+50 TO STA. 148+50

JOB NO.	100060653
DATE:	JULY, 2019
DRAWING NO.	16/66
DESIGNED BY:	N. BARCOS
DRAWN BY:	L. MAMACLAY
CHECKED BY:	P. BATES
HORIZ.:	1"=20'
VERT.:	NONE

CLV

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 16 Jul 15, 2019 - 4:11PM





GRAPHIC SCALE

HORIZONTAL: 1"=20'

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

SEWER CONSTRUCTION NOTES

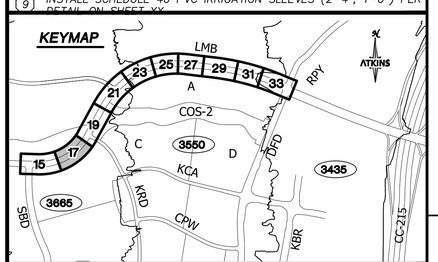
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
5. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
6. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE #31
7. INSTALL 22.5° HORIZONTAL BEND PER UDACS PLATE #31
8. INSTALL IN-LINE REDUCER PER UDACS PLATE #30
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.
11. INSTALL AIR VALVE ASSEMBLY AND VALVE BOX PER UDACS PLATES #38 AND #39

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 PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



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

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOUNDATIONS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

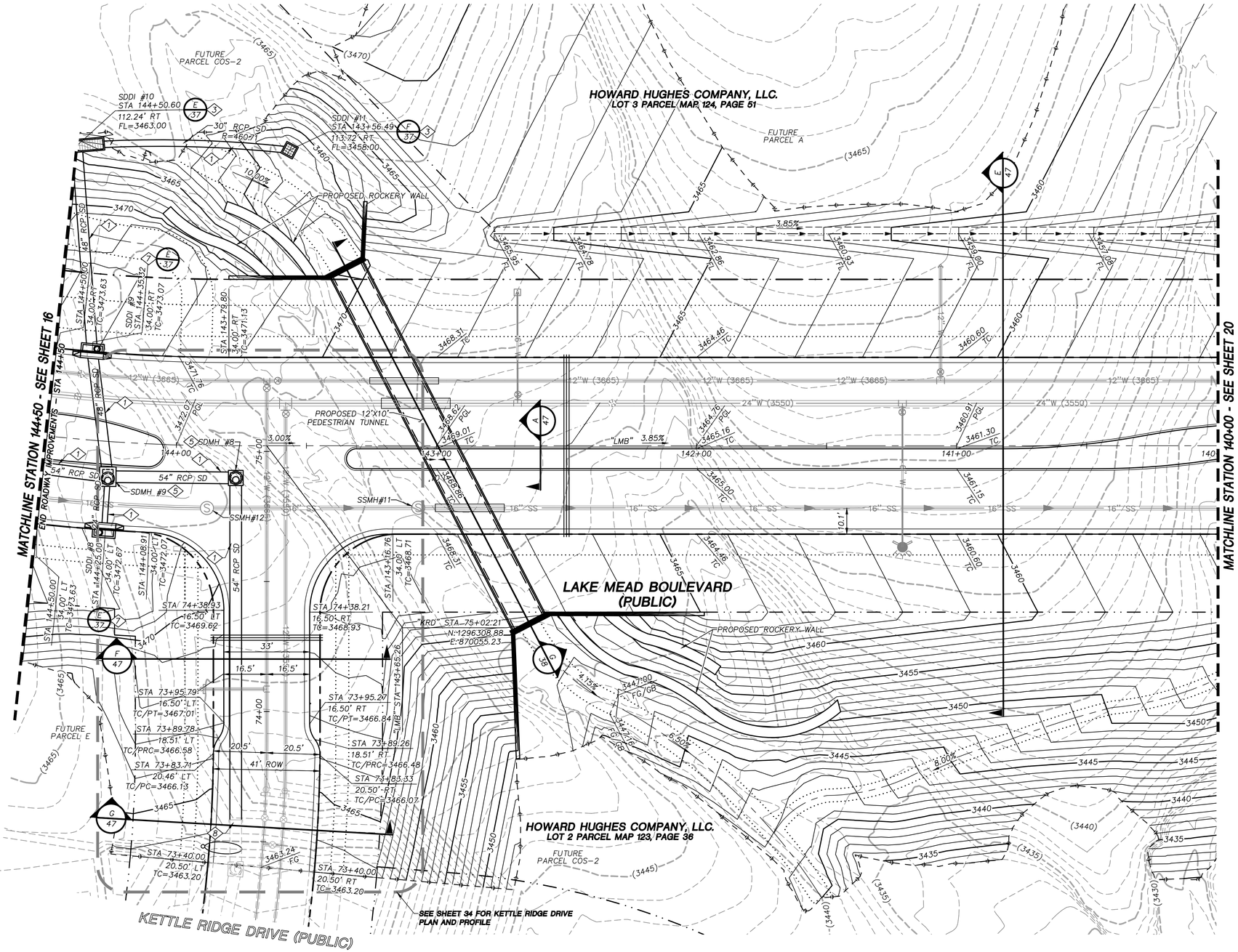
ROADWAY PLAN AND PROFILE
STA 144+50 TO STA 148+50

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 17/66

CLV

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 17 Jul 15, 2019 - 6:56PM



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 REGIONAL AND ARTERIAL SYSTEMS OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES WITH CONTROL Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES WITH EQUIPMENT CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

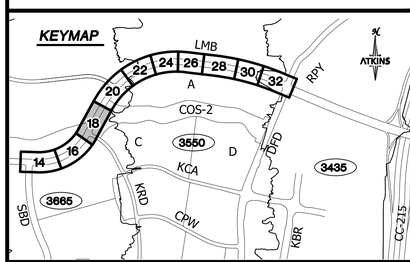
STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

KEYMAP



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.

PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL A. BATES
No. 18723
CIVIL
7/15/19

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

SUMMERLIN

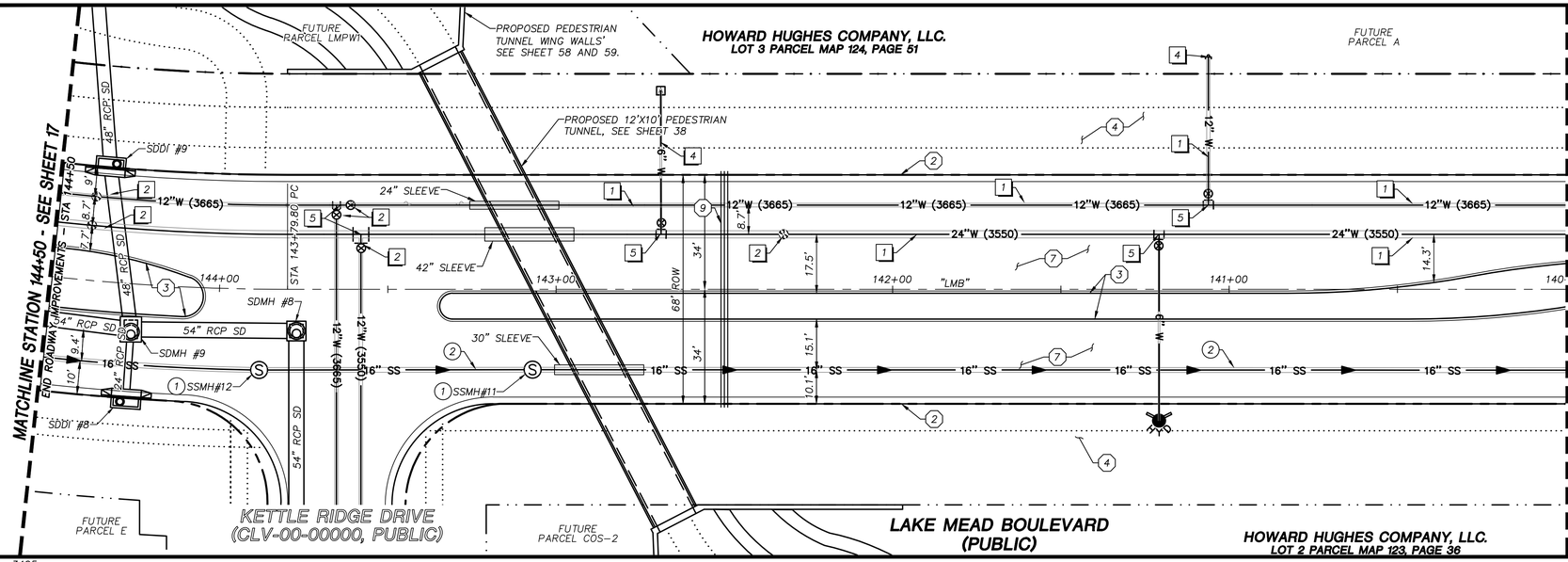
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

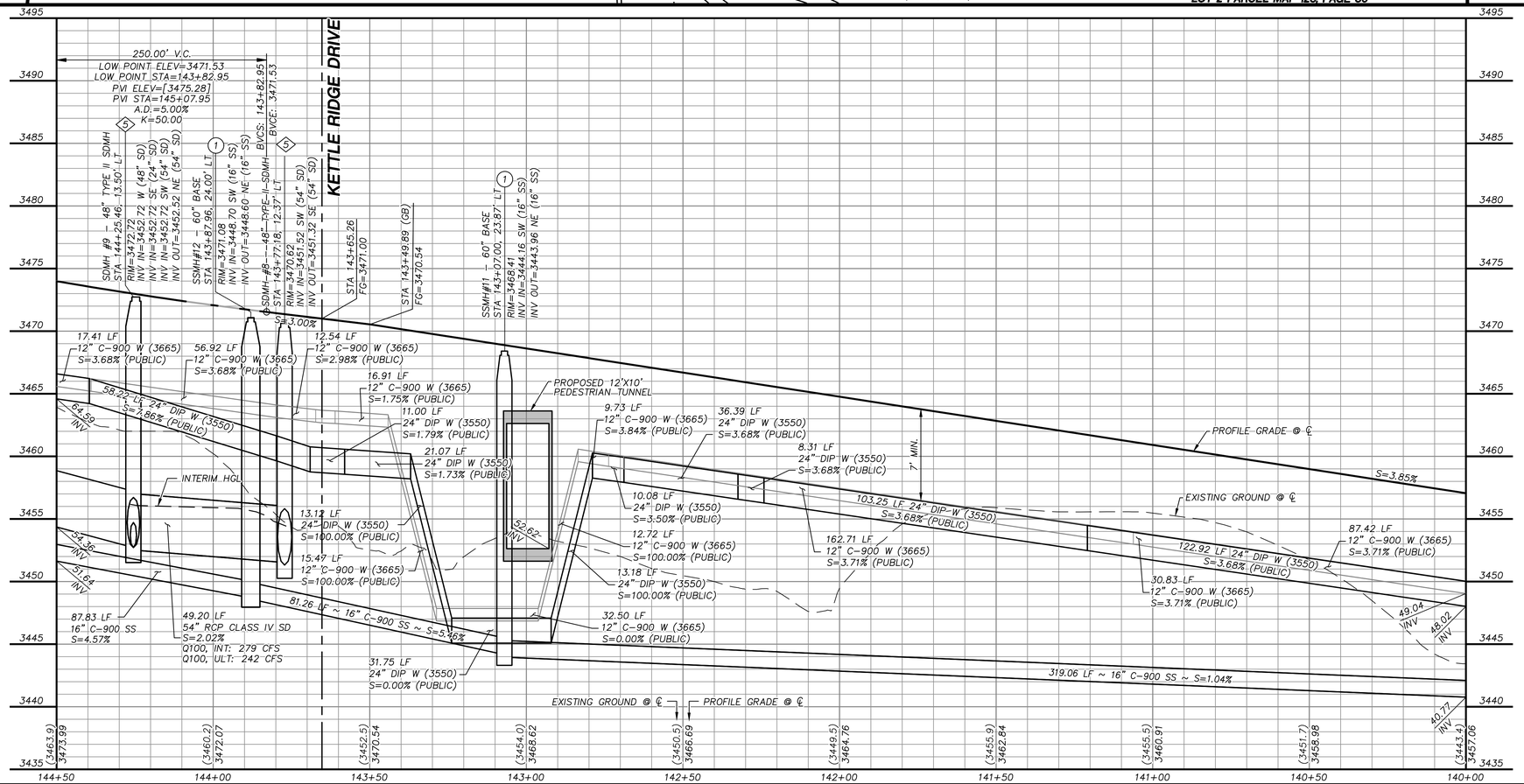
ROADWAY GRADING PLAN
STA 140+00 TO STA 144+50

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 18/66
CLV

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 18 Jul 15, 2019 - 4:12PM





STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406
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9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

SEWER CONSTRUCTION NOTES

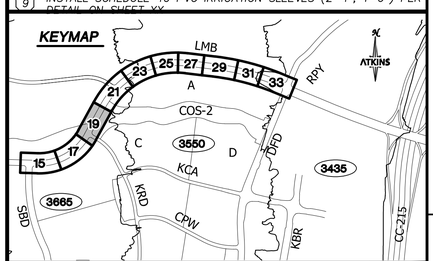
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
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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 PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



REVISIONS			
REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY PLAN AND PROFILE
STA 140+00 TO STA 144+50

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICE MANAGER DATE
PROJECT NO. 136107 FIRST APPROVED DATE: _____
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL
(FIRE FLOW IS FOR OFFSITE IMPROVEMENTS ONLY)

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 EMERGENCY AND NOTIFICATION SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-642-2444

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

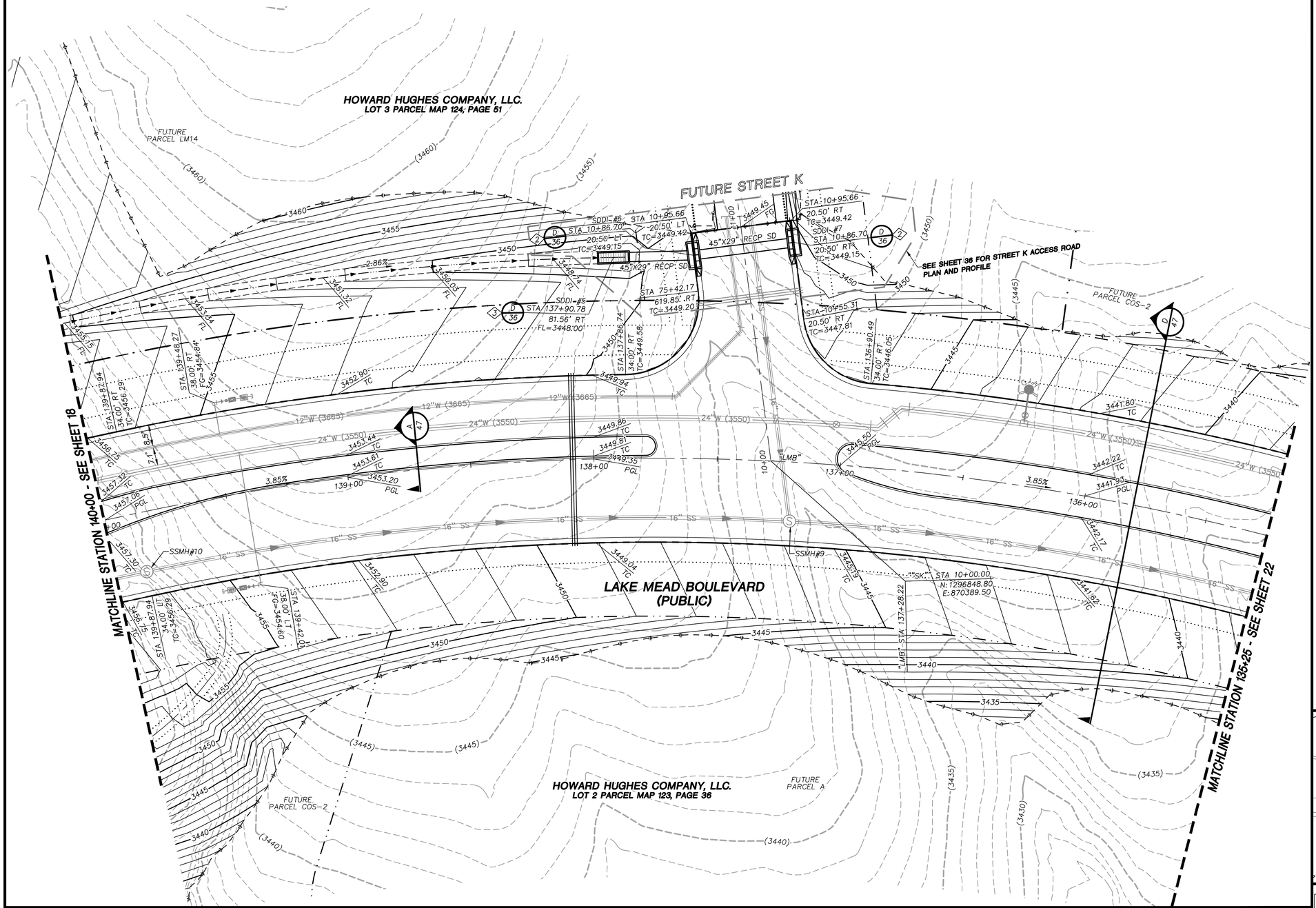
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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 19/66
CLV

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 19 Jul 15, 2019 - 6:57PM



STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
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11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPROVAL

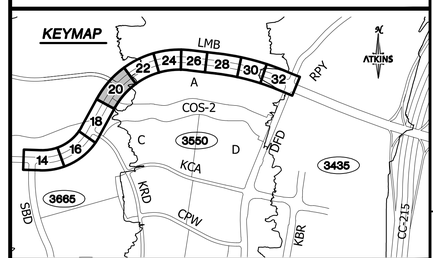
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY GRADING PLAN
STA. 135+25 TO STA. 140+00

KEYMAP



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

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

FAST Call before you UnderGround 1-702-432-5300 REGIONAL AND NATIONAL SYSTEMS OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COURTLY. Call 811 OR 1-800-642-2444

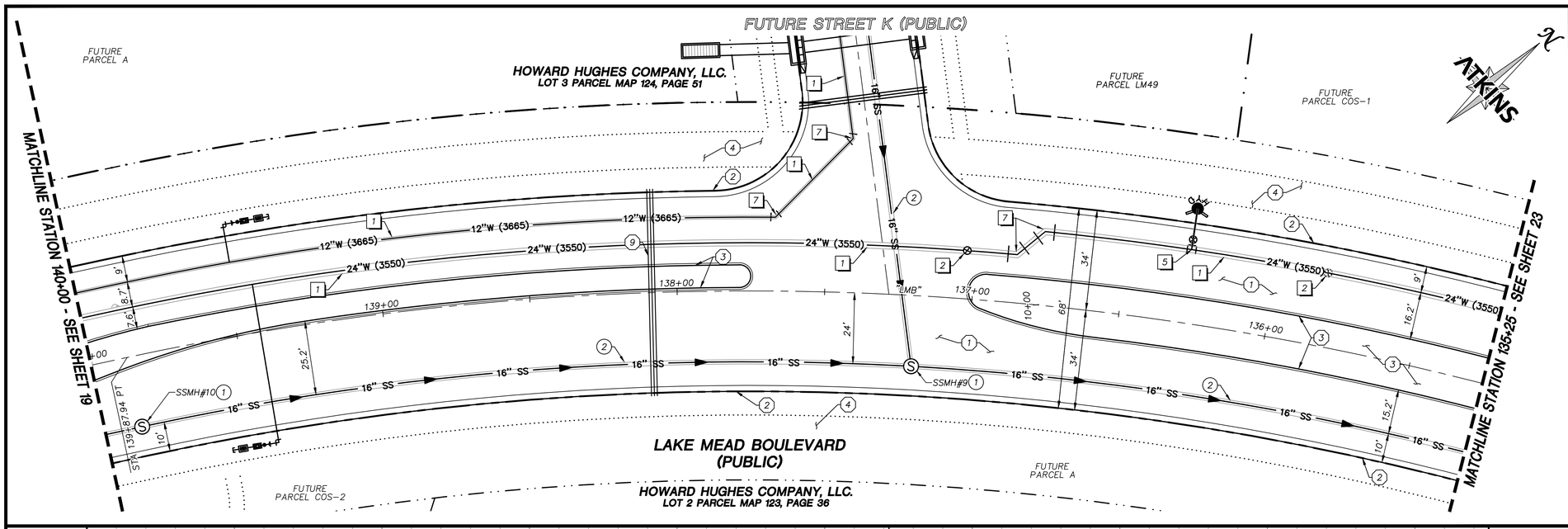
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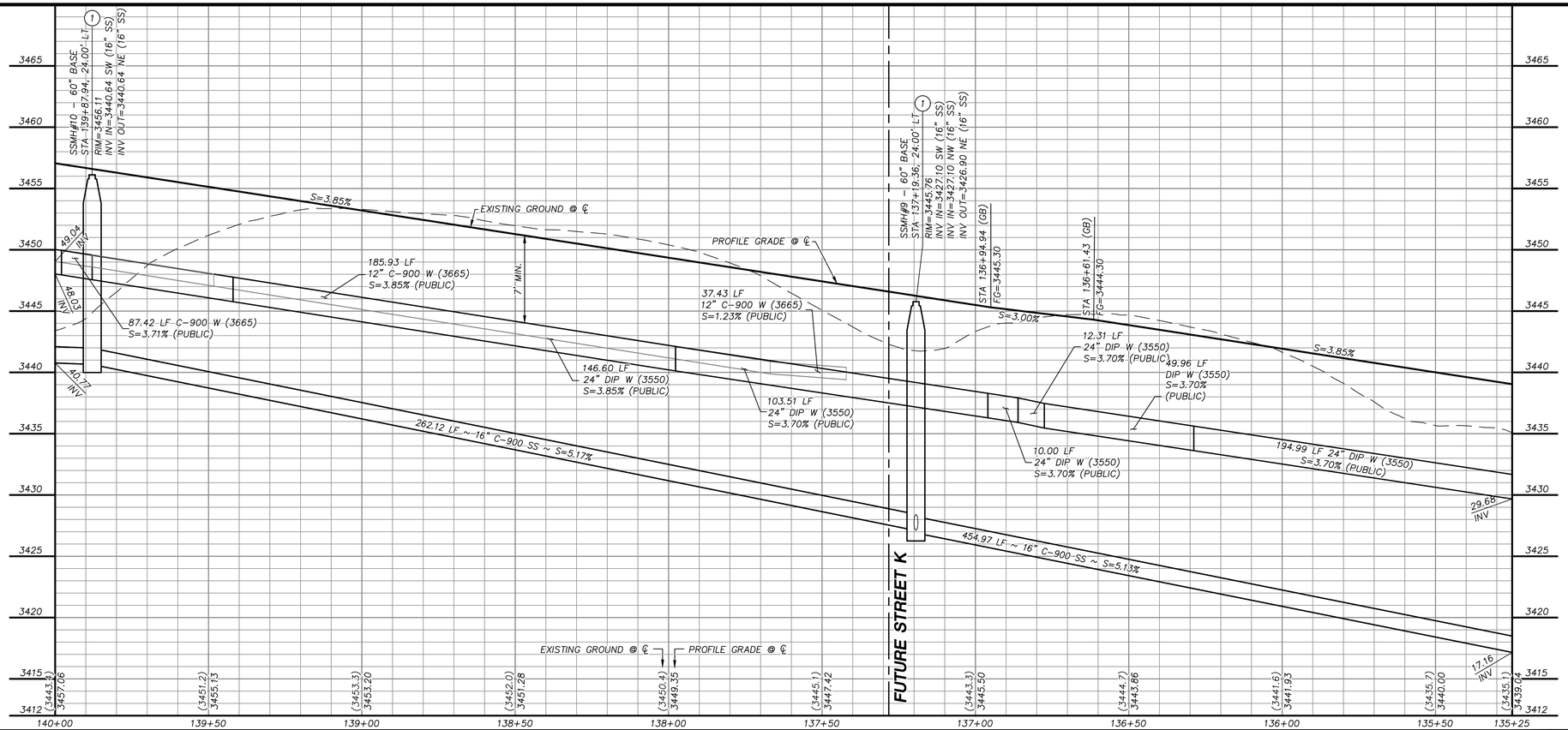
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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL S. BATES
No. 18723
CIVIL
7/15/19

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 20/66
CLV
DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

X:\Projects\SummerWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 20 Jul 15, 2019 - 4:12PM





GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICE MANAGER DATE
PROJECT NO. 136107 FIRST APPROVED DATE: _____
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL
(FIRE FLOW IS FOR OFFSITE IMPROVEMENTS ONLY)

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

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NAVD88 ELEVATION: 989.574 METERS
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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

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

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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SEWER CONSTRUCTION NOTES

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4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

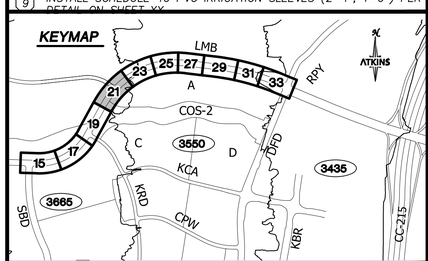
WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
5. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
6. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE #31
7. INSTALL 22.5° HORIZONTAL BEND PER UDACS PLATE #31
8. INSTALL IN-LINE REDUCER PER UDACS PLATE #30
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.
11. INSTALL AIR VALVE ASSEMBLY AND VALVE BOX PER UDACS PLATES #38 AND #39

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 PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX

KEYMAP



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.

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOUNDATIONS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

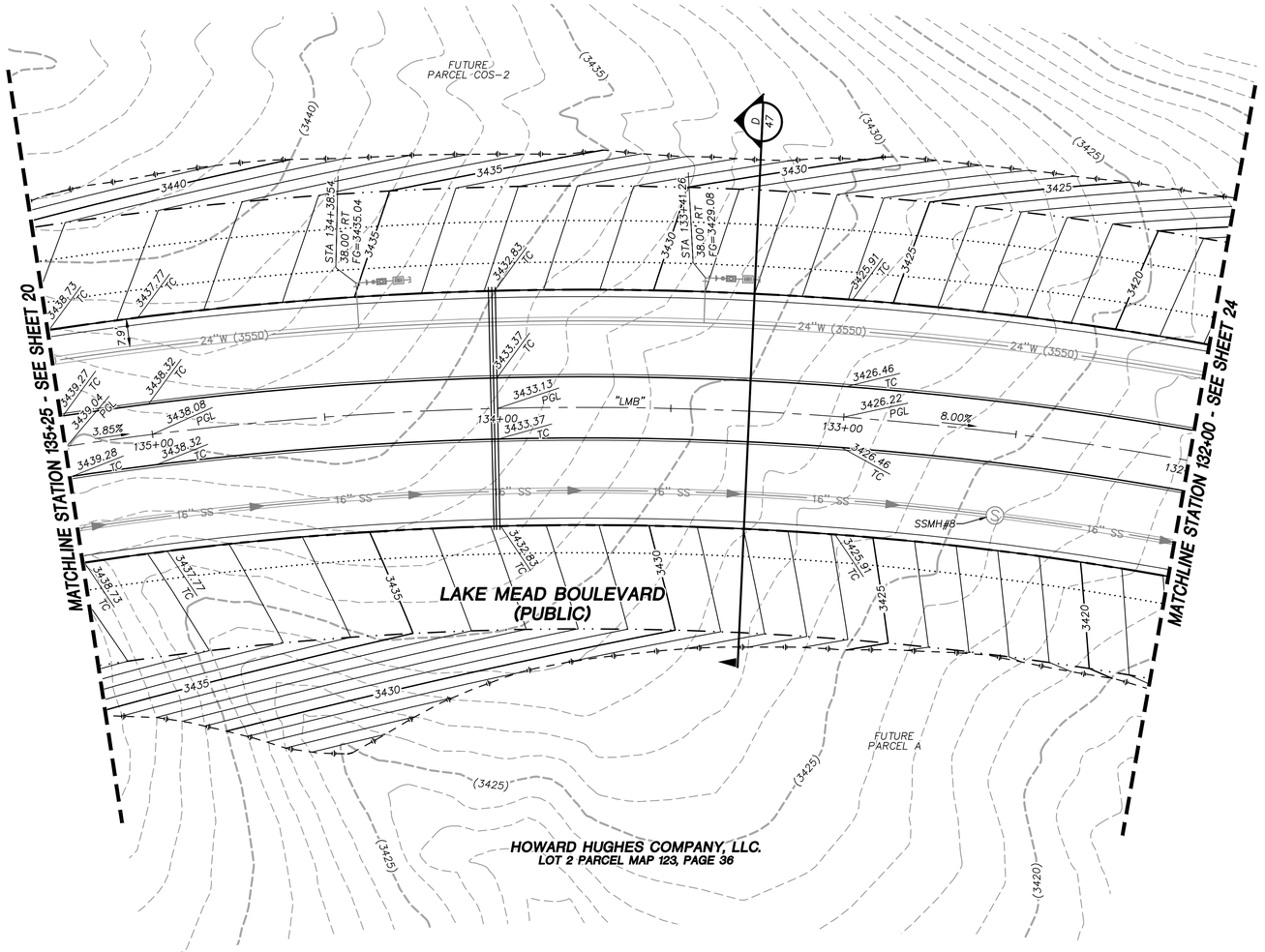
ROADWAY PLAN AND PROFILE
STA. 135+25 TO STA. 140+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 21/66

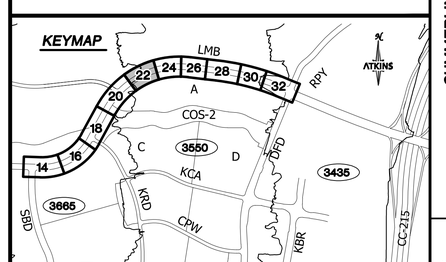
CLV

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 21 Jul 15, 2019 - 4:13PM



STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING, HITTING OR DAMAGING UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 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.

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL BATES No. 18723 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

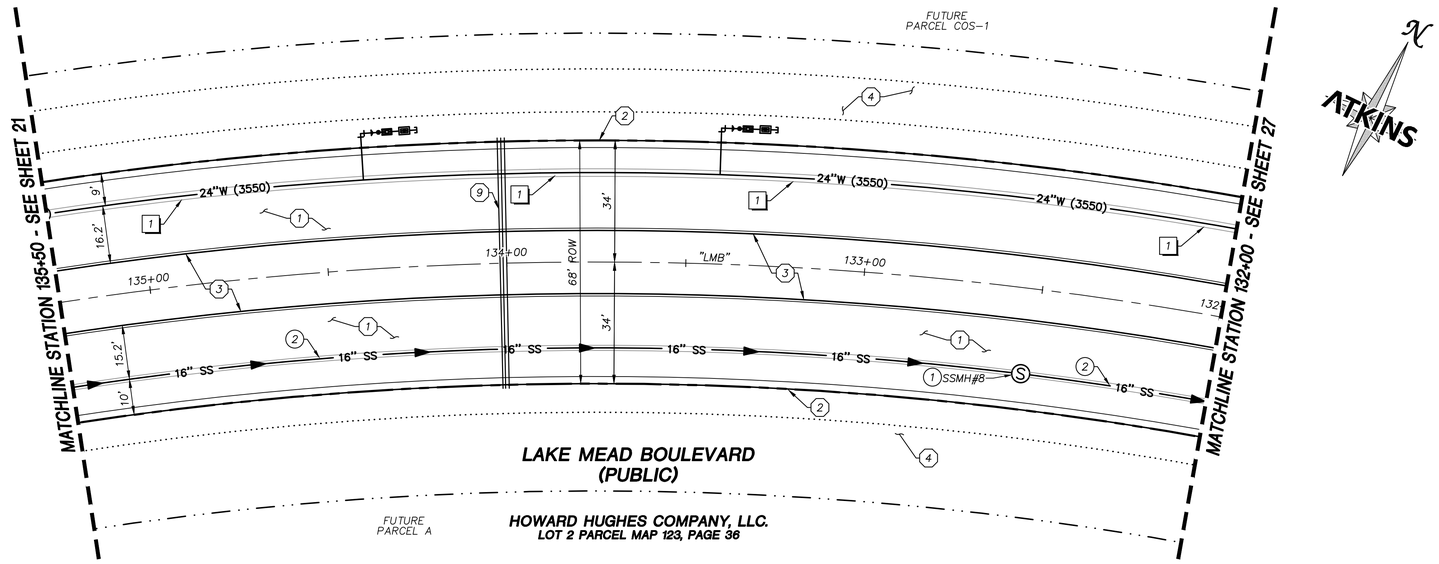
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET M)

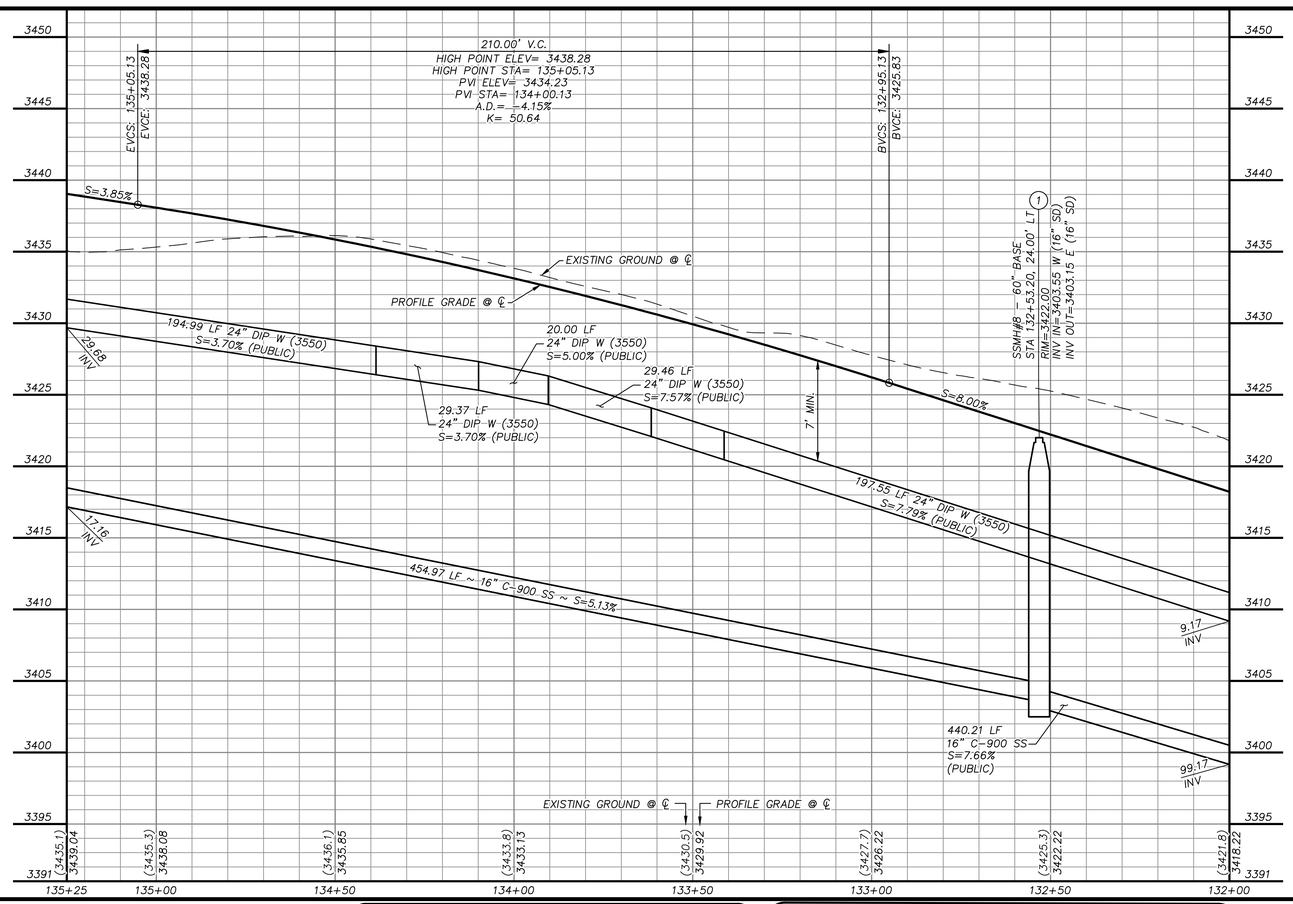
ROADWAY GRADING PLAN
STA. 132+00 TO STA. 135+25

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 22/66
CLV

K:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 22 Jul 15, 2019 - 4:13PM





GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICE MANAGER DATE
PROJECT NO. 136107 FIRST APPROVED DATE: _____
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL
(FIRE FLOW IS FOR OFFSITE IMPROVEMENTS ONLY)

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 (LOCATION AND NOTIFICATION SYSTEM OF UTILITIES)

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

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

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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
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9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

SEWER CONSTRUCTION NOTES

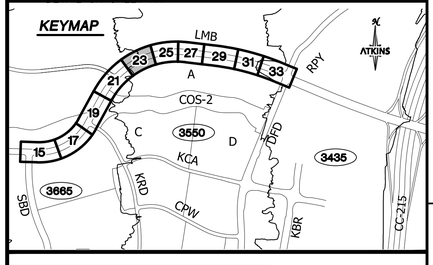
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
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7. INSTALL 22.5° HORIZONTAL BEND PER UDACS PLATE #31
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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 PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



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

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL M. BATES 23 M 18725 CIVIL No. 18725

7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

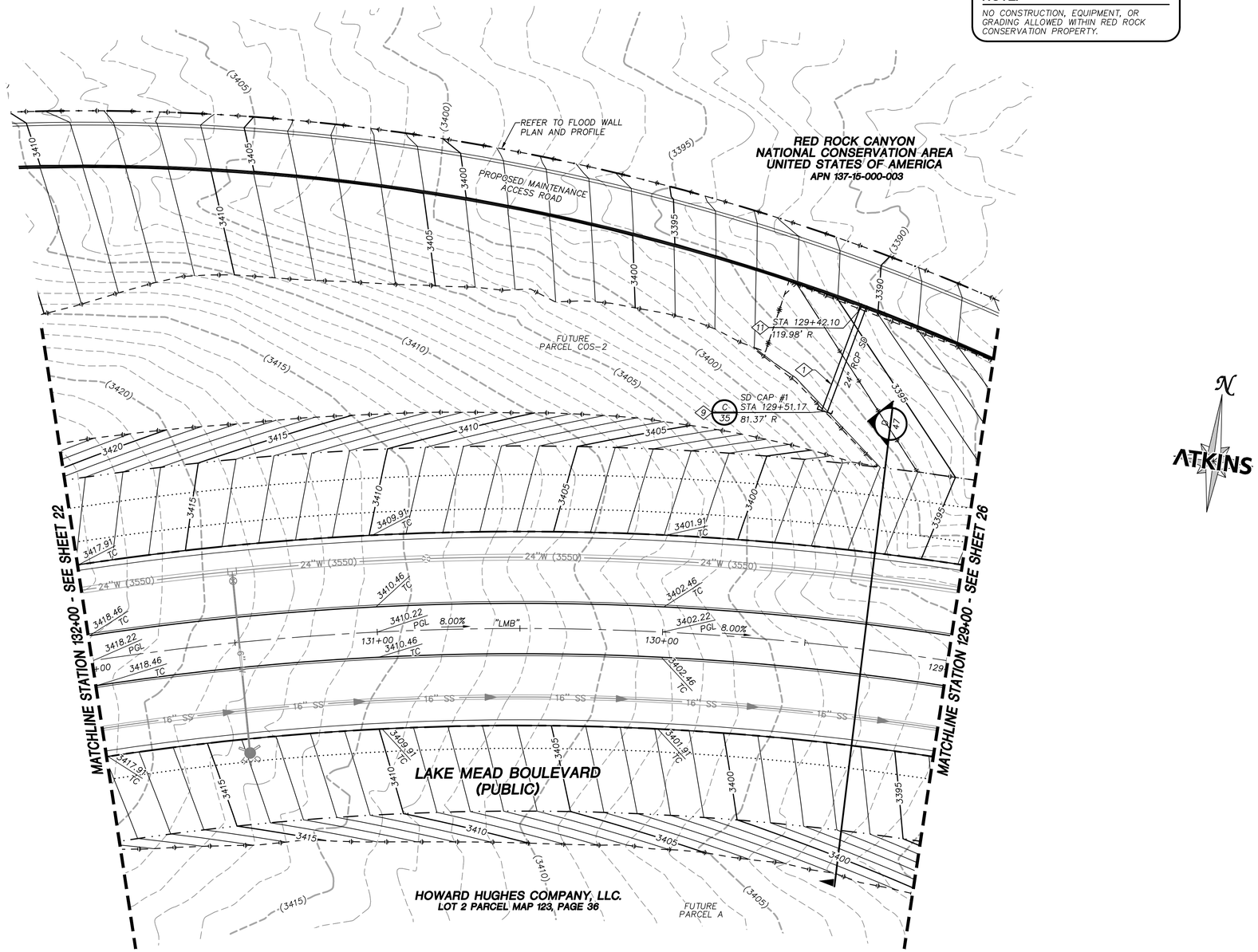
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY PLAN AND PROFILE
STA. 132+00 TO STA. 135+50

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 23/66
CLV

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 23 Jul 15, 2019 - 4:13PM



STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403
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9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPROVAL

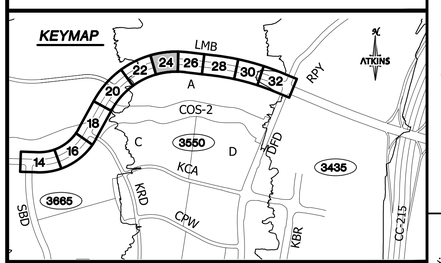
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY GRADING PLAN
STA. 129+00 TO STA. 132+00

KEYMAP



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 (FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION)

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-642-2444

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

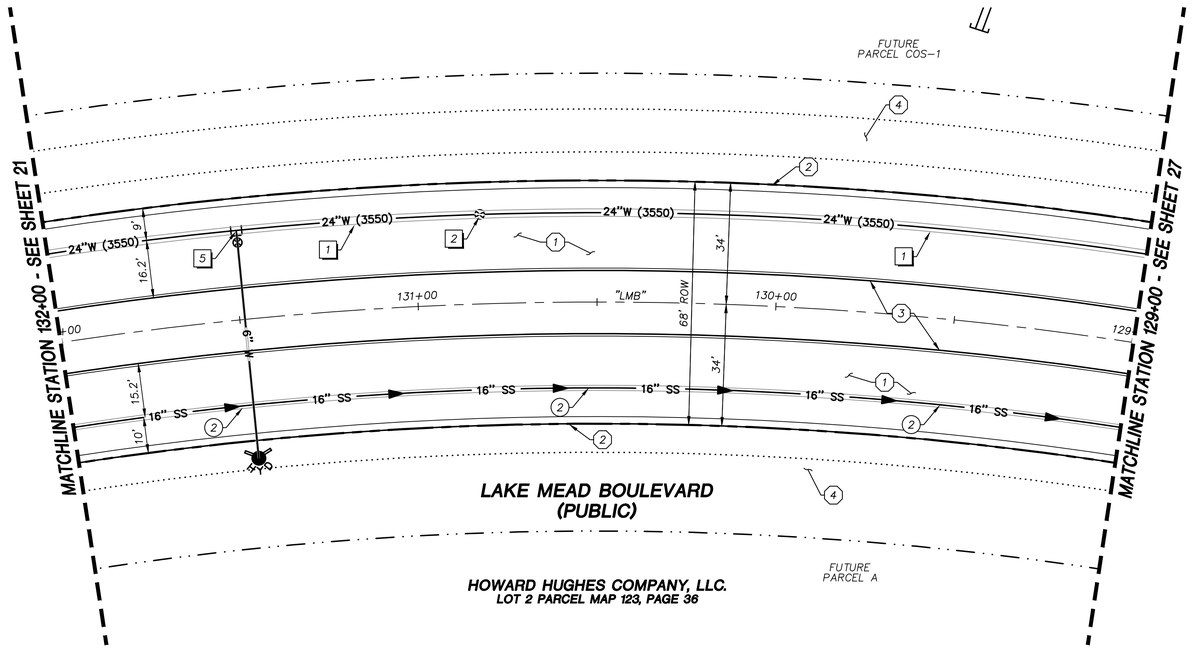
UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER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

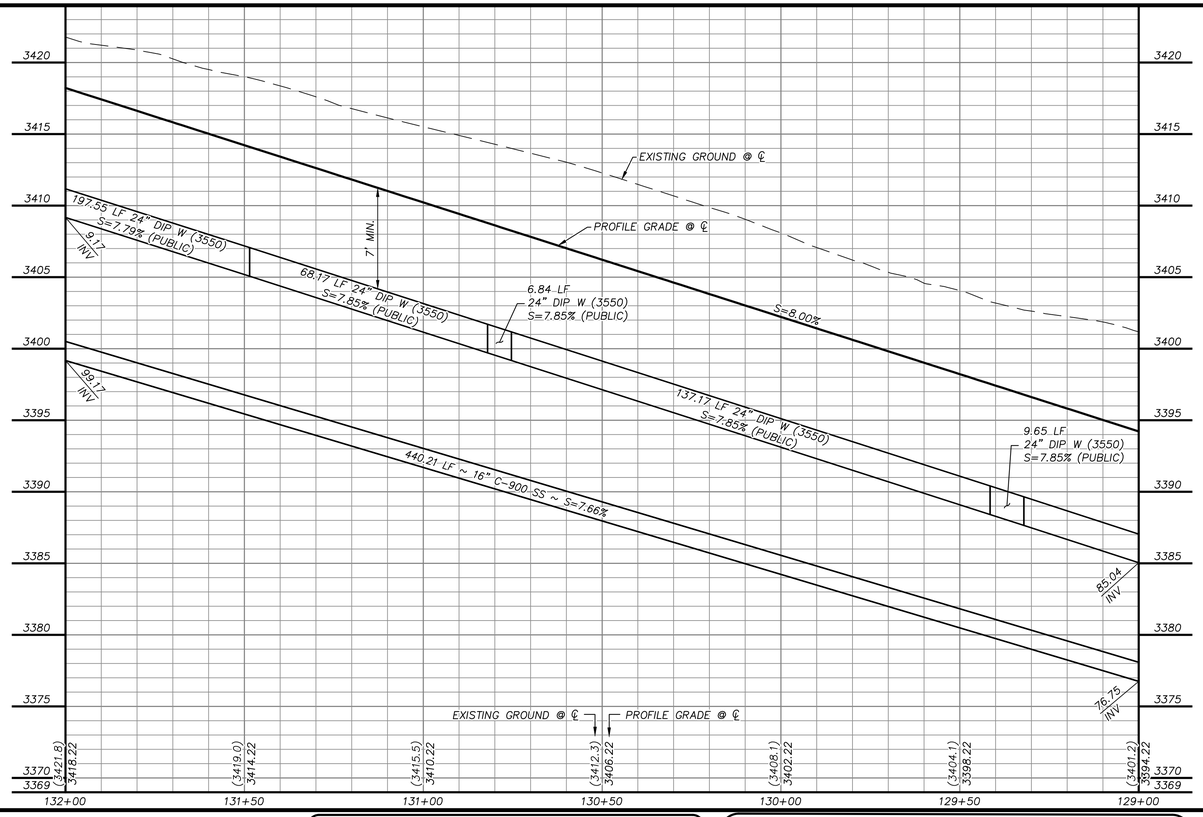
PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A. BATES
No. 18723
CIVIL
7/15/19

JOB NO.	100060653
DATE:	JULY, 2019
DRAWING NO.	24/66
DESIGNED BY:	N. BARCOS
DRAWN BY:	L. MAMACLAY
CHECKED BY:	P. BATES
HORIZ.:	1"=20'
VERT.:	NONE

CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 24 Jul 15, 2019 - 4:14PM





GRAPHIC SCALE

HORIZONTAL: 1"=20'

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICE MANAGER — DATE

PROJECT NO. 136107 FIRST APPROVED DATE: ——

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

(FIRE FLOW IS FOR OFFSITE IMPROVEMENTS ONLY)

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 EMERGENCY AND ARTERIAL SYSTEMS OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-642-2444

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

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

SEWER CONSTRUCTION NOTES

1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

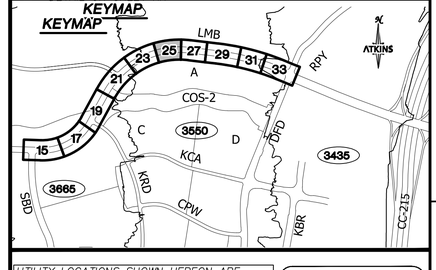
WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
5. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
6. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE #31
7. INSTALL 22.5° HORIZONTAL BEND PER UDACS PLATE #31
8. INSTALL IN-LINE REDUCER PER UDACS PLATE #30
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.
11. INSTALL AIR VALVE ASSEMBLY AND VALVE BOX PER UDACS PLATES #38 AND #39

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 PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX

KEYMAP



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.

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A BATES Exp. 12-31-20 CIVIL No. 18723

7/15/19

REVISIONS			
REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

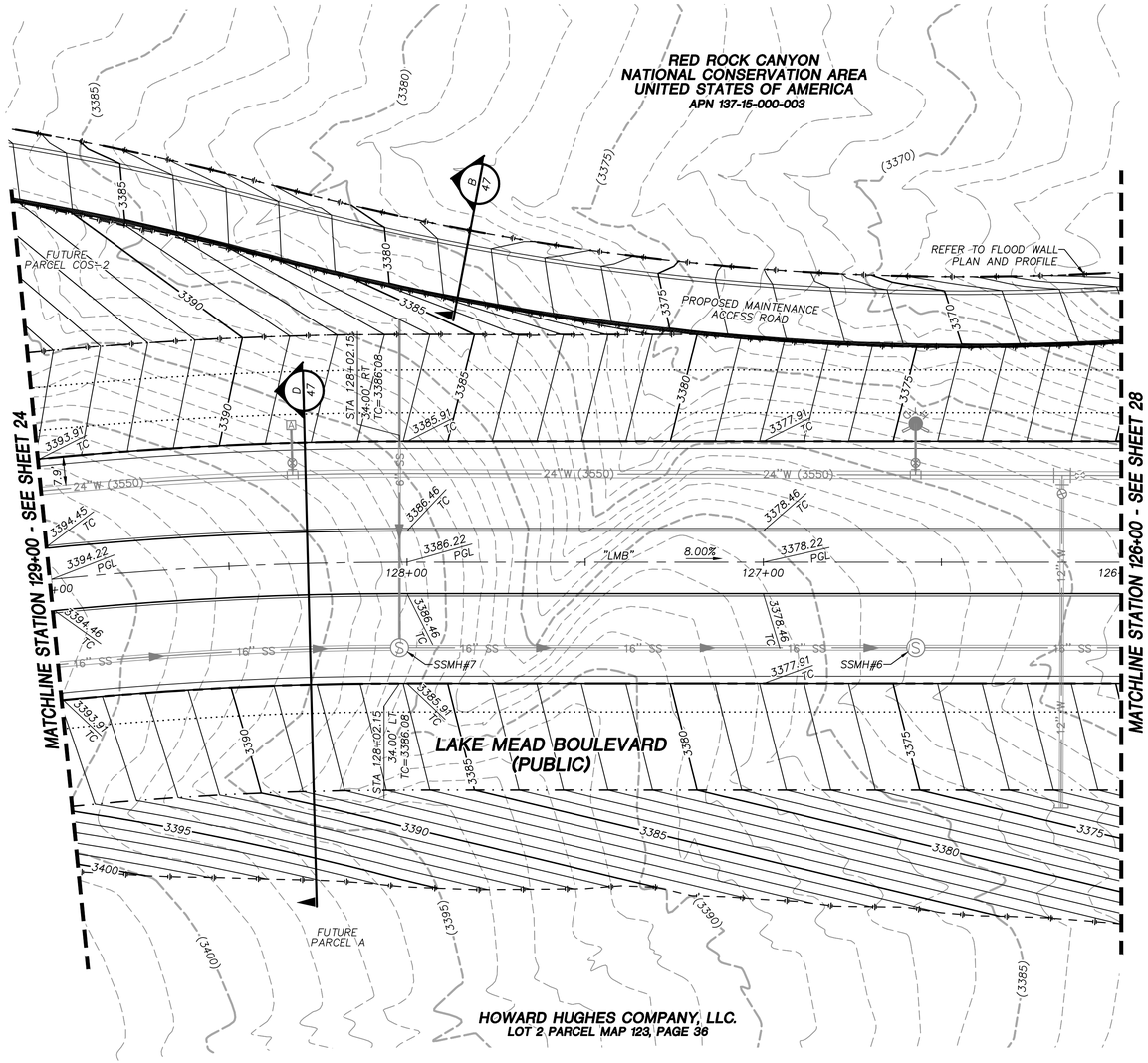
ROADWAY PLAN AND PROFILE
STA. 129+00 TO STA. 132+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 25/66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 25 Jul 15, 2019 - 4:14PM

NOTE:
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FEDERALLY AND NATIONAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID BURIED UTILITIES AND AVOID OVERHEAD UTILITY LINES. IT'S COURTLY. Call 811 or 1-800-642-2444

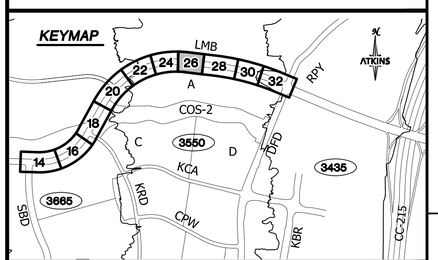
AVOID HITTING OVERHEAD POWER LINES. IT'S COURTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL



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.

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES 07-15-19 CIVIL No. 18723
7/15/19

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

SUMMERLIN

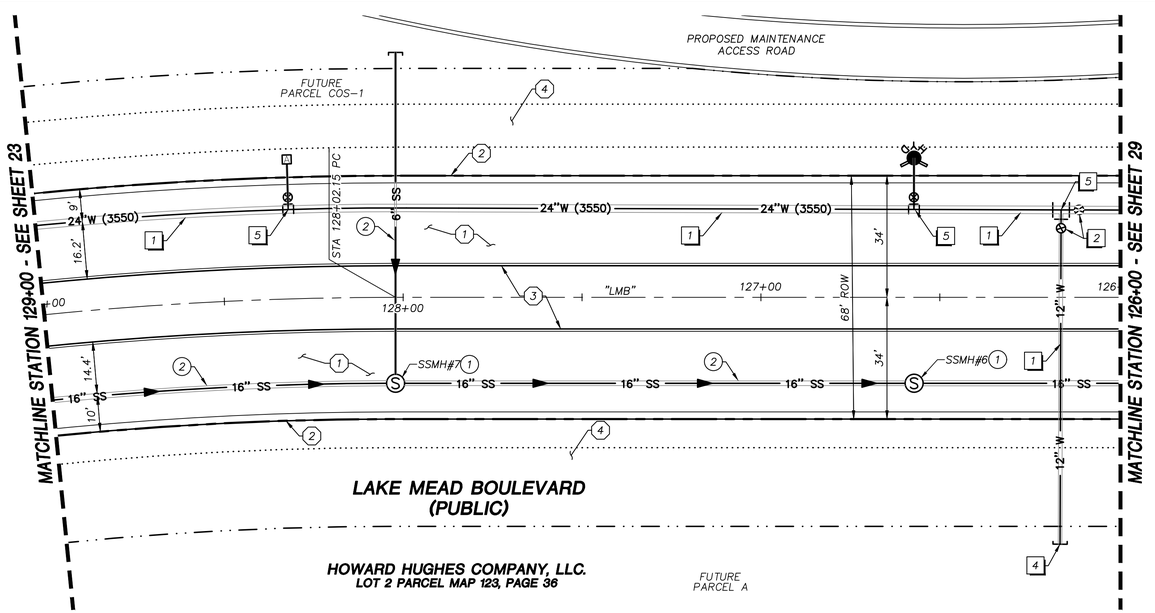
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

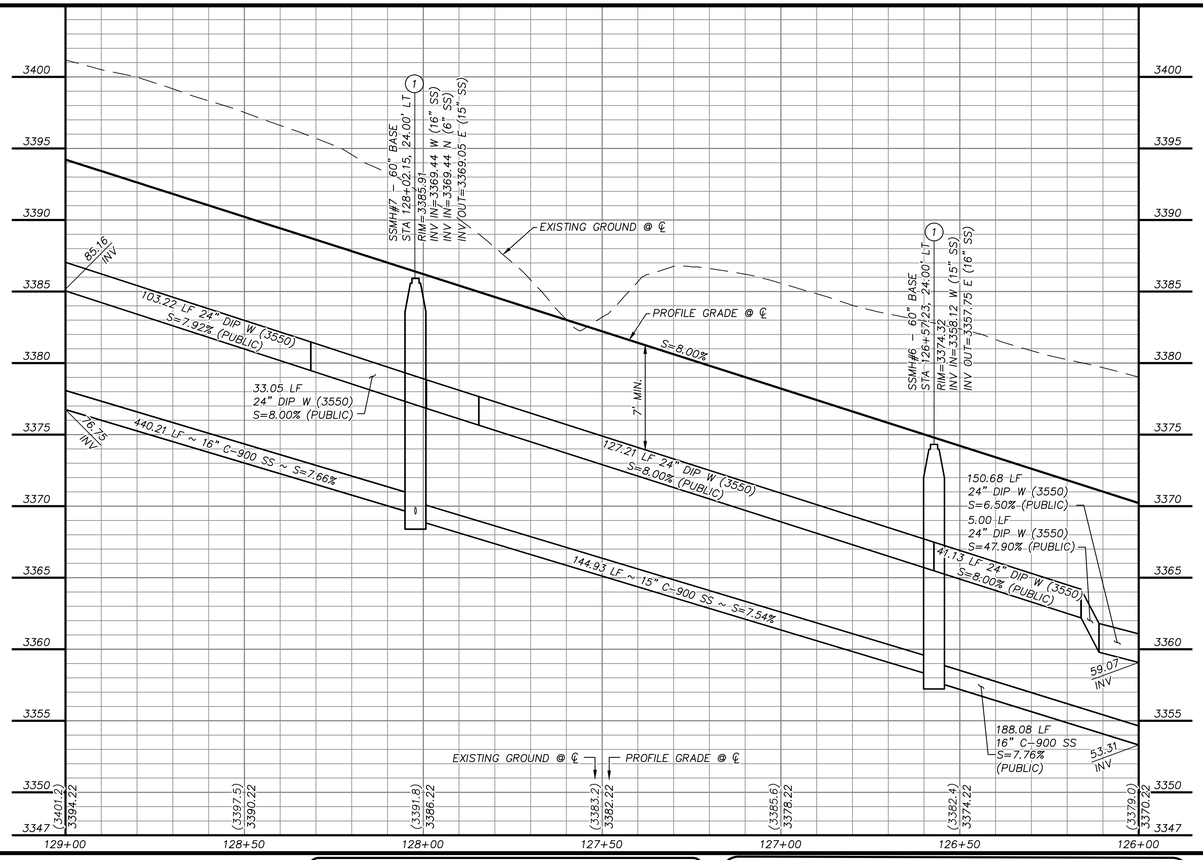
ROADWAY GRADING PLAN
STA. 126+00 TO STA. 129+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 26/66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-GI.dwg LAYOUT: 26 Jul 15, 2019 - 4:14PM





STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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10. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

SEWER CONSTRUCTION NOTES

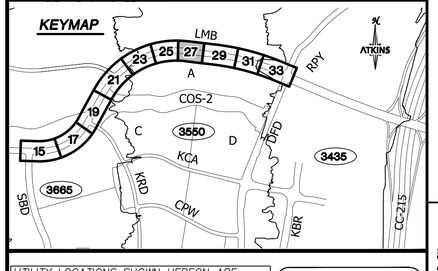
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
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2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
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7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICE MANAGER DATE
PROJECT NO. 136107 FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL
(FIRE FLOW IS FOR OFFSITE IMPROVEMENTS ONLY)

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 EMERGENCY AND ARTERIAL SYSTEMS OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-642-2444

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

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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A BATES No. 18723 CIVIL
7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY PLAN AND PROFILE
STA. 126+00 TO STA. 129+00

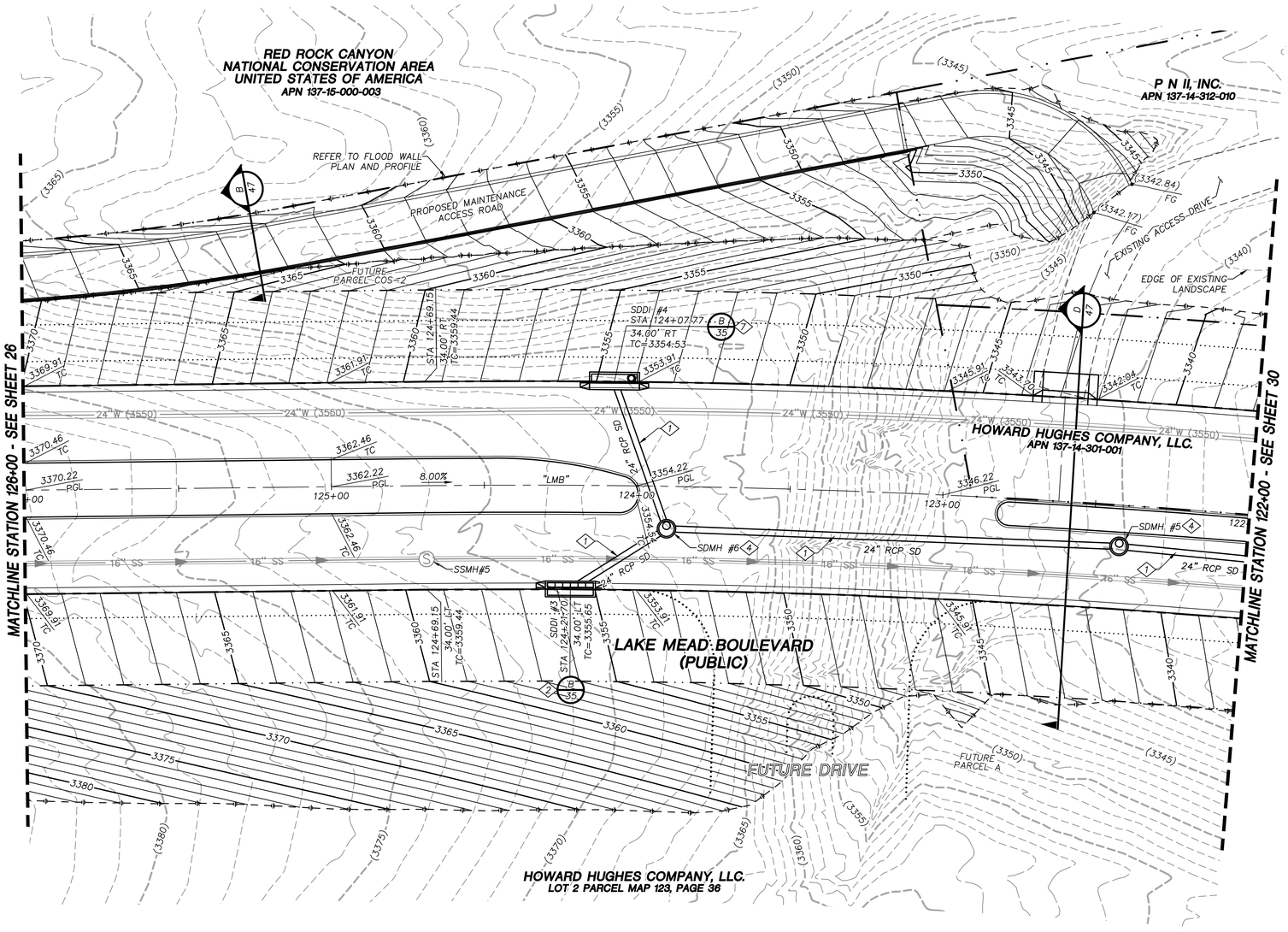
DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 27/66

CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 27 Jul 15, 2019 - 4:14PM

NOTE:
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COURTLY. Call 811 OR 1-800-642-2444

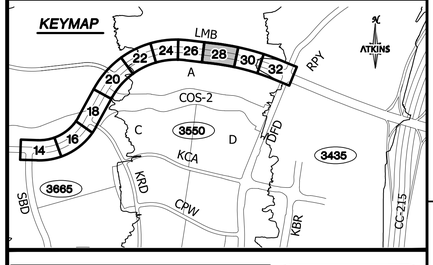
AVOID HITTING OVERHEAD POWER LINES. IT'S COURTLY. CALL BEFORE YOU DO OVERHEAD. 1-702-227-2929

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
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11. OUTLET STORM DRAIN PIPE AT WALL FACE
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REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL



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PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL BATES
No. 18723
CIVIL
7/15/19

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

SUMMERLIN

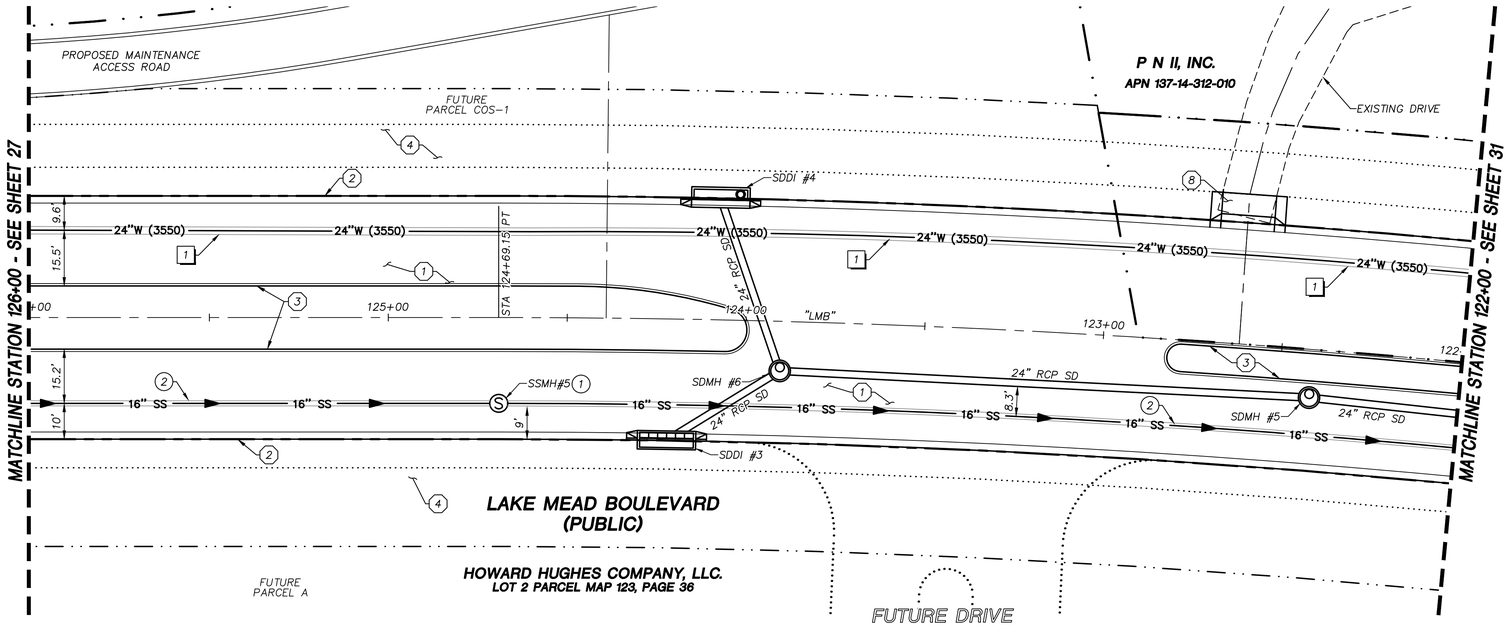
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET M)

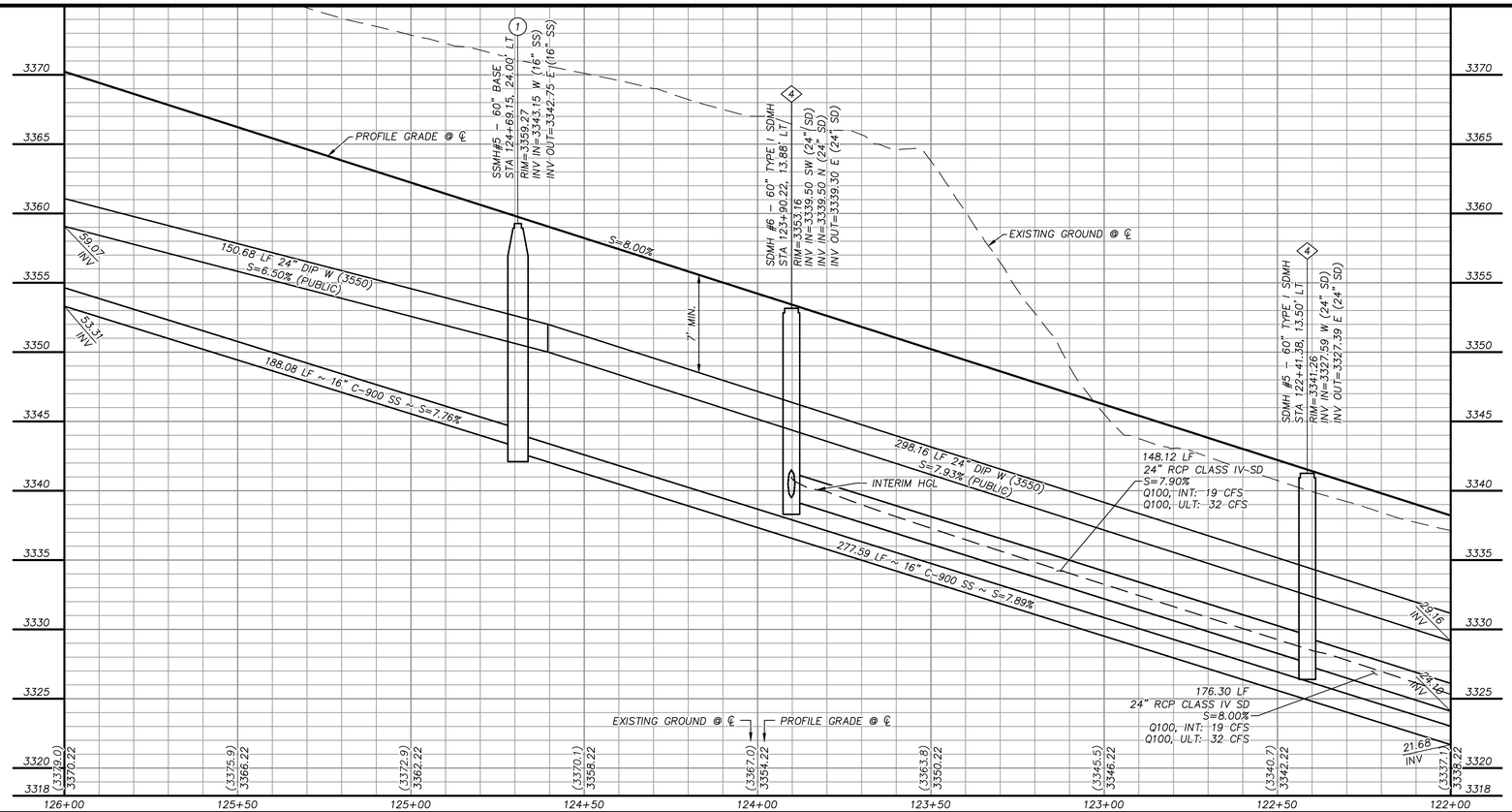
ROADWAY GRADING PLAN
STA. 122+00 TO STA. 126+00

JOB NO.	100060653
DATE:	JULY, 2019
DESIGNED BY:	N. BARCOS
DRAWN BY:	L. MAMACLAY
CHECKED BY:	P. BATES
HORIZ.:	1"=20'
VERT.:	NONE
DRAWING NO.	26/66

CLV

K:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 28 Jul 15, 2019 - 4:15PM





STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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SEWER CONSTRUCTION NOTES

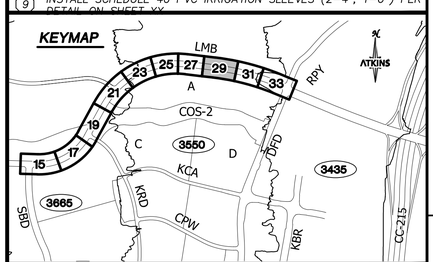
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
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3. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD #219
4. FUTURE SIDEWALK BY OTHERS
5. CONSTRUCT CONCRETE SIDEWALK PER CCAUSD #234
6. CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5').
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICE MANAGER DATE
PROJECT NO. 136107 FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL
(FIRE FLOW IS FOR OFFSITE IMPROVEMENTS ONLY)

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FEDERALLY AND NATIONAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

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

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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

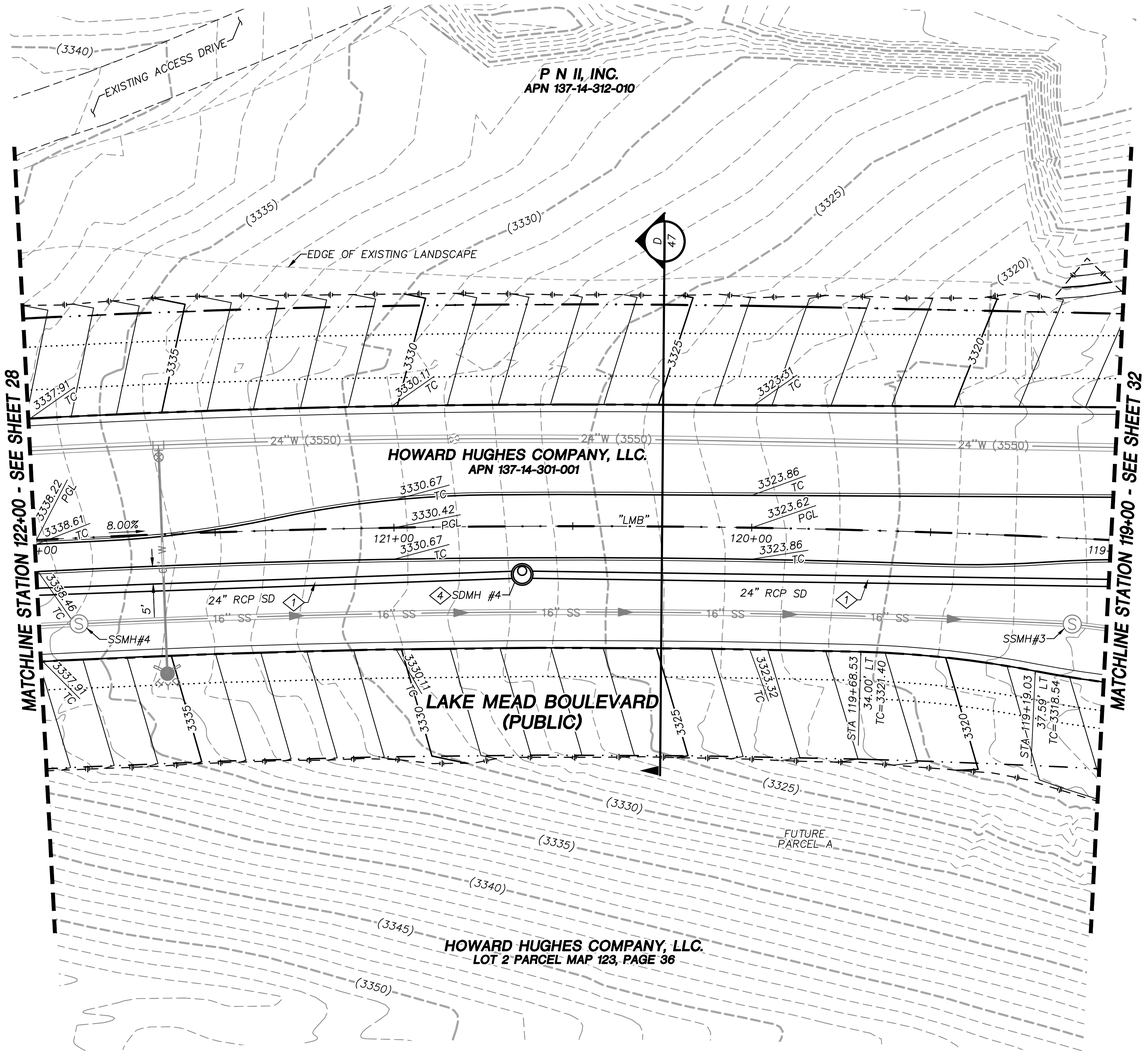
JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 29/66

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOUNDATIONS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY PLAN AND PROFILE
STA. 122+00 TO STA. 126+00

CLV

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 29 Jul 15, 2019 - 6:58PM



STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

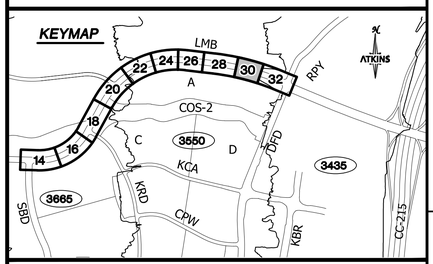
BENCHMARK

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-6300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES ITS QUICK & EASY Call 811 OR 1-800-642-2444

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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

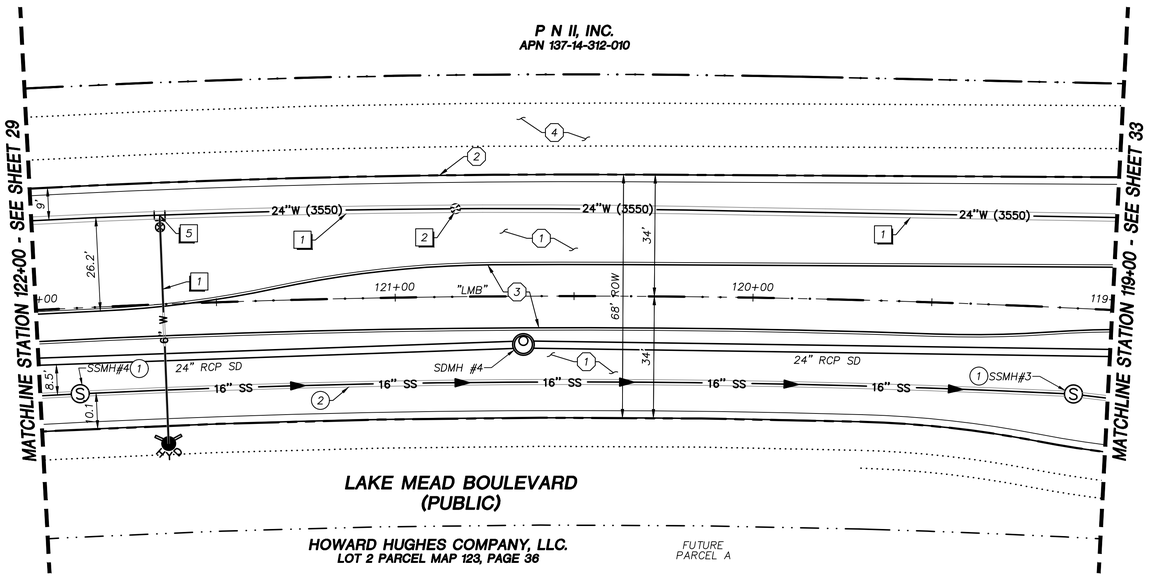
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

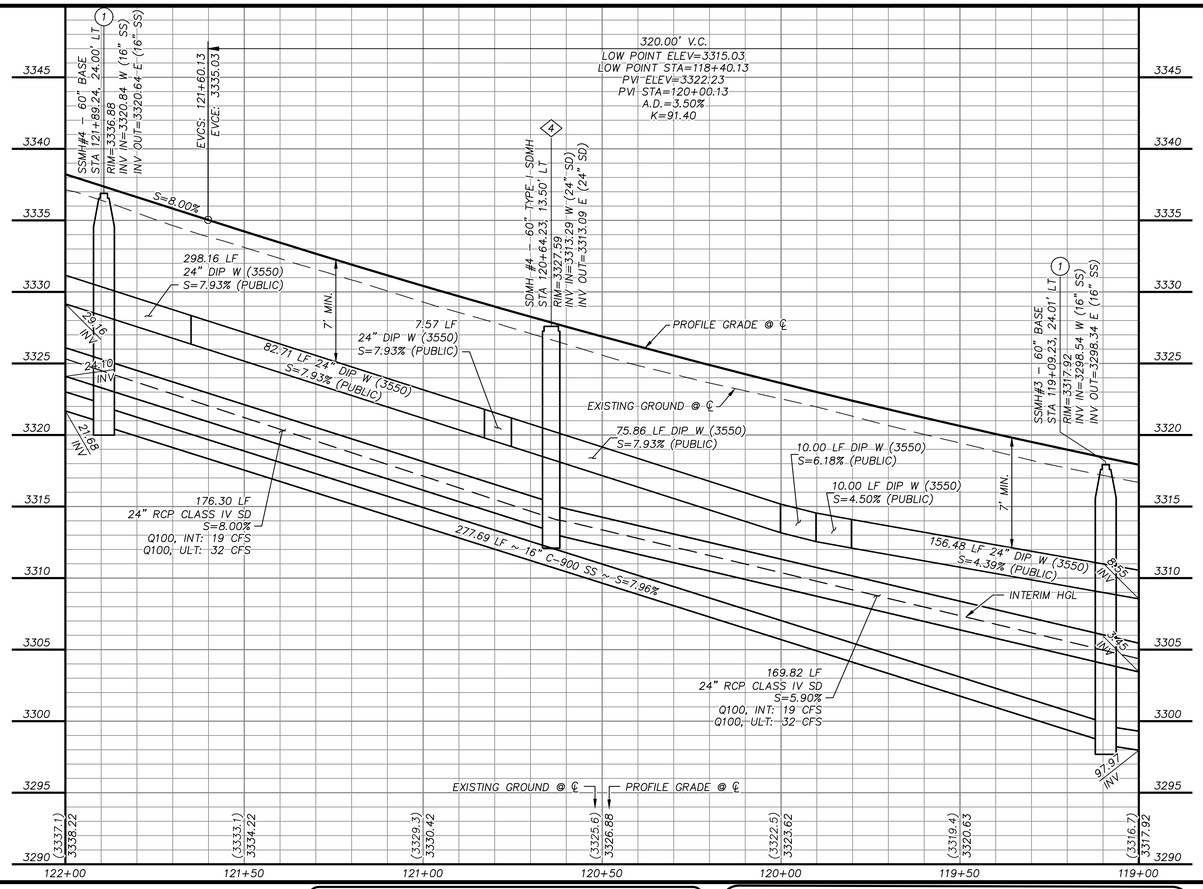
ROADWAY GRADING PLAN
STA. 119+00 TO STA. 122+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 30/66
CLV

X:\Projects\SummerlinWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 30 Jul 15, 2019 - 4:15PM





GRAPHIC SCALE

HORIZONTAL: 1"=20'

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICE MANAGER DATE
PROJECT NO. 136107 FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL
(FIRE FLOW IS FOR OFFSITE IMPROVEMENTS ONLY)

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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BENCHMARK

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T21S,R59E,S03

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STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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
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9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

SEWER CONSTRUCTION NOTES

1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

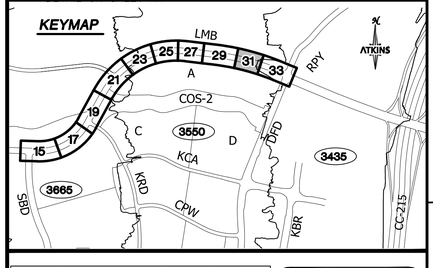
WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
5. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
6. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE #31
7. INSTALL 22.5° HORIZONTAL BEND PER UDACS PLATE #31
8. INSTALL IN-LINE REDUCER PER UDACS PLATE #30
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.
11. INSTALL AIR VALVE ASSEMBLY AND VALVE BOX PER UDACS PLATES #38 AND #39

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 PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX

KEYMAP



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.

PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

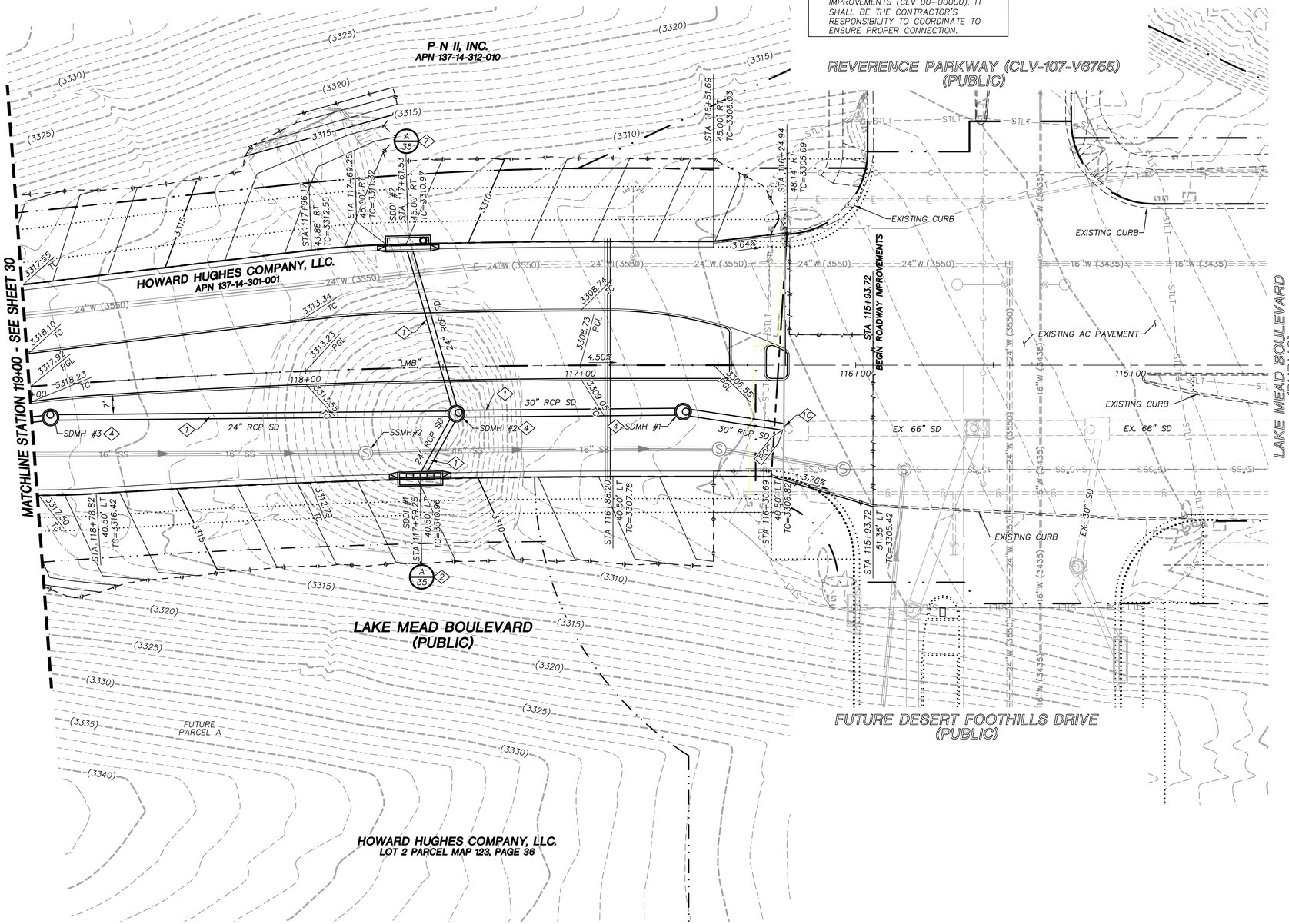
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY PLAN AND PROFILE
STA. 119+00 TO STA. 122+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 31/66
CLV

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 31 Jul 15, 2019 - 6:58PM



STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 REMOTELY AND ARTERIAL SYSTEM OF TRANSPORTATION

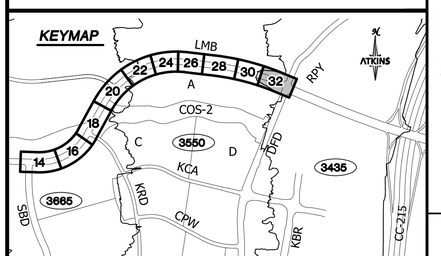
Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-642-2444

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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A. BATES
No. 18723
CIVIL
7/15/19

KEYMAP



REV.	DESCRIPTION	BY	DATE	APPROVAL

REVISIONS

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

SUMMERLIN

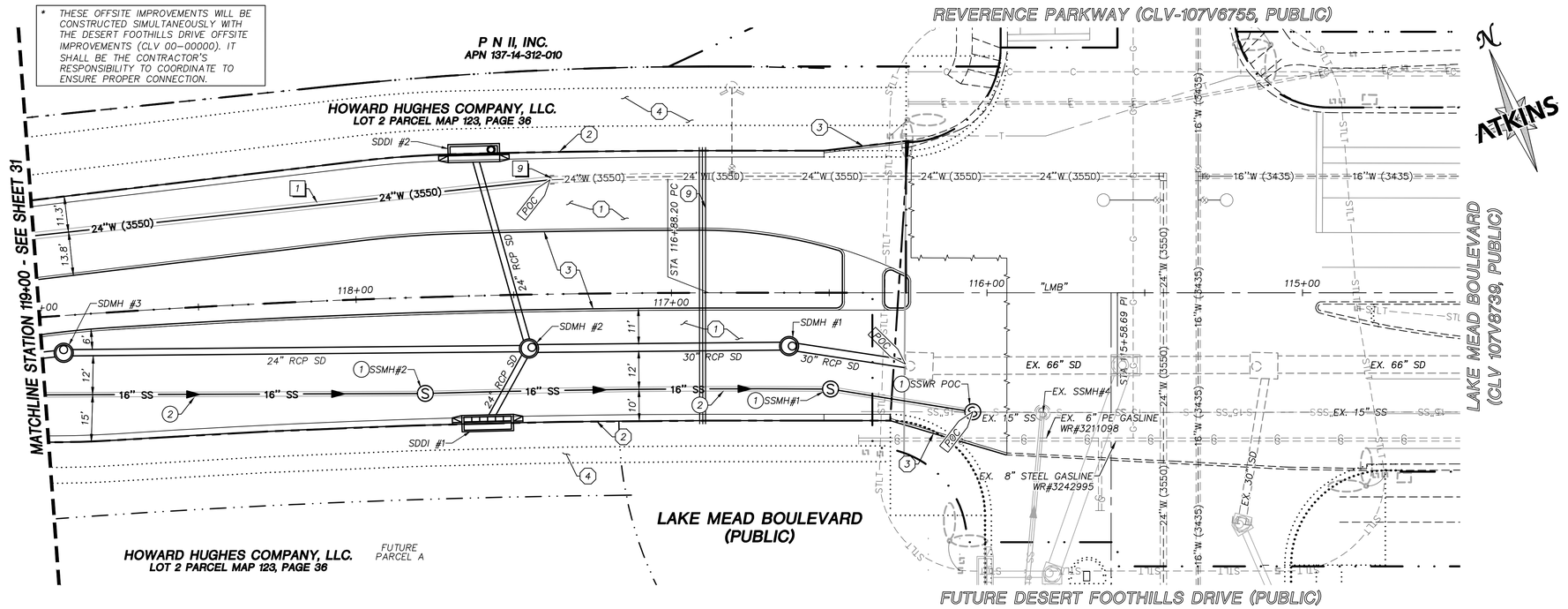
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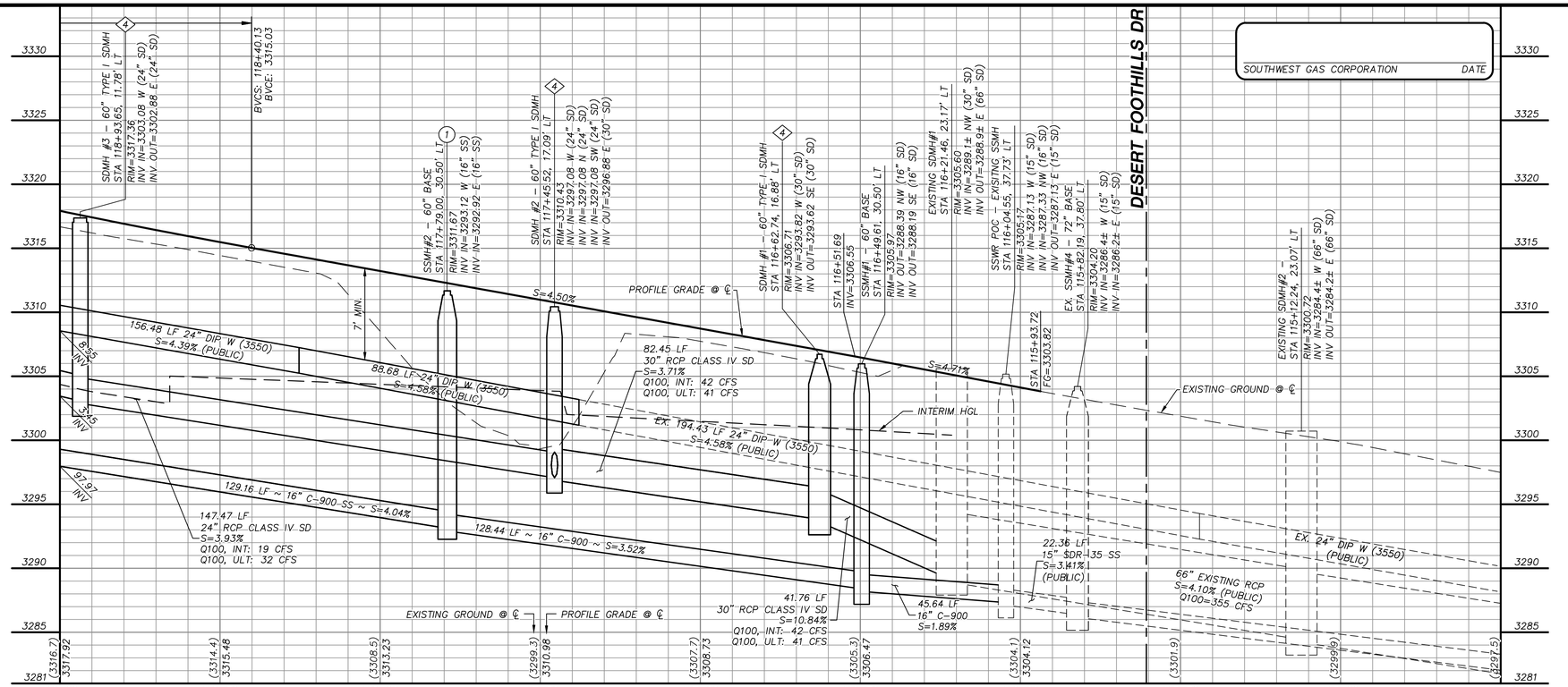
ROADWAY GRADING PLAN
BEGIN TO STA. 119+00

JOB NO.	100060653
DATE:	JULY, 2019
DRAWING NO.	32/66
DESIGNED BY:	N. BARCOS
DRAWN BY:	L. MAMACLAY
CHECKED BY:	P. BATES
HORIZ.:	1"=20'
VERT.:	NONE

CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 32 Jul 15, 2019 - 4:16PM





GRAPHIC SCALE

HORIZONTAL: 1"=20'

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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STORM DRAIN CONSTRUCTION NOTES

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12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

SEWER CONSTRUCTION NOTES

1. INSTALL SEWER MANHOLE PER DCSWCS SD-1 AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

WATERLINE CONSTRUCTION NOTES

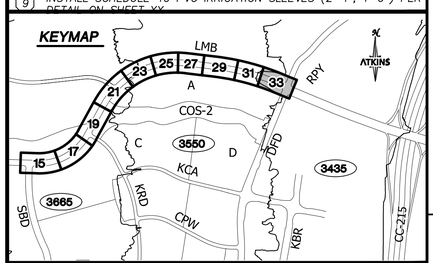
1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
5. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
6. INSTALL 11.25° HORIZONTAL BEND PER UDACS PLATE #31
7. INSTALL 22.5° HORIZONTAL BEND PER UDACS PLATE #31
8. INSTALL IN-LINE REDUCER PER UDACS PLATE #30
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.
11. INSTALL AIR VALVE ASSEMBLY AND VALVE BOX PER UDACS PLATES #38 AND #39

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 PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT (HTE #00-0000). SEE SHEET 47 FOR TYPICAL PAVEMENT SECTION.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL



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

SUMMERLIN

SUMMERLIN VILLAGE 22

LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

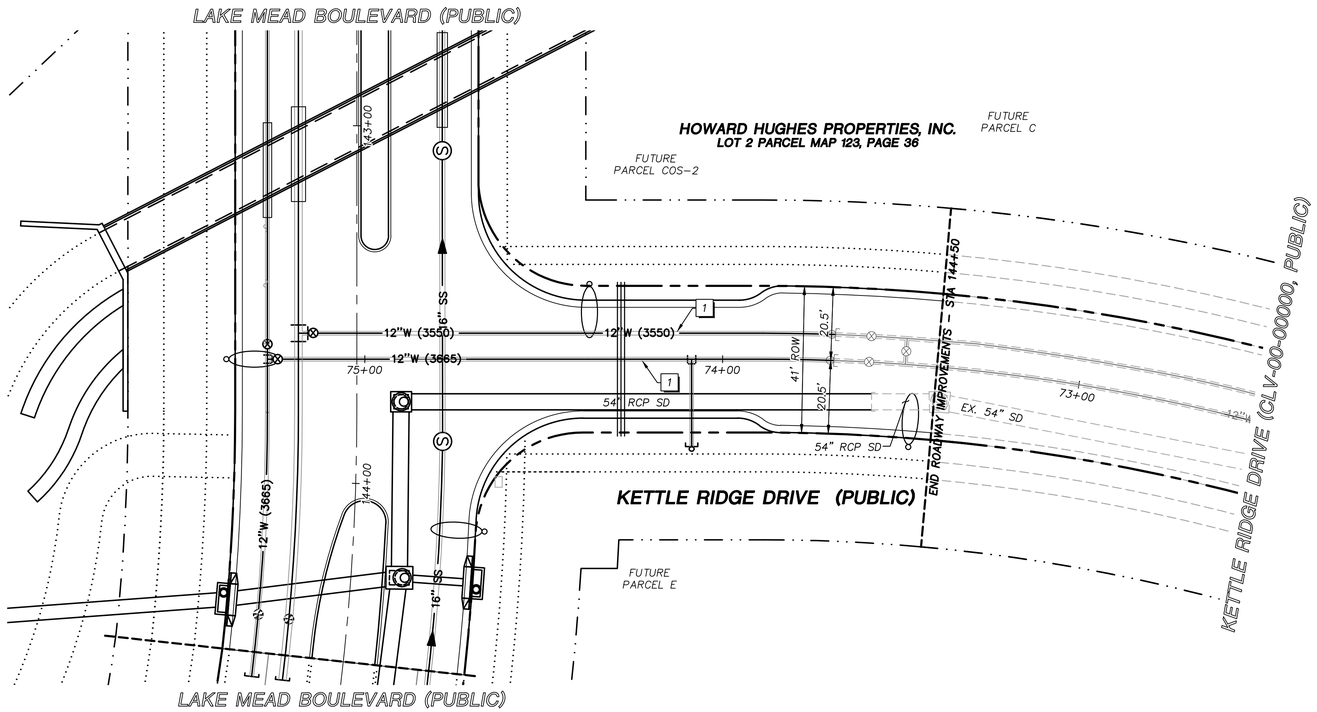
ROADWAY PLAN AND PROFILE BEGIN TO STA. 119+00

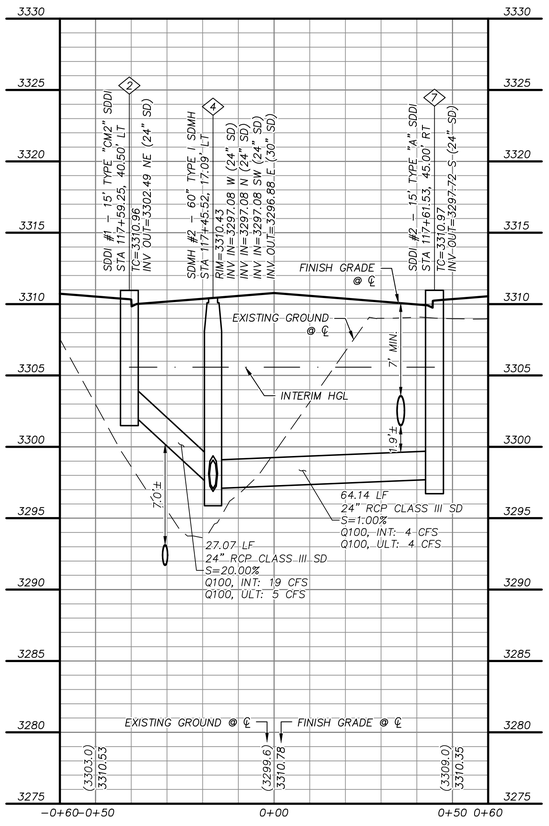
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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

JOB NO.	DESIGNED BY: N. BARCOS
100060653	DRAWN BY: L. MAMACLAY
DATE: JULY, 2019	CHECKED BY: P. BATES
DRAWING NO. 33/66	HORIZ.: 1"=20' VERT.: 1"=5'
CLV	

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 33 Jul 15, 2019 - 6:58PM

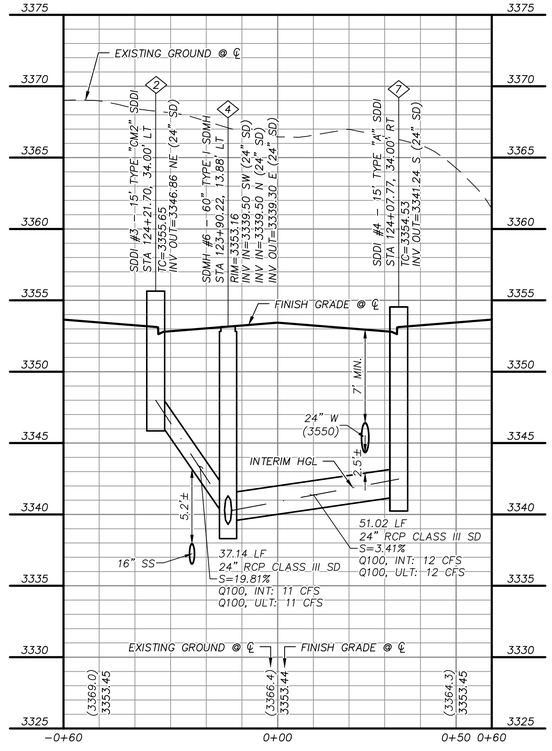

LAKE MEAD BOULEVARD (PUBLIC)
HOWARD HUGHES PROPERTIES, INC.
LOT 2 PARCEL MAP 123, PAGE 36
FUTURE PARCEL C
FUTURE PARCEL COS-2
FUTURE PARCEL E
KETTLE RIDGE DRIVE (PUBLIC)
KETTLE RIDGE DRIVE (CLV-00-00000, PUBLIC)
END ROADWAY IMPROVEMENTS - STA 144+50
41' ROW
20.5'
20.5'
12"W (3550)
12"W (3665)
54" RCP SD
EX. 54" SD
54" RCP SD
16" SS
12"W (3665)
143+00
144+00
75+00
74+00
73+00
1
1
1



STORM DRAIN LATERAL 1

"LMB" STA. 117+46 SEE SHEET 32

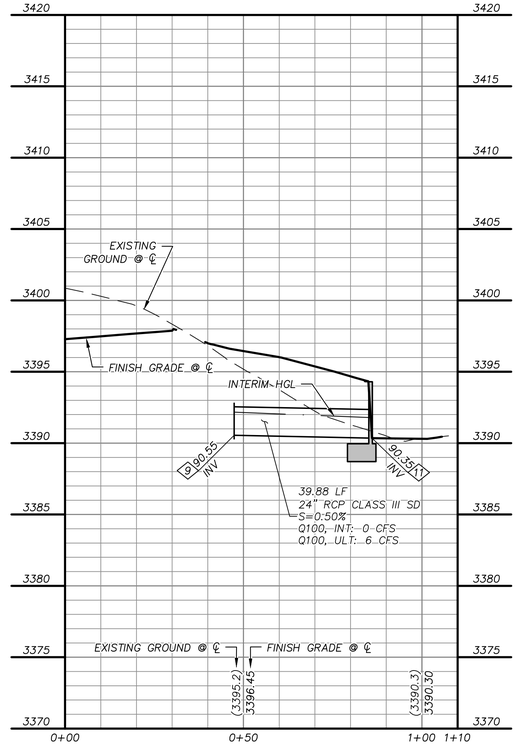
A / 35



STORM DRAIN LATERAL 2

"LMB" STA. 123+90 SEE SHEET 28

B / 35



STORM DRAIN LATERAL 3

"LMB" STA. 129+42 SEE SHEET 24

C / 35

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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
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9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES, IT'S COSTLY. Call 811 OR 1-800-642-2444

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

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PROFESSIONAL ENGINEER - STATE OF NEVADA — PAUL BATES — No. 18723 — CIVIL — 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
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LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

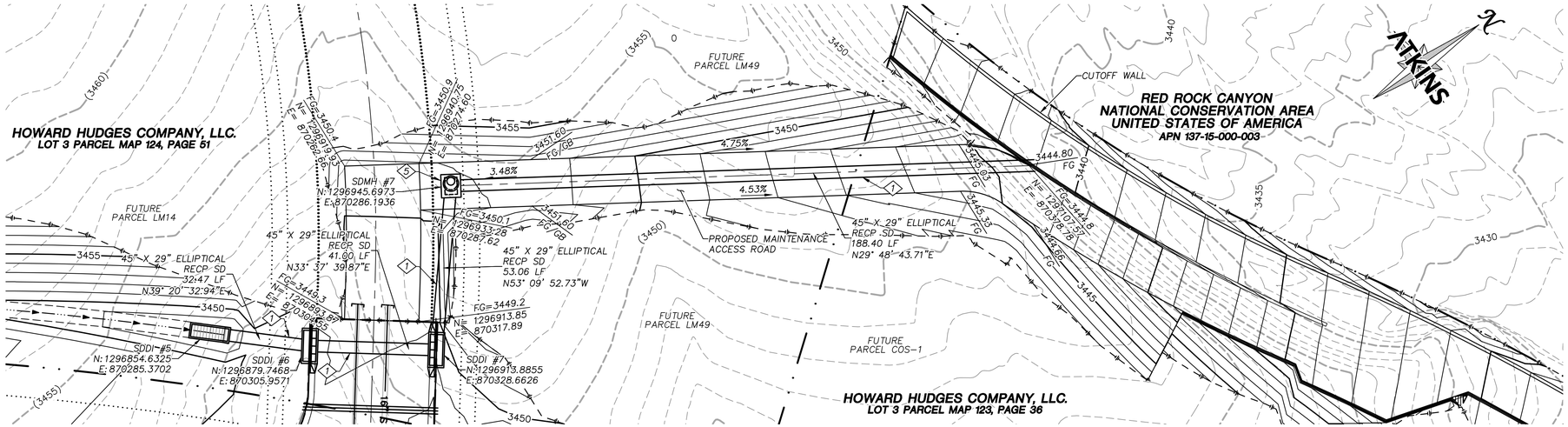
STORM DRAIN LATERAL PLAN AND PROFILE

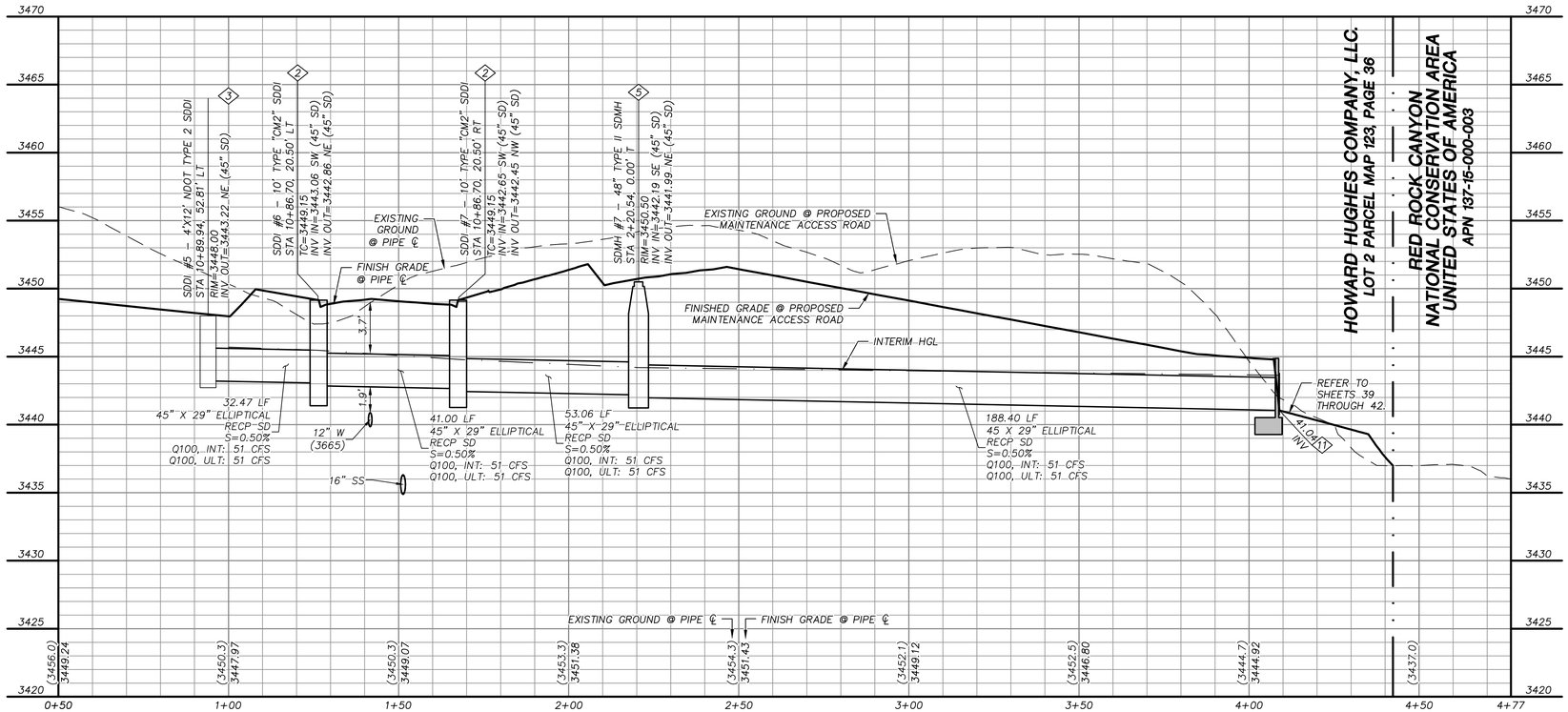
DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 35/66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-xx-LATL-P.dwg LAYOUT: 35 Jul 15, 2019 - 7:26PM

NOTE:
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.





STORM DRAIN LATERAL 4

"LMB" STA. 137+42 SEE SHEET 20

D
36

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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DS#XXX-0000

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 EMERGENCY AND INFORMATIONAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES, IT'S COSTLY. Call 811 OR 1-800-642-2444

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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A. BATES
No. 18729
CIVIL
7/15/19

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Fax: +1.702.263.7200

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD – DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE – KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

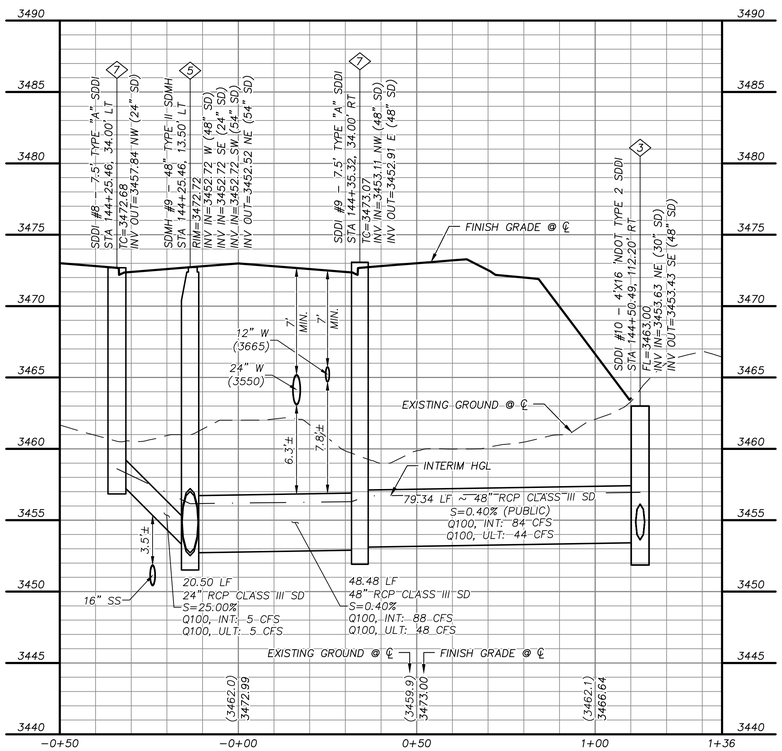
STORM DRAIN LATERAL PLAN AND PROFILE

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 36/66

CLV

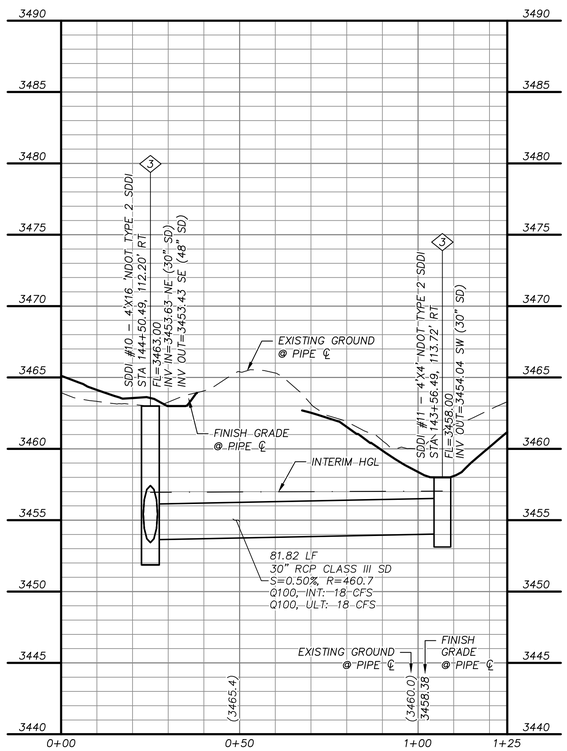
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STORM DRAIN LATERAL 5

"LMB" STA. 144+25 SEE SHEET 18

E 37



STORM DRAIN LATERAL 6

"LMB" STA. 144+02 SEE SHEET 18

F 37

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 EMERGENCY AND JUNTURAL SYSTEM OF TRANSPORTATION

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PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL A. BATES
No. 18729
CIVIL
7/15/19

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

SUMMERLIN

SUMMERLIN VILLAGE 22

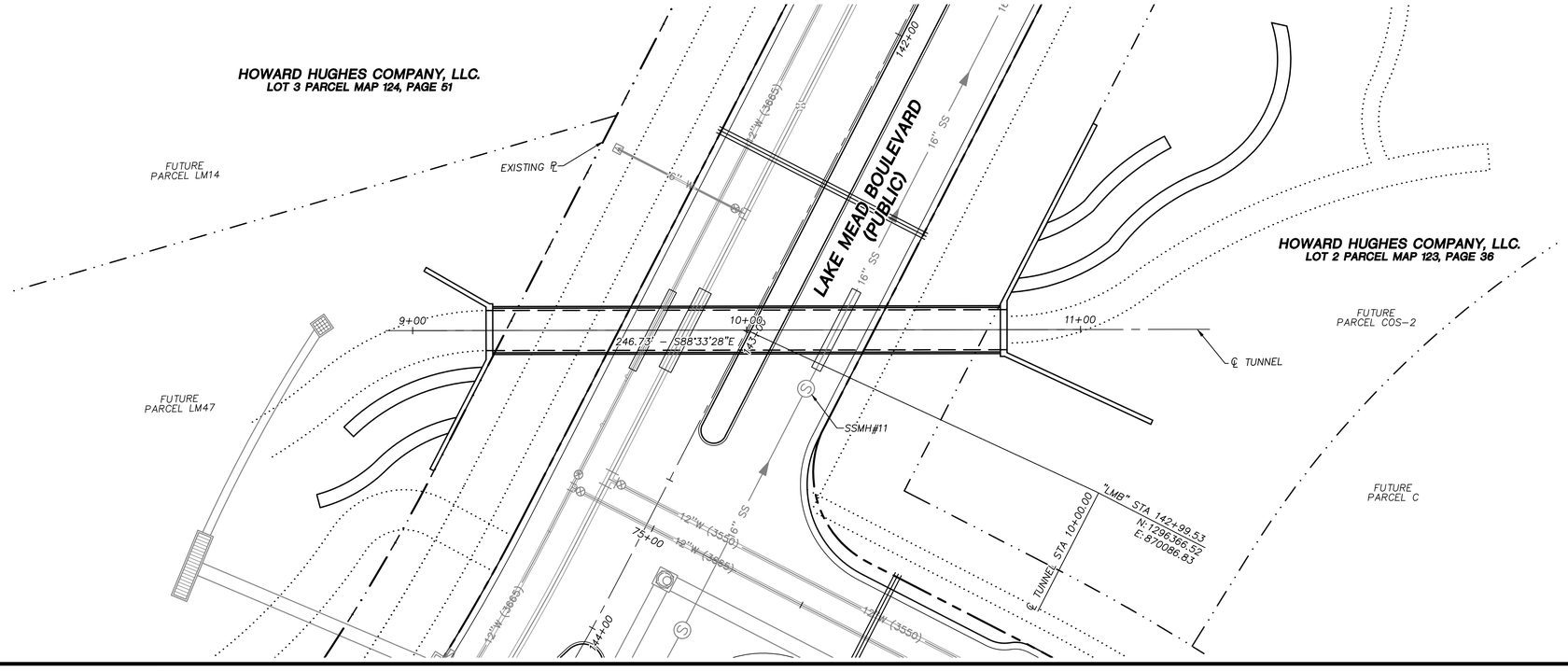
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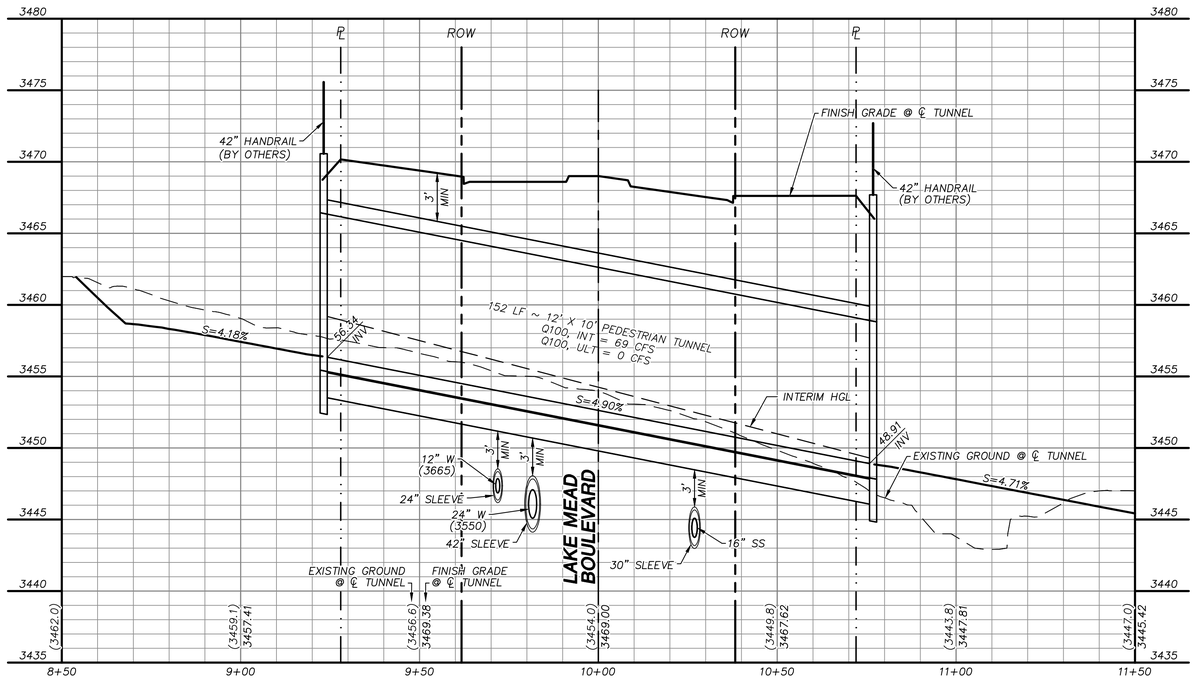
STORM DRAIN LATERAL PLAN AND PROFILE

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 37/66
CLV

X:\Projects\SummitWest\Village 22\100060653 – V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-xx-LATL-P.dwg LAYOUT: 37 Jul 15, 2019 – 7:27PM





PEDESTRIAN TUNNEL PLAN & PROFILE

"LMB" STA. 143+01 SEE SHEET 18

G
38

GRAPHIC SCALE

20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

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REVISIONS

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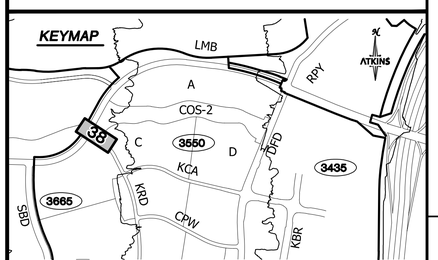
ATKINS
2270 Corporate Circle Suite 200
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Telephone: +1.702.263.7275
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SUMMERLIN

SUMMERLIN VILLAGE 22
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PEDESTRIAN TUNNEL PLAN & PROFILE

KEYMAP



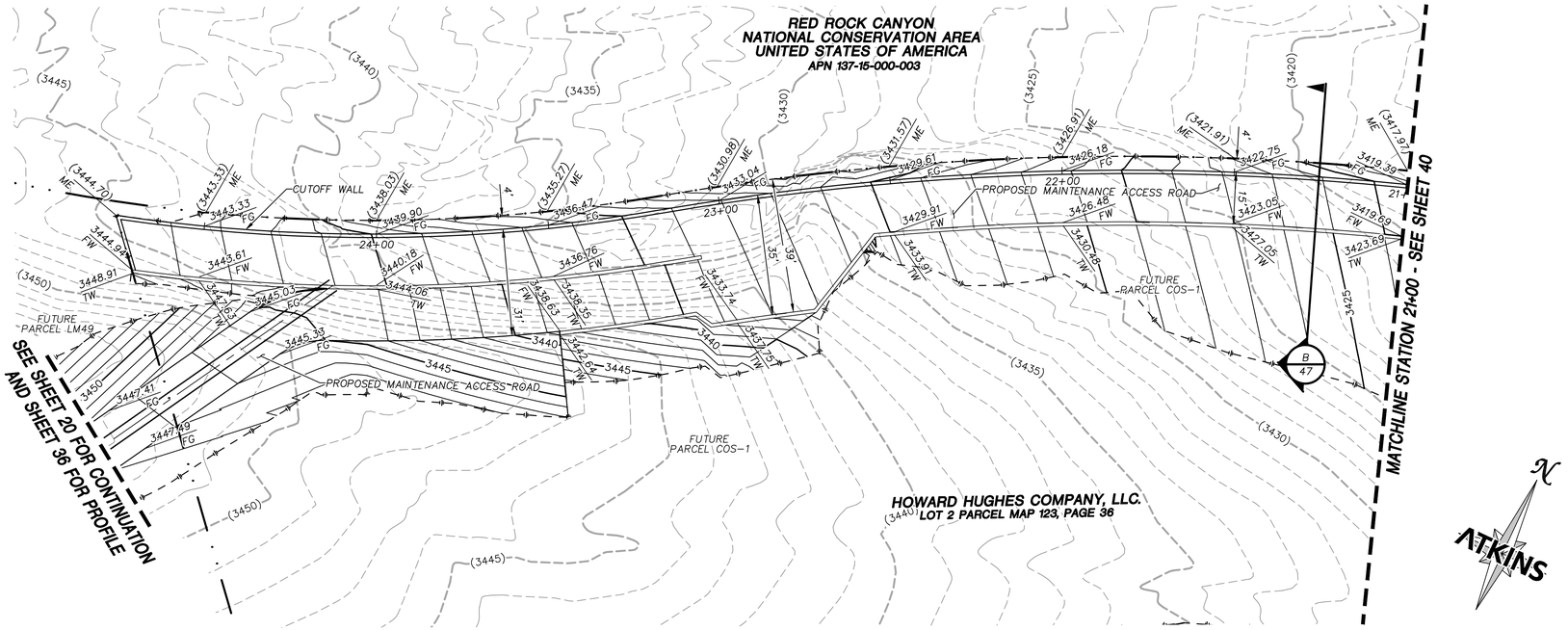
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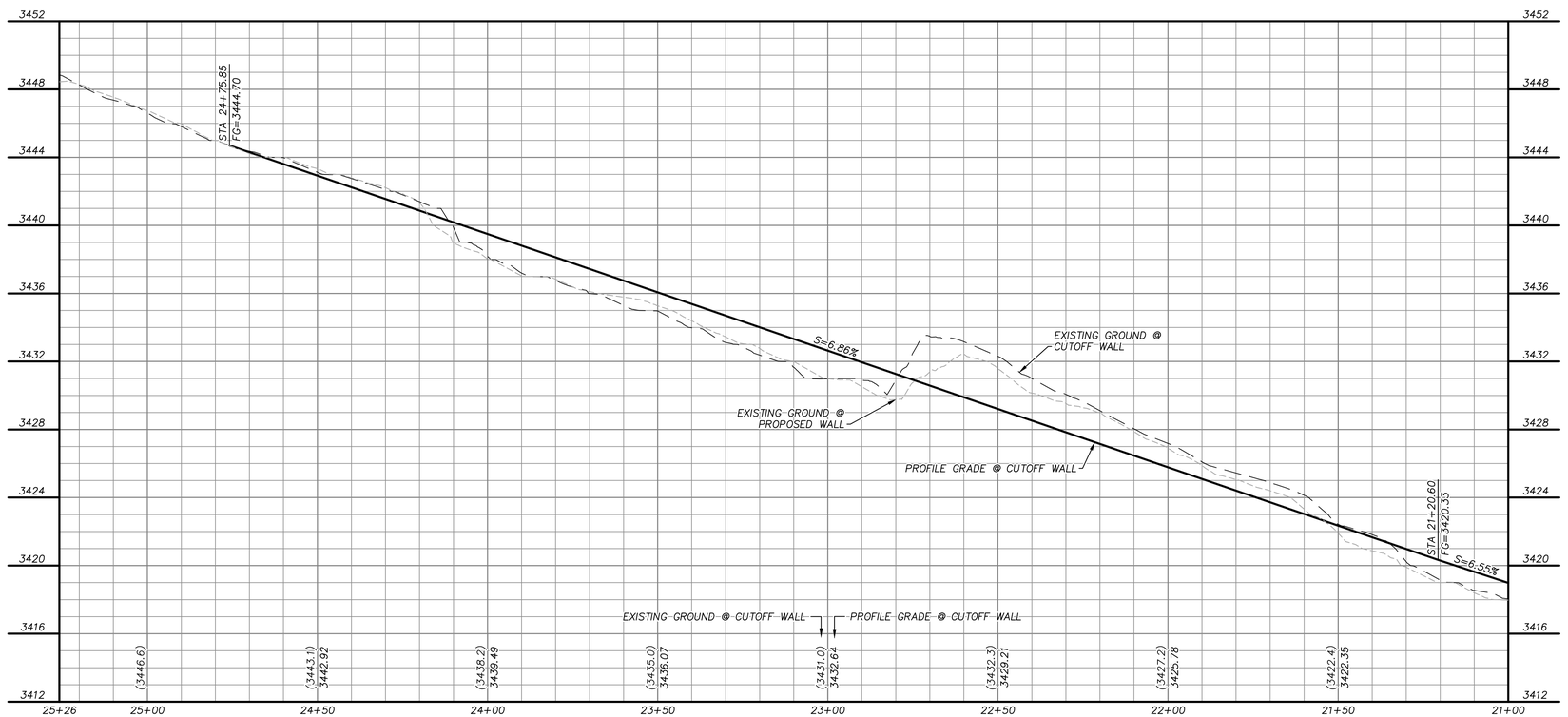
PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A. GATES
No. 18725
CIVIL
7/15/19

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 38/66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-14-GRAD-TUNL-G11.dwg LAYOUT: 39 Jul 15, 2019 - 4:54PM





GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 (ASSISTED AND ARTERIAL SYSTEM OF TRANSPORTATION)

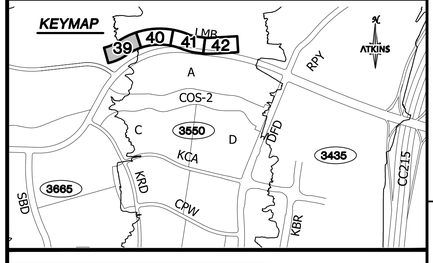
Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COURTLY. Call 811 or 1-800-642-2444

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

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
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11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=12", THICKNESS=24")

NOTE:
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.



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.

PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL BATES
No. 18723
CIVIL
7/15/19

REV.	DESCRIPTION	BY	DATE	APPROVAL
	REVISIONS			

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

SUMMERLIN

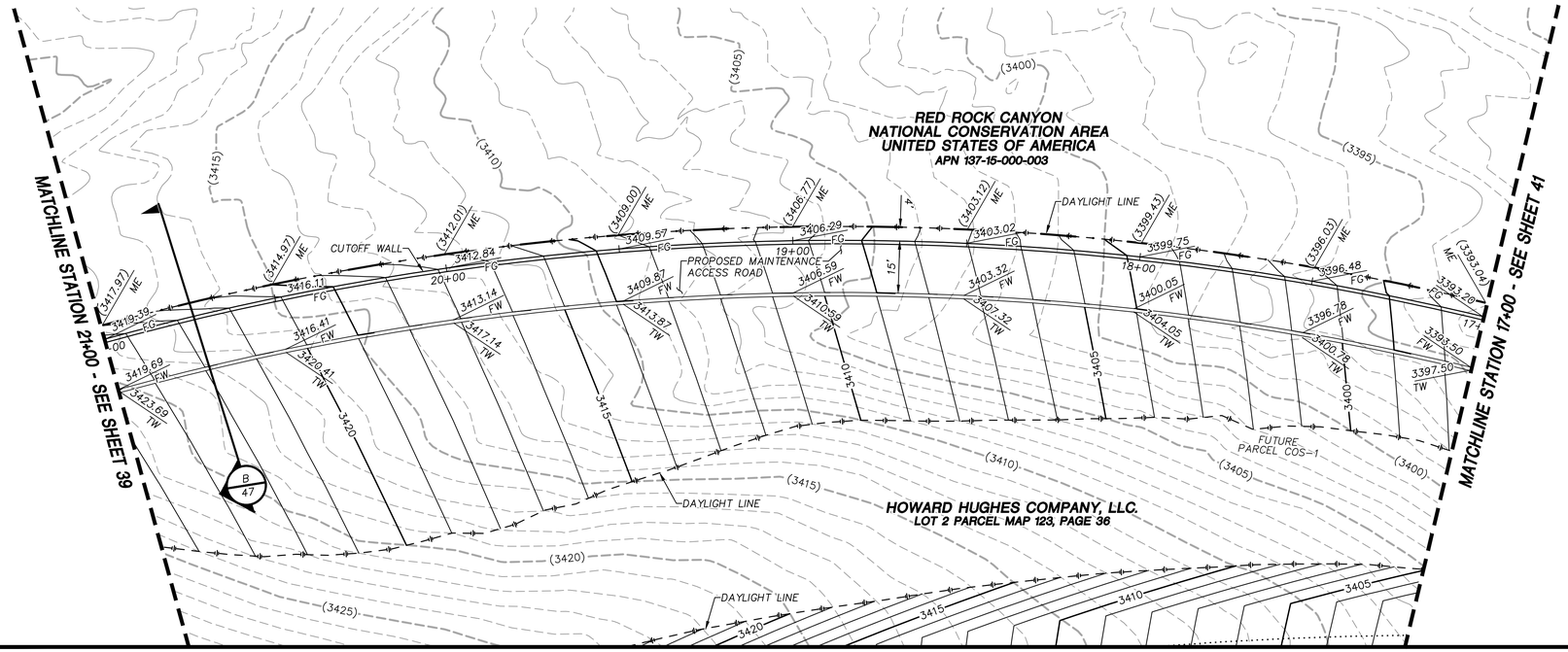
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

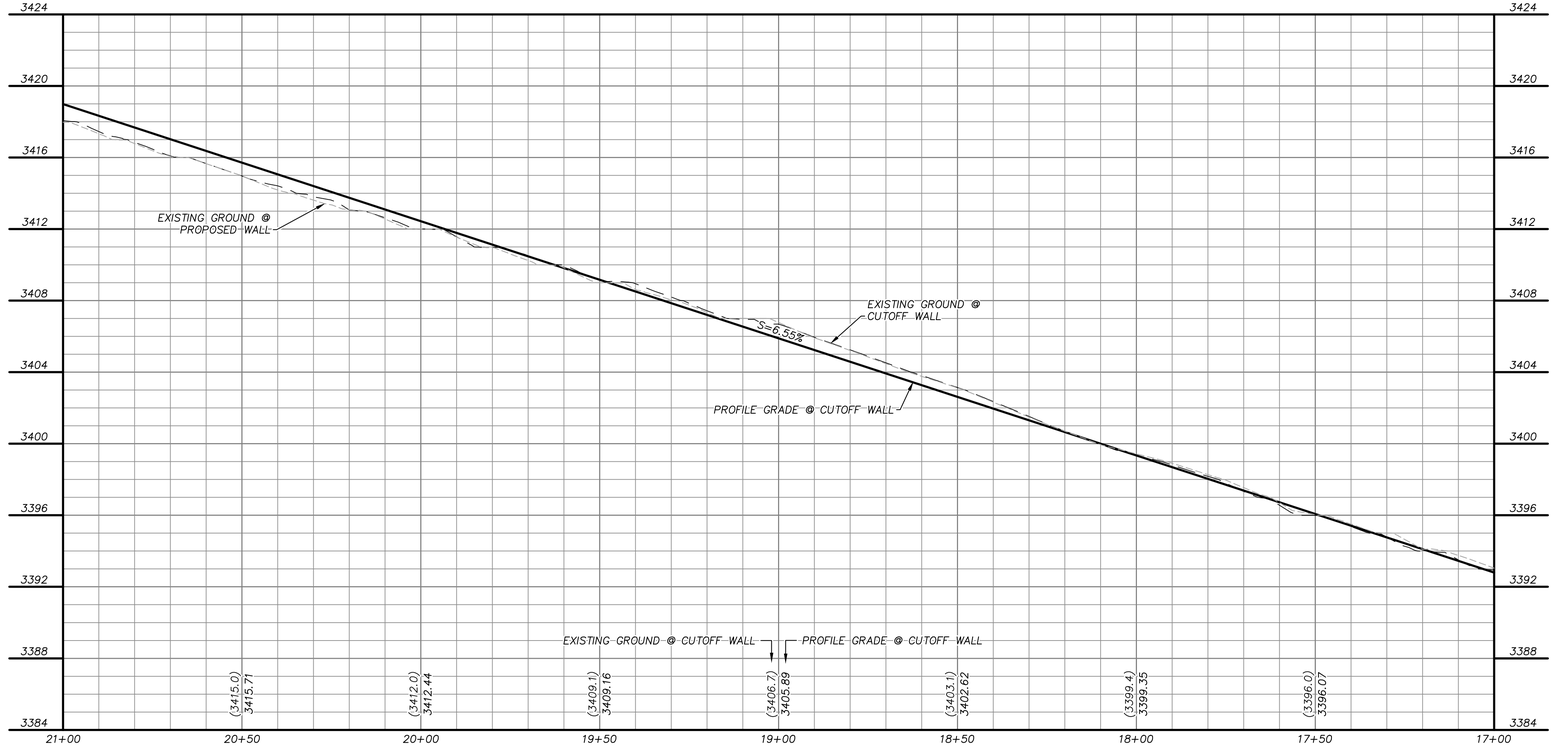
FLOODWALL PLAN AND PROFILE
STA 21+00 TO END

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 39/66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-11-GRAD-WALL-GW1.dwg LAYOUT: FW-1 Jul 15, 2019 - 4:55PM





GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

BENCHMARK

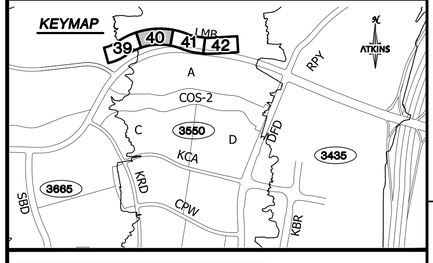
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 811 Call 811 or 1-800-642-2444 AVOID HITTING OVERHEAD POWER LINES, ETC. CONTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

STORM DRAIN CONSTRUCTION NOTES

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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL BATES No. 18723 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

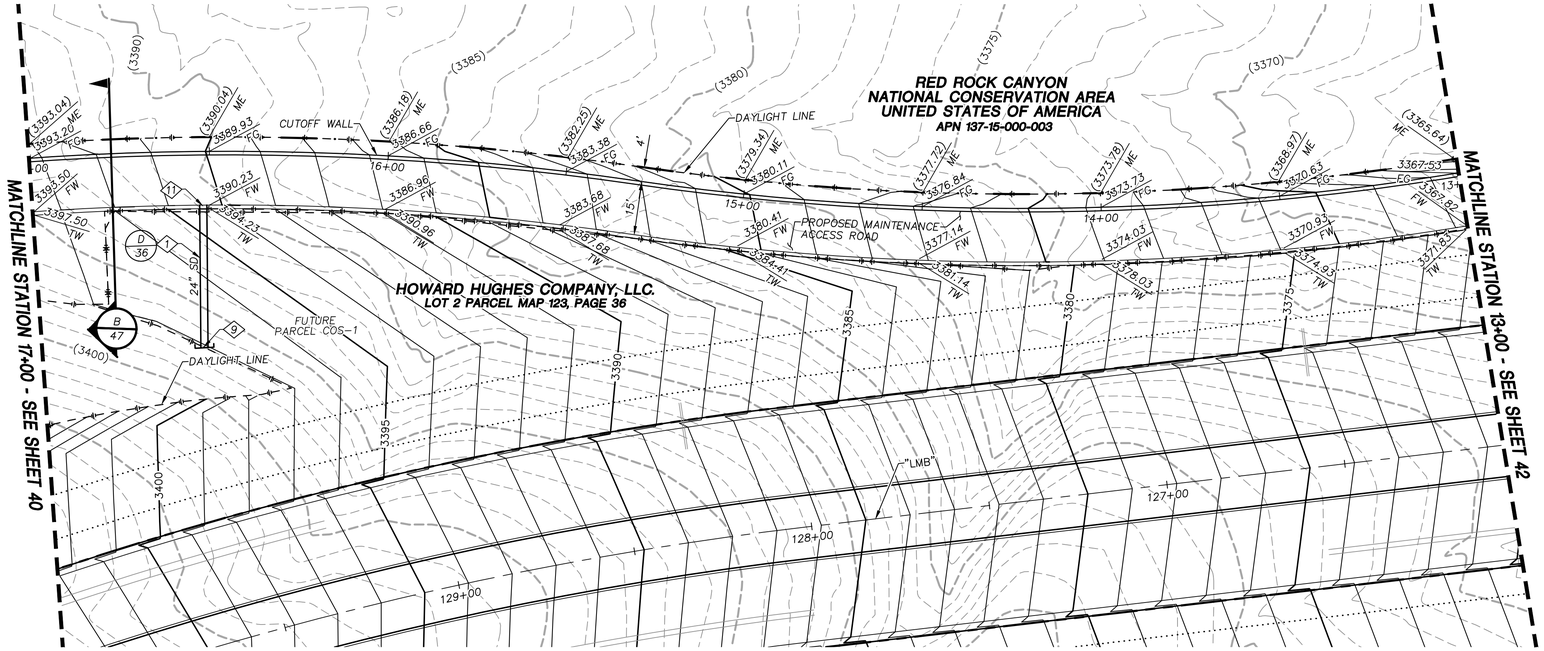
FLOODWALL PLAN AND PROFILE
STA. 17+00 TO STA. 21+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 40/66

CLV

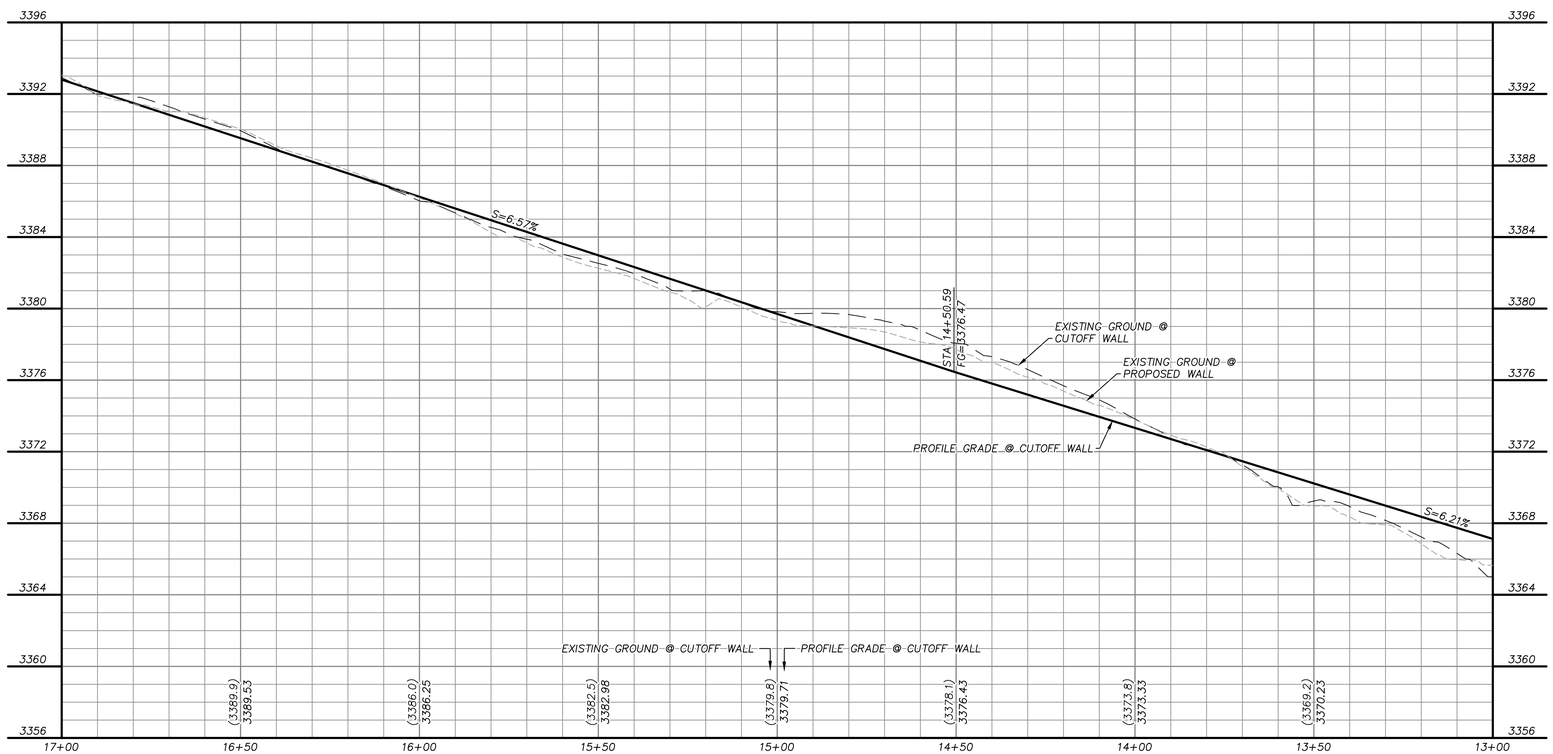
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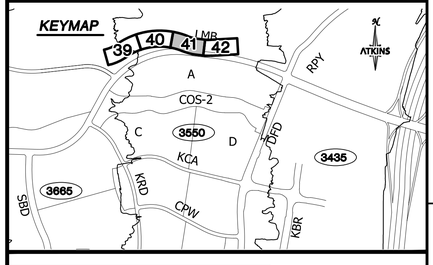


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GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

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BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 (702-TRY-FAST) — Nevada One Call System of Transportation

Call before you Dig — Avoid cutting underground utility lines. Don't dig. Call 811 or 1-800-642-2444

Avoid hitting overhead power lines. It's costly. Call before you do overhead 1-702-227-2929

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PROFESSIONAL ENGINEER-STATE OF NEVADA — PAUL BATES — CIVIL — No. 18723 — 7/15/19

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

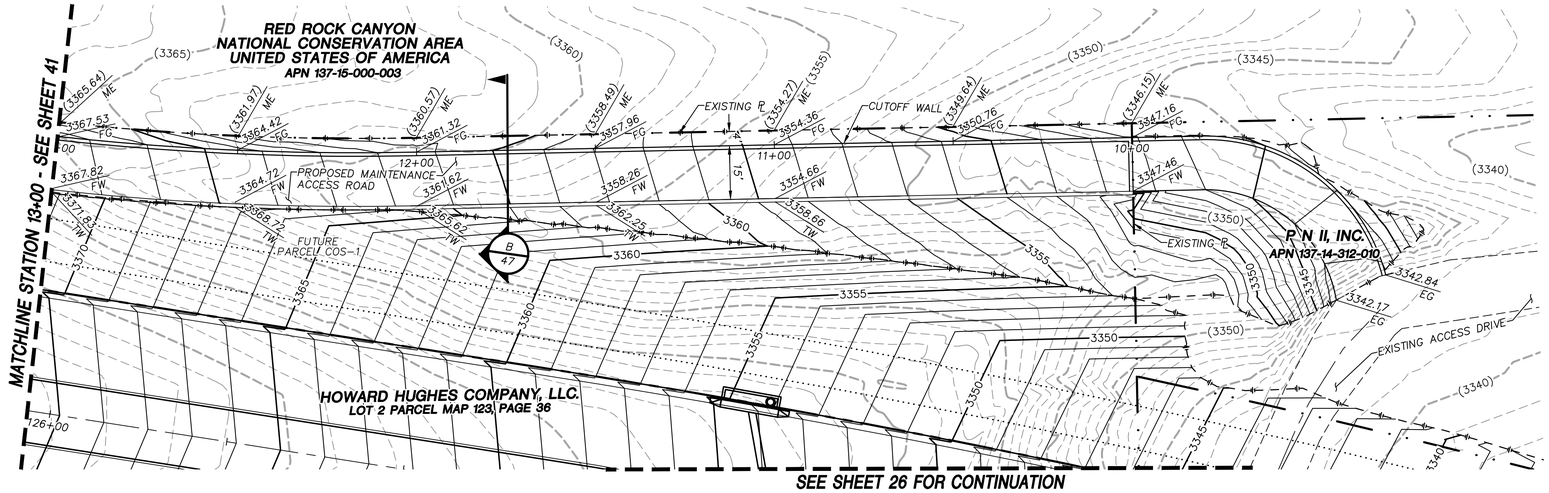
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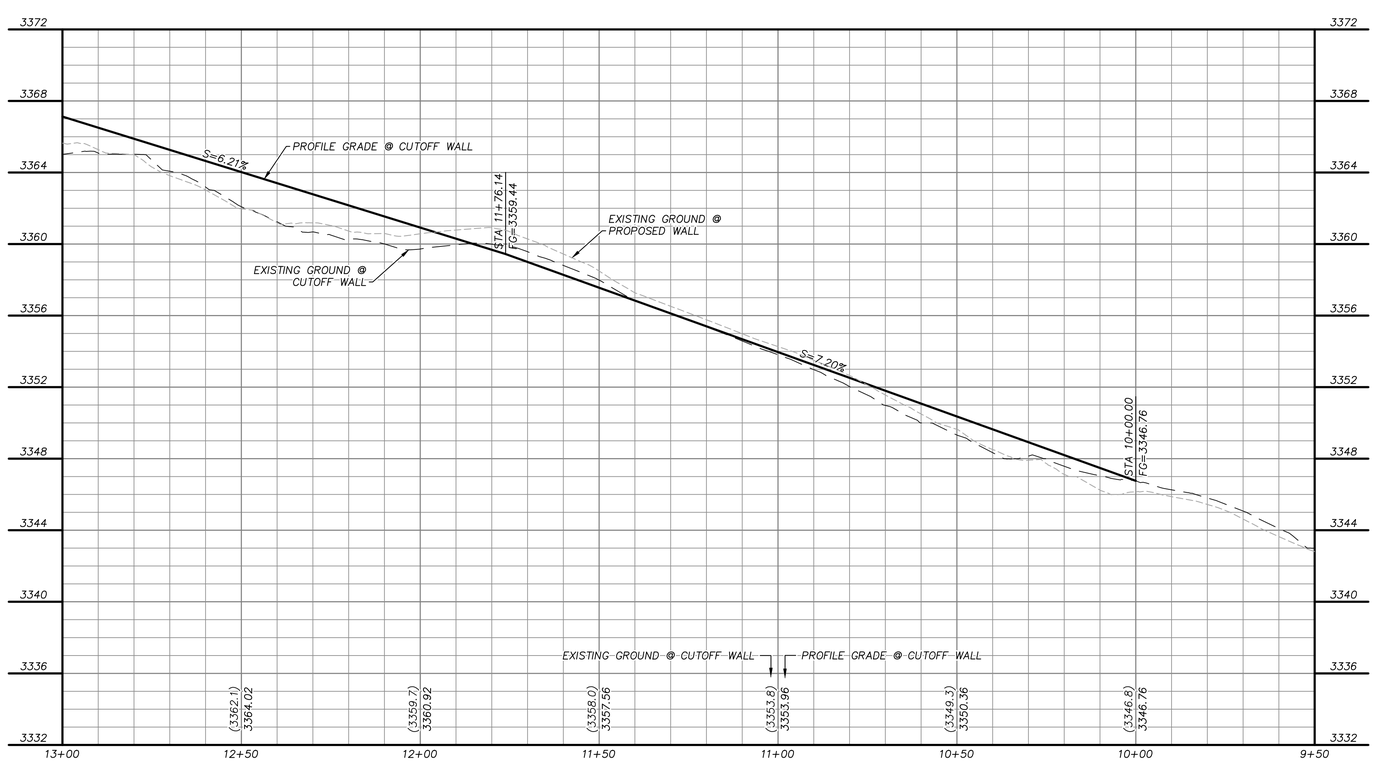
FLOODWALL PLAN AND PROFILE
STA. 13+00 TO STA. 17+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 41/66
CLV

K:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-11-GRAD-WALL-GW1.dwg LAYOUT: FW-3 Jul 15, 2019 - 4:55PM

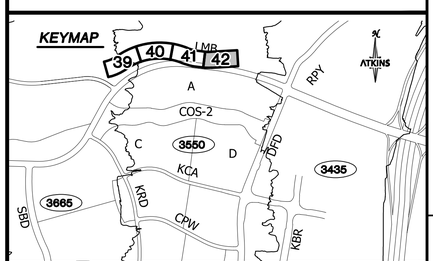




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GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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DS#XXX-0000

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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES No. 18723 CIVIL 7/15/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

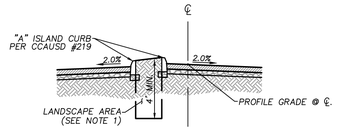
SUMMERLIN VILLAGE 22
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LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FLOODWALL PLAN AND PROFILE BEGIN TO STA. 13+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 42/66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-11-GRAD-WALL-GW1.dwg LAYOUT: FW-4 Jul 15, 2019 - 4:55PM



LEFT TURN LANE

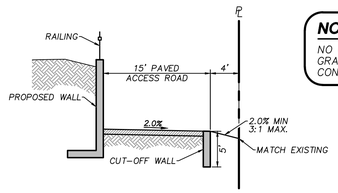
NOTES:

1. EXCAVATE MEDIAN 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.

PROFILE GRADE LINE DETAIL FOR OFFSET MEDIAN

N.T.S.

A 47



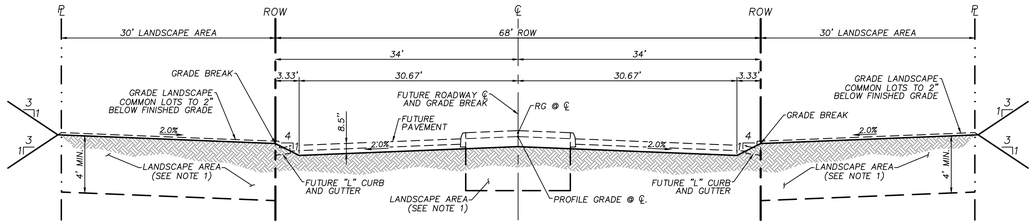
NOTE:

NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.

LAKE MEAD BLVD FLOOD WALL TYPICAL SECTION

N.T.S.

B 47



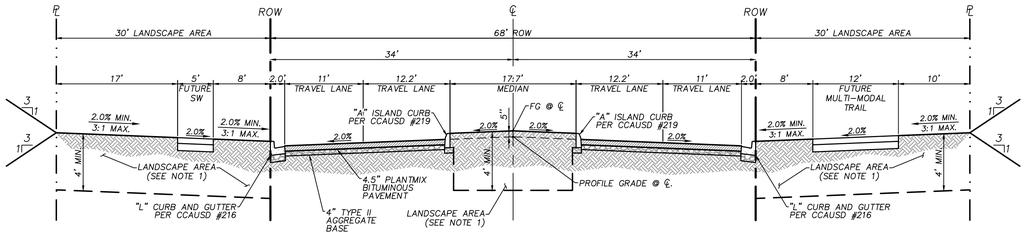
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LAKE MEAD BOULEVARD - ROUGH GRADING SECTION

N.T.S.

C 47



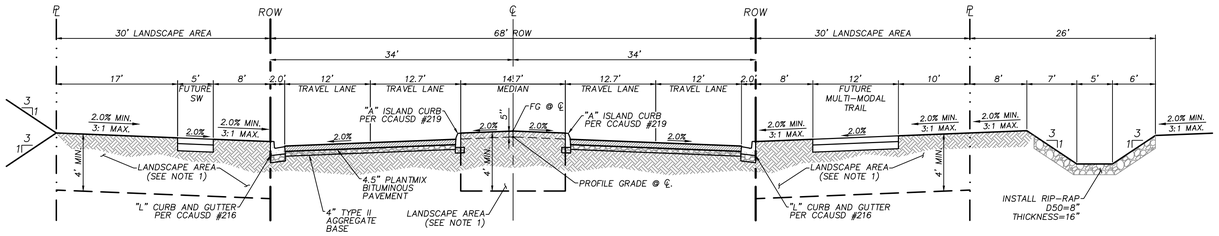
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LAKE MEAD BOULEVARD - TYPICAL SECTION

N.T.S.

D 47



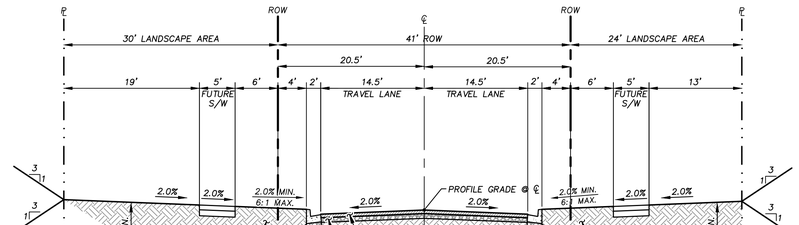
NOTES:

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LAKE MEAD BOULEVARD - SWALE SECTION

N.T.S.

E 47



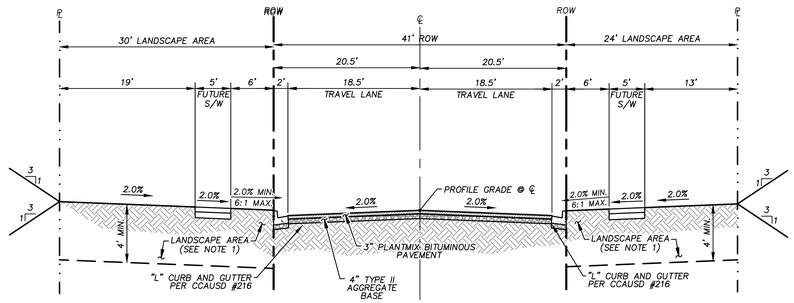
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KETTLE RIDGE DRIVE - TYPICAL SECTION WITH CURB EXTENSION

N.T.S.

F 47



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KETTLE RIDGE DRIVE - TYPICAL SECTION

N.T.S.

G 47

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22

LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

TYPICAL SECTION

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. DATES
HORIZ.: NONE
VERT.: NONE

JOB NO. 100060653
DATE: JULY, 2019
DRAWING NO. 47/66
CLV

FAST Call before you UnderGround 1-702-432-5300 FIREWAY AND ARTERIAL SYSTEM OF TRANSPORTATION
Call before you D g AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-227-2600
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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A. DATES
No. 18729
CIVIL
7/15/19

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-11-DETL-D1.dwg LAYOUT: D1 Jul 15, 2019 - 4:56PM

Appendix E. CD-ROM

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

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SUMMERLIN®

Summerlin West Village 22

Lake Mead Boulevard

Desert Foothills Drive to Kettle Ridge Drive (Street J)

Lake Mead Boulevard Rough Grade

Kettle Ridge Drive to Scurry Bend Drive (Street N)

September 11, 2019

Addendum #1

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Addendum #1: Lake Mead Boulevard: Desert Foothills Drive to Kettle Ridge Drive & Rough Grade: Kettle Ridge Drive to Scurry Bend Drive Date: September 11, 2019

Location of Development: a) Descriptive (Cross Streets) North/South: Kettle Ridge 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	x	Roadway Improvements

1. Total Owned Land Area: At Site: +/- 446 acres Being Developed/Disturbed: 16.81 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: 69.63 acres
6. Has the site drainage been evaluated in the past? ✔ **YES** **NO** If yes, please identify documentation: Master Conceptual Drainage Study for Summerlin West Village 22
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

PROFESSIONAL ENGINEER STATE OF NEVADA
MOLLY M. ANDERSON
EXP: 12/31/20
CIVIL
No. 24365
9/11/19

Engineer's Seal

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

*New Required Field

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

Revision	Date

DS #5155
Local Entity File No.

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Lake Mead Boulevard and Lake Mead Boulevard Rough Grade	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**

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**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		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.
X		Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
X		Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
X		Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
	N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
X		Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$ 8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
	N/A	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
	N/A	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
	N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • 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 (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

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

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

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

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

II. GRADING PLAN INFORMATION		
Yes	No	
X		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
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.

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 **Addendum #1 to the Technical Drainage Study for Lake Mead Boulevard: Desert Foothills Drive to Kettle Ridge Drive (Street J) and Lake Mead Boulevard Rough Grade: Kettle Ridge Drive (Street J) to Scurry Bend Drive (Street N)** electronic submittal matches the paper version bound into the study.



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

Comment Response Letter

Your reference: DS #5155

Albert Sung
City of Las Vegas Public Works
333 N. Rancho Dr, 7th Floor
Las Vegas, NV 89106

September 11, 2019

RE: ADDENDUM #1 TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22 LAKE MEAD BOULEVARD: DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J) & LAKE MEAD BOULEVARD ROUGH GRADE: KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

Dear Albert,

This letter and the attached documents have been prepared as an Addendum #1 to the *Technical Drainage Study (TDS) for Summerlin West Village 22 Lake Mead Boulevard: Desert Foothills Drive to Kettle Ridge Drive (Street J) & Lake Mead Boulevard Rough Grade: Kettle Ridge Drive (Street J) to Scurry Bend Drive (Street N).*

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

A technical drainage study for the modification of the Beltway Channel has been submitted and has just been conditionally approved. The subject drainage study will not be approved prior to the construction bond of the *Beltway Channel Modification* project has been executed.

Comment response: The developer, The Howard Hughes Corporation, has acknowledged that a construction bond for the Beltway Channel Modification Project, will be in place for approval of this Technical Drainage Study. However, it is expected that this comment is not to hold up a conditional approval of the TDS.

Comment #2: The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.

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

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

Comment response: The proposed report will be submitted to CCRFCD for concurrence.

Comment #3: The subject development is premised on the protection, primarily of an interim berm along the west side of *Scurry Bend Drive* and secondarily of berms along the north side of *Lake Mead Boulevard* and the west of *Kettle Ridge Drive*. See Figure 3 of the subject study.

However, in the improvement plans, interim berms or swales are nowhere to be found. Address and resolve in the next submittal. Provide berms or swales for interim flood protection of the improved roadway. Revise the improvement plans accordingly.

Comment response: The interim berms and swales along Scurry Bend Drive are proposed with the Kettle Ridge Drive (Street J): Lake Mead Boulevard to Fleet Wing Drive and Scurry Bend Drive (Street N) Rough Grading: Lake Mead Boulevard to Fleet Wing Drive improvement plans and have been analyzed in the associated Technical Drainage Study (DS#5156). This TDS was submitted concurrently with this proposed Lake Mead Boulevard TDS, but is to be constructed prior to the construction of Lake Mead Boulevard.

Comment #4: Drop inlets deeper than 10' require special structural design and structural calculations. Provide a soils report, structural calculations and specifications, two wet stamped structural sets, and a grading plan to the *Building Department* for processing. The engineer must provide a copy of *Building Department* approval of the structures to *Flood Control* prior to the final acceptance of the drainage study.

Comment response: Structural calculations are being submitted to the Building Department.

Comment #5: ***Sheet 18/66, Sheet 19/66*** and all pertinent sheets: The proposed 54"-storm drain in *Kettle Ridge Drive* appears to be too close to the street curb & gutter. In case of repair or maintenance in the future, the curb & gutter will likely be disturbed for open trench or staging area for the repair. Relocate the 54"-RCP towards the center of *Kettle Ridge Drive* as much as possible.

Comment response: The proposed 54"-RCP is revised further from the curb & gutter with this submittal.

Comment #6: Sheet 18/66: SDDI #10 and SDDI #11 appear to be in sump condition. Address in a worst case scenario that both inlets are totally clogged, is there an overflow path available for emergency discharge? Also in the next submittal, address whether the proposed pedestrian tunnel will be impacted during such situation. Provide finished grade elevation at the entrance of the pedestrian tunnel. Provide enough finished grades to clearly identify the emergency overflow path in the next submittal.

Comment response: The worst case overflow for these two inlets will be through the Pedestrian Tunnel. Per discussion in the meeting with the City, the tunnel will have proper signage discouraging pedestrians from using it in a rain event. Finish grade elevations have been added to the entrance of the tunnel.

Comment #7: Sheet 18/66: Address what's the design criteria for the pedestrian tunnel in respect to flood control, ie, is the tunnel kept dry during a 10-year or 100-year storm event.

Comment response: In the interim condition, the pedestrian tunnel was designed to carry the 10-year storm event of the tributary area (subbasin INT-LMB1). The 100-year (153 cfs) minus the 10-year (68 cfs) storm events, or 85 cfs, will be picked up into SDDI #10 and SDDI #11 prior to the tunnel entrance. In the worst-case scenario where SDDI #10 and SDDI #11 are both 100% clogged, the emergency route for the flow would be through the pedestrian tunnel. There is a sign proposed at the ends of the tunnel telling pedestrians to stay out during storm events. In the ultimate condition, there will be no flow in the pedestrian tunnel. Upstream storm drain within Lake Mead Boulevard for future projects (by others) will cut off the tributary flow to the proposed tunnel.

Comment #8: Sheet 18/66: Address whether the pedestrian tunnel is to be privately maintained by Summerlin Master HOA or publicly maintained by the *City of Las Vegas*.

If it is to be publicly maintained, provide access ramps from *Lake Mead Boulevard* to both ends of the tunnel for future maintenance.

Comment response: The pedestrian tunnel is to be privately maintained by the Summerlin Master HOA.

Comment #9: Also, if it is to be publicly maintained, the improvement plans must be reviewed for maintenance and access concerns by *City Streets & Sanitation Department* for their review and approval which must be secured prior to the subject drainage study approval. Contact *Mr. Matthew Meyer, Streets & Sanitation Manager* for guidance.

Comment response: It is acknowledged that the pedestrian tunnel is to be privately maintained.

Comment #10: Sheet 18/66: The proposed 54"-RCP in *Kettle Ridge Drive* is a regional facility. Label with the Clark County Regional Flood Control District's facility ID on the plan.

Comment response: The regional facility has been labeled on the plans.

Comment #11: Clearly label "Public" and "Private" storm drains in all pertinent sheets. For example, storm drains in the perimeter streets such as *Lake Mead Boulevard* are "Public"; storm drains in the common elements such as SDDI #10, SDDI #11 and the connecting pipes are "Private". Review and revise accordingly in the next submittal.

Comment response: The storm drain has been labeled accordingly.

Comment #12: Sheet 20/66, Sheet 36/66 and Sheets 39 to 42/66: It is shown that the runoff from the proposed 45"x29: elliptical storm drain discharges across the proposed access drive into the *Red Rock Canyon Conservation Area*. Note that this is a concentrated discharge, address about the discharge velocity and the erosion impact to the *Red Rock Canyon Conservation Area* in the next submittal.

Comment response: The proposed access drive has been changed to concrete pavement at the discharge outlet to mitigate any velocity concerns. The velocity at the outlet is 8.8 ft/s, which is within the tolerance for concrete. The concrete access drive would act as a level spreader to avoid concentrated discharge. The flow across the level spreader has a length of 25'-30' over which to spread prior to reaching the Red Rock Canyon Conservation Area.

Comment #13: Sheet 28/66 and Sheet 29/66: The *City of Las Vegas* has a policy that nuisance drop inlets must be provided at a maximum spacing of 600' in arterial roads. From SDDI #8 and SDDI #9 at approximately Station 144+20 to SDDI#3 and SDDI #4 at Station 124+00, there are no inlets in a spacing of 2,000 feet. Extend the 24"-RCP in *Lake Mead Boulevard* westerly to comply with the City policy. 18"-RCP will suffice for the nuisance drop inlets requirement.

Comment response: Per included email from Oh-Sang Kwon, nuisance flow inlets were determined to not be required for this project. Please note that Mr. Kwon mistakenly indicated the Kettle Ridge Drive project by name in this email, but request from Chris Anderson of Howard Hughes referred to Lake Mead Boulevard.

Comment #14: Revise all drop inlets to Type "C-D" Modified Drop Inlet per Standard Drawing 412.1 or Neenah Pre-cast inlets. Note that the lengths of "C-D" modified inlets are in the multiple of 2.5'. Revise all pertinent construction notes and callouts accordingly.

Comment response: The drop inlets, construction notes, and callouts have been revised.

Comment #15: Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (Stormwater Quality Management Stamp and Sign Detail).

Comment response: The note has been added to the relevant sheets.

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

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Appendix A.	**Referenced E-mail**	
Appendix B.	**Revised WSPG-W Model**	
B.1.	Interim Condition WSPG-W Model	
B.2.	Ultimate Condition WSPG-W Model	
Appendix C.	**CD-ROM**	

Appendices

Appendix A. Referenced E-mail

Anderson, Carl E

From: Chris Anderson <Chris.Anderson@howardhughes.com>
Sent: Wednesday, August 28, 2019 6:15 PM
To: Anderson, Carl E; Barcos, Nicolas; Wilson, David D; Bates, Paul A
Cc: April Chapman; Rose Carver
Subject: Fwd: Nuisance drains Summerlin

Categories: SV22N: Overall & Miscellaneous, Summerlin West

Sent from my iPhone-Chris Anderson

Begin forwarded message:

> **From:** Oh-Sang Kwon <okwon@LasVegasNevada.GOV>
> **Date:** August 28, 2019 at 4:39:36 PM PDT
> **To:** Chris Anderson <Chris.Anderson@howardhughes.com>
> **Cc:** Albert Sung <YSung@LasVegasNevada.GOV>
> **Subject: RE: Nuisance drains Summerlin**
>
> **This email originated from an external server. Use caution.**
>
> ---
>
> Chris,
>
> Yes, we are okay with not installing nuisance storm drain in this segment of Kettle Ridge. Please let me know if you need anything else.
>
> Thank you,

Oh Sang Kwon
Engineering Project Manager
Public Works | City Engineering
702-229-1815 | **702-379-9491**
333 N. Rancho Drive, 7th Floor | Las Vegas, NV 89106

lasvegasnevada.gov

Your opinion is important! Click here to take a short survey.

From: Chris Anderson <Chris.Anderson@howardhughes.com>
Sent: Wednesday, August 28, 2019 4:25 PM
To: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>
Cc: Albert Sung <YSung@LasVegasNevada.GOV>
Subject: Nuisance drains Summerlin

EXTERNAL EMAIL: This email originated from outside the organization, do not click links or open attachments unless you recognize the sender and know the content is safe.

As discussed, at our Meeting last week to discuss kettle Ridge and Lake Mead, we requested that the city's requirement for nuisance drains be eliminated for a section of Lake Mead (1800 Lf) which only has roadway drainage and standard HOA landscaping. No developer will discharging onto this segment of Lake Mead. You indicated you would take this up the ladder.

This request would eliminate about 1200 Lf of 24" SD to install and CLV to maintain.

We indicated that there maybe future roads that we may request to eliminated on a case by case basis

Sent from my iPhone-Chris Anderson

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Appendix B. Revised WSPG-W Model

B.1. Interim Condition WSPG-W Model

B.2. Ultimate Condition WSPG-W Model

B.1 Interim Condition WSPG-W Model

```
T1 SUMMERLIN WEST VILLAGE 22    LMB-J-INTERIM.WSW                                    0
T2 LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)
T3 ATKINS / INTERIM CONDITIONS
SO    00.00 3447.34  54                          3451.70
R     00.00 3447.34  54      .013
R     27.93 3449.14  54      .013                                    0.000     00.0 1
REM  ################################### SDMH#8A
R     33.93 3449.34  54      .013                                    0.000     00.0 0
REM  ################################### SDMH#8
R    129.13 3451.30  54      .013                                    0.000     15.0 0
R    130.13 3451.33  54      .013                                    0.000     15.0 0
R    131.13 3451.36  54      .013                                    0.000     15.0 0
R    132.13 3451.39  54      .013                                    0.000     15.0 1
R    133.13 3451.42  54      .013                                    0.000     15.0 0
R    134.13 3451.46  54      .013                                    0.000     15.0 0
R    135.13 3451.50  54      .013                                    0.000     15.0 0
R    185.74 3452.52 54       .013                                              06.7 1
REM  ################################### SDMH#9
JX   188.16 3452.62 54 48 24 .013     89.0     5.0 3452.72 3452.72 82.3  -86.6
R    191.74 3452.72 54       .013                                              00.0 0
R    236.30 3455.84 54       .013                                    0.000     00.0 0
SH   236.30 3455.84 54
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
CD  54  4   0    .000   4.500     .000  .000  .000   .00
Q          185.00    .0
```

FILE: LMB-J-INTERIM.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9: 5: 8

SUMMERLIN WEST VILLAGE 22 LMB-J-INTERIM.WSW

LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3447.340	3.334	3450.674	279.03	22.09	7.58	3458.25	.00	4.35	3.94	4.500	.000	.00	0 .0
7.229	.0644					.0242	.18	3.33	2.17	2.41	.013	.00	.00	PIPE
7.229	3447.806	3.417	3451.222	279.03	21.54	7.20	3458.43	.00	4.35	3.85	4.500	.000	.00	0 .0
11.550	.0644					.0224	.26	3.42	2.07	2.41	.013	.00	.00	PIPE
18.780	3448.550	3.586	3452.136	279.03	20.53	6.55	3458.68	.00	4.35	3.62	4.500	.000	.00	0 .0
9.150	.0644					.0203	.19	3.59	1.87	2.41	.013	.00	.00	PIPE
27.930	3449.140	3.777	3452.917	279.03	19.58	5.95	3458.87	.00	4.35	3.31	4.500	.000	.00	0 .0
6.000	.0334					.0191	.11	3.78	1.66	2.98	.013	.00	.00	PIPE
33.930	3449.340	3.828	3453.168	279.03	19.35	5.82	3458.98	.00	4.35	3.21	4.500	.000	.00	0 .0
95.200	.0206					.0185	1.76	3.83	1.61	3.64	.013	.00	.00	PIPE
129.130	3451.300	3.975	3455.275	279.03	18.77	5.47	3460.75	.00	4.35	2.89	4.500	.000	.00	0 .0
1.000	.0300					.0180	.02	3.97	1.46	3.10	.013	.00	.00	PIPE
130.130	3451.330	3.985	3455.315	279.03	18.73	5.45	3460.76	.00	4.35	2.86	4.500	.000	.00	0 .0
1.000	.0300					.0180	.02	3.99	1.45	3.10	.013	.00	.00	PIPE
131.130	3451.360	3.996	3455.356	279.03	18.69	5.43	3460.78	.00	4.35	2.84	4.500	.000	.00	0 .0
1.000	.0298					.0179	.02	4.00	1.44	3.11	.013	.00	.00	PIPE
132.130	3451.390	4.007	3455.397	279.03	18.66	5.40	3460.80	.00	4.35	2.81	4.500	.000	.00	0 .0
1.000	.0300					.0179	.02	4.01	1.43	3.10	.013	.00	.00	PIPE

FILE: LMB-J-INTERIM.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 2

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9: 5: 8

SUMMERLIN WEST VILLAGE 22 LMB-J-INTERIM.WSW

LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
133.130	3451.420	4.018	3455.438	279.03	18.62	5.38	3460.82	.00	4.35	2.78	4.500	.000	.00	0 .0
1.000	.0400					.0178	.02	4.02	1.41	2.80	.013	.00	.00	PIPE
134.130	3451.460	4.041	3455.501	279.03	18.54	5.34	3460.84	.00	4.35	2.72	4.500	.000	.00	0 .0
1.000	.0400					.0177	.02	4.04	1.39	2.80	.013	.00	.00	PIPE
135.130	3451.500	4.066	3455.566	279.03	18.46	5.29	3460.85	.00	4.35	2.66	4.500	.000	.00	0 .0
50.610	.0202					.0177	.89	4.07	1.36	3.69	.013	.00	.00	PIPE
185.740	3452.520	4.351	3456.871	279.03	17.72	4.88	3461.75	.00	4.35	1.61	4.500	.000	.00	0 .0
JUNCT STR	.0414					.0133	.03	4.35	1.00		.013	.00	.00	PIPE
188.160	3452.620	8.529	3461.149	185.00	11.63	2.10	3463.25	.00	3.93	.00	4.500	.000	.00	0 .0
3.580	.0279					.0089	.03	8.53	.00	2.42	.013	.00	.00	PIPE
191.740	3452.720	8.460	3461.180	185.00	11.63	2.10	3463.28	.00	3.93	.00	4.500	.000	.00	0 .0
44.560	.0700					.0089	.39	8.46	.00	1.85	.013	.00	.00	PIPE
236.300	3455.840	5.735	3461.575	185.00	11.63	2.10	3463.68	.00	3.93	.00	4.500	.000	.00	0 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                   0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#9 & #10
T3 ATKINS / INTERIM CONDITIONS
SO    188.16 3452.72   2                        3461.149
R     234.64 3452.91   2      .013                                0.000     02.9 0
JX    235.64 3453.01   2  2   .013   05.00          3452.91         90.00
R     236.64 3453.11   2
R     315.98 3453.43   2      .013
SH    315.98 3453.43   2
CD  1  3   0     .000   8.000    6.000  .000  .000  -.08
CD  2  4   1     .000   4.000     .000  .000  .000   .00
Q            84.000   .0
```

FILE: LMB-SDL5N.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9:50:11

Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#9 & #1
0 ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
188.160	3452.720	8.429	3461.149	89.00	7.08	.78	3461.93	.00	2.86	.00	4.000	.000	.00	1 .0
46.480	.0041					.0038	.18	8.43	.00	3.17	.013	.00	.00	PIPE
234.640	3452.910	8.425	3461.335	89.00	7.08	.78	3462.11	.00	2.86	.00	4.000	.000	.00	1 .0
JUNCT STR	.1001					.0036	.00	8.42	.00		.013	.00	.00	PIPE
235.640	3453.010	8.499	3461.509	84.00	6.68	.69	3462.20	.00	2.78	.00	4.000	.000	.00	1 .0
1.000	.1001					.0040	.00	8.50	.00	1.21	.014	.00	.00	PIPE
236.640	3453.110	8.402	3461.512	84.00	6.68	.69	3462.21	.00	2.78	.00	4.000	.000	.00	1 .0
79.340	.0040					.0034	.27	8.40	.00	3.03	.013	.00	.00	PIPE
315.980	3453.430	8.354	3461.784	84.00	6.68	.69	3462.48	.00	2.78	.00	4.000	.000	.00	1 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                   0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#8
T3 ATKINS / INTERIM CONDITIONS
SO    188.16 3452.72    2                          3461.149
R     188.16 3452.72    2
R     208.66 3457.84    2       .013
SH    208.66 3357.84    2
CD   1   3   0     .000    8.000     6.000  .000  .000  -.08
CD   2   4   1     .000    2.000      .000  .000  .000   .00
Q              5.000    .0
```

FILE: LMB-SDL5S.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9:50:52

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#8

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
188.160	3452.720	8.429	3461.149	5.00	1.59	.04	3461.19	.00	.79	.00	2.000	.000	.00	1 .0
20.500	.2498				.0003	.01	8.43	.00	.25	.010	.00	.00	PIPE	
208.660	3457.840	3.315	3461.155	5.00	1.59	.04	3461.19	.00	.79	.00	2.000	.000	.00	1 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                    0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDDI#10 to SDDI#11
T3 ATKINS / INTERIM CONDITIONS
SO    315.98 3453.63    2                          3461.784
R     315.98 3453.63    2
R     397.80 3454.04    2       .013
SH    397.80 3454.04    2
CD  2   4   1     .000   2.500     .000  .000  .000   .00
Q             18.000    .0
```

FILE: LMB-SDL6.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time:10: 1:27

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDDI#10 to SDDI#11

ATKINS / INTERIM 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
315.980	3453.630	8.154	3461.784	18.00	3.67	.21	3461.99	.00	1.44	.00	2.500	.000	.00	1 .0
81.820	.0050				.0011	.09	8.15	.00	1.22	.010	.00	.00	PIPE	
397.800	3454.040	7.837	3461.877	18.00	3.67	.21	3462.09	.00	1.44	.00	2.500	.000	.00	1 .0

B.2 Ultimate Condition WSPG-W Model

```
T1 SUMMERLIN WEST VILLAGE 22    LMB-J-ULT.WSW                                        0
T2 LAKE MEAD BLVD TO KETTLE RIDGE DRIVE (STREET J)
T3 ATKINS / ULTIMATE CONDITIONS
SO    00.00 3447.34  54                          3451.00
R     00.00 3447.34  54      .013
R     27.93 3449.14  54      .013                                  0.000     00.0 1
REM  ################################### SDMH#8A
R     33.93 3449.34  54      .013                                  0.000     00.0 0
REM  ################################### SDMH#8
R    129.13 3451.30  54      .013                                  0.000     15.0 0
R    130.13 3451.33  54      .013                                  0.000     15.0 0
R    131.13 3451.36  54      .013                                  0.000     15.0 0
R    132.13 3451.39  54      .013                                  0.000     15.0 1
R    133.13 3451.42  54      .013                                  0.000     15.0 0
R    134.13 3451.46  54      .013                                  0.000     15.0 0
R    135.13 3451.50  54      .013                                  0.000     15.0 0
R    185.74 3452.52 54       .013                                              06.7 1
REM  ################################### SDMH#9
JX   188.16 3452.62 54 48 24 .013     49.0     5.0 3452.72 3452.72 82.3  -86.6
R    191.74 3452.72 54       .013                                              00.0 0
R    236.30 3455.84 54       .013                                  0.000     00.0 0
SH   236.30 3455.84 54
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
CD  54  4   0    .000   4.500     .000  .000  .000   .00
Q          188.00    .0
```

FILE: LMB-J-ULT.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9: 5:37

SUMMERLIN WEST VILLAGE 22 LMB-J-ULT.WSW

LAKE MEAD BLVD 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	3447.340	3.015	3450.355	242.03	21.36	7.09	3457.44	.00	4.25	4.23	4.500	.000	.00	0 .0
8.263	.0644					.0234	.19	3.02	2.30	2.21	.013	.00	.00	PIPE
8.263	3447.873	3.099	3450.972	242.03	20.72	6.67	3457.64	.00	4.25	4.17	4.500	.000	.00	0 .0
10.843	.0644					.0213	.23	3.10	2.18	2.21	.013	.00	.00	PIPE
19.105	3448.571	3.238	3451.809	242.03	19.76	6.06	3457.87	.00	4.25	4.04	4.500	.000	.00	0 .0
8.825	.0644					.0191	.17	3.24	2.00	2.21	.013	.00	.00	PIPE
27.930	3449.140	3.389	3452.529	242.03	18.84	5.51	3458.04	.00	4.25	3.88	4.500	.000	.00	0 .0
6.000	.0334					.0178	.11	3.39	1.82	2.71	.013	.00	.00	PIPE
33.930	3449.340	3.430	3452.770	242.03	18.61	5.38	3458.15	.00	4.25	3.83	4.500	.000	.00	0 .0
24.223	.0206					.0173	.42	3.43	1.78	3.21	.013	.00	.00	PIPE
58.153	3449.839	3.467	3453.306	242.03	18.41	5.26	3458.57	.00	4.25	3.78	4.500	.000	.00	0 .0
70.977	.0206					.0163	1.16	3.47	1.74	3.21	.013	.00	.00	PIPE
129.130	3451.300	3.643	3454.943	242.03	17.55	4.78	3459.72	.00	4.25	3.53	4.500	.000	.00	0 .0
1.000	.0300					.0155	.02	3.64	1.57	2.80	.013	.00	.00	PIPE
130.130	3451.330	3.652	3454.982	242.03	17.51	4.76	3459.74	.00	4.25	3.52	4.500	.000	.00	0 .0
1.000	.0300					.0154	.02	3.65	1.56	2.80	.013	.00	.00	PIPE
131.130	3451.360	3.662	3455.022	242.03	17.46	4.73	3459.76	.00	4.25	3.50	4.500	.000	.00	0 .0
1.000	.0298					.0153	.02	3.66	1.55	2.81	.013	.00	.00	PIPE

FILE: LMB-J-ULT.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 2

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9: 5:37

SUMMERLIN WEST VILLAGE 22 LMB-J-ULT.WSW

LAKE MEAD BLVD 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
132.130	3451.390	3.673	3455.063	242.03	17.42	4.71	3459.77	.00	4.25	3.49	4.500	.000	.00	0 .0
1.000	.0300					.0152	.02	3.67	1.54	2.80	.013	.00	.00	PIPE
133.130	3451.420	3.683	3455.103	242.03	17.37	4.68	3459.79	.00	4.25	3.47	4.500	.000	.00	0 .0
1.000	.0400					.0151	.02	3.68	1.53	2.55	.013	.00	.00	PIPE
134.130	3451.460	3.702	3455.162	242.03	17.29	4.64	3459.80	.00	4.25	3.44	4.500	.000	.00	0 .0
1.000	.0400					.0150	.01	3.70	1.51	2.55	.013	.00	.00	PIPE
135.130	3451.500	3.722	3455.222	242.03	17.20	4.60	3459.82	.00	4.25	3.40	4.500	.000	.00	0 .0
4.588	.0202					.0148	.07	3.72	1.49	3.24	.013	.00	.00	PIPE
139.718	3451.592	3.743	3455.335	242.03	17.12	4.55	3459.89	.00	4.25	3.37	4.500	.000	.00	0 .0
32.739	.0202					.0142	.46	3.74	1.47	3.24	.013	.00	.00	PIPE
172.457	3452.252	3.961	3456.213	242.03	16.32	4.14	3460.35	.00	4.25	2.92	4.500	.000	.00	0 .0
13.283	.0202					.0134	.18	3.96	1.28	3.24	.013	.00	.00	PIPE
185.740	3452.520	4.248	3456.768	242.03	15.56	3.76	3460.53	.00	4.25	2.07	4.500	.000	.00	0 .0
JUNCT STR	.0414					.0111	.03	4.25	1.00		.013	.00	.00	PIPE
188.160	3452.620	6.846	3459.466	188.00	11.82	2.17	3461.64	.00	3.95	.00	4.500	.000	.00	0 .0
3.580	.0279					.0091	.03	6.85	.00	2.44	.013	.00	.00	PIPE
191.740	3452.720	6.779	3459.499	188.00	11.82	2.17	3461.67	.00	3.95	.00	4.500	.000	.00	0 .0
30.066	.0700					.0091	.27	6.78	.00	1.87	.013	.00	.00	PIPE

FILE: LMB-J-ULT.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 3

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9: 5:37

SUMMERLIN WEST VILLAGE 22 LMB-J-ULT.WSW

LAKE MEAD BLVD 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
221.806	3454.825	4.947	3459.772	188.00	11.82	2.17	3461.94	.00	3.95	.00	4.500	.000	.00	0 .0
HYDRAULIC JUMP														
221.806	3454.825	3.013	3457.838	188.00	16.61	4.28	3462.12	.00	3.95	4.23	4.500	.000	.00	0 .0
2.953	.0700					.0142	.04	3.01	1.79	1.87	.013	.00	.00	PIPE
224.760	3455.032	3.092	3458.124	188.00	16.13	4.04	3462.17	.00	3.95	4.17	4.500	.000	.00	0 .0
4.015	.0700					.0130	.05	3.09	1.70	1.87	.013	.00	.00	PIPE
228.775	3455.313	3.231	3458.544	188.00	15.38	3.67	3462.22	.00	3.95	4.05	4.500	.000	.00	0 .0
3.146	.0700					.0116	.04	3.23	1.56	1.87	.013	.00	.00	PIPE
231.921	3455.533	3.381	3458.914	188.00	14.67	3.34	3462.25	.00	3.95	3.89	4.500	.000	.00	0 .0
2.324	.0700					.0104	.02	3.38	1.42	1.87	.013	.00	.00	PIPE
234.245	3455.696	3.546	3459.242	188.00	13.98	3.04	3462.28	.00	3.95	3.68	4.500	.000	.00	0 .0
1.494	.0700					.0094	.01	3.55	1.29	1.87	.013	.00	.00	PIPE
235.739	3455.801	3.732	3459.532	188.00	13.33	2.76	3462.29	.00	3.95	3.39	4.500	.000	.00	0 .0
.561	.0700					.0086	.00	3.73	1.15	1.87	.013	.00	.00	PIPE
236.300	3455.840	3.949	3459.789	188.00	12.71	2.51	3462.30	.00	3.95	2.95	4.500	.000	.00	0 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                  0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#9 & #10
T3 ATKINS / ULTIMATE CONDITIONS
SO    188.16 3452.72    2                        3459.47
R     234.64 3452.91    2      .013                                0.000     02.9 0
JX    235.64 3453.01    2  2   .013   05.00          3452.91          90.00
R     236.64 3453.11    2
R     315.98 3453.43    2      .013
SH    315.98 3453.43    2
CD   1   3   0     .000   8.000    6.000  .000  .000  -.08
CD   2   4   1     .000   4.000     .000  .000  .000   .00
Q              44.000   .0
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FILE: LMB-SDL5N_ULT.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1
Program Package Serial Number: 7271
WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9:50:31
Summerlin Village 22 - Lake Mead Boulevard
Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#9 & #1
0 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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
188.160	3452.720	6.750	3459.470	49.00	3.90	.24	3459.71	.00	2.10	.00	4.000	.000	.00	1 .0
46.480	.0041				.0012	.05	6.75	.00	2.08	.013	.00	.00	PIPE	
234.640	3452.910	6.616	3459.526	49.00	3.90	.24	3459.76	.00	2.10	.00	4.000	.000	.00	1 .0
JUNCT STR	.1001				.0011	.00	6.62	.00		.013	.00	.00	PIPE	
235.640	3453.010	6.609	3459.619	44.00	3.50	.19	3459.81	.00	1.98	.00	4.000	.000	.00	1 .0
1.000	.1001				.0011	.00	6.61	.00	.87	.014	.00	.00	PIPE	
236.640	3453.110	6.510	3459.620	44.00	3.50	.19	3459.81	.00	1.98	.00	4.000	.000	.00	1 .0
79.340	.0040				.0009	.07	6.51	.00	1.96	.013	.00	.00	PIPE	
315.980	3453.430	6.264	3459.694	44.00	3.50	.19	3459.88	.00	1.98	.00	4.000	.000	.00	1 .0

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                    0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#8
T3 ATKINS / ULTIMATE CONDITIONS
SO    188.16 3452.72    2                          3459.47
R     188.16 3452.72    2
R     208.66 3457.84    2       .013
SH    208.66 3357.84    2
CD  1  3  0     .000    8.000     6.000  .000  .000  -.08
CD  2  4  1     .000    2.000      .000  .000  .000   .00
Q             5.000    .0
```

FILE: LMB-SDL5S_ULT.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time: 9:51: 7

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDMH#9 S to SDDI#8

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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
188.160	3452.720	6.750	3459.470	5.00	1.59	.04	3459.51	.00	.79	.00	2.000	.000	.00	1 .0
19.040	.2498					.0003	.01	6.75	.00	.25	.010	.00	.00	PIPE
207.200	3457.476	2.000	3459.476	5.00	1.59	.04	3459.51	.00	.79	.00	2.000	.000	.00	1 .0
.723	.2498					.0003	.00	2.00	.00	.25	.010	.00	.00	PIPE
207.923	3457.656	1.815	3459.471	5.00	1.67	.04	3459.51	.00	.79	1.16	2.000	.000	.00	1 .0
.414	.2498					.0003	.00	1.81	.18	.25	.010	.00	.0	

```
T1 Summerlin Village 22 - Lake Mead Boulevard                                    0
T2 Desert Foothills Drive to STREET 27 - Lateral at SDDI#10 S to SDDI#11
T3 ATKINS / ULTIMATE CONDITIONS
SO    315.98 3453.63    2                          3459.694
R     315.98 3453.63    2
R     397.80 3454.04    2       .013
SH    397.80 3454.04    2
CD  2   4   1     .000   2.500     .000  .000  .000    .00
Q             18.000    .0
```

FILE: LMB-SDL6_ULT.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 9-10-2019 Time:10: 1:43

Summerlin Village 22 - Lake Mead Boulevard

Desert Foothills Drive to STREET 27 - Lateral at SDDI#10 S to SDDI#11

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 or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
315.980	3453.630	6.064	3459.694	18.00	3.67	.21	3459.90	.00	1.44	.00	2.500	.000	.00	1 .0
81.820	.0050					.0011	.09	6.06	.00	1.22	.010	.00	.00	PIPE
397.800	3454.040	5.747	3459.787	18.00	3.67	.21	3460.00	.00	1.44	.00	2.500	.000	.00	1 .0

Appendix C. CD-ROM

SUMMERLIN VILLAGE 22
IMPROVEMENT PLANS FOR:

LAKE MEAD BOULEVARD
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
FUTURE SID PROJECT

LAKE MEAD BOULEVARD ROUGH GRADE
KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

SUMMERLIN®

SHEET INDEX

1	COVER SHEET	
2	LEGEND AND ABBREVIATIONS	
3	GENERAL NOTES	
4	DEMOLITION PLAN	
5	HORIZONTAL CONTROL PLAN 1	
6	HORIZONTAL CONTROL PLAN 2	
7	OVERALL DRAINAGE PLAN	
8–9	MASTER DRAINAGE PLAN	
10–11	MASTER WATER PLAN	
12–13	MASTER SEWER PLAN	
14	ROADWAY GRADING PLAN	STA. 148+50 TO END
15	ROADWAY PLAN AND PROFILE	STA. 148+50 TO END
16	ROADWAY GRADING PLAN	STA. 144+50 TO STA. 148+50
17	ROADWAY PLAN AND PROFILE	STA. 144+50 TO STA. 148+50
18	ROADWAY GRADING PLAN	STA. 140+00 TO STA. 144+50
19	ROADWAY PLAN AND PROFILE	STA. 140+00 TO STA. 144+50
20	ROADWAY GRADING PLAN	STA. 135+25 TO STA. 140+00
21	ROADWAY PLAN AND PROFILE	STA. 135+25 TO STA. 140+00
22	ROADWAY GRADING PLAN	STA. 132+00 TO STA. 135+25
23	ROADWAY PLAN AND PROFILE	STA. 132+00 TO STA. 135+50
24	ROADWAY GRADING PLAN	STA. 129+00 TO STA. 132+00
25	ROADWAY PLAN AND PROFILE	STA. 129+00 TO STA. 132+00
26	ROADWAY GRADING PLAN	STA. 126+00 TO STA. 129+00
27	ROADWAY PLAN AND PROFILE	STA. 126+00 TO STA. 129+00
28	ROADWAY GRADING PLAN	STA. 122+00 TO STA. 126+00
29	ROADWAY PLAN AND PROFILE	STA. 122+00 TO STA. 126+00
30	ROADWAY GRADING PLAN	STA. 119+00 TO STA. 122+00
31	ROADWAY PLAN AND PROFILE	STA. 119+00 TO STA. 122+00
32	ROADWAY GRADING PLAN	BEGIN TO STA. 119+00
33	ROADWAY PLAN AND PROFILE	BEGIN TO STA. 119+00
34	KETTLE RIDGE DRIVE PLAN AND PROFILE	
35–36	STORM DRAIN LATERAL PROFILES	
37	OFFSITE STORM DRAIN PLAN AND PROFILE	
38	PEDESTRIAN TUNNEL PLAN & PROFILE	
39	FLOODWALL PLAN AND PROFILE	STA. 21+00 TO END
40	FLOODWALL PLAN AND PROFILE	STA. 17+00 TO STA. 21+00
41	FLOODWALL PLAN AND PROFILE	STA. 13+00 TO STA. 17+00
42	FLOODWALL PLAN AND PROFILE	BEGIN TO STA. 13+00
46–47	STREETLIGHT PLAN	
49–50	SIGNAGE AND STRIPING PLAN	
52	TYPICAL SECTIONS	
48	WATER DETAILS	
49	SEWER DETAILS	
50	INTERSECTION DETAIL	LAKE MEAD BLVD AND KETTLE RIDGE DR
51	INTERSECTION DETAIL	LAKE MEAD BLVD AND STREET K
52	INTERSECTION DETAIL	LAKE MEAD BLVD AND DESERT FOOTHILLS DR
53	TUNNEL TYPICAL SECTION AND GENERAL NOTES	
54	TUNNEL PLAN AND ELEVATION	
55	TUNNEL GEOMETRICS	
56	TUNNEL FOOTING DETAILS SHEET 1 OF 2	
57	TUNNEL FOOTING DETAILS SHEET 2 OF 2	
58	WINGWALLS 1 AND 2	
59	WINGWALLS 3 AND 4	
60	FLOOD WALL 01 PLAN AND ELEVATION	
61	FLOOD WALL 02 PLAN AND ELEVATION SHEET 1 OF 4	
62	FLOOD WALL 02 PLAN AND ELEVATION SHEET 2 OF 4	
63	FLOOD WALL 02 PLAN AND ELEVATION SHEET 3 OF 4	
64	FLOOD WALL 02 PLAN AND ELEVATION SHEET 4 OF 4	
65	FLOOD WALL 03 PLAN AND ELEVATION	
66	WALL TYPICAL SECTION AND GENERAL NOTES	

UTILITY NOTE

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.

CALL BEFORE YOU DIG: 1-800-642-2444

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE) PRESSURE REDUCING VALVES BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY AND WILL NOTE BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF THE LAS VEGAS VALLEY WATER DISTRICT FACILITIES.

NOTICE OF INTENT NOTE

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

PROPOSED RIGHT-OF-WAY ACREAGE
5.73 AC.

PROPOSED DISTURBED AREA ACREAGE
17.08

GEOTECHNICAL ENGINEER
PREPARED BY: NOVA GEOTECHNICAL & INSPECTION SERVICES
4480 W. HACIENDA AVENUE, SUITE 104, LAS VEGAS, NV 89118
PHONE: 702-873-3478
PROJECT NO.: G-18-176
DATED: DECEMBER 3, 2018

OWNER /DEVELOPER

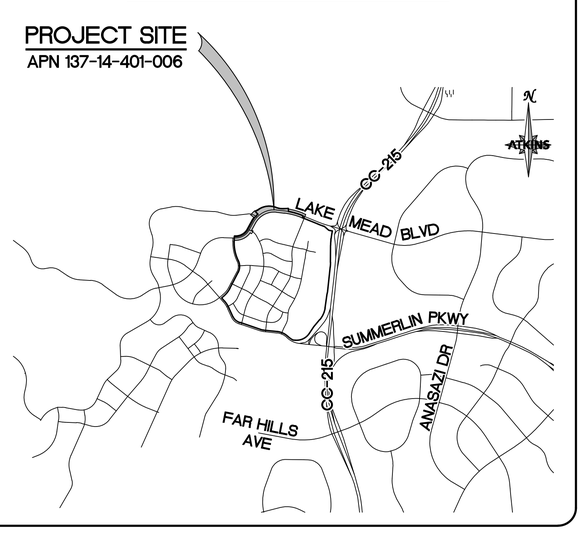
OWNER

CONTACT: KEVIN ORROCK
HOWARD HUGHES COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY
10845 GRIFFITH PEAK DRIVE, SUITE 160
LAS VEGAS, NV 89135

NPDES PERMIT NOTE

THE ENGINEER SHOULD CONTACT THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) TO OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PRIOR TO CONSTRUCTION. ALL CONSTRUCTION PROJECTS ONE ACRE OR LARGER MUST APPLY FOR THE PERMIT THROUGH NDEP. ALL QUESTIONS REGARDING THE NPDES PERMIT REQUIREMENTS SHOULD BE DIRECTED TO THE NDEP AT (775) 687-9429.

LOCATION MAP



ENGINEER / CONSULTANT

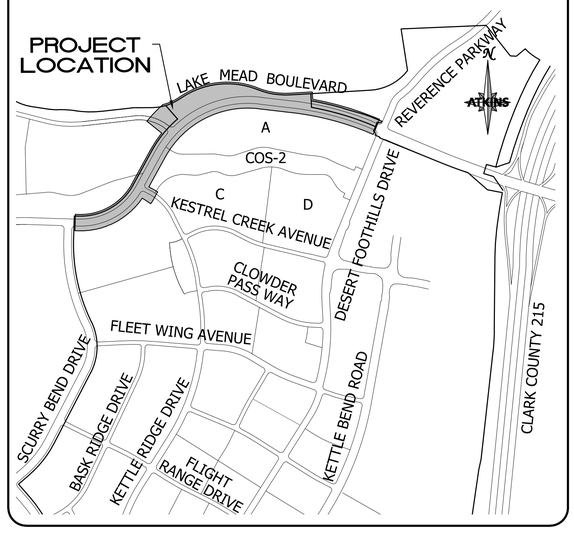
CIVIL

CONTACT: DAVID WILSON P.E.
ATKINS
2270 CORPORATE CIRCLE SUITE 200
HENDERSON, NEVADA 89074
(702) 263-7275

FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2150E, DATED 9/27/2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

VICINITY MAP



APPROVALS

HOWARD HUGHES COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY

KEVIN T. ORROCK, VICE PRESIDENT — DATE

ALLEN PAVELKA, P.E. #9029 — DATE
CITY ENGINEER

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

CITY OF LAS VEGAS PLANNING DEPARTMENT — DATE

NOTE:
THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

LAS VEGAS FIRE AND RESCUE — DATE

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK — DATE

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

SHEETS: _____

NV ENERGY — DATE

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

SOUTHWEST GAS CORPORATION — DATE

COX COMMUNICATIONS OF LAS VEGAS, INC — 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.

LINEAR UNIT: US SURVEY FOOT (FTUS)
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00
SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)
ZONE: LAS VEGAS HIGH ELEVATION ZONE
PROJECTION: TRANSVERSE MERCATOR STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID OF ORIGIN: 400,000.00 M (1,312,333.3333 FTUS)
EASTING AT CENTRAL MERIDIAN: 300,000 M (984,250.0000 FTUS)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.000135 (EXACT)
NOTES:

1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO "GROUND" DISTANCES IN THE PROJECTED AREA
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

BENCHMARK

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
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

LEGAL DESCRIPTION

BEING A PORTION OF LOT 2 AS SHOWN ON THE MAP THEREOF IN BOOK 123 OF PLATS, PAGE 36, OFFICIAL RECORDS, CITY OF LAS VEGAS CLARK COUNTY, NEVADA

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you D g AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

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

PROFESSIONAL ENGINEER - STATE OF NEVADA — PAUL A. BATES — EXPIRES 12-31-20 — CIVIL — No. 18723

9/11/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN®

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

COVER SHEET

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: NONE
VERT.: NONE

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 1 / 66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-01-TITL-C1.dwg LAYOUT: C-1 Sep 11, 2019 - 8:34AM

@	AT
#	NUMBER
AB	ABANDONED
AC	ASPHALTIC CONCRETE
ACP	ASBESTOS CEMENT PIPE
AGG	AGGREGATE
AIP	ABANDON IN PLACE
ALT	ALTERNATE
AP	ANGLE POINT
APPROX	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL
AV/AR	AIR VACUUM AIR RELIEF VALVE
BC	BACK OF CURB
BCR	BACK OF CURB RETURN
BLK	BLOCK
BLVD	BOULEVARD
BM	BENCHMARK
BO	BLOW OFF
BP	BOTTOM OF PIPE
BSW	BACK OF SIDEWALK
BVC	BEGIN VERTICAL CURVE
BVCE	BEGINNING OF VERTICAL CURVE ELEVATION
BVCS	BEGINNING OF VERTICAL CURVE STATION
BW	BOTTOM WIDTH
C&G	CURB AND GUTTER
C–C	CENTER TO CENTER
CATV	CABLE TELEVISION
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT
CF	CUBIC FOOT
CIP	CAST IRON PIPE OR CAST IN PLACE
CL	CENTERLINE
CLR	CLEAR
CLV	CITY OF LAS VEGAS
CM	CONSTRUCTION MANAGER
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNDT	CONDUIT
CNLV	CITY OF NORTH LAS VEGAS
CO	CLEANOUT
COH	CITY OF HENDERSON
COL	COLUMN
CON'T	CONTINUATION
CONC	CONCRETE
CONST	CONSTRUCT OR CONSTRUCTION
COR	CORNER
COS	COMMUNITY OPEN SPACE
CPP	CORRUGATED PLASTIC PIPE
CSP	CORRUGATED STEEL PIPE
CU	CUBIC
CULV	CULVERT
CY	CUBIC YARD
D	DEPTH
DCSWCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS
DET, DTL	DETAIL
DEPT	DEPARTMENT
DG	DESIGN GRADE
DI	DROP INLET
DIA	DIAMETER
DIAG	DIAGONAL
DIP	DUCTILE IRON PIPE
DOC	DOCUMENT
DW	DRIVEWAY
DWG	DRAWING
E	EAST
EA	EACH
EB	EASTBOUND
EC	END OF CURVE
ECR	END CURB RETURN
EF	EACH FACE
EG	EXISTING GROUND
ELEC	ELECTRICAL
ELEV	ELEVATION
EMBK	EMBANKMENT
EOP	EDGE OF PAVEMENT
EP	EDGE OF PAVEMENT ALIGNMENT END
EQ	EQUAL
ESMT	EASEMENT
EVC	END VERTICAL CURVE
EVCS	END VERTICAL CURVE STATION
EW	EACH WAY
EX, EXST	EXISTING
EXP, JT	EXPANSION JOINT
FA	FIRE ALARM
FC	FACE OF CURB
FF	FINISHED FLOOR ELEVATION
FH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTIC
FT	FOOT OR FEET
G	GAS LINE
GALV	GALVANIZED
GB	GRADE BREAK
GL	GRATE LENGTH
GM	GAS METER
GUT	GUTTER
GV	GATE VALVE
H	HEIGHT
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HDWL	HEADWALL
HE	HORIZONTAL ELLIPTICAL
HGL	HYDRAULIC GRADE LINE
HOA	HOMEOWNER'S ASSOCIATION
HOR	HORIZONTAL
HP	HIGH POINT
ID	INSIDE DIAMETER
IN	INCH(ES)
INT	INTERSECTION
INV	INVERT
IQAC	INTERAGENCY QUALITY ASSURANCE COMMITTEE
IRR	IRRIGATION
ISL	ISLAND
JB	JUNCTION BOX
JCT	JUNCTION
JT	JOINT
K	VERTICAL CURVE K VALUE
L	LENGTH
LB	POUND(S)
LF	LINEAR FEET
LIN	LINEAR
LIN #	CCWRD MANHOLE NUMBER
LOC	LENGTH OF CURVE
LOL	LAYOUT LINE
LP	LOW POINT
LS	LANDSCAPE
LT	LEFT
LVC	LENGTH OF VERTICAL CURVE
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAS	MASONRY
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MON	MONOLITHIC, MONUMENT
MTL	MATERIAL
ME	MATCH EXISTING
MUE	MUNICIPAL UTILITY EASEMENT
N	NORTH
NAP	NOT A PART
NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
NF	NEAR FACE
NG	NUMBER OF GRATES, NATURAL GRADE
NIC	NOT IN CONTRACT
No.	NUMBER
NTS	NOT TO SCALE
NVE	NV ENERGY
OC	ON CENTER
OD	OUTSIDE DIAMETER
OG	OPEN GRADE
OH	OVERHEAD
OHP	OVERHEAD POWER
OS	OFFSET
P	POWER
PB	PULL BOX
PBS	PLANTMIX BITUMINOUS SURFACE
PC	POINT OF CURVATURE
PCC	PORTLAND CEMENT CONCRETE OR POINT OF COMPOUND CURVATURE
PE	POLYETHYLENE
PG	PROPOSED GRADE
PGL	PROFILE GRADE LINE
PH	POT HOLE
PI	POINT OF INTERSECTION
PIP	PROTECT IN PLACE
PL	PROPERTY LINE
PLCS	PLACES
PMF	PAVEMENT MARKING FILM
POC	POINT OF CONNECTION
PP	POWER POLE
PRC	POINT OF REVERSE CURVATURE
PROP	PROPOSED
PSI	POUNDS PER SQUARE INCH
PT	POINT, POINT OF TANGENCY
PUE	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
QTY	QUANTITY
Q100,INT.	INTERIM 100 YEAR STORM FLOW RATE
Q100,ULT.	ULTIMATE 100 YEAR STORM FLOW RATE
(R)	RADIAL
R/W,ROW	RIGHT OF WAY
R	RADIUS
RC	REINFORCED CONCRETE
RCB	REINFORCED CONCRETE BOX
RCC	ROLLER COMPACTED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RECP	REINFORCED ELLIPTICAL CONCRETE PIPE
REINF	REINFORCED OR REINFORCEMENT
RELOC	RELOCATE
REV	REVISION
RG	ROUGH GRADE
RP	RADIUS POINT
RPM	RAISED PAVEMENT MARKER
RR	RAILROAD
RT	RIGHT
SCHED	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SF	SQUARE FOOT/SQUARE FEET
SHLD	SHOULDER
SHT	SHEET
SHP	STEEL HIGH PRESSURE PIPE
SMFO	SINGLE MODE FIBER OPTIC
SNWA	SOUTHERN NEVADA WATER AUTHORITY
SQ	SQUARE
SS	SANITARY SEWER OR SIDE SLOPE
SSD	SUMMERLIN STANDARD DRAWING
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STLT	STREETLIGHT
SDHW	STORM DRAIN HEADWALL
STRUCT	STRUCTURAL OR STRUCTURE
SUM #	CCWRD MANHOLE NUMBER
SURV	SURVEY
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
SY	SQUARE YARD
T	TELEPHONE LINE
TAN	TANGENT
TB	TOP OF BOX
TBA	TO BE ADJUSTED
TBC	TOP OF BACK OF CURB
TBR	TO BE REMOVED
TC	TOP OF CURB
TCD	TRAFFIC CONTROL DEVICE
TDS	TECHNICAL DRAINAGE STUDY
TEL	TELEPHONE
TEMP	TEMPORARY
TF	TOP OF FOOTING
THK	THICK
THR	THRUST
THW	TOP OF HEADWALL
TOF	TOP OF FACE
TW/TOW	TOP OF WALL
TP	TOP OF PIPE
TRANS	TRANSITION
TS	TRAFFIC SIGNAL
TSI	TRAFFIC SIGNAL INTERCONNECT
TW	TOP OF WALL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS
UG	UNDERGROUND
UGP	UNDERGROUND POWER
UIE	UPPER INVERT ELEVATION
UNO	UNLESS NOTED OTHERWISE
UPRR	UNION PACIFIC RAILROAD
USD	UNIFORM STANDARD DRAWING
UTACS	ULTRA THIN ASPHALT CONCRETE SURFACE
USTCDE	UTILITY, STREETLIGHT, TRAFFIC CONTROL DEVICE EASEMENT
V	VOLT
VAR	VARIABLE
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VG	VALLEY GUTTER
W	WEST, WATER
W/	WITH
WB	WEST BOUND
WL	WATER LINE
WM	WATER METER
W/O	WITHOUT
WPJ	WEAKENED PLANE JOINT
WV	WATER VALVE
WW	WING WALL
YD	YARD(S)

	EXISTING	PROPOSED
DAYLIGHT LINE		
FLOWLINE		
CENTERLINE		
PARCEL LINE		
RIGHT OF WAY		
PAVEMENT STRIPING		
OVERHEAD POWER	—OHP—	—OHP—
UNDERGROUND POWER	—UGP—	—UGP—
SANITARY SEWER	—S—	15" SS
WATER		24"W (3550)
STORM DRAIN		
GAS	—G—	—G—
CABLE T.V.	—CATV—	—CATV—
TELEPHONE	—T—	—T—
STREETLIGHT CONDUIT	—STLT—	STLT
STOP BAR		
CONCRETE ENCASEMENT		
FENCE		
BLOCK WALL		
RETAINING WALL		
SAWCUT PAVEMENT		
CONTOUR	(3005)	3005
SPOT ELEVATION	x 3011.6	x 3011.6
CURB AND GUTTER		
EDGE OF PAVEMENT		
EASEMENT		
MATCHLINE		
SIGN		
DOUBLE POST SIGN		
STORM DRAIN MANHOLE	SD	
STORM DRAIN STRUCTURE		
DROP INLET		
BEEHIVE INLET		
SEWER MANHOLE	S	
FIRE HYDRANT		
CAP AND BLOWOFF		
GATE VALVE		
REDUCER		
STREETLIGHT	OR	
PULLBOX		
SIGNAL POLE		
ELEVATION	(00.0) FG	00.0 FG
WATER PRESSURE ZONE BOUNDARY		
WATER PRESSURE ZONE		3550
		FUTURE
SIDEWALK		

ROADWAY ALIGNMENT DESIGNATIONS

"LMB" = LAKE MEAD BOULEVARD
"DFD" = DESERT FOOTHILLS DRIVE
"KCA" = KESTREL CREEK AVENUE (STREET I)
"KRD" = KETTLE RIDGE DRIVE (STREET J)
"SBD" = SCURRY BEND DRIVE (STREET N)
"SK" = STREET K
"FW" = FLOOD WALL

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 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.

PROFESSIONAL ENGINEER – STATE OF NEVADA – PAUL A BATES – EXPIRES 12-31 – CIVIL – No. 18123 – 9/11/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

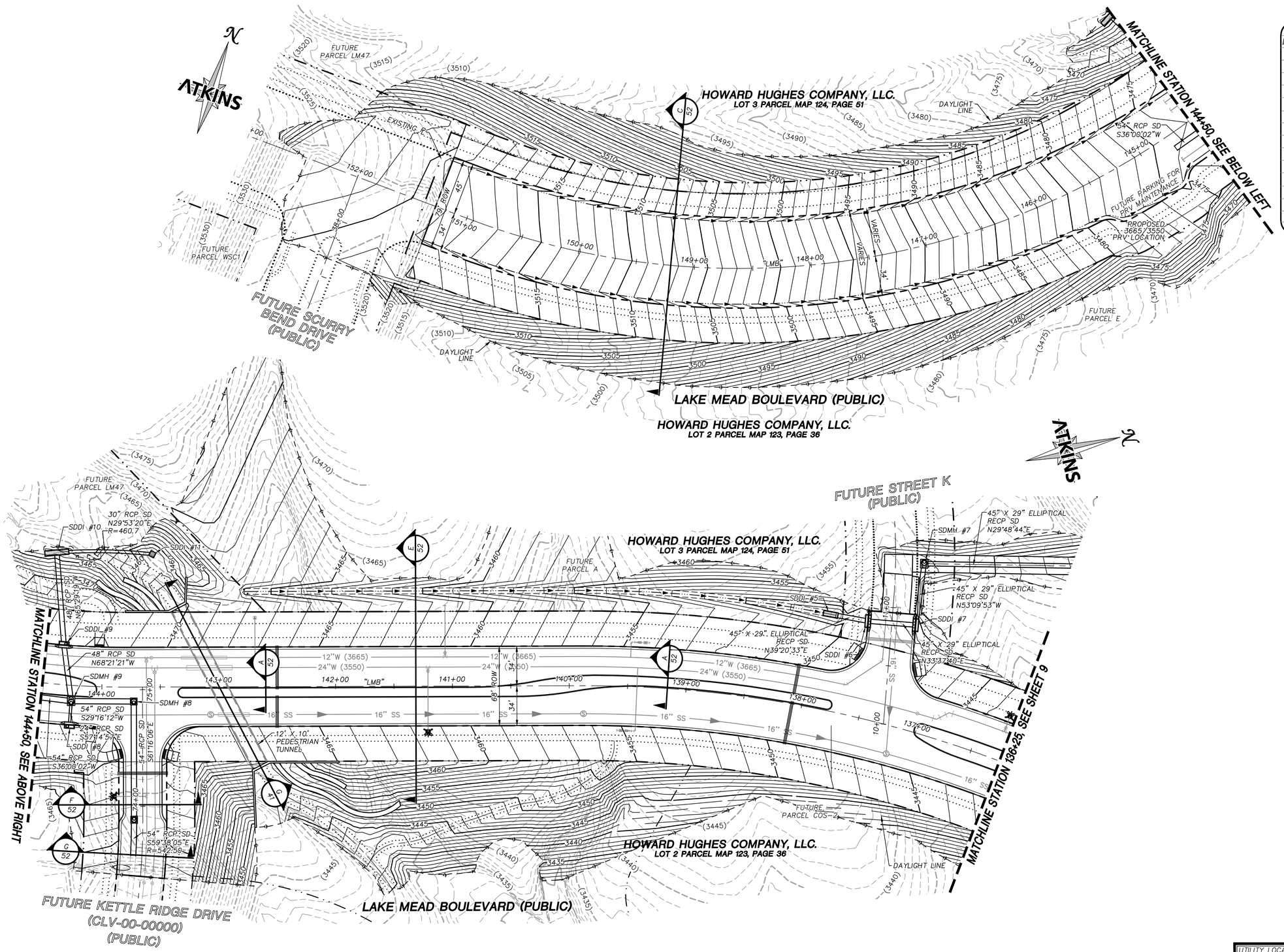
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD – DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE – KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

LEGEND AND ABBREVIATIONS

DESIGNED BY: N. BARCAS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: NONE
VERT.: NONE

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 2 / 66
CLV

X:\Projects\SummitWest\Village 22\100060653 – V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653–02–LOND–C2.dwg LAYOUT: C–2 Sep 11, 2019 – 8:34AM



SUMMARY OF QUANTITIES

DESCRIPTION	QUANTITY	UNIT
DRAINAGE		

MASTER PLAN NOTE

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

STORM DRAIN NOTES

1. SEE PROFILE SHEETS FOR CONSTRUCTION NOTES AND INFORMATION RELATED TO PIPE SIZE (INNER DIAMETER), MANHOLE BASE SIZE (INSIDE DIMENSIONS), AND DROP INLET LENGTHS (CURB OPENINGS).
2. ALL STORM DRAIN MATERIAL TO BE CLASS III REINFORCED CONCRETE PIPE, UNLESS OTHERWISE NOTED IN PROFILES
3. CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.

GRAPHIC SCALE
40 0 20 40 80
HORIZONTAL: 1"= 40'

SOILS REPORT

BY NOVA
PROJECT NO. G-18-176
DATED 12/03/18
EARTHWORK QUANTITIES (RAW):
CUT= 40,570 CU YDS
FILL= 86,860 CU YDS

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

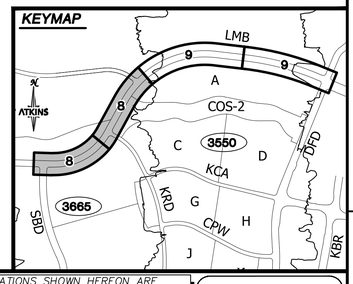
Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES ITS QUICK! Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. ITS QUICK! CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A BATES EXP. 12-31-20 CIVIL No. 18723 9/11/19

KEYMAP



REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

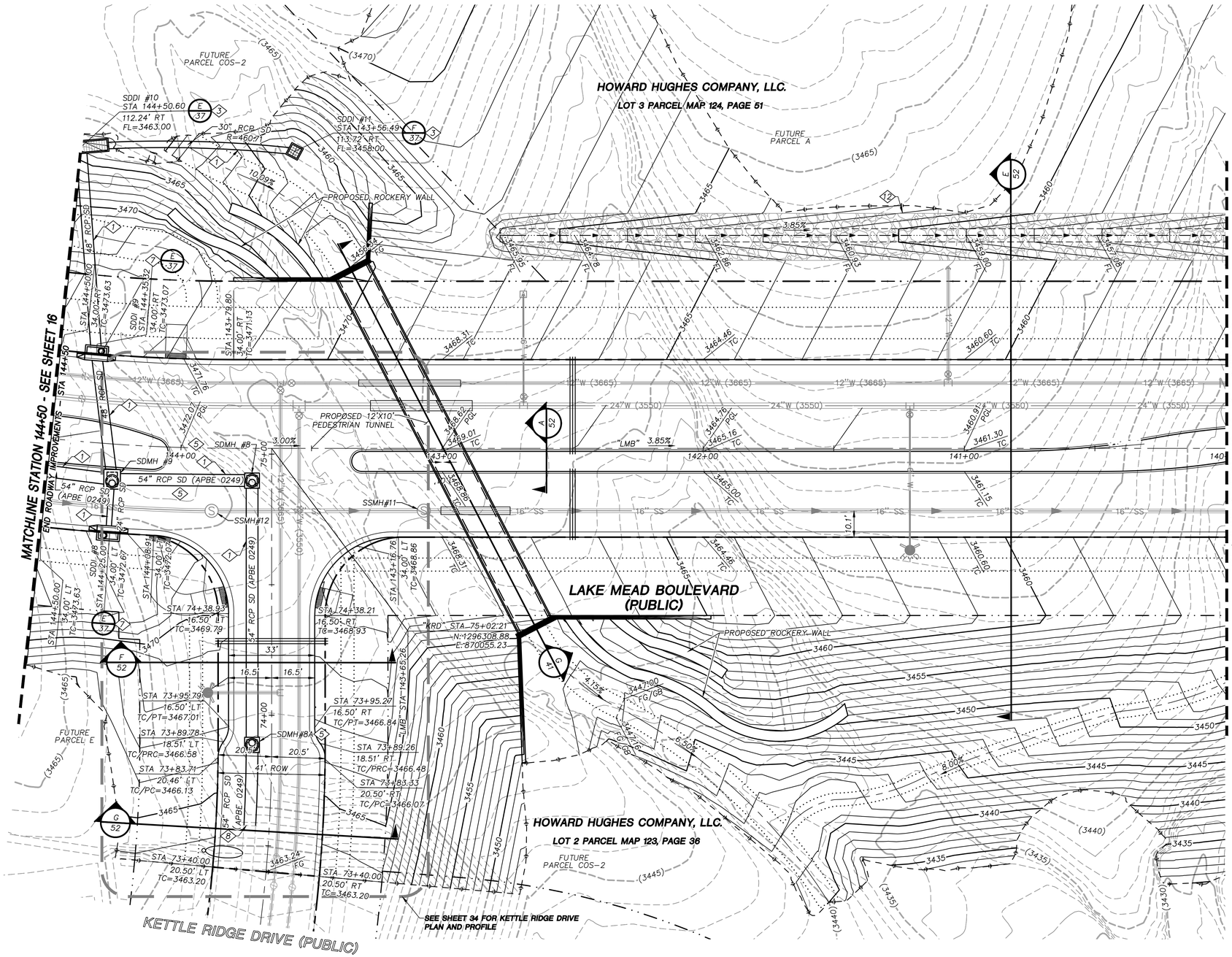
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

MASTER DRAINAGE PLAN

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=40'
VERT.: NONE

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 8 /66
CLV 18-19262

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-05-STRM-SD1.dwg LAYOUT: SD-1 Sep 11, 2019 - 8:37AM



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 REGIONAL AND ARTERIAL SYSTEMS OF TRANSPORTATION

Call before you Dig AVOID CUTTING OR DISTURBING UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-642-2444

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

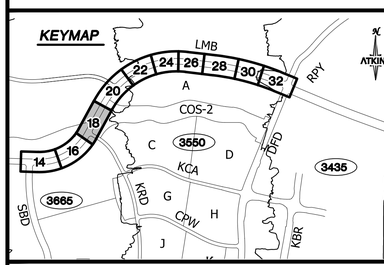
STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=8", THICKNESS=16")

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

KEYMAP



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PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL A BATES
EXP. 6-30-20
CIVIL
NO. 18723
9/11/19

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

SUMMERLIN

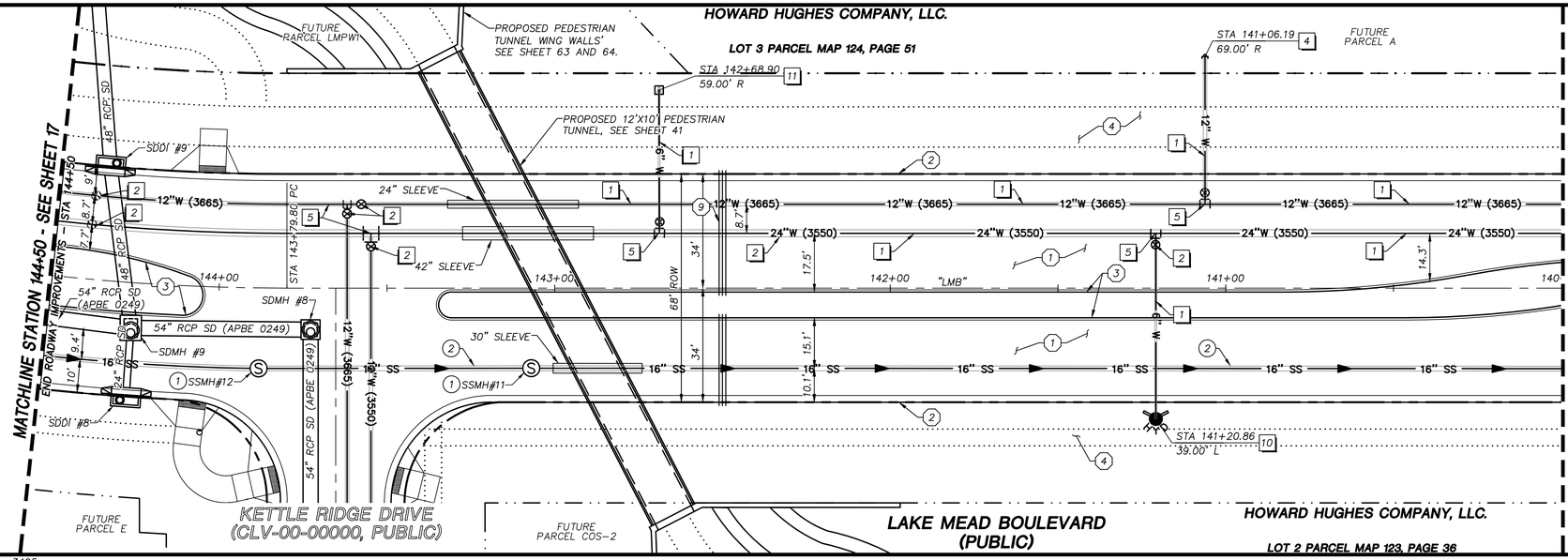
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

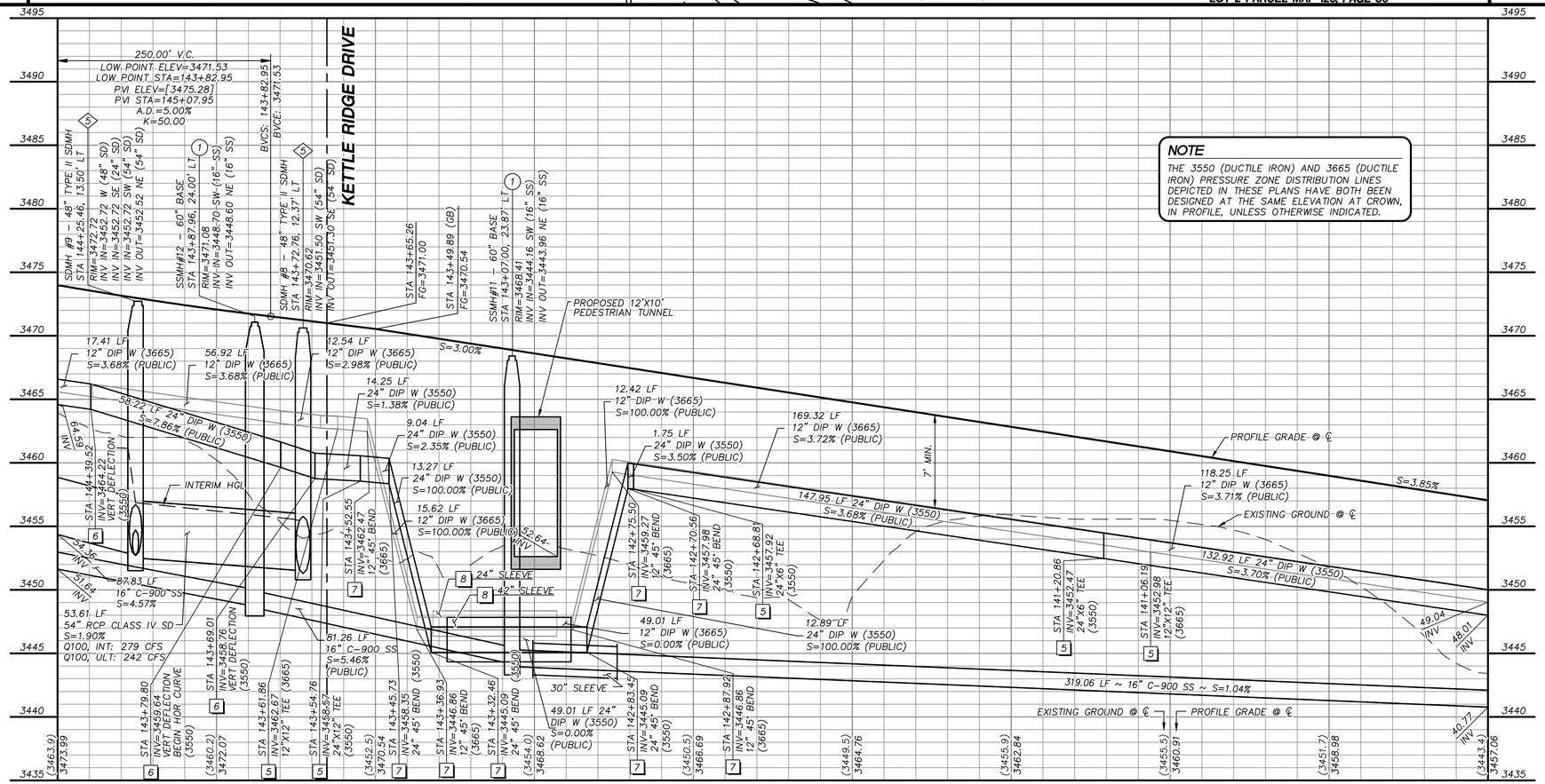
ROADWAY GRADING PLAN
STA. 140+00 TO STA. 144+50

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 18/66
CLV

X:\Projects\SummerWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 18 Sep 11, 2019 - 8:39AM





NOTE

THE 3550 (DUCTILE IRON) AND 3665 (DUCTILE IRON) PRESSURE ZONE DISTRIBUTION LINES DEPICTED IN THESE PLANS HAVE BOTH BEEN DESIGNED AT THE SAME ELEVATION AT CROWN, IN PROFILE, UNLESS OTHERWISE INDICATED.

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 REMOTELY AND ARTISTICALLY SYSTEMS OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

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

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. 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.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

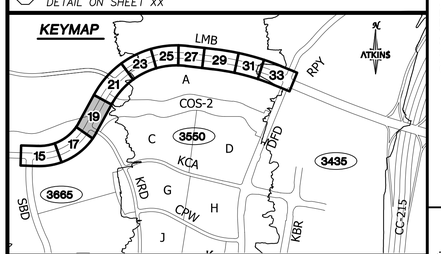
WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
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6. INSTALL DEFLECTION AT PIPE JOINTS (MAXIMUM OF 1°)
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8. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
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6. CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5').
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KEYMAP



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PROFESSIONAL ENGINEER-STATE OF NEVADA PAUL A. BATES EXPIRES 12/31 CIVIL No. 18123 9/11/19

REV.	DESCRIPTION	BY	DATE	APPROVAL

REVISIONS

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

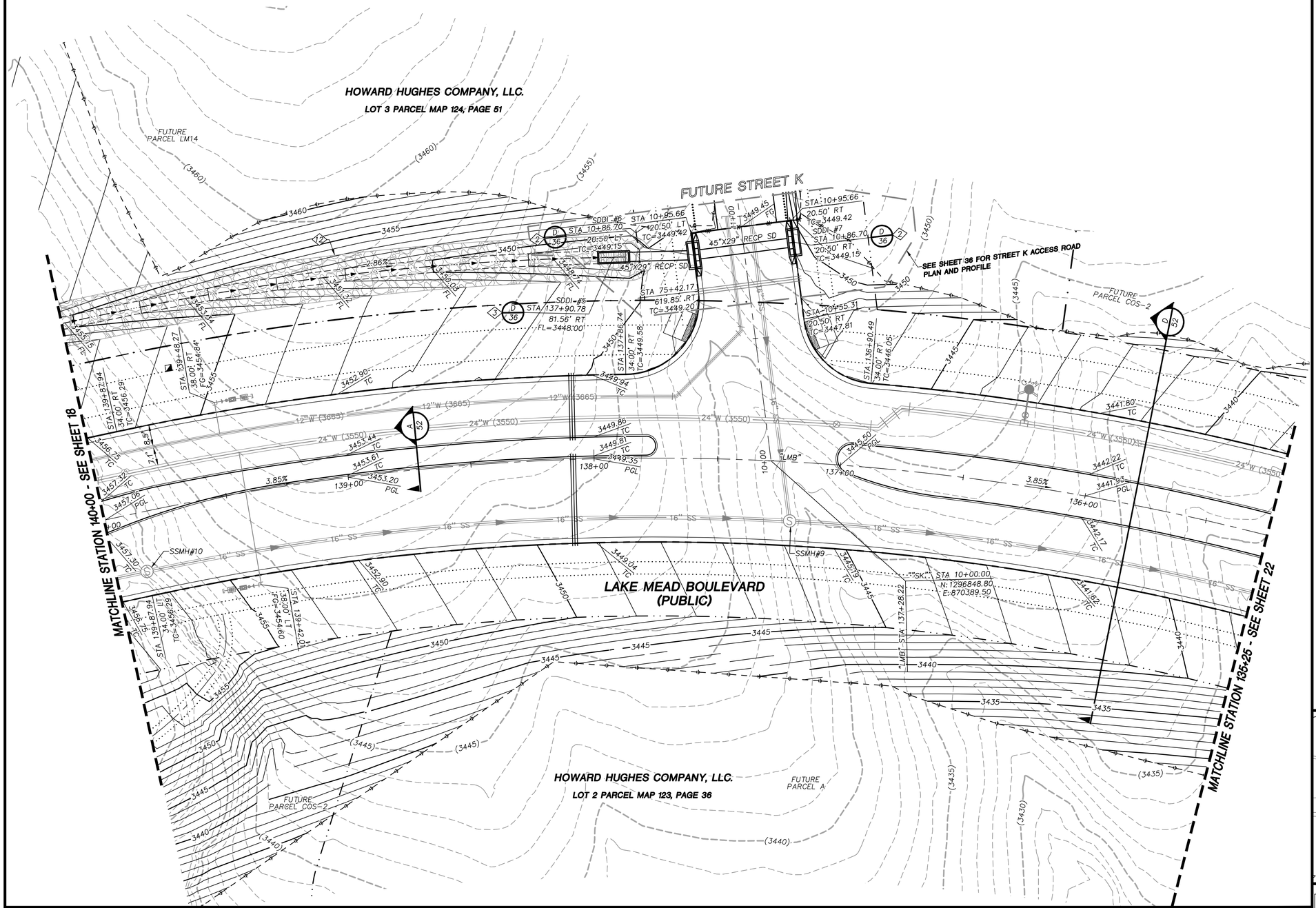
SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY PLAN AND PROFILE
STA. 140+00 TO STA. 144+50

DESIGNED BY:	N. BARCOS
DRAWN BY:	L. MAMACLAY
CHECKED BY:	P. BATES
HORIZ.:	1"=20'
VERT.:	1"=5'
JOB NO.	100060653
DATE	SEPTEMBER, 2019
DRAWING NO.	19/66
CLV	

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 19 Sep 11, 2019 - 8:40AM



STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPROVAL

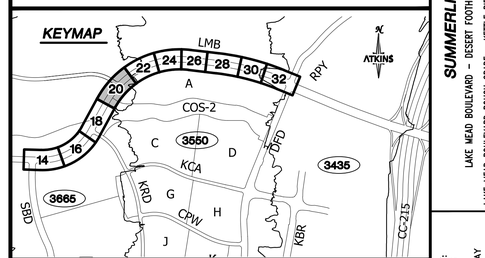
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

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ROADWAY GRADING PLAN
STA. 135+25 TO STA. 140+00

KEYMAP



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 PRIORITY AND INTERNAL SYSTEMS OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

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

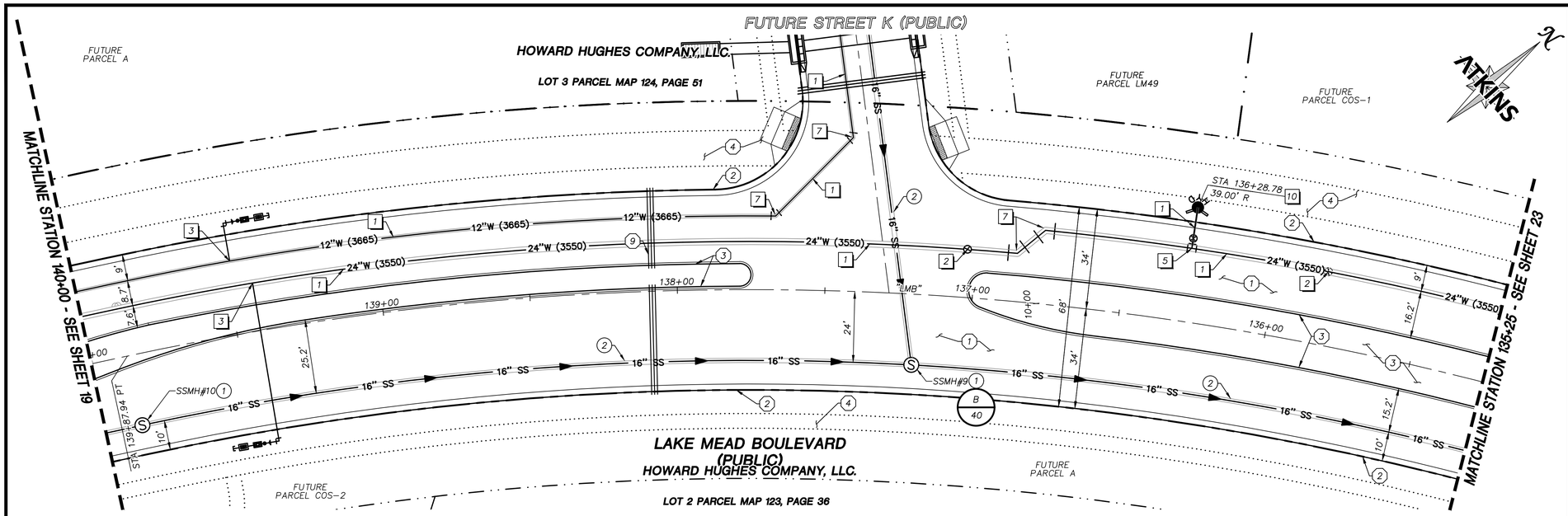
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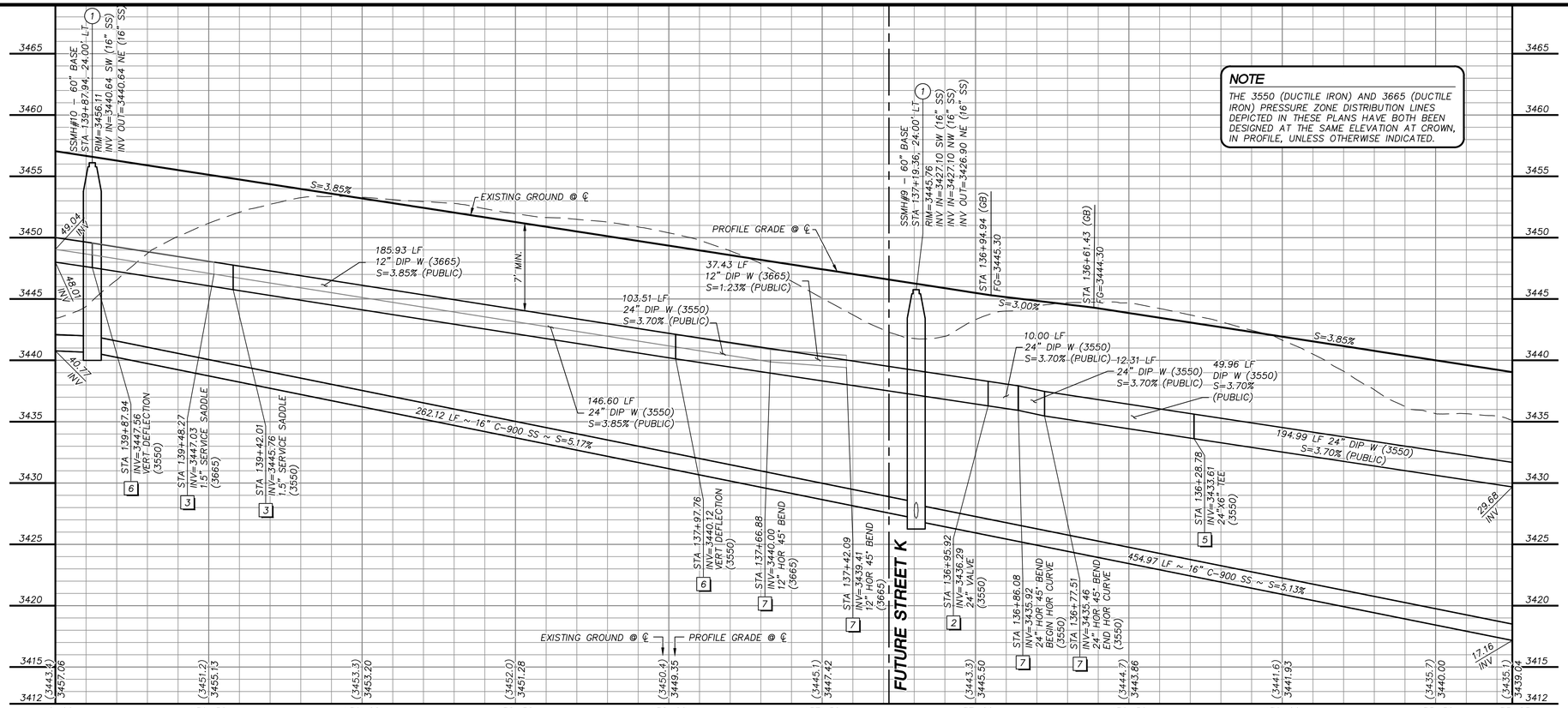
PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A. BATES
EXPIRES 12-31
CIVIL
No. 18723
9/11/19

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 20/66
CLV

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

X:\Projects\SummerlWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-08-GRAD-G1.dwg LAYOUT: 20 Sep 11, 2019 - 8:40AM





GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 NEVADA AND ARIZONA SYSTEMS OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES IN CLARK COUNTY. Call 811 OR 1-800-642-2444

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

NOTE

THE 3550 (DUCTILE IRON) AND 3665 (DUCTILE IRON) PRESSURE ZONE DISTRIBUTION LINES DEPICTED IN THESE PLANS HAVE BOTH BEEN DESIGNED AT THE SAME ELEVATION AT CROWN, IN PROFILE, UNLESS OTHERWISE INDICATED.

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

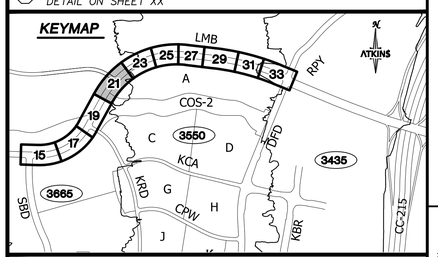
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1. INSTALL WATER MAIN PER UDACS PLATES #17 AND #19
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2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
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8. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224
9. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX

KEYMAP



REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

ROADWAY PLAN AND PROFILE
STA. 135+25 TO STA. 140+00

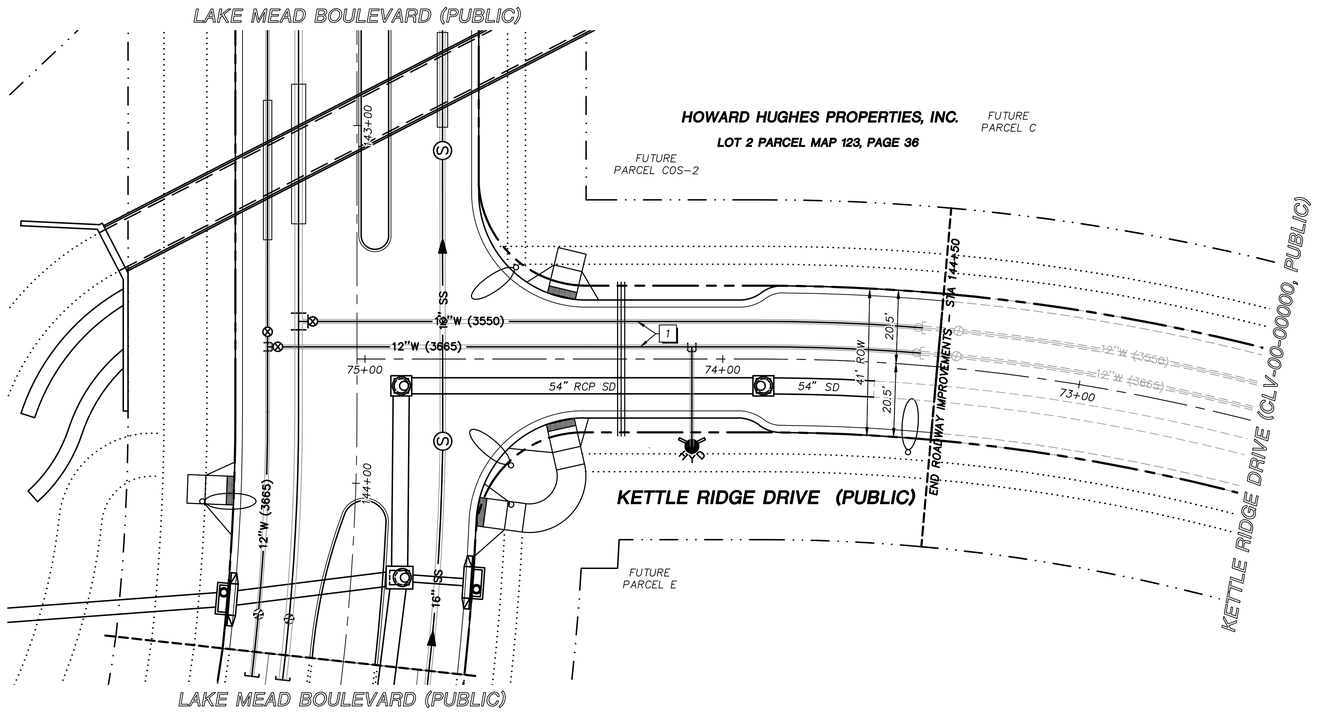
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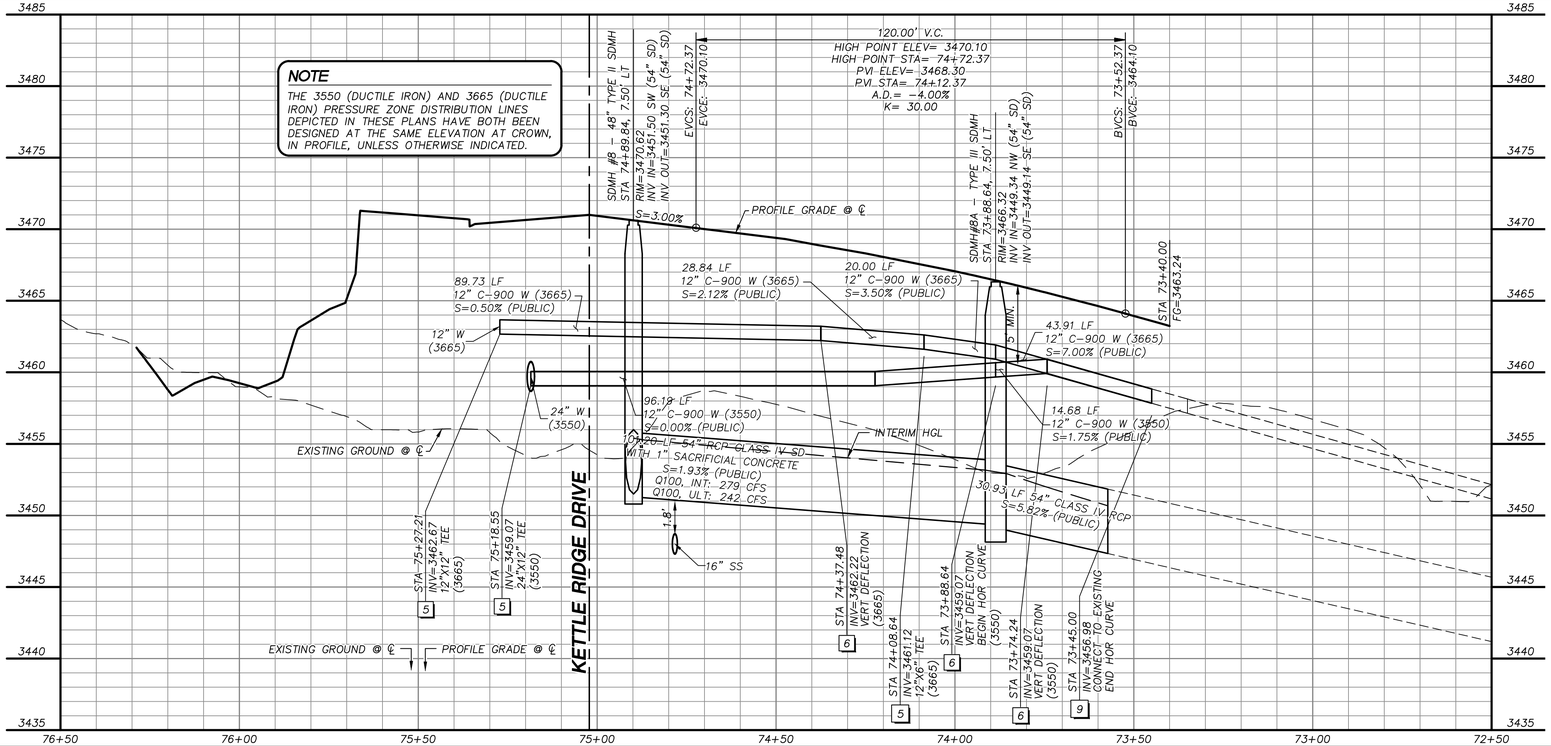
PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL A. BATES
EXPIRES 12-31-20
CIVIL
No. 18725
9/11/19

JOB NO.	100060653
DATE:	SEPTEMBER, 2019
DRAWING NO.	21/66
DESIGNED BY:	N. BARCOS
DRAWN BY:	L. MAMACLAY
CHECKED BY:	P. BATES
HORIZ.:	1"=20'
VERT.:	1"=5'

CLV

X:\Projects\SummitWest\Village 22\100060653 - Y22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-09-PLAN-P1.dwg LAYOUT: 21 Sep 11, 2019 - 8:40AM





GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

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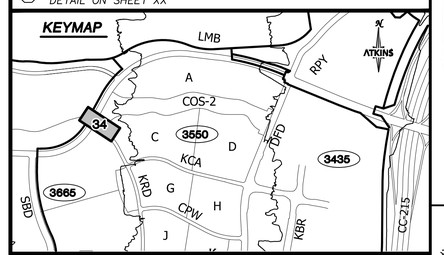
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PROFESSIONAL ENGINEER - STATE OF NEVADA — PAUL A. BATES — EXPIRES 12-31-20 — CIVIL — No. 18723 — 9/11/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

SUMMERLIN VILLAGE 22

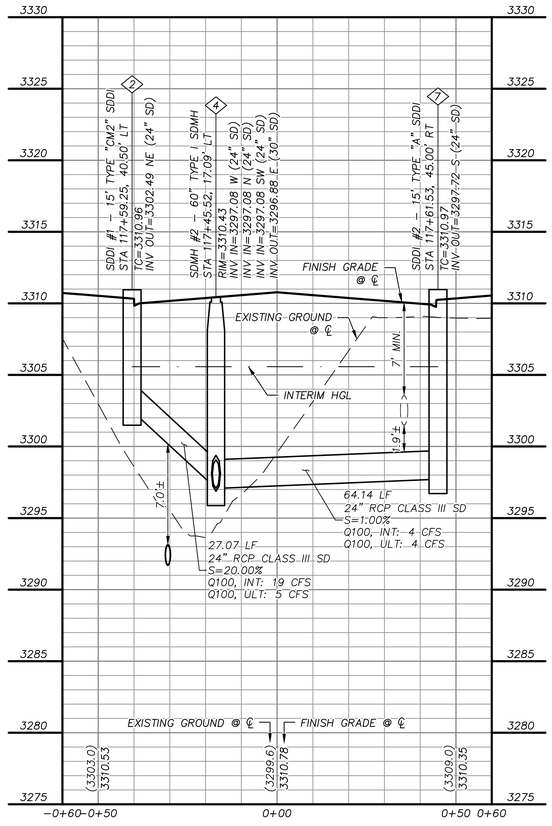
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET M)

KETTLE RIDGE DRIVE PLAN AND PROFILE

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=40'
VERT.: NONE

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 34/66
CLV

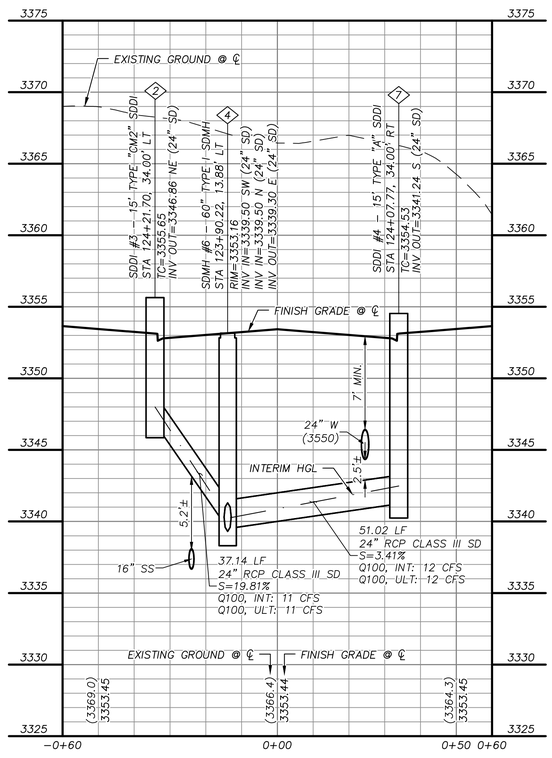
K:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-31-GRAD-SJ-PP.dwg LAYOUT: PJ-1 Sep 11, 2019 - 8:45AM



STORM DRAIN LATERAL 1

"LMB" STA. 117+46 SEE SHEET 32

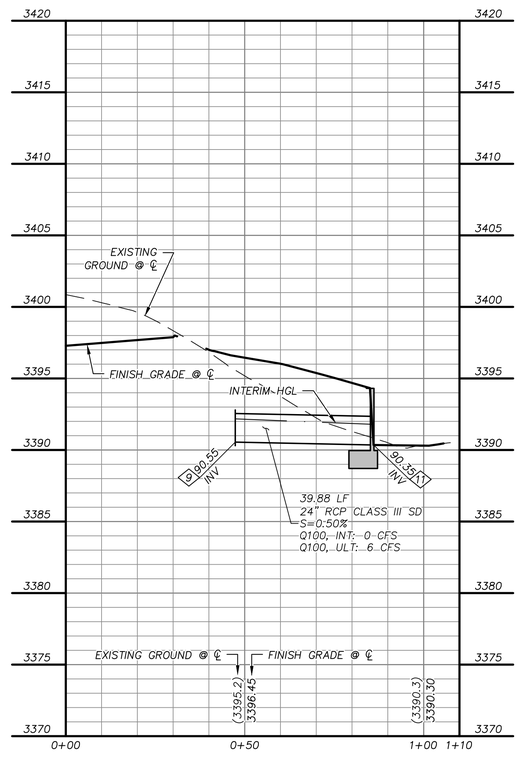
A / 35



STORM DRAIN LATERAL 2

"LMB" STA. 123+90 SEE SHEET 28

B / 35



STORM DRAIN LATERAL 3

"LMB" STA. 129+42 SEE SHEET 24

C / 35

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R–4.2.1
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. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE–CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP–RAP (D50=8", THICKNESS=16")

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX–0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. ITS COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. ITS COSTLY. CALL BEFORE YOU DO OVERHEAD 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.

PROFESSIONAL ENGINEER – STATE OF NEVADA – PAUL A. BATES – No. 18723 – EXPIRES 12-31-20 – CIVIL

9/11/19

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

SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD – DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE – KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

STORM DRAIN LATERAL PLAN AND PROFILE

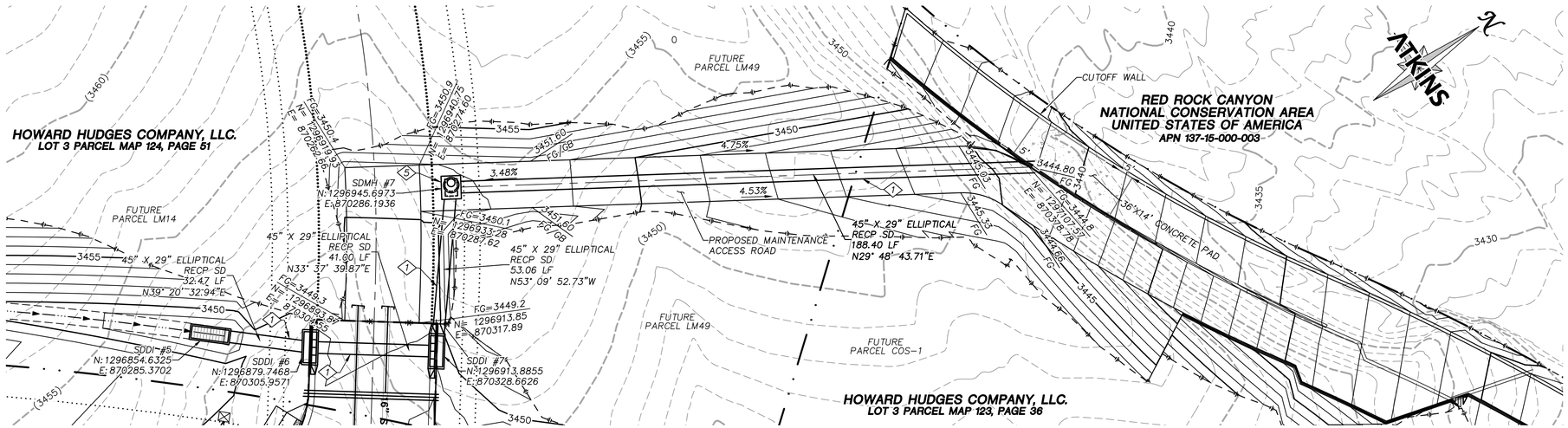
DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

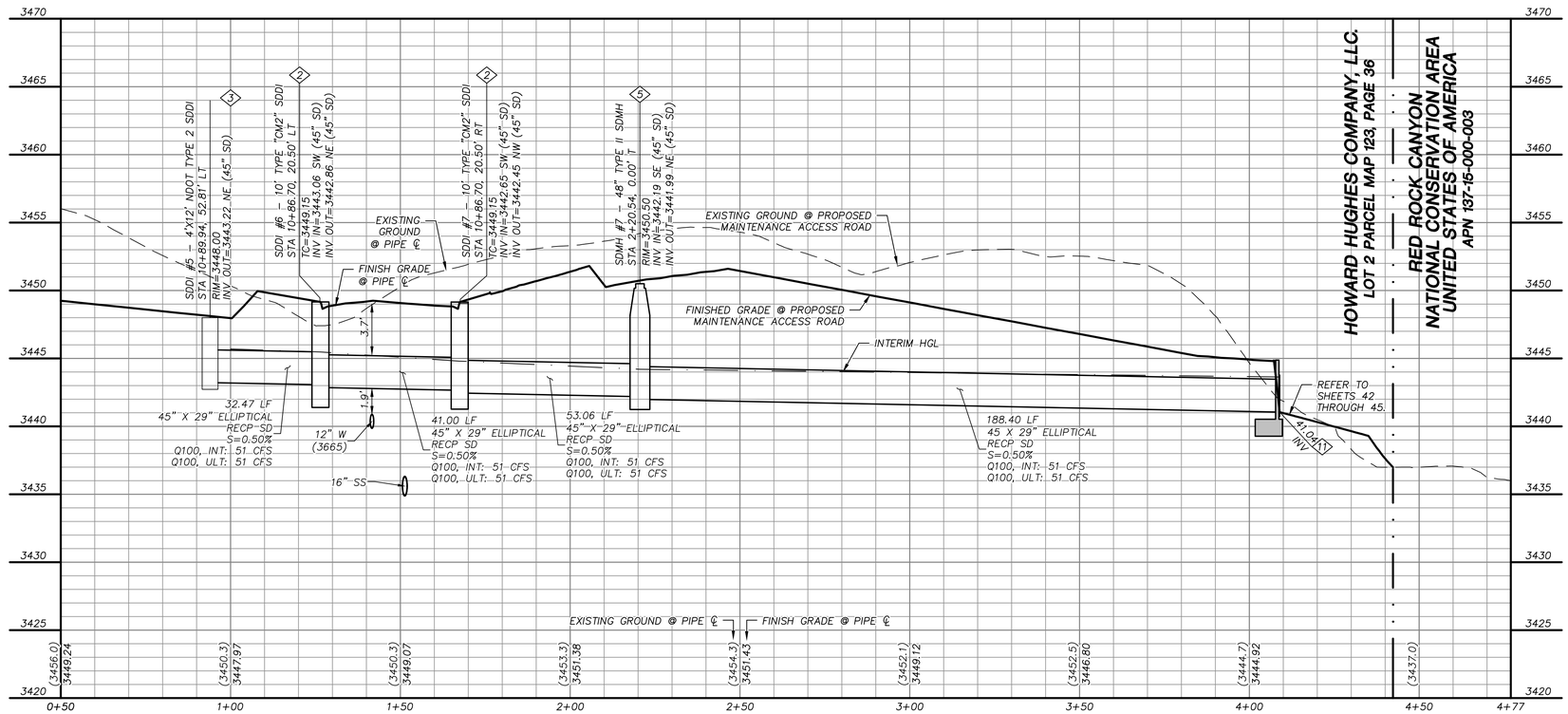
JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 35/66

CLV

X:\Projects\SummWest\Village 22\100060653 – V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653–xx–LATL–P.dwg LAYOUT: 35 Sep 11, 2019 – 8:53AM

NOTE:
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.





STORM DRAIN LATERAL 4

"LMB" STA. 137+42 SEE SHEET 20

D
36

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=8", THICKNESS=16")

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 FUNDED BY THE NEVADA SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES IN CLARK COUNTY. Call 811 OR 1-800-642-2444

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

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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A. BATES
EXPIRES 12/31/20
CIVIL
No. 18723
9/11/19

REVISIONS			
REV.	DESCRIPTION	BY	DATE	APPROVAL

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

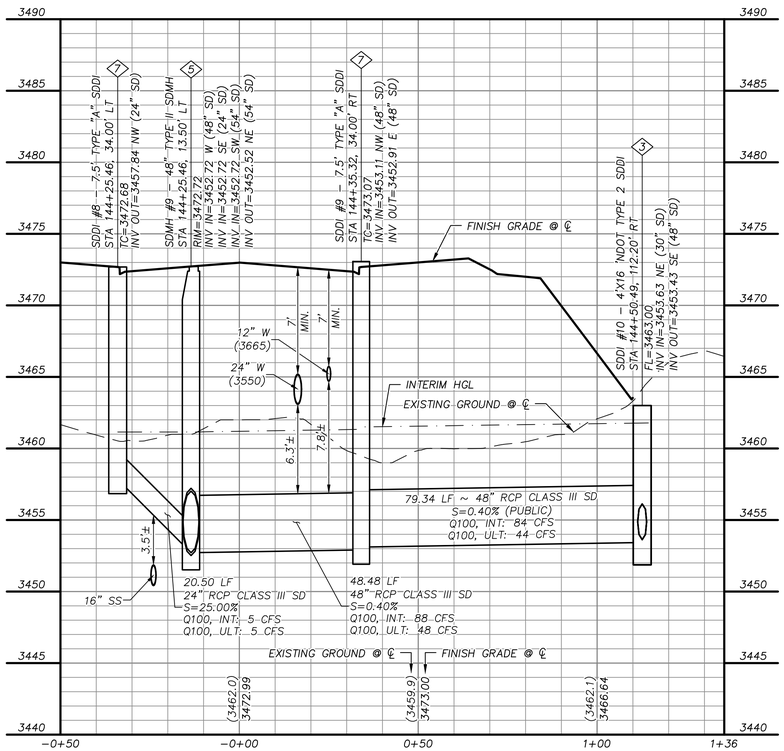
SUMMERLIN

SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

STORM DRAIN LATERAL PLAN AND PROFILE

JOB NO.	100060653
DATE:	SEPTEMBER, 2019
DRAWING NO.	36/66
DESIGNED BY:	N. BARCOS
DRAWN BY:	L. MAMACLAY
CHECKED BY:	P. BATES
HORZ.:	1"=20'
VERT.:	NONE
CLV	

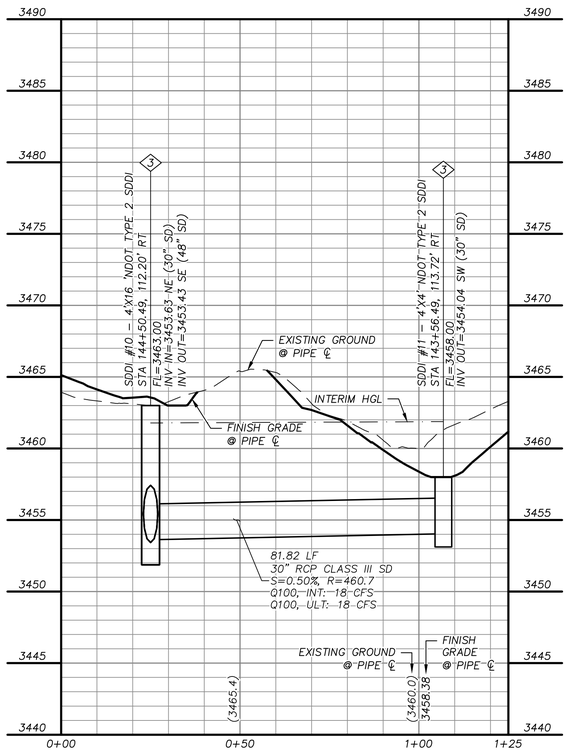
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STORM DRAIN LATERAL 5

"LMB" STA. 144+25 SEE SHEET 18

E 37



STORM DRAIN LATERAL 6

"LMB" STA. 144+02 SEE SHEET 18

F 37

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP–RAP (D50=8", THICKNESS=16")

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX–0000

BASIS OF BEARING

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

BENCHMARK

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T21S,R59E,S03

FAST Call before you UnderGround 1-702-432-5300 NEVADA AND ARIZONA SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES ITS QUICK! Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. ITS QUICK! CALL BEFORE YOU DIG OVERHEAD 1-702-227-2929

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PROFESSIONAL ENGINEER – STATE OF NEVADA
PAUL A. BATES
EXPIRES 12/31
CIVIL
No. 18123
9/11/19

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

SUMMERLIN

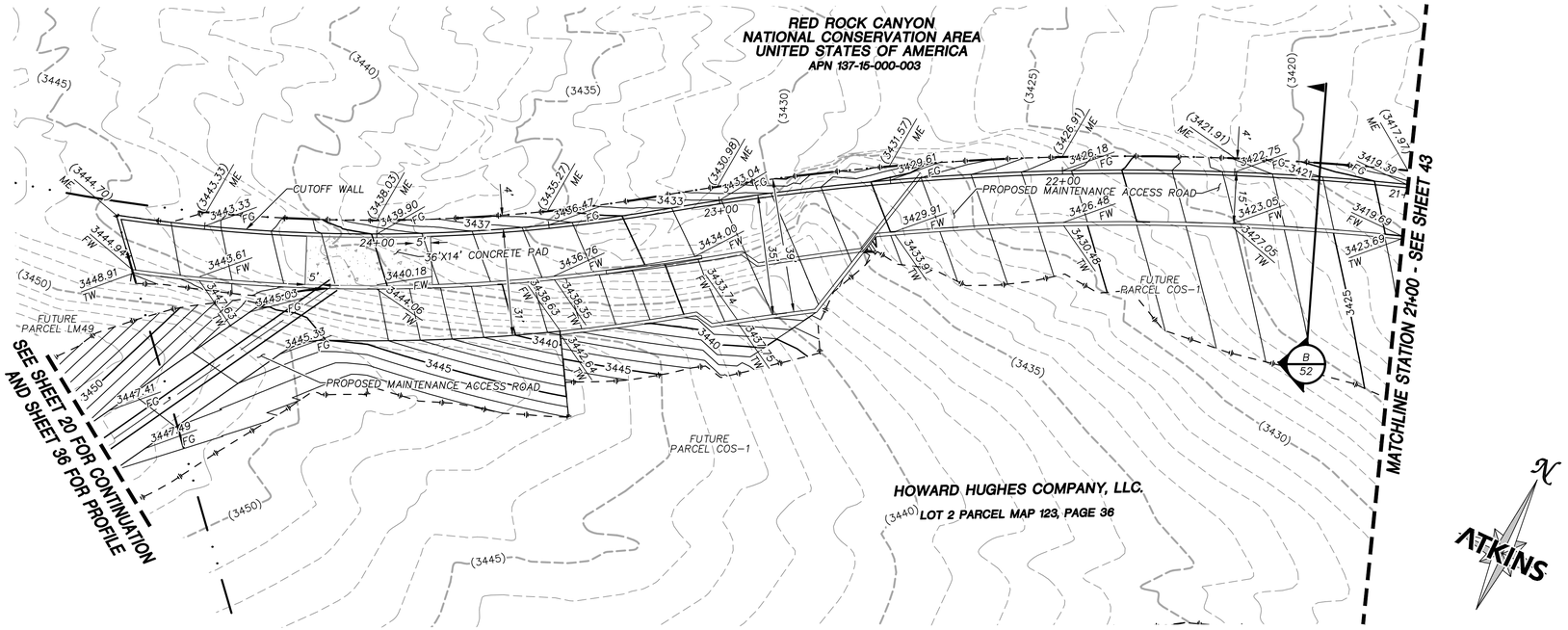
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD – DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE – KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

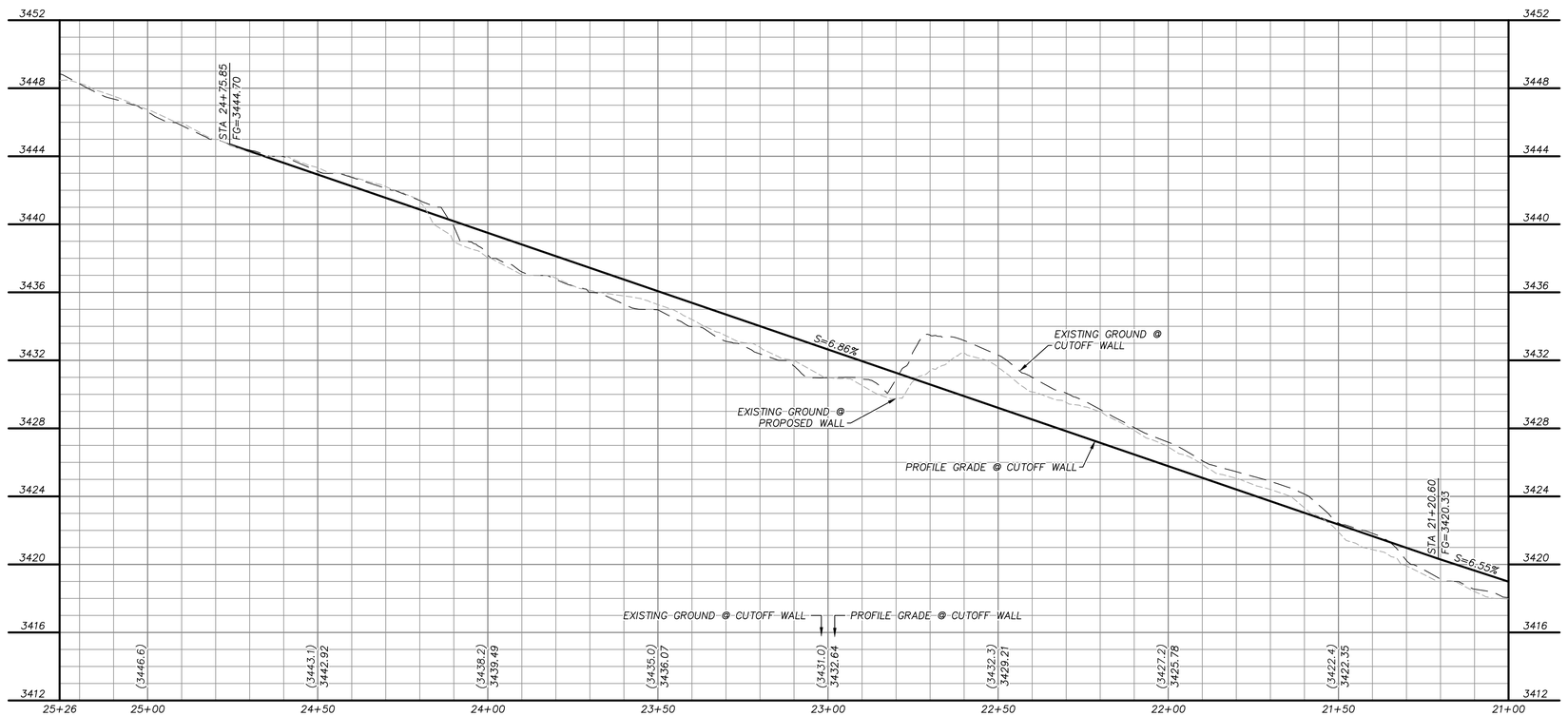
STORM DRAIN LATERAL PLAN AND PROFILE

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 37/66
CLV

X:\Projects\SummWest\Village 22\100060653 – V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653–xx–LATL–P.dwg LAYOUT: 37 Sep 11, 2019 – 8:54AM





GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

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

FAST Call before you UnderGround 1-702-432-5300 COOPERATIVE AND EFFICIENT SYSTEM OF TRANSPORTATION

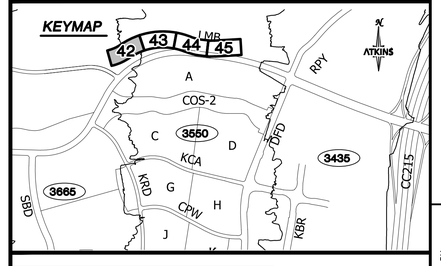
Call before you Dig AVOID DIGGING UNDERGROUND UTILITY LINES. IT'S SECURE AND LEGAL. Call 811 or 1-800-642-2444

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

STORM DRAIN CONSTRUCTION NOTES

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

NOTE:
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.



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.

PROFESSIONAL ENGINEER - STATE OF NEVADA
PAUL A. BATES
EXPIRES 06/30
CIVIL
No. 18725
9/11/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

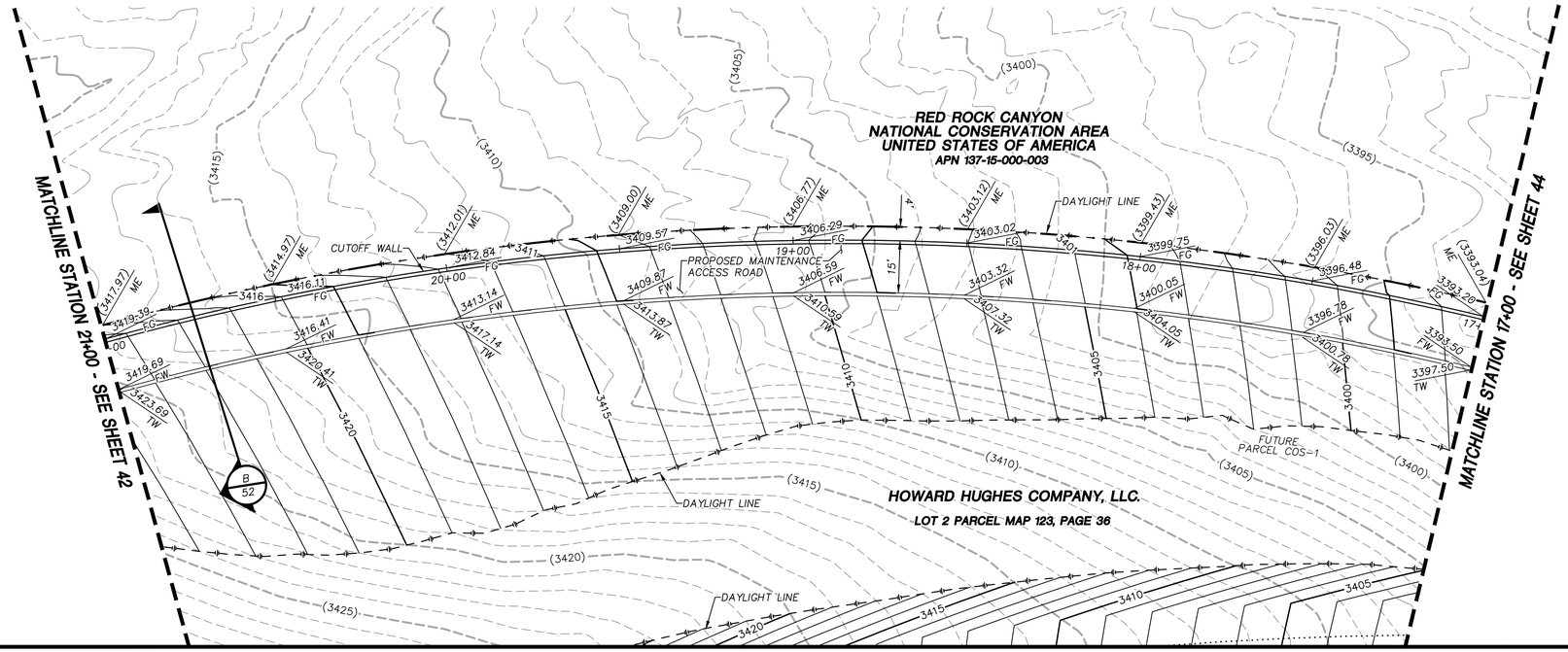
SUMMERLIN

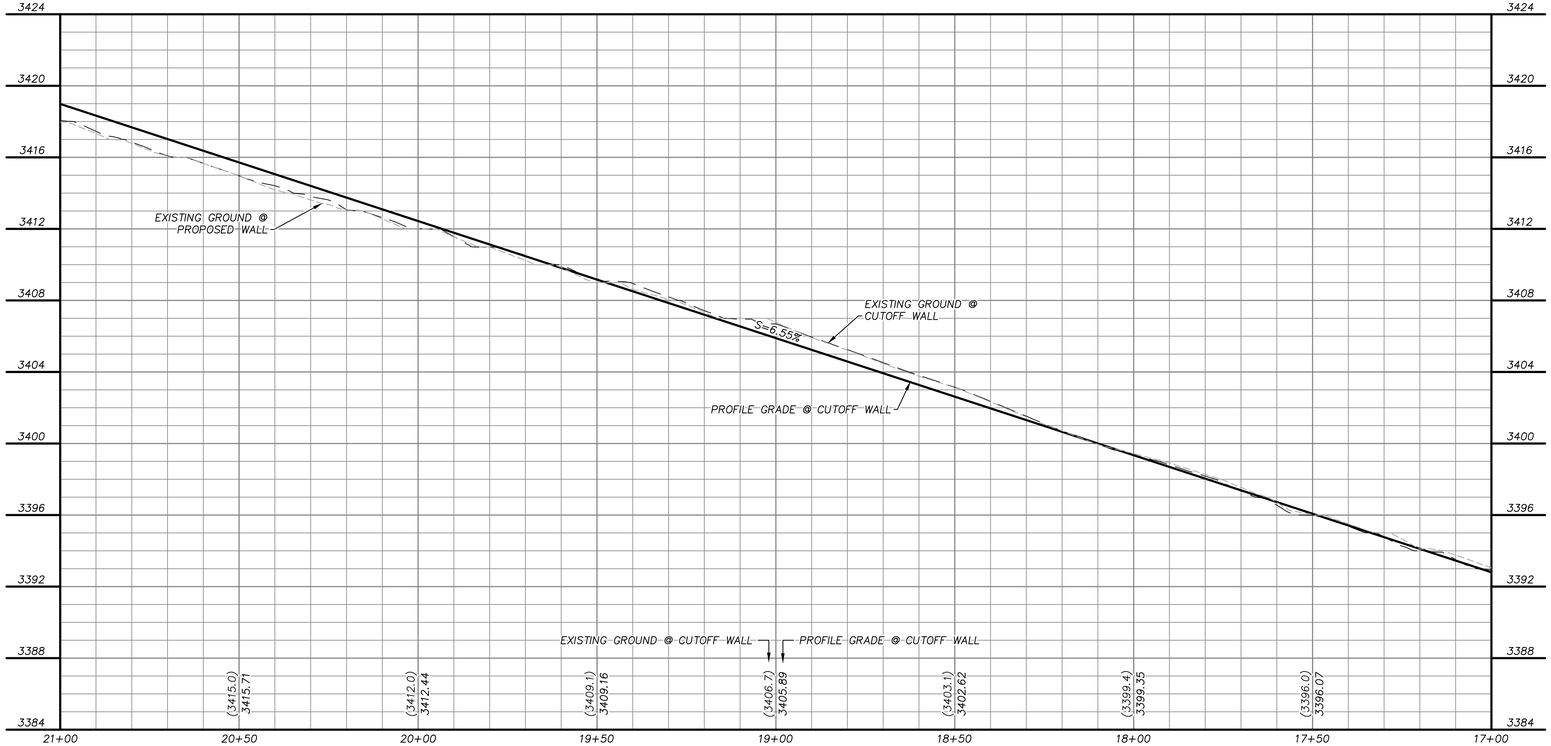
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FLOODWALL PLAN AND PROFILE
STA 21+00 TO END

JOB NO.	100060653
DATE:	SEPTEMBER, 2019
DRAWING NO.	42/66
DESIGNED BY:	N. BARCOS
DRAWN BY:	L. MAMACLAY
CHECKED BY:	P. BATES
HORIZ.:	1"=20'
VERT.:	1"=5'
CLV	

X:\Projects\SummitWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-11-GRAD-WALL-GWI.dwg LAYOUT: FW-1 Sep 11, 2019 - 8:58AM

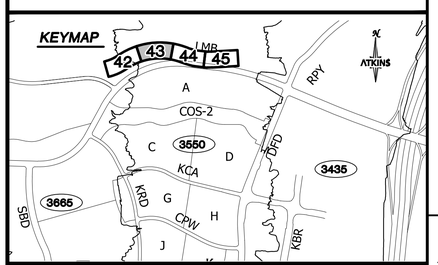




STORM DRAIN CONSTRUCTION NOTES

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NOTE:
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GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

BASIS OF BEARING

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

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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

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Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-642-2444

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

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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A BATES
EXPIRES 12-31-20
CIVIL
No. 18723
9/11/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

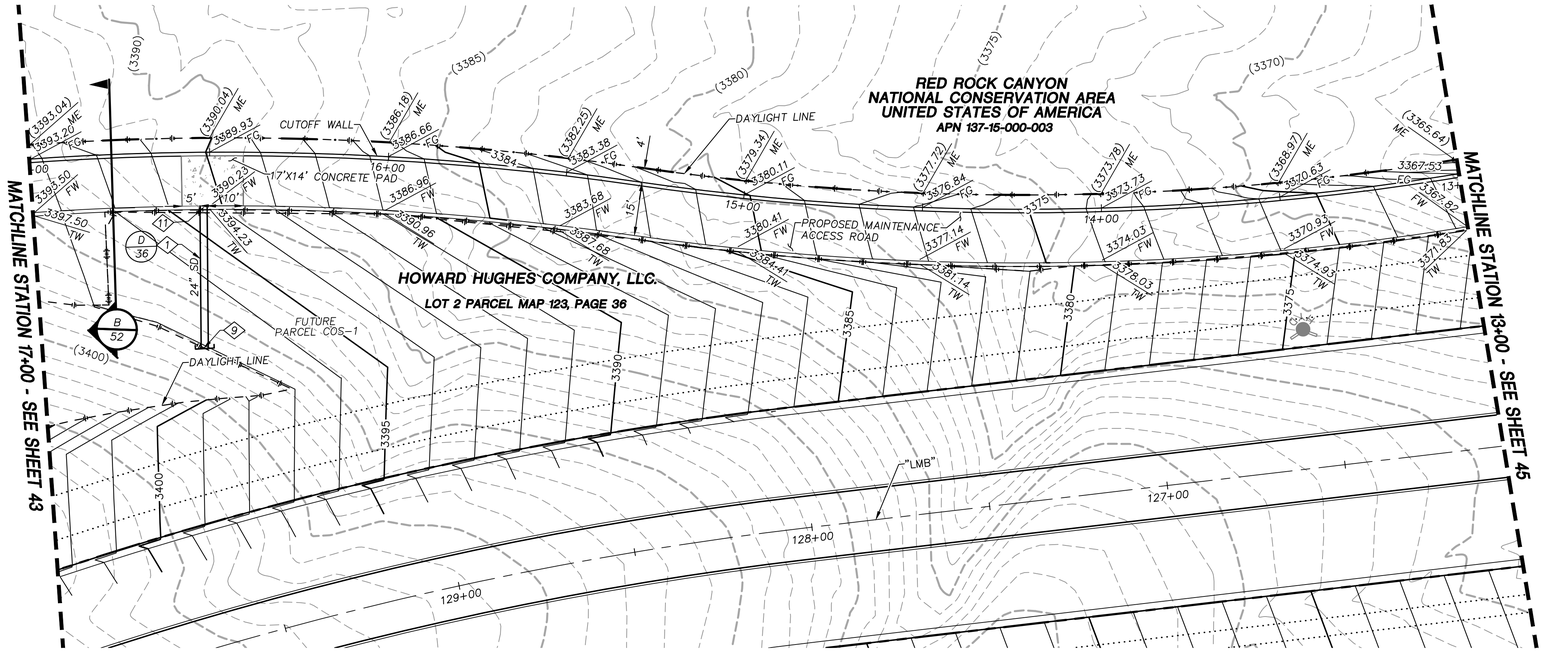
SUMMERLIN VILLAGE 22
LAKE MEAD BOULEVARD - DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

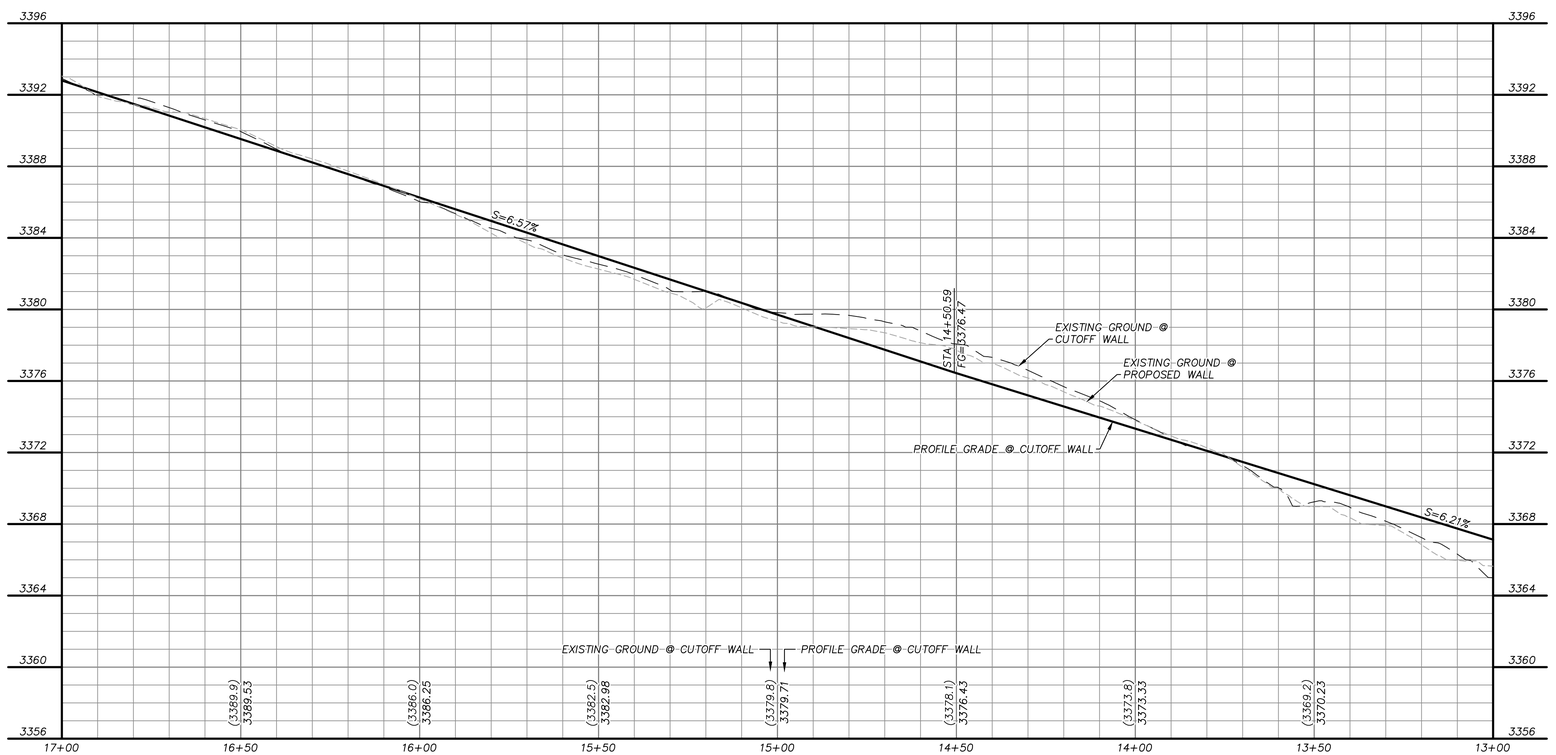
FLOODWALL PLAN AND PROFILE
STA. 17+00 TO STA. 21+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 43/66
CLV

X:\Projects\Summerlin\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-11-GRAD-WALL-GW1.dwg LAYOUT: FW-2 Sep 11, 2019 - 8:56AM





GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE

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

DS#XXX-0000

BASIS OF BEARING

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

BENCHMARK

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

FAST Call before you UnderGround 1-702-432-5300 FRIENDLY AND ARTERIAL SYSTEM OF TRANSPORTATION

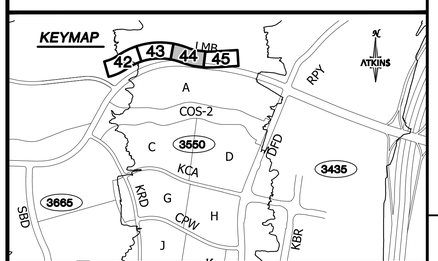
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AVOID HITTING OVERHEAD POWER LINES. ITS QUIETLY. CALL BEFORE YOU GO OVERHEAD 1-702-227-2929

STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET 8 FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL MODIFIED TYPE "2" DROP INLET PER NDOT STANDARD R-4.2.1
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. CONNECT PROPOSED 24" PIPE TO EXISTING MANHOLE. RE-CONSTRUCT EXISTING 66" PIPE OPENING TO FIT 24" PIPE
11. OUTLET STORM DRAIN PIPE AT WALL FACE
12. INSTALL RIP-RAP (D50=8", THICKNESS=16")

NOTE:
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.



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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A BATES
EXPIRES 12-31-20
CIVIL
No. 18723
9/11/19

REV.	DESCRIPTION	BY	DATE	APPROVAL

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

SUMMERLIN

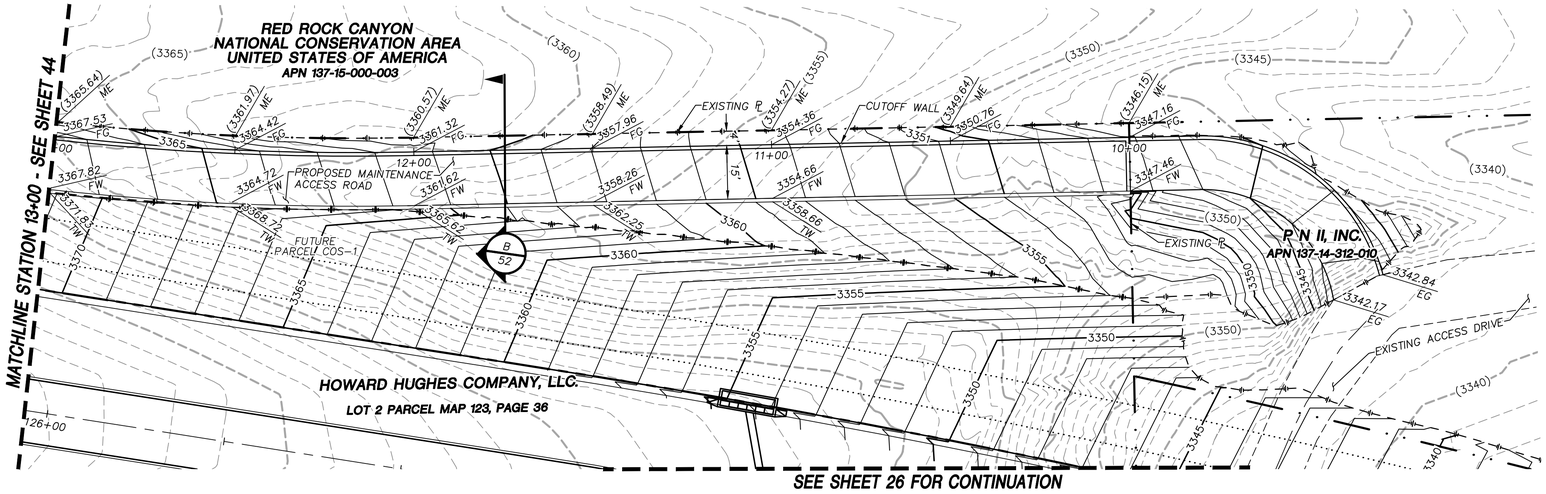
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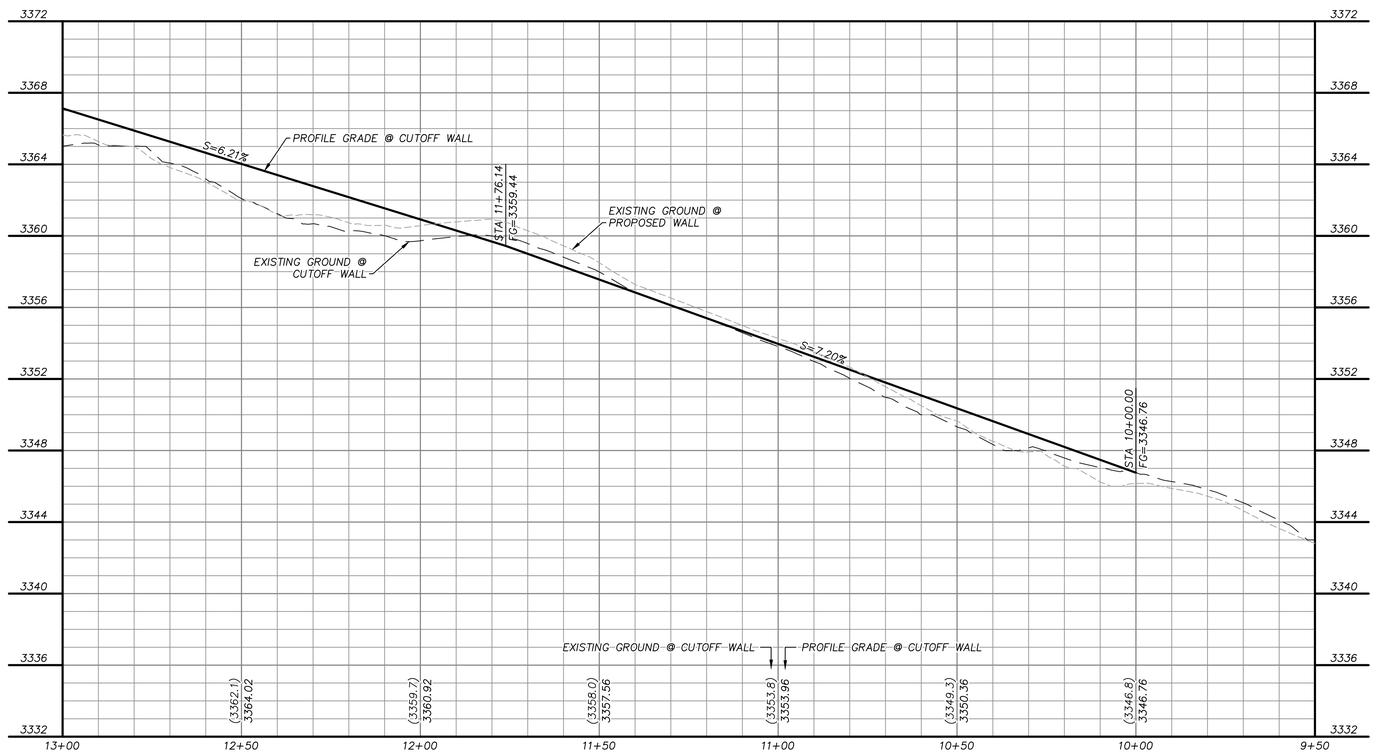
FLOODWALL PLAN AND PROFILE
STA. 13+00 TO STA. 17+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 44/66
CLV

X:\Projects\Summerlin\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-11-GRAD-WALL-GW1.dwg LAYOUT: FW-3 Sep 11, 2019 - 8:56AM

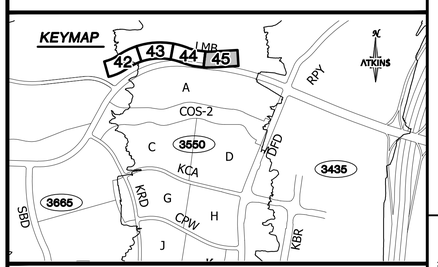




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HORIZONTAL: 1"=20'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

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PAUL BATES PE#18723 DATE

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PROFESSIONAL ENGINEER-STATE OF NEVADA
PAUL A BATES
EXPIRES 09-30
CIVIL
No. 18723
9/11/19

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7375
Fax: +1.702.263.7200

SUMMERLIN

SUMMERLIN VILLAGE 22
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LAKE MEAD BOULEVARD ROUGH GRADE - KETTLE RIDGE DRIVE (STREET J) TO SCURRY BEND DRIVE (STREET N)

FLOODWALL PLAN AND PROFILE
BEGIN TO STA. 13+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: P. BATES
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100060653
DATE: SEPTEMBER, 2019
DRAWING NO. 45/66
CLV

X:\Projects\SummWest\Village 22\100060653 - V22N Lake Mead (Desert Foothills to Street N)_Sheets\60653-11-GRAD-WALL-GW1.dwg LAYOUT: FW-4 Sep 11, 2019 - 8:56AM

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

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