DS #: 4980

APN: 137-22-000-017

PROJECT: Summerlin V23B Sky Vista Drive - Alta to Far Hills

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: May 4, 2018
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 V23B Sky Vista Drive - Alta to Far Hills**		**COPIES TO:** GCW, Inc.
Cross Streets:	Sky Vista Drive from Alta to Far Hills		The Howard Hughes Company, LLC
File Number:	F:\Depot\DSMemos\DS4980A.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-017		CCRFCD
Zoning Action:	MDR-72841		
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	4/11/2018	4/23/2018 & 5/3/2018	See Comments Below	$400.00	495088: $400
			TOTAL FEES (LDDRS):	**$400.00**	**----**

REMARKS:

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

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

1. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.
2. The referenced *Flood Control Master Plan Update for Summerlin West Planning Area* (SWPA) is still under review; therefore, the subject study will not be approved prior to the approval of the SWPA Master Update study.
3. The project proposed to build temporary drainage facilities including drainage berms/ditches along predominantly the west side of the proposed *Sky Vista Drive*. Prior to the final plans approval, the developer must complete a ***Maintenance & Liability Agreement*** for the interim drainage improvements and post a minimum maintenance bond of $50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facilities and an exhibit that adequately shows the location and limits of the drainage facilities to *City Flood Control Section* for approval. Once the drainage study is conditionally approved, the engineer/developer should contact *City Land Development Section* (702-229-6371) to begin the agreement process.

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

4. Since the street and the associated storm drain facilities will eventually be dedicated to the ***City of Las Vegas***, the engineer/developer must coordinate with *City of Las Vega Streets & Sanitation Department* for their review and approval for maintenance issues prior to the final acceptance of the subject improvement plans.
5. Provide maintenance access to culvert inlets.
6. Provide inlet sizing calculations for DI#3 and DI#4.
7. The maximum allowable spacing between inlets is 600', there are 1700' between the proposed inlets DI#2 and DI#3, add two nominal inlets in between at both sides of *Sky Vista Drive*.
8. *Sheet 14*: Add a nominal drop inlet at SDMH #1 on the east side of *Sky Vista Drive*.
9. *Sheet 18*: Add a nominal drop inlet at SDMH #7 on the east side of *Sky Vista Drive*.
10. *Sheet 20*: Add nominal inlets on both sides of SDMH #9 in *Sky Vista Drive*.
11. The 60" RCP shown on *Sheet 14* was designed for 243 cfs, but the study is proposing a flow of 393 cfs, provide a discussion on the increase in flow, and how that will affect the downstream system.
12. The calculated curve number for *Soil# 502 Desert Shrubs* is 75, but the value used in the weighted curve number calculations is 73. Review and revise accordingly.
13. ***Figure 4***: Provide all *Flood Control Facilities* maps that are interacting with the project site. For example, it appears that a facility just south of this map is the existing facility this design is connecting to. Provide this map and table as well.
14. The Drop Inlet Sizing Calculation provided for DI#2 is for a 7.5' CM2 inlet, however *Sheet 10* and *Sheet 14* show a 10' CM2 inlet. Review and revise accordingly.
15. *Sheet 10 and Sheet 14* show DI#2 at station 363+05.60 while it is called out at 362+99 on the drop inlet sizing calculations.
16. *Sheet 23*: DI #5 and DI #6 are proposed in sump condition. Address the overflow path in a worst case scenario that the inlets are totally clogged. Note that the maximum ponding depth cannot exceed 12".
17. All offsite interim flood control facilities such as but not limited to berms / ditches and temporary sumps are privately owned and to be privately maintained by the *Howard Hughes Company*. Provide a note as such in the grading plans.
18. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

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/22
AREA K-22

TRANSACTION REPORT

MAY/05/2018/SAT 03:47 PM

FAX(TX)

#	DATE	START T.	RECEIVER	COM.TIME	PAGE	TYPE/NOTE	FILE
001	MAY/05	03:46PM	7028042299	0:00:38	2	MEMORY OK SG3	1220

CITY OF LAS VEGAS **INTER-OFFICE MEMORANDUM**			**DATE:** **May 4, 2018**
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Parcel Number:	137-22-000-017		CCRFCD
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FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES X	NO	

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

TECHNICAL DRAINAGE STUDY
FOR
VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

62023B-240

April 2018

GCW
ENGINEERS \ SURVEYORS

Prepared for:

The Howard Hughes Company, LLC
10801 W. Charleston Blvd., 3Rd Floor
Las Vegas, Nevada 89135
Phone: (702) 791-4300

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Village 23B Sky Vista Drive Alta Drive to Far Hills Avenue Date: April 2018

Location of Development: a) Descriptive (Cross Streets) North/South: Sky Vista Drive

East/West: Alta Drive , Far Hills Avenue

b) Section: 22 Township: 20 S Range: 59 E

c) APN : 137-22-000-017

Name of Owner: Hughes Howard Company, LLC

Telephone No.: (702) 791 - 4300 Fax No.: N/A E-Mail Address: chris.anderson@howardhughes.com

Address: 10801 Charleston Blvd., 3Rd Floor, Las Vegas, Nevada 89146

Contact Person-Name: Steve Jones **Telephone No.:** (702) 804-2130

* **E-Mail Address:** sjones@gcwengineering.com **Fax No.:** (702) 804-2299

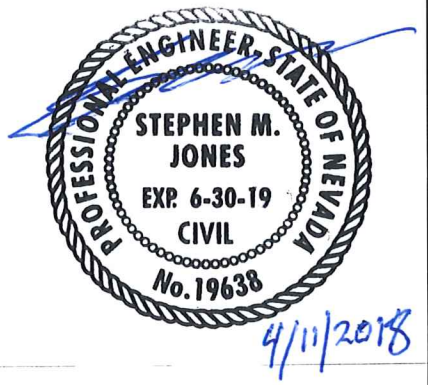
Firm: GCW, Inc.

Address: 1555 South Rainbow Blvd, Las Vegas, Nevada 89146

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	x	Building Permit		

1. Total Owned Land Area: At Site: +/- 12 Acres Being Developed/Disturbed: +/- 12 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.): Road Improvement
5. Approximate upstream land area which drains to the subject site: +/- 4000 Acres
6. Has the site drainage been evaluated in the past? ☒ **YES** ☐ **NO** If yes, please identify documentation: The Conceptual Drainage Study for Summerlin Village 23B
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: The flow generated by the proposed Sky Vista Drive storm drain conveyed by the Existing 10'X8' RCB
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.**

Local Entity File No.

Revision	Date

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Village 23B Sky Vista Drive Alta Drive to Far Hills Avenue	Map ID:
Firm Name: GCW, Inc.	Engineer: Steve Jones
Address: 1555 S. Rainbow Blvd City: Las Vegas	State: Nevada Zip: 89146
Phone Number: (702) 804-2130	Fax Number: (702) 804-2299
Property Owner: Hughes Howard Company, LLC	
Address: 10801 Charleston Blvd., 3Rd Floor City: Las Vegas	State: Nevada Zip: 89146

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 Q100 and V100 and D100 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.
	N/A	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
	N/A	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
	N/A	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
	N/A	Building and/or lot numbers.
X		Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
	NA	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	
_____	NA	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
_____	N/A	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q100 flows.
X	_____	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
_____	NA	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, Q10 and Q100 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.
X	_____	Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
____	____	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 Q100 and Q10 flows representing the worst case for interior and all perimeter streets. Q100 d x v < 8. Q10 d x v < 6 and 12 foot dry lane for rights-of-way > 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X	____	A summary table of interior and exterior street capacity calculations showing the street name, Q100 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 Q100 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.)
	N/A	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. _____ by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

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

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

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

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

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

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

TECHNICAL DRAINAGE STUDY
FOR
VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

62023B-240

April 2018

Prepared for:

The Howard Hughes Company, LLC
10801 W. Charleston Blvd., 3Rd Floor
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4450

Prepared By:

GCW, Inc.
1555 S. Rainbow Blvd.
Las Vegas, Nevada 89146
Phone: (702) 804-2000
Fax: (702) 804-2299

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I. INTRODUCTION

The Howard Hughes Company is proposing to construct roadway and storm drain improvements in Sky Vista Drive from Alta Drive to Far Hills Avenue. Drainage improvements to direct flow towards existing storm drain systems in Sky Vista Drive and Far Hills Avenue will also be constructed with this project.

The improvements are located within the jurisdictional limits of the City of Las Vegas (CLV). The project improvements are located on a portion of Assessor's Parcel Numbers (APN) 137-22-000-017.

GCW has reviewed technical drainage studies and improvement plans for properties adjacent to the proposed site to determine drainage patterns and flow rates that will impact the proposed improvements. Hydrologic and hydraulic information have been referenced from these studies/plans for the purposes of this report.

Summerlin West Planning Area Master Plan Update (which was under review at the time of this report) has been used for ultimate condition offsite basin delineation and land use type.

Pertinent reference materials have been included in Appendix C. These materials have been reviewed and determined acceptable in content for referencing. The referenced studies and improvement plans include the following:

- *Summerlin West Planning Area Master Plan Update* (Reference 1, hereinafter referred to as the Summerlin West MPU Study) which was under review at the time of this report, has been used for ultimate condition offsite basin delineation. Moreover, HEC-1 cards for Detention Basin No. 5 outflows have been referenced from the Summerlin West MPU Study.
- *The Conceptual Drainage Study for Summerlin Village 23B,* (Reference 2, hereinafter referred to as the Summerlin Village 23B Study), was approved by the City of Las Vegas on December 9, 2003. The referenced study provides the existing condition drainage map for the project area.
- *Detention Basin No. 5 / Expansion and Diversion Berm Improvement Plans,* (Reference 3, hereinafter referred to as the Detention Basin No. 5 Study), was approved by the City of Las Vegas on May 30, 2001, and provides

hydrological and hydraulic analysis for Detention Basin No. 5. It also designed and installed the detention basin outlets. Therefore, outlet inverts and stage relationships have been derived from the Detention Basin No. 5 Study.

- *Village 23B Far Hills Avenue RCB Improvements,* (Reference 4, hereinafter referred to as the Village 23B Far Hills Ave Study), was approved by the City of Las Vegas on August 28, 2013, and provides storm drain analysis for the existing storm drain facilities at the intersection of Far Hills Avenue and Sky Vista Drive. The referenced study's designed flowrate of these storm drains has been utilized to show acceptability of the proposed flowrates.
- *Village 23A/23B Alta Drive RCB Regional Drainage Improvements,* (Reference 5, *hereinafter* referred to as the Village 23A/23B Alta Drive RCB Study), was approved by the City Las Vegas on October 22, 2003. The Village 23A/23B Alta Drive RCB Study provides storm drain analysis for the existing storm drain facilities at the intersection of Alta Drive and Sky Vista Drive. In addition, the study provides the HGL at the existing 10'X8' RCB in Sky Vista Drive used for hydraulic model of the proposed storm drain facilities. The referenced study's designed flowrate of these storm drains has been utilized to show acceptability of the proposed flowrates.
- *Village 23A/24 Sky Vista Improvement Plan,* (Reference 6, hereinafter referred to as the Village 23A/24 Sky Vista Study), was approved by the City of Las Vegas on April 8, 2015. The referenced study provides storm drain information for the existing 60" RCP storm drain in Sky Vista Drive, and drop inlets information at the intersection of Alta Drive and Sky Vista Drive.

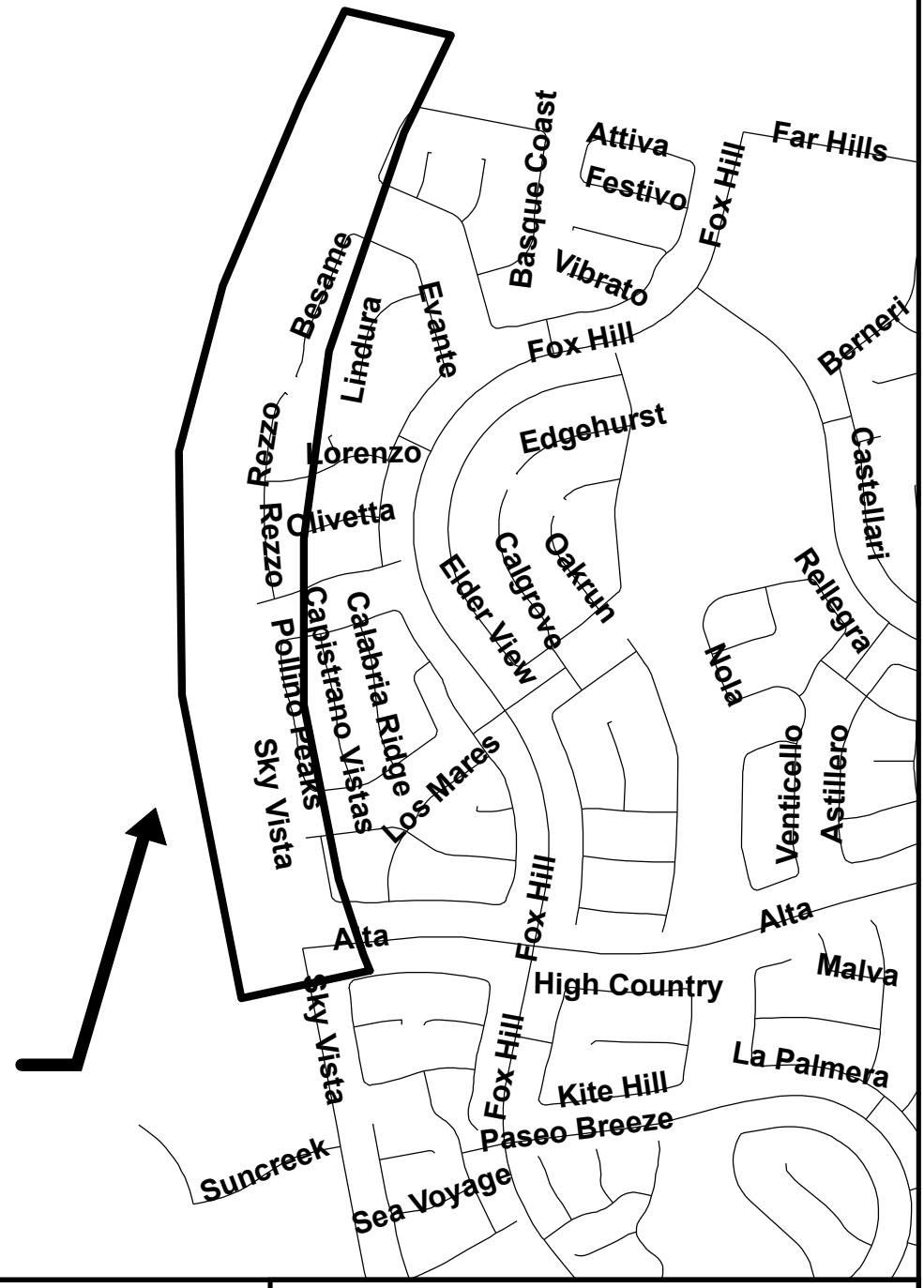
The purpose of this report is to provide detailed hydrologic and hydraulic analyses for the site, and to propose storm drain facilities for the future residential development that will utilize the proposed offsite improvements for discharge. The following tasks were performed in the preparation of this report:

- Identify previous drainage studies for the project site and surrounding areas.
- Identify the FEMA floodplain designation for the project site.
- Identify existing and proposed regional drainage facilities adjacent to the site.
- Estimate runoff generated for the peak 10-year and 100-year return period storms for interim, and ultimate conditions.

- Recommend drainage facilities required to allow for the future residential area to develop and meet CCRFCD criteria.

II. LOCATION AND DESCRIPTION

The project site is located in Section 22, Township 20 South, Range 59 East, M.D.M., in the City of Las Vegas, Nevada. Please refer to Figure 1 for the location of the project. Generally, the site slopes from the northwest to the southeast at approximately 5 percent. For this study, the proposed improvements consist of street, storm drain, and interim condition improvements for the conveyance of flow.



GRAPHIC SCALE

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

1 in = 1,000 ft

NORTH

THE HOWARD HUGHES COMPANY, LLC
VILLAGE 23B SKY VISTA DRIVE

FIG 1

VICINITY MAP

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4/10/2018 7:38:56 PM F:\Projects\600\62023B-240\Division\Fctl\Figures\GIS\Template8.5x11.mxd MEdalat

III. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD ANALYSIS

Figure 2 shows a portion of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) containing Community Panel Number 32003C2150E, dated September 27, 2002. Therefore, the project site lies within a FEMA-designated Zone X. Areas designated as Zone X are described as the areas determined to be outside the 500-year flood and protected by levee from 100-year flood. Therefore, the project is not located within a FEMA-designated Special Flood Hazard Area (SFHA). Figure 2 shows the site denoted on a portion of the aforementioned FIRM.

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A, V, A99* With BFE or Depth Regulatory Floodway *Zone AE, AO, AH, VE, AR*
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X* Future Conditions 1% Annual Chance Flood Hazard *Zone X* Area with Reduced Flood Risk due to Levee. See Notes. *Zone X* Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X* Effective LOMRs Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer Levee, Dike, or Floodwall
OTHER FEATURES	20.2 Cross Sections with 1% Annual Chance 17.5 Water Surface Elevation Coastal Transect 513 Base Flood Elevation Line (BFE) Limit of Study Jurisdiction Boundary Coastal Transect Baseline Profile Baseline Hydrographic Feature
MAP PANELS	Digital Data Available No Digital Data Available Unmapped

N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/9/2018 at 12:34:09 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FIGURE 2

IV. CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) HYDROLOGY AND FACILITIES

Figures 3 and 4 are reproduced from Figure F-24 of the 2013 Clark County Regional Flood Control District (CCRFCD) Master Plan Update (Reference 7, hereinafter referred to as the 2013 MPU) and Figure H-24 of the 2008 CCRFCD Master Plan Update (Reference 8, hereinafter referred to as the 2008 MPU). Figure 4 depicts the project site in relation to existing and proposed CCRFCD facilities. As is shown on the figure, even though the proposed development is not adjacent to CCRFCD facilities, the proposed storm drain is going to be utilized with the regional detention basin No. 5. In other words, the proposed storm drain will be tied into the 60" RCP outlet for CCRFCD facility detention basin No. 5 in Sky Vista Drive.

V. HYDROLOGY

The methodology presented in this study is in compliance with the *CCRFCD Hydrologic Criteria and Drainage Design Manual* (Reference 9, hereinafter referred to as the Manual).

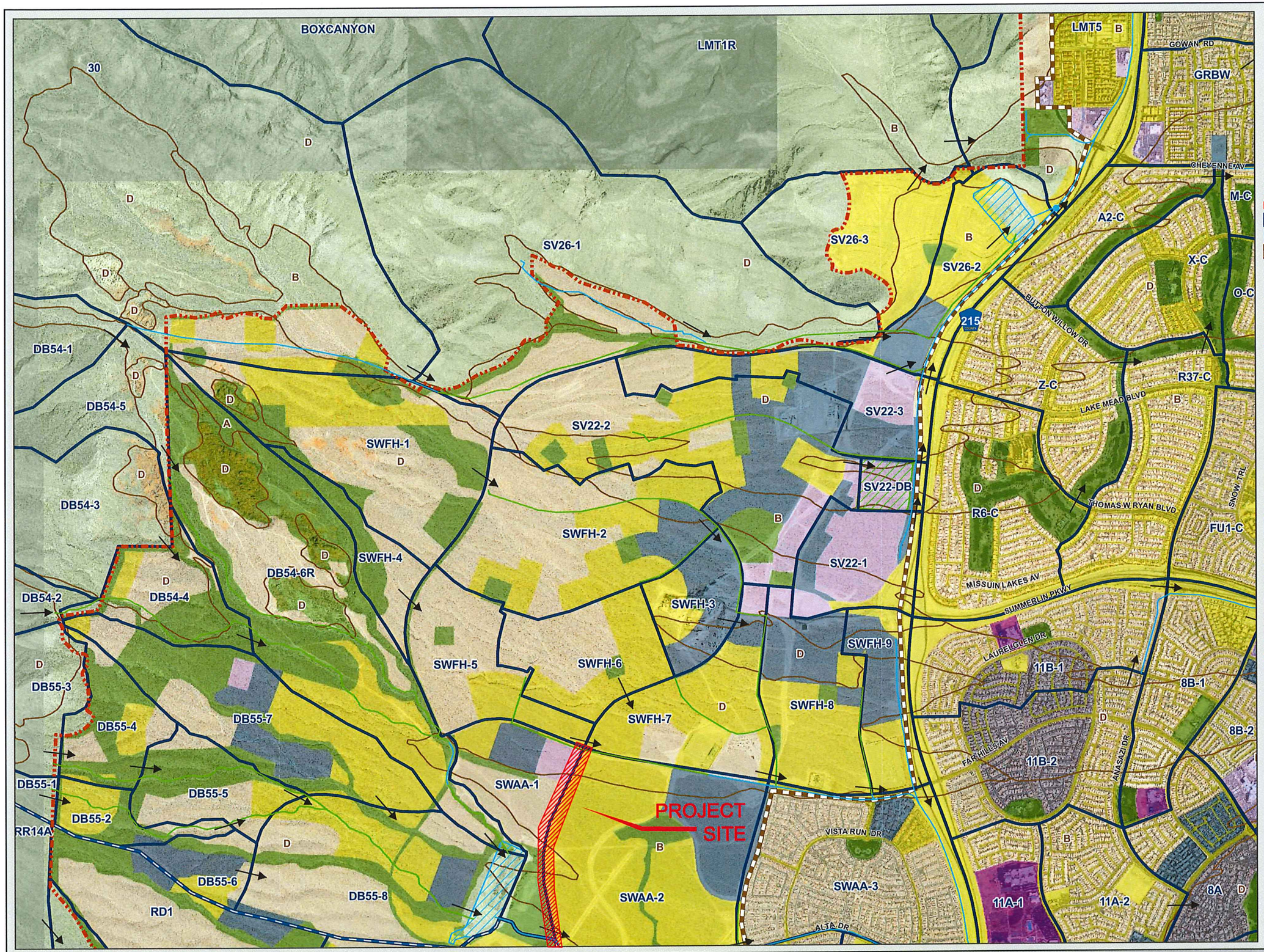
Model Description - The watersheds were modeled using the SCS Unit Hydrograph method within the Army Corps of Engineers *HEC-1 Flood Hydrograph Package* (Reference 10). Since the drainage area for each watershed within the project is less than 8 square miles, an SDN 3 design storm was selected for use in the HEC-1 computer model.

Precipitation - The project site and tributary drainage areas lie outside the McCarran Rainfall Area as identified in the Manual. Rainfall depth for the project were determined using Table 501 of the manual. Refer to Appendix A for hydrologic information.

Storm Centering - Storm centering is applied in order to verify if the 60-inch storm drain is sized appropriately. Storm centering is utilized with the assumption that the storm is over the localized basins with no outflow from detention basin. Table 1 shows summary of storm centering comparison.

Table 1: Summary of Storm Centering Comparison: With Detention Basin Outflow vs. Without Detention Basin Outflow

	With DB Outflow		Without DB Outflow	
Location	Area (sq. mi.)	100-Yr Flow (cfs)	Area (sq. mi.)	100-Yr Flow (cfs)
CPA	6.86	379	0.14	306
CP5	6.89	393	0.17	386



REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H- 24

HYDROLOGIC SUMMARY

LEGEND

- Ultimate Development Boundary
- Watershed Boundary (ID)
- 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)

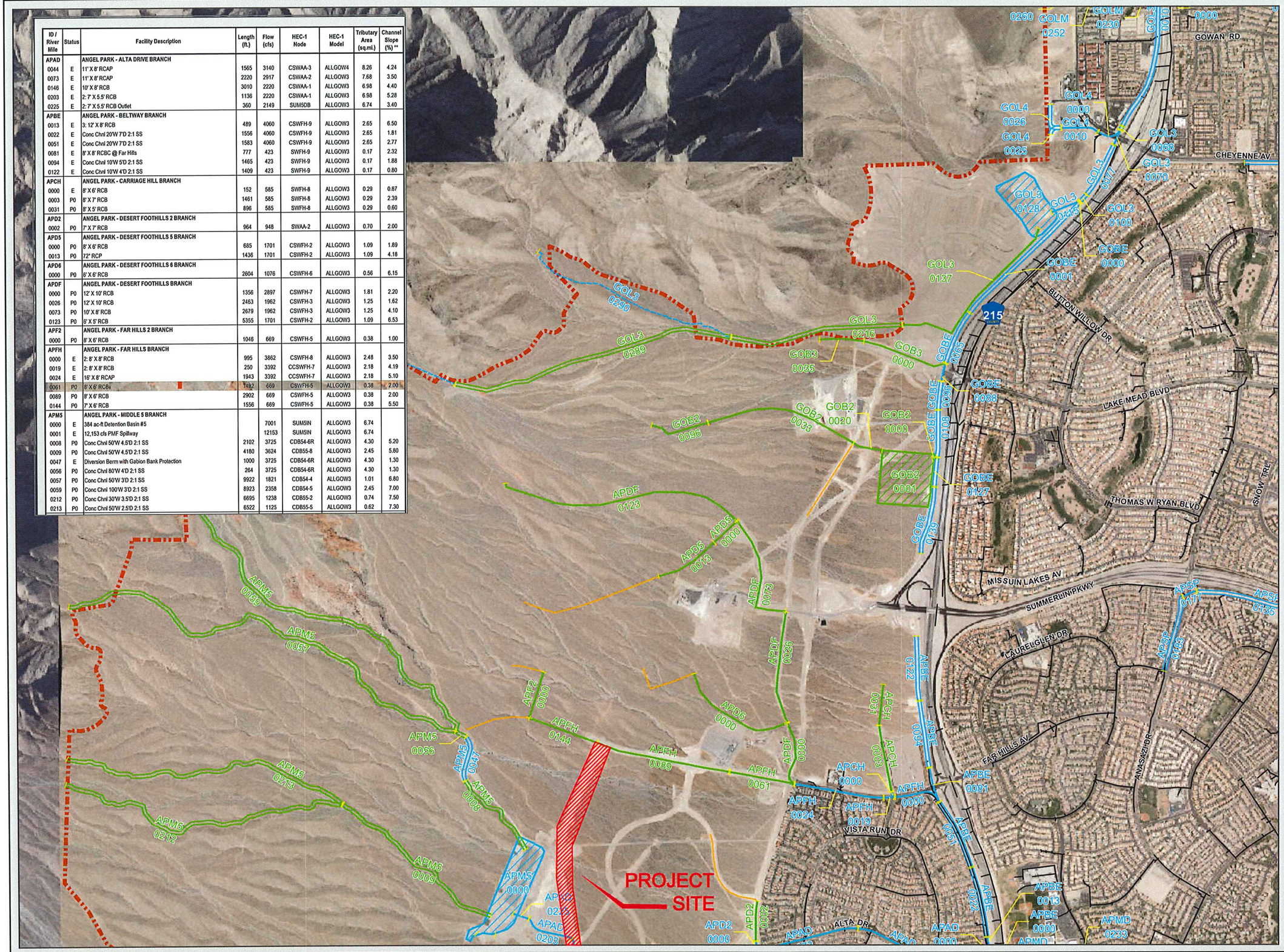
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		1	2	3								
		4	5	6								
			7	8	9	10						
11	12	13	14	15	16	17						
		18	19	20	21	22	23					
		24	25	26	27	28						
		29	30	31	32	33	34					
		35	36	37	38	39	40					
		41	42	43	44	45	46					
		47	48	49	50	51	52					
		53	54	55	56							
		57	58	59								

PBS&J PB

FIGURE 3

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
APAD		ANGEL PARK - ALTA DRIVE BRANCH						
0044	E	11' X 8' RCAP	1565	3140	CSWAA-3	ALLGOW4	8.26	4.24
0073	E	11' X 8' RCAP	2220	2917	CSWAA-2	ALLGOW3	7.68	3.50
0146	E	10' X 8' RCB	3010	2220	CSWAA-1	ALLGOW3	6.98	4.40
0203	E	2: 7' X 5.5' RCB	1136	2220	CSWAA-1	ALLGOW3	6.98	5.28
0225	E	2: 7' X 5.5' RCB Outlet	360	2149	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	8' 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' RCB4	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



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)

US95 I-15 I-215

	1	2	3					A1	A2			
	4	5	6					A3	A4			
		7	8	9	10			A5	A6			
	11	12	13	14	15	16	17					
		18	19	20	21	22	23					
		24	25	26	27	28						
		29	30	31	32	33	34					
		35	36	37	38	39	40					
		41	42	43	44	45	46					
		47	48	49	50	51	52					
		53	54	55	56							
		57	58	59								

FIGURE 4

Curve Number – The soils information for the project watershed was obtained from the *Soil Survey of Las Vegas Valley Area, Nevada, Part of Clark County* (Reference 11). This survey delineates families of soil types and the Hydrologic Soil Group (HSG) of each family. A Custom Soil Resource Report for the project site is included in Appendix A. The report shows that the project's watershed consists of Soil Type 156 (Vace-Wechech association), Soil Type 502 (Canutio-Cave gravelly fine sandy loams), and Soil Type 731 (Purob-Irongold association). Soil Type 156 is classified as 89 percent HSG Type "D", 10 percent Type "B", and 1 percent Type "A". Soil Type 502 is classified as 55 percent HSG Type "A", and 45 percent Type "D". Soil Type 731 is classified as 88 percent HSG Type "D", 10 percent Type "A", and 2 percent Type "B".

The land uses or land covers used throughout the site consist of "Desert Shrub" (poor condition), for undeveloped areas, and "Impervious Areas, Paved" for streets during the interim conditions. During the ultimate conditions the offsite watershed is considered developed with land uses per the referenced Summerlin West MPU Study. For the lots that are anticipated to be 5-7 units per acre, the CN for "Commercial and Business" have been used. In addition, for the lots that are anticipated to be 3-5 units per acre, the CN for 7,000 sq ft lots have been applied. Curve numbers (CN) for interim and ultimate conditions basins are included in Appendix A.

Note for the Summerlin West MPU watershed draining directly to the detention basin No. 5, that is directly referenced in this study's HEC-1 model, the curve numbers and all subbasin parameters have been unchanged from the referenced study.

For the given soils, CN values were determined from Table 602 of the Manual. CN values were determined utilizing the weighted percentage of each soil group. Composite Curve number calculations have been included in Appendix A

Drainage Areas and Flow Patterns – The subbasins and flow patterns used for the hydrologic modeling were determined from referenced studies and digital files for the proposed improvements.

Lag Time – The lag time (TLAG) is described as the time between the center of mass of rainfall and the time of peak discharge from a basin. Lag time can be related to time of concentration (Tc) by the following relationship: TLAG = 0.6 (Tc). The time of concentration (Tc) is defined as the time required for runoff to flow from the most hydraulically distant area of the basin to the outlet of the basin or a design point. The procedure for calculating Tc is outlined in Section 602 of the Manual. Lag time calculations for the drainage subbasins have been included in Appendix A on Standard Form 4.

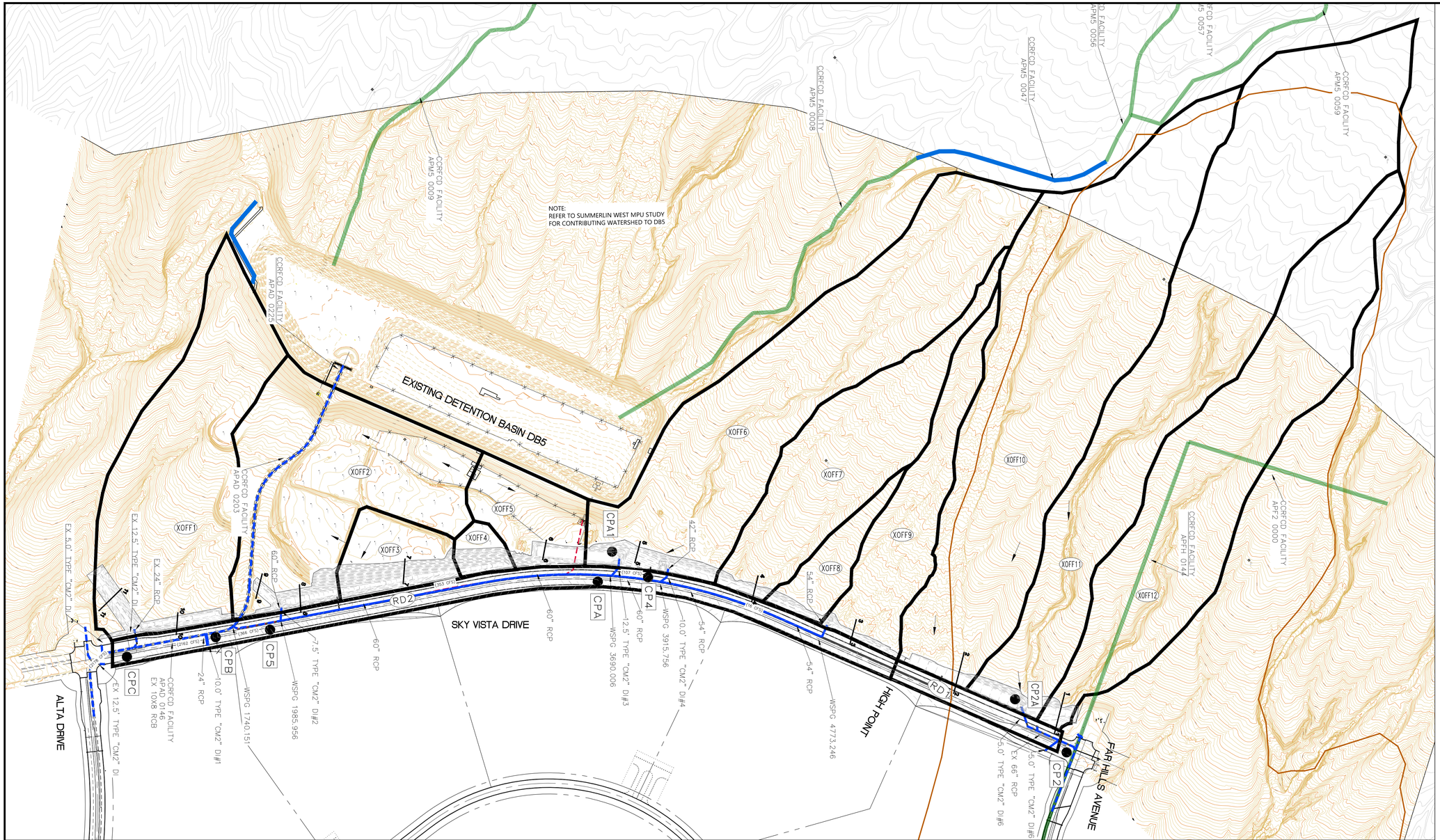
VI. EXISTING CONDITIONS

The Summerlin Village 23B Study provides historic existing conditions drainage map for the project area. Therefore, a site specific existing condition hydrology analysis is not necessary for this study. Typical of master planned communities, the pre vs. post-development drainage impacts are addressed by master drainage infrastructure in separate studies. Refer to Existing Conditions Drainage Map in Appendix C for the subbasins and drainage patterns for the existing conditions hydrologic analysis for this project.

VI. INTERIM CONDITIONS

Refer to Figure 5, Interim Conditions Drainage Map for the subbasins and drainage patterns used in the interim conditions hydrologic analysis for this project. Hydrologic and hydraulic calculations have been included in Appendix A and B, respectively.

During the interim condition, with the proposed storm drain and street improvements in place, the remaining offsite area reserved for future residential development remains undeveloped. Eleven ditches are proposed on the west side of Sky Vista Drive to route the generated runoff into the proposed storm drain. In order to route the 60-inch outlet for the Detention Basin, a ditch has been proposed to convey flow to a temporary 72-inch stub. The ditches calculations have been provided in Appendix B.



INTERIM CONDITIONS 100-YEAR DITCH CHARACTERISTICS

Ditch	Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Freeboard (ft)	Total Depth (ft)	Velocity (ft/s)	Bottom Width (ft)
1	2.0	76	0.48	0.52	1.0	5.00	30
2	2.0	100	0.45	0.55	1.0	4.82	45
3	1.7	16	0.55	0.95	1.5	4.38	5
4	1.6	33	0.59	0.91	1.5	4.76	10
5	0.4	13.5	0.74	1.26	2.0	2.53	5
6	0.5	344	1.41	1.09	2.5	4.97	45
7	3.7	10	0.18	1.32	1.5	3.56	15
8	4.1	20.4	0.2	1.30	1.5	4.03	25
9	0.9	27.3	0.87	1.13	2	4.14	5
10	2.6	32.7	0.41	0.59	1	4.98	15
11	1.8	42.6	0.53	0.97	1.5	4.82	15

INTERIM CONDITION
CONCENTRATION POINT SUMMARY

Point ID	Tributary Sources	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
CP2A	XOFF10, XOFF11, XOFF12	0.18	279	105
CP2	RD1, CP2A	0.18	285	108
CP4	XOFF6, XOFF7, XOFF8, XOFF9	0.09	107	29
CPA1	XOFF5, 60RCP	6.73	334	167
CPA	CP4, CPA1	3.68	355	172
CP5	CPA, XOFF2, XOFF3, XOFF4	6.87	366	174
CPB	CP5, 7X5	6.87	2162	1507
CPC	CPB, XOFF1, RD2	6.92	2178	1511

INTERIM CONDITION
SUBBASIN FLOW RATE SUMMARY

Subbasin ID	Area (acres)	Q_{100} (cfs)	Q_{10} (cfs)
XOFF1	23.4	61	23
XOFF2	21.6	52	18
XOFF3	4.3	8	2
XOFF4	1.1	2	0
XOFF5	5.6	12	3
XOFF6	31.2	65	21
XOFF7	15.1	21	4
XOFF8	3.4	5	1
XOFF9	9.9	16	3
XOFF10	41.9	97	34
XOFF11	43.1	107	41
XOFF12	28.3	75	30
RD1	2.1	9	5
RD2	10.1	36	19
60RRCP	-	332	-
7X5	-	1797	-

LEGEND

- ST2 — SUBBASIN NAME
- SUBBASIN BOUNDARY
- CP1 — CONCENTRATION POINT
- FLOW DIRECTION
- 12 — 12 — CROSS SECTION
- PROP MPU FACILITY
- EX MPU FACILITY
- (XX CFS) — STORM DRAIN FLOW RATE

NORTH

GRAPHIC SCALE
250 0 125 250
(IN FEET)
1 inch = 250 ft.

% COMPLETE

DATE:

DESCRIPTION	DATE	AGEN. APP.	DATE	CCW. APP.

REV.	DATE

PROJECT NO.
620238-240

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-11-18
PLOT TIME: 14:32:15

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

\\Pandora\Data\Projects\600\620238-240\Division\Fall\Figures\CCW_Figs_
Masih Edalat

THE HOWARD HUGHES PROPERTIES, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

FIGURE 5
INTERIM CONDITION DRAINAGE MAP

DRAWING
FIG5
1 OF 1 SHTS

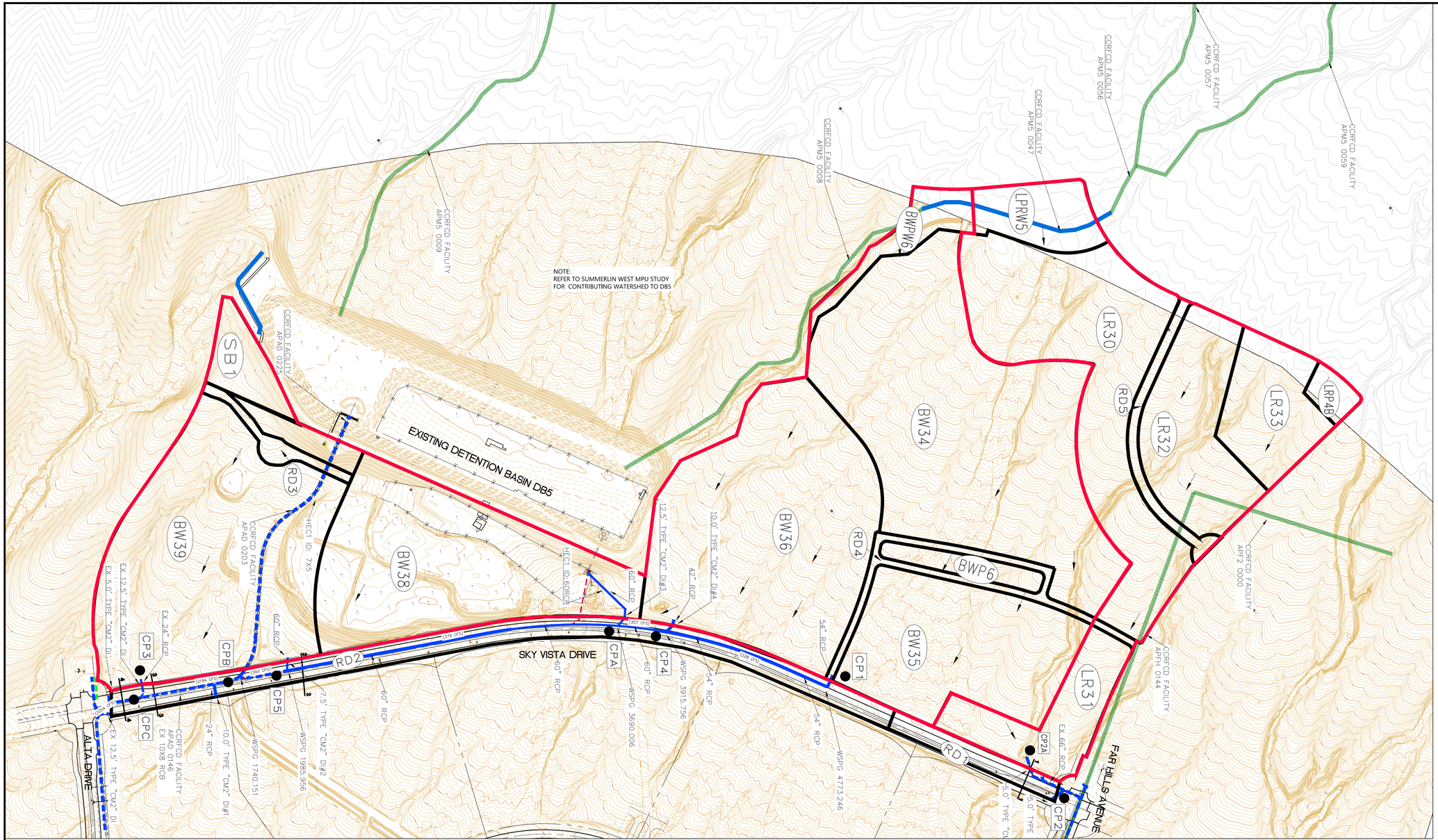
LOT#

HTE: 00-00000

VII. ULTIMATE CONDITIONS

Refer to Figure 6, Ultimate Conditions Drainage Map, for the subbasins and drainage patterns used in the ultimate conditions hydrologic analysis for this project. Hydrologic calculations have been included in Appendix A.

In the ultimate conditions, hydrologic analysis subbasins have been changed based on Summerlin West land use plan. In general, the drainage patterns for the ultimate conditions subbasins are consistent with interim conditions but with larger flow rates to account for future development. Note that it is expected that the temporary 72-inch storm drain stub proposed by this project is replaced with 60-inch RCP and extended for collection of the 60-inch detention basin outlet flow.



NOTE:
OFFSITE SUBBASIN DELINEATIONS AND LAND USES ARE BASED ON SUMMERLIN WEST MPU.

100-YEAR FLOW CHARACTERISTICS
ULTIMATE CONDITIONS

Location	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (ft/s)	D*V	Tributary
1-1 Half	0.83	4.50	0.39	2.60	1.01	RD1
2-2	4.32	36.00	0.46	6.52	3.00	RD2
3-3 West Half	3.00	10.60	0.42	5.10	2.14	DI#2 Bypass
4-4 East Half	3.00	9.00	0.40	4.95	1.98	DI#1 Bypass
4-4 West Half	3.00	2.00	0.28	3.2	0.9	EX 12.5' CM2 DI Bypass

ULTIMATE CONDITION
CONCENTRATION POINT SUMMARY

Point ID	Tributary Sources	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
CP1	BWPW6, BW35, BWP6, BW34, & RD4	0.09	228	110
CP2A	LR31, LR30, LR32, LR33, LRP4B, RD5 & LPRW5	0.09	199	93
CP2	CP2A & RD1	0.09	207	97
CP3	SB1, RD3, & BW39	0.04	100	49
CP4	CP1 & BW36	0.14	307	140
CP5	CPA & BW38	6.89	393	195
CPA	CP4 & DB5 60RCP	6.86	379	188
CPB	CP5 & DB 7X5 RCBC	6.89	2184	1520
CPC	CP3, RD2, & CPB	6.95	2204	1531

ULTIMATE CONDITION
SUBBASIN FLOW RATE SUMMARY

Subbasin ID	Area (acres)	Q_{100} (cfs)	Q_{10} (cfs)
BW34	35.8	139	67
BW35	15.8	61	30
BWP6	1.9	6	2
BWPW6	2.9	10	4
BW36	28.4	78	31
BW38	22.2	80	38
BW39	22.0	84	42
LR30	25.0	80	37
LR31	6.6	25	12
LR32	10.3	39	19
LR33	6.7	26	13
LRP4B	1.1	4	2
LPRW5	4.2	16	7
RD1	2.1	9	5
RD2	10.1	36	19
RD3	1.3	6	3
RD4	2.8	12	6
RD5	2.0	9	5
SB1	2.9	10	4
60RCP	-	332	-
7X5	-	1797	-

LEGEND

- (ST2) SUBBASIN NAME
- SUMMERLIN WEST MPU LARGE BASIN BOUNDARY
- SUBBASIN BOUNDARY
- CP1 CONCENTRATION POINT
- FLOW DIRECTION
- 12 — 12 CROSS SECTION
- PROP SD FACILITY
- EX SD FACILITY
- (XX CFS) STORM DRAIN FLOW RATE

NORTH

GRAPHIC SCALE
250 0 125 250
(IN FEET)
1 inch = 250 ft.

% COMPLETE

DATE:

REV.	DATE	DESCRIPTION	AGEN. APP.	DATE	CCW. APP.	DATE

PROJECT NO. 620238-240
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-11-18
PLOT TIME: 14:46:49

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
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gcwengineering.com

\\Pandora\Data\Projects\600\620238-240\Division\Fall\Figures\GCW_Fig6_...
Masih Edalat

THE HOWARD HUGHES PROPERTIES, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

FIGURE 6
ULTIMATE CONDITION DRAINAGE MAP

DRAWING
FIG6
1 OF 1 SHTS

LD#
HTE: 00-00000

VIII. STREET HYDRAULICS

The resulting street flow data is based on the ultimate condition flow rates. Full width street sections have been provided with the flow evenly distributed through the cross sections. The flowrates used in the street flow normal depth calculations have been presented on Figure 6 along with the locations of the cross sections. Note that the drop inlets on both side of Sky Vista Drive are able to collect all the flows. Hydraulic calculations have been included in Appendix B.

Street Sections 1, 2 and 3 were used in determining the flow intercepted by the existing and proposed drop inlets in Sky Vista Drive. Based on the calculated street flow characteristics, the criteria for depth (D) and velocity times depth (D*V) for the 100-year storm event will be met. Since, the 10-year storm event criteria for (D*V) is met during the 100-year storm event, a 10-year street flow analysis has not been provided. Street flow also meets local Summerlin design criteria of being contained at or below top of curb in Sky Vista.

IX. STORM DRAIN FACILITIES

The existing and proposed storm drain facilities, and the proposed stub in Sky Vista Drive are shown on Figure 7. WSPG models (Reference 12) were done to ensure the existing and proposed storm drain system could safely convey the flow to Alta Drive. Due to timing of the detention basin and size of watershed, the WSPG model flow rates in the trunk 54 and 60-inch pipes in Sky Vista are based off the HEC-1 model concentration points. The model (SV2.WSW) runs from 360+50, an existing 10'X8' RCB in Sky Vista Drive to 390+78. Another model (60RCP.WSW) runs from a conceptual extension plan for the proposed 60-inch RCP at 380+00 to the detention basin outlet.

According to the 60RCP.WSW model, water surface elevation at the existing detention basin 60-inch outlet in the ultimate condition is lower than water surface elevation calculated by the Detention Basin No. 5 Study (using HY-8). In addition, water surface elevation at the drop inlet at 380+00 is less than 1 foot to the surface elevation and it does not meet the criteria. However, since the proposed drop inlet is not designed to collect street flow (intended only for nuisance flow in order to turn the pipe from Sky Vista toward the detention basin), the water surface elevation is acceptable. WSPGW calculations for the storm drain facilities have been included in Appendix B. HGL elevations have been marked up on the storm drain profile sheets included in Appendix C.

Drop inlet calculations were done to ensure the existing and proposed inlets could intercept the flow. Inlet control calculations were done for the stubs for the interim conditions. In addition, full flow capacity calculations were done to insure the pipes could intercept the ultimate conditions flow. All drop inlet calculations contain a 50 percent clogging factor. Since the bypass flow from the inlets in Sky Vista Drive is zero, this project will not negatively impact downstream facilities. Moreover, the ultimate conditions flowrate is less than the designed flow in both Sky Vista Drive and Alta Drive junction (CPC), and Sky Vista and Far Hills Avenue junction (CP2). Table 2 summarizes the designed versus proposed 100-year flowrates at the two

junctions. Inlet control calculations, and drop inlet calculations have been included in Appendix B.

Table 2: Summary of Designed vs. Proposed 100-Yr Flowrates		
Location	**Designed (cfs)**	**Proposed (cfs)**
Sky Vista Drive and Alta Drive junction	2265	2204 (CPC)
Sky Vista and Far Hills Avenue junction	320	207 (CP2)

X. CONCLUSIONS AND RECOMMENDATIONS

1. Methodology used in this report is in compliance with Clark County Regional Flood Control District (CCRFCD) criteria.

2. The project area lies within a designated FEMA Flood Zone X. Therefore, the project is not currently located in a FEMA-designated Special Flood Hazard Area.

3. The site is not adjacent to CCRFCD Facilities.

4. The proposed drainage patterns in this report are generally consistent with existing conditions and the 2013 MPU.

5. Flow rates for the design of this project are based off the land plan from the under review Summerlin West MPU.

6. In general, the proposed development does not adversely impact the drainage patterns and downstream properties or facilities.

XI. REFERENCES

1. VTN Nevada. *Summerlin West Planning Area Master Plan Update.* February, 2018.
2. G. C. Wallace, Inc. *The Conceptual Drainage Study for Summerlin Village 23B.* September 2003.
3. G. C. Wallace, Inc. *Detention Basin No. 5 / Expansion and Diversion Berm Improvement Plans.* May 2001.
4. G. C. Wallace, Inc. *The Technical Drainage Study for Village 23B Far Hills Avenue RCB Improvements.* July 2013.
5. G. C. Wallace, Inc. *The Technical Drainage Study for Village 23A/23B Alta Drive RCB Regional Drainage Improvements.* September 2003.
6. G. C. Wallace, Inc. *The Technical Drainage Study for Village 23A/24 Sky Vista Improvement Plan.* January 2015.
7. *CCRFCD 2013 Las Vegas Valley Master Plan Update.* 2013.
8. *CCRFCD 2008 Las Vegas Valley Master Plan Update.* 2008.
9. Clark County Regional Flood Control District. *Hydrologic Criteria and Drainage Design Manual.* August 1999.
10. U.S. Army Corps of Engineers. *HEC-1 Flood Hydrograph Package.* Revised June 1998.
11. U. S. Department of Agriculture, Soil Conservation Service. *SCS Soil Survey of Las Vegas Valley Area, Nevada, Part of Clark County.* Version 12. Sep 15, 2017.

12. CIVILDESIGN Corporation, WSPGW Water Surface Pressure Gradient Package, 1987-2016. Version 14.10.

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE
APPENDIX LAYOUT

Appendix A. Hydrologic Calculations and Information

1. Figure 503 from the CCRFCD Manual
2. Figure 506 from the CCRFCD Manual
3. Table 501 from the CCRFCD Manual
4. Table 602 – 1 of 4 from the CCRFCD Manual
5. Table 602 – 4 of 4 from the CCRFCD Manual
6. Table 602A from the CCRFCD Manual
7. NCRCS USDA Custom Soils Resource Report
8. Curve Number Calculations (Interim/Ultimate)
9. Interim Conditions Standard Form 4
10. Interim Conditions HEC-1 Analysis
11. Ultimate Conditions Standard Form 4
12. Ultimate Conditions HEC-1 Analysis

Appendix B. Hydraulic Calculations and Information

1. Ditch Calculations
2. Normal Depth Street Calculations
3. Drop Inlet Calculations
4. Inlet Control Calculations
5. Pipe Capacity Calculations
6. Storm Drain Lateral Loss Calculations
7. WSPG calculations

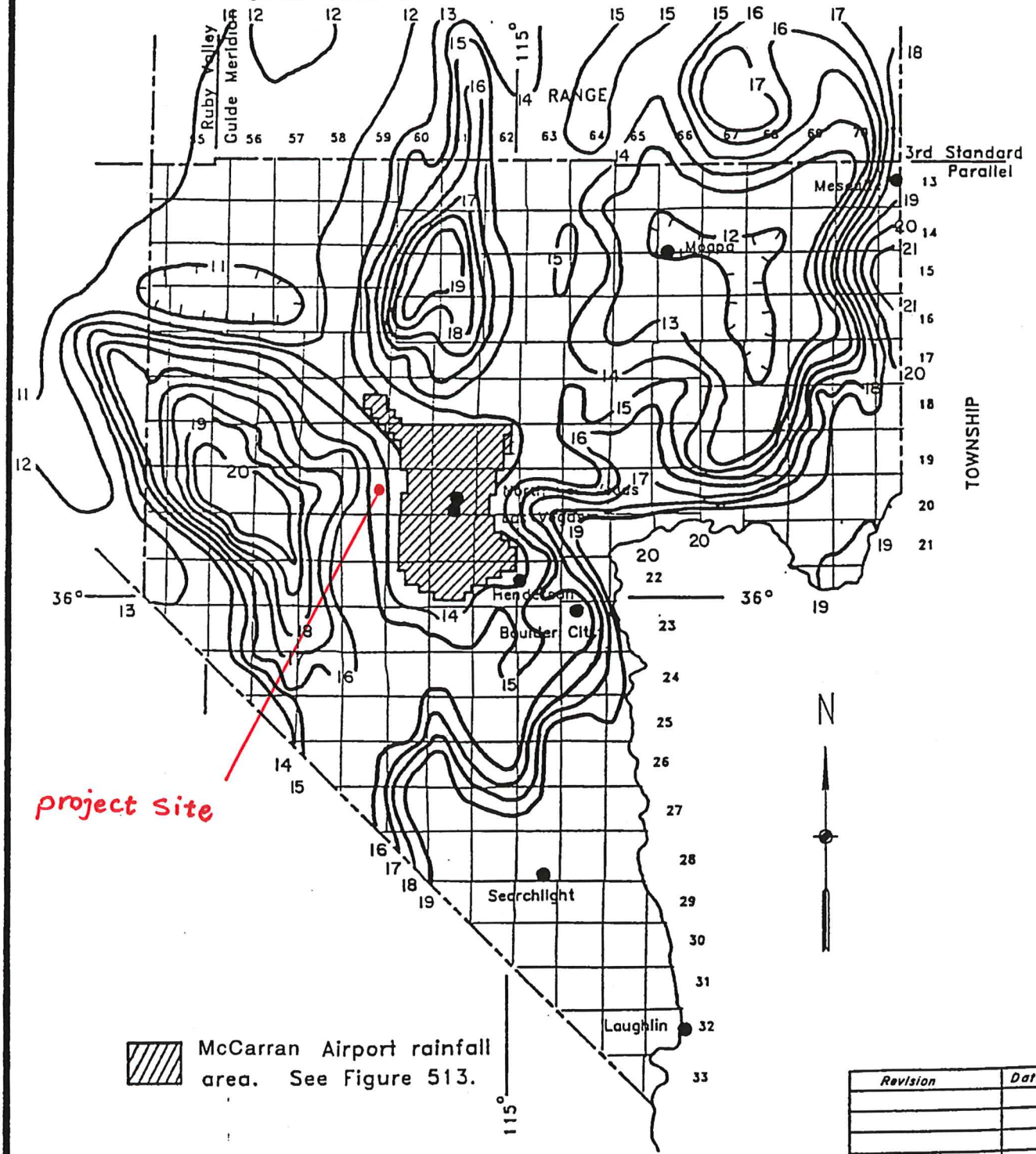
Appendix C. Referenced Material and Supporting Documents

1. Summerlin West Planning Area Master Plan Update
    a. DB5/Alta Tributary
    b. Curve Number Table
    c. HEC-1 (Alta-sdn3)
2. The Conceptual Drainage Study for Summerlin Village 23B
    a. Approval Letters
    b. Figure 5: Existing Conditions Drainage Map
3. Detention Basin No. 5 / Expansion and Diversion Berm Improvement Plans.
    a. Sheet C-4 Stage relationships
4. Village 23B Far Hills Avenue RCB Improvements
    a. Sheet 20 – P10 Plan and Profile
5. 23A/23B Alta Drive RCB Regional Drainage Improvements.
    a. Sheet 13-15
6. Village 23A/24 Sky Vista Improvement Plan
    a. Sheet 33-34

APPENDIX A

Hydrologic Calculations and Information

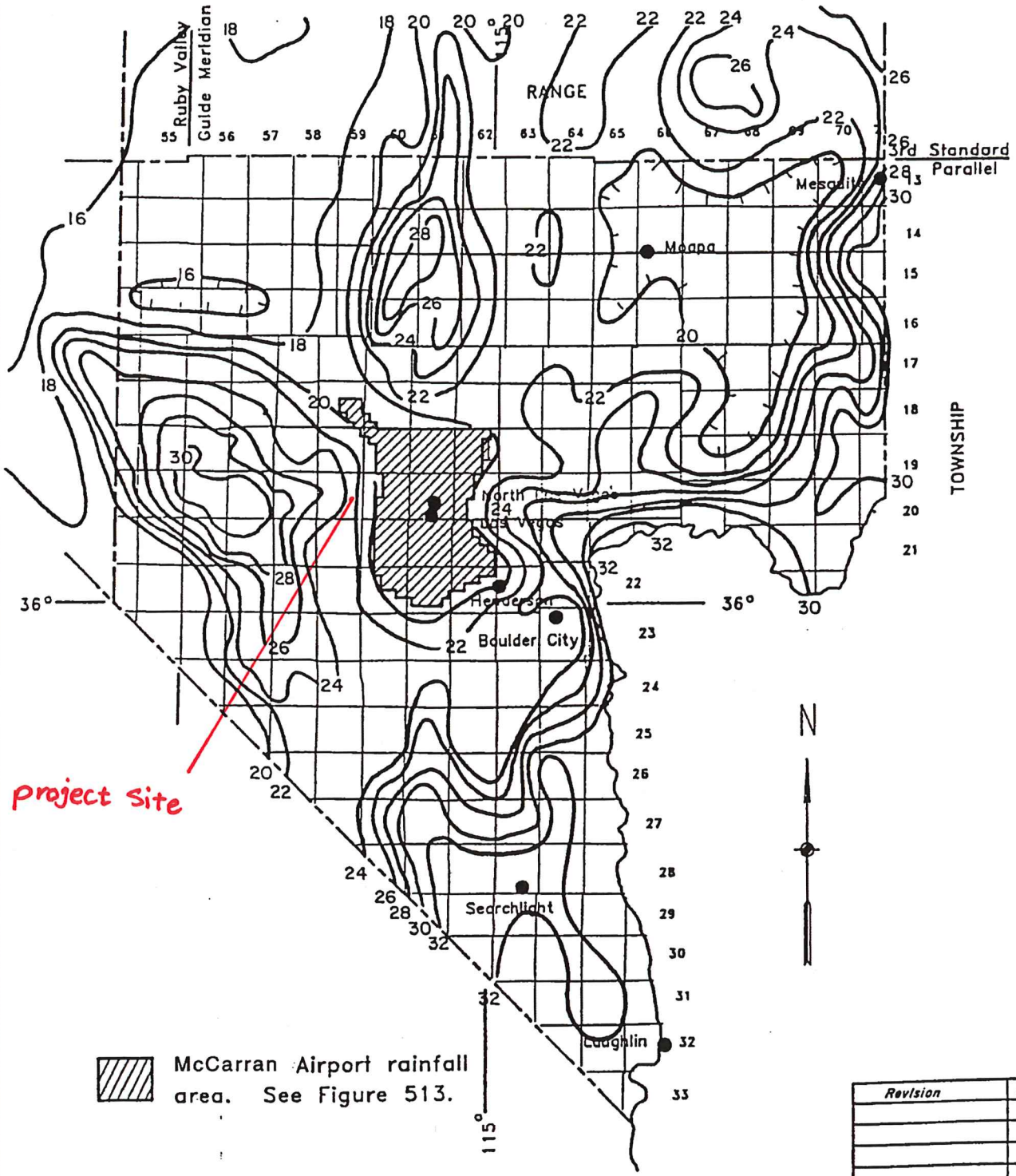
RAINFALL DEPTH-DURATION-FREQUENCY
10-YEAR, 6-HOUR
(DEPTHS IN TENTHS OF INCHES)



Revision	Date

WRC ENGINEERING	REFERENCE: NOAA ATLAS 2, VOLUME VII NEVADA, 1973	FIGURE 503

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



Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 506

PRECIPITATION ADJUSTMENT RATIOS

Recurrence Interval	Ratio to NOAA Atlas 2
2-year	1.00
5-year	1.16
→ 10-year	1.24 x 1.45 = 1.8
25-year	1.33
50-year	1.39
→ 100-year	1.43 x 2.33 = 3.34

$$\frac{1.8}{3.34} = 0.54$$

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

Revision	Date

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

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

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

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

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

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

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

Revision	Date

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

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

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

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

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

Revision	Date

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

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

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

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

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

Revision	Date

REFERENCE:

TABLE 602A

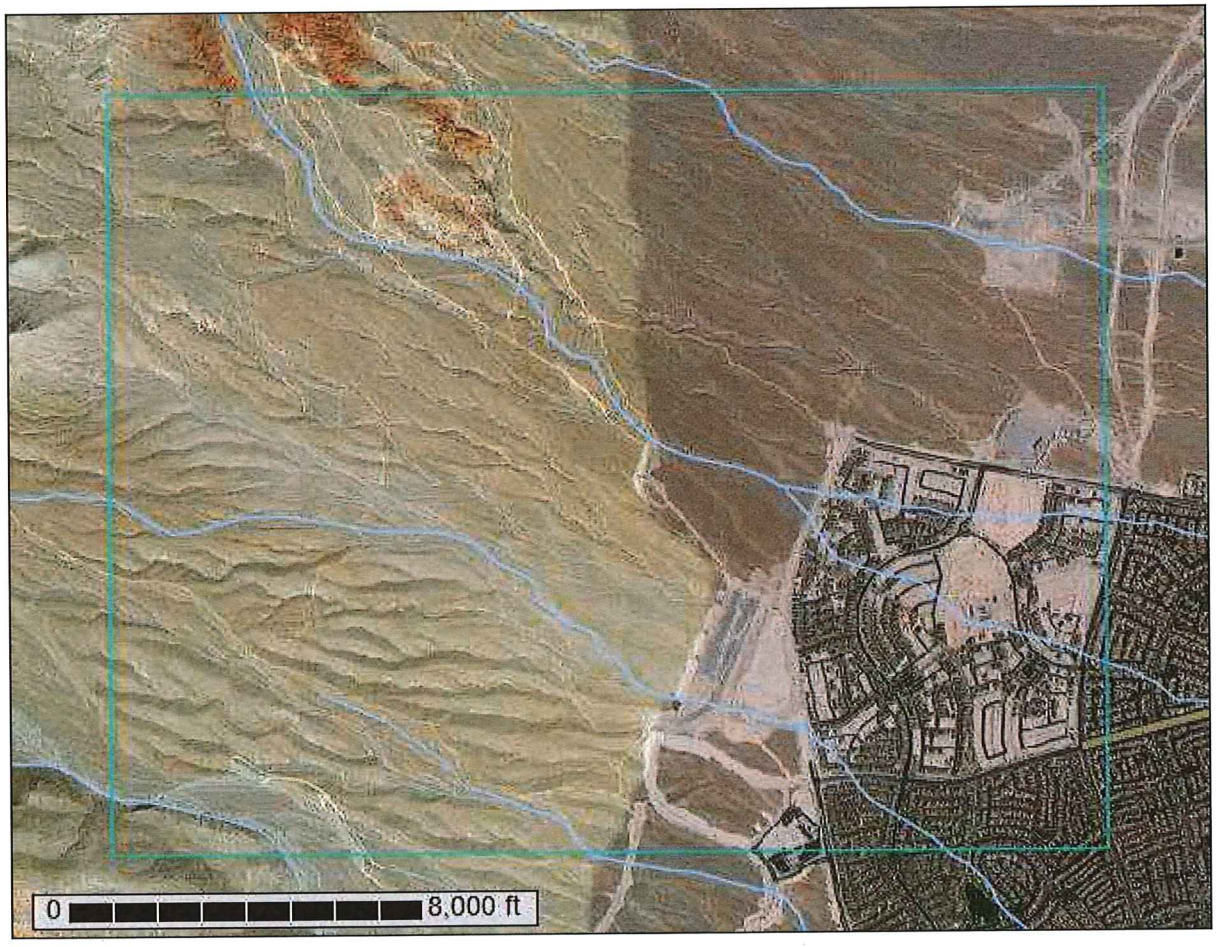
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Las Vegas Valley Area, Nevada, Part of Clark County



February 5, 2018

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

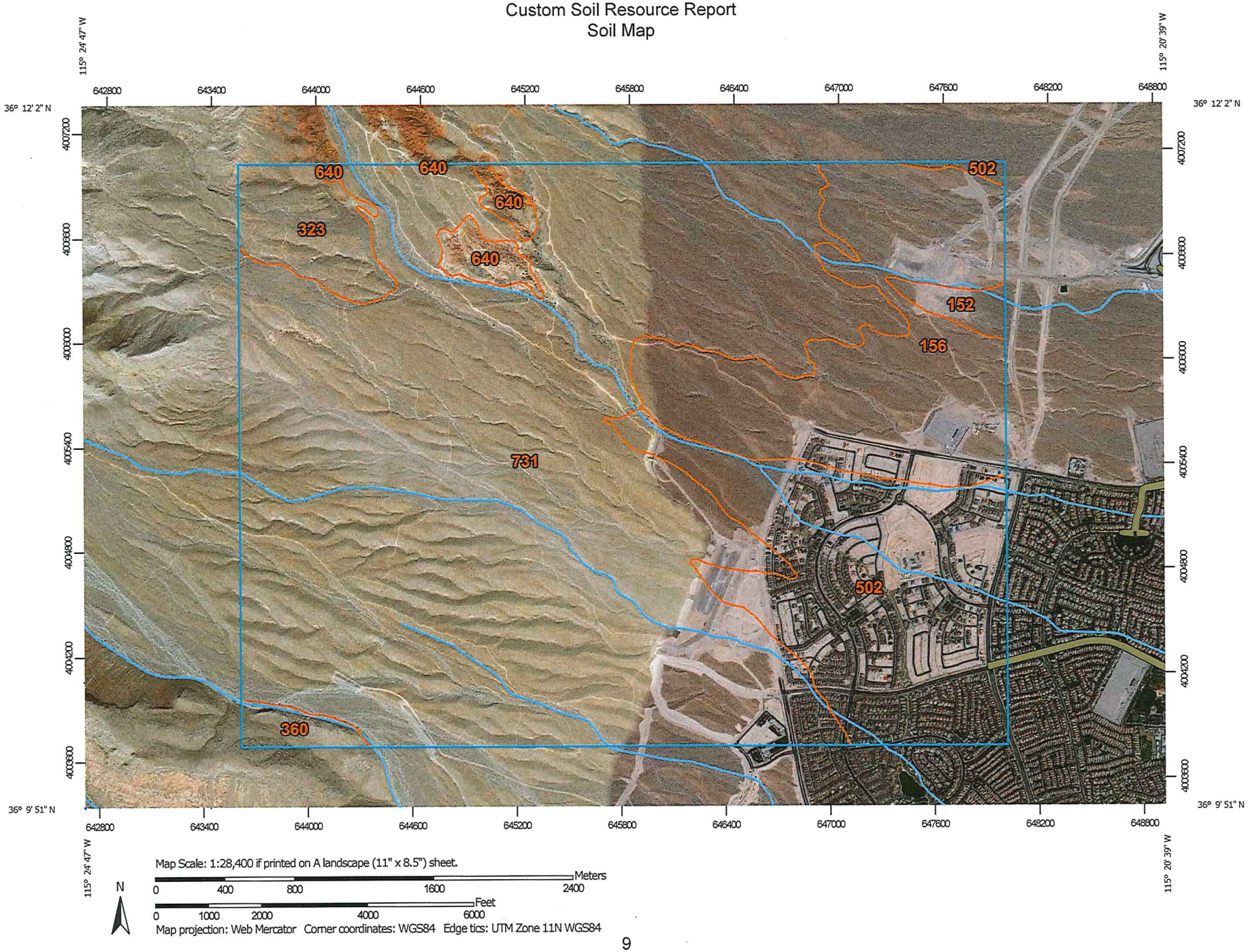
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

Soil Map

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

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Date(s) aerial images were photographed: Sep 19, 2015—Nov 23, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
152	Cave gravelly fine sandy loam, 0 to 4 percent slopes	30.8	0.8%
156	Vace-Wechech association	541.6	14.8%
323	Boxspring-Scrapy-Rock outcrop association	118.7	3.3%
360	Rock outcrop-St. Thomas complex, 15 to 30 percent slopes	35.3	1.0%
502	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	566.5	15.5%
640	Rock outcrop, sandstone	56.8	1.6%
731	Purob-Irongold association	2,300.3	63.0%
Totals for Area of Interest		**3,650.1**	**100.0%**

Map Unit Descriptions

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

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

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

components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Las Vegas Valley Area, Nevada, Part of Clark County

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

Map Unit Setting

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

Map Unit Composition

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

Description of Cave

Setting

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

Typical profile

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

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

156—Vace-Wechech association

Map Unit Setting

National map unit symbol: 1tf5w
Elevation: 2,720 to 4,030 feet
Mean annual precipitation: 5 to 7 inches
Mean annual air temperature: 57 to 69 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Vace and similar soils: 45 percent
Wechech and similar soils: 25 percent
Wechech, steep, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vace

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous loess and mixed alluvium

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam
H2 - 2 to 8 inches: loam
H3 - 8 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 4 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Desert Fans 4-6 P.Z. (R030XB005NV)
Other vegetative classification: Limy 5-7 p.z. (030XB005NV_3)

Hydric soil rating: No

Description of Wechech

Setting

Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolomite

Typical profile

H1 - 0 to 2 inches: very gravelly sandy loam
- 2 to 7 inches: very gravelly sandy loam
H2 - 7 to 13 inches: very gravelly sandy loam
H3 - 13 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 8 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 50 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Desert Fans 4-6 P.Z. (R030XB005NV)
Hydric soil rating: No

Description of Wechech, Steep

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolomite

Typical profile

H1 - 0 to 2 inches: very gravelly sandy loam
- 2 to 7 inches: very gravelly sandy loam
H2 - 7 to 13 inches: very gravelly sandy loam
H3 - 13 to 60 inches: cemented material

Properties and qualities

Slope: 8 to 30 percent
Depth to restrictive feature: 8 to 14 inches to petrocalcic
Natural drainage class: Well drained

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 50 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 0.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: LIMY HILL 5-7 P.Z. (R030XB001NV)
Hydric soil rating: No

Minor Components

Weiser
Percent of map unit: 8 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: GRAVELLY FAN 5-7 P.Z. (R030XB075NV)
Other vegetative classification: Gravelly Fan 5-7 p.z. (030XB075NV_1)
Hydric soil rating: No

Irongold
Percent of map unit: 4 percent
Landform: Fan remnants
Landform position (two-dimensional): Shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool thermic fan portions corr cool hills to R030XB029NV (R030XB029NV)
Other vegetative classification: Shallow Gravelly Loam 5-7 p.z. (030XB029NV_2)
Hydric soil rating: No

Commski
Percent of map unit: 2 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: CALCAREOUS LOAM 5-7 P.Z. (R030XA066NV)
Other vegetative classification: Calcareous Loam 5-7 p.z. (030XA066NV_1)
Hydric soil rating: No

Threelakes
Percent of map unit: 1 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: VALLEY WASH (R030XB028NV)
Hydric soil rating: No

323—Boxspring-Scrapy-Rock outcrop association

Map Unit Setting

National map unit symbol: 1tf6r
Elevation: 4,430 to 7,690 feet
Mean annual precipitation: 7 to 14 inches
Mean annual air temperature: 51 to 57 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Boxspring and similar soils: 40 percent
Scrapy and similar soils: 30 percent
Rock outcrop: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boxspring

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Colluvium and/or residuum weathered from limestone and dolomite

Typical profile

H1 - 0 to 2 inches: extremely gravelly loam
H2 - 2 to 15 inches: extremely gravelly loam
H3 - 15 to 25 inches: bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 14 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Other vegetative classification: Shallow Gravelly Loam 8-10 p.z. (029XY077NV_1)
Hydric soil rating: No

Description of Scrapy

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Down-slope shape: Concave
Across-slope shape: Linear

Typical profile

A - 0 to 1 inches: very gravelly sandy loam
Bk - 1 to 12 inches: very gravelly sandy loam
R - 12 to 22 inches: bedrock

Properties and qualities

Slope: 30 to 50 percent
Percent of area covered with surface fragments: 2.0 percent
Depth to restrictive feature: 10 to 14 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: SHALLOW LIMESTONE SLOPE 11-13 P.Z. (R030XC025NV)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Cliffs
Down-slope shape: Convex
Across-slope shape: Convex

Minor Components

Lithic calciustolls

Percent of map unit: 9 percent
Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Typic haplustolls

Percent of map unit: 6 percent
Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: PIMO-JUOS WSG: OR0507 (029XY126NV)
Hydric soil rating: No

360—Rock outcrop-St. Thomas complex, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hrby
Elevation: 1,600 to 3,000 feet
Mean annual precipitation: 4 to 9 inches
Mean annual air temperature: 61 to 70 degrees F
Frost-free period: 170 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 50 percent
St. thomas and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex

Description of St. Thomas

Setting

Landform: Hills
Down-slope shape: Linear

Across-slope shape: Convex
Parent material: Colluvium derived from limestone and dolomite over residuum weathered from limestone and dolomite

Typical profile

H1 - 0 to 7 inches: extremely cobbly fine sandy loam
H2 - 7 to 17 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Percent of area covered with surface fragments: 2.0 percent
Depth to restrictive feature: 4 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 0.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY HILL 3-5" P.Z. (030XB017NV_3)
Hydric soil rating: No

Minor Components

Weiser

Percent of map unit: 10 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Bracken

Percent of map unit: 5 percent
Landform: Pediments
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: GYSIC LOAM 3-8 P.Z. (030XB026NV_2)
Hydric soil rating: No

502—Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrcf
Elevation: 1,700 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Canutio and similar soils: 55 percent
Cave and similar soils: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canutio

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 9 inches: gravelly fine sandy loam
H2 - 9 to 60 inches: stratified extremely gravelly loamy coarse sand to gravelly loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

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

Description of Cave

Setting

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

Typical profile

H1 - 0 to 16 inches: gravelly fine sandy loam
H2 - 16 to 30 inches: indurated
H3 - 30 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Minor Components

Arizo

Percent of map unit: 5 percent
Landform: Channels
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: VALLEY WASH (R030XB028NV)
Hydric soil rating: No

640—Rock outcrop, sandstone

Map Unit Setting

National map unit symbol: hrct
Elevation: 3,970 to 6,660 feet
Mean annual precipitation: 7 to 9 inches
Mean annual air temperature: 51 to 56 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Cliffs
Down-slope shape: Convex
Across-slope shape: Convex

Minor Components

Nupper

Percent of map unit: 5 percent
Landform: Cliffs
Landform position (two-dimensional): Summit
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: SHALLOW SANDSTONE HILL 11-13 P.Z. (R030XC020NV)
Hydric soil rating: No

Moentria

Percent of map unit: 5 percent
Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Other vegetative classification: Shallow Gravelly Loam 8-10 p.z. (029XY077NV_1)
Hydric soil rating: No

731—Purob-Irongold association

Map Unit Setting

National map unit symbol: 1tf74
Elevation: 3,410 to 6,660 feet
Mean annual precipitation: 5 to 10 inches
Mean annual air temperature: 51 to 63 degrees F
Frost-free period: 130 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Purob and similar soils: 60 percent
Irongold and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Purob

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 3 inches: extremely gravelly loam
H2 - 3 to 8 inches: very gravelly loam
H3 - 8 to 19 inches: very gravelly loam
H4 - 19 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 8 percent
Percent of area covered with surface fragments: 1.0 percent
Depth to restrictive feature: 14 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 80 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Hydric soil rating: No

Description of Irongold

Setting

Landform: Fan remnants
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: And/or alluvium derived from limestone

Typical profile

H1 - 0 to 1 inches: extremely gravelly loam
H2 - 1 to 7 inches: gravelly loam
H3 - 7 to 11 inches: very gravelly loam
H4 - 11 to 34 inches: cemented material
H5 - 34 to 60 inches: extremely gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 8 percent
Percent of area covered with surface fragments: 1.0 percent
Depth to restrictive feature: 10 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 70 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 5-7 P.Z. cool thermic fan portions corr cool hills to R030XB029NV (R030XB029NV)
Hydric soil rating: No

Minor Components

Typic torriorthents

Percent of map unit: 5 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Hydric soil rating: No

Purob

Percent of map unit: 3 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW GRAVELLY LOAM 7-9 P.Z. Mountain portions correlated t (R030XC007NV)
Hydric soil rating: No

Arizo

Percent of map unit: 3 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: UPLAND WASH (R030XB051NV)
Hydric soil rating: No

Typic haplocalcids

Percent of map unit: 2 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: SHALLOW LIMESTONE SLOPE 5-7 P.Z. (R030XA006NV)
Hydric soil rating: No

Aridic calcixerolls

Percent of map unit: 1 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: GRAVELLY INSET FAN 7-9 P.Z. (R030XC011NV)
Hydric soil rating: No

Xeric haplocambids

Percent of map unit: 1 percent
Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: GRAVELLY CALCAREOUS INSET FAN 9-11 P.Z. (R030XC012NV)
Hydric soil rating: No

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Curve Numbers for Project Site Soil Types

Soil#	Hydrologic Soil Group			Land Use Type						
	A	B	D	Commercial	Open Space	Natural Desert Landscaping	7000 sq ft lots	Apartments/Condos	Desert Shrubs	Streets and Roads
156	1.00%	10.00%	89.00%	94.64	88	87	91	93	87	98
502	55.00%	0.00%	45.00%	91.7	78	75	83	87	75	98
731	10.00%	2.00%	88.00%	94.34	87	86	90	92	86	98

Summerlin Village 23B Sky Vista Drive					
WEIGHTED CURVE NUMBERS					
Interim Conditions					
Basin	Soil	Percent	CN	Land Use	WCN
XOFF1	731	100.0%	85.3	Desert Shrub Poor	85.3
XOFF2	731	85.0%	85.3	Desert Shrub Poor	83.5
	502	15.0%	73.0		
XOFF3	731	28.0%	85.3	Desert Shrub Poor	76.4
	502	72.0%	73.0		
XOFF4	502	100.0%	73.0	Desert Shrub Poor	73.0
XOFF5	731	46.0%	85.3	Desert Shrub Poor	78.7
	502	54.0%	73.0		
XOFF6	731	66.0%	85.3	Desert Shrub Poor	81.1
	502	34.0%	73.0		
XOFF7	502	100.0%	73.0	Desert Shrub Poor	73.0
XOFF8	502	100.0%	73.0	Desert Shrub Poor	73.0
XOFF9	502	100.0%	73.0	Desert Shrub Poor	73.0
XOFF10	731	4.0%	85.3	Desert Shrub Poor	83.5
	502	23.0%	73.0		
	156	73.0%	86.7		
XOFF11	731	6.0%	85.3	Desert Shrub Poor	86.6
	156	94.0%	86.7		
XOFF12	156	100.0%	86.7	Desert Shrub Poor	86.7
RD1	502	100.0%	98	Street and Roads	98.0
RD2	731	100.0%	98	Street and Roads	98.0

Summerlin Village 23B Sky Vista Drive
WEIGHTED CURVE NUMBERS
Ultimate Conditions

Basin	Soil	Percent	Land Use	WCN
BW34	731	24.0%	Commercial	93.3
	502	44.0%		
	156	32.0%		
BW35	502	52.0%	Commercial	93.1
	156	48.0%		
BWP6	502	52.0%	Open Space (Poor)	82.8
	156	48.0%		
BWPW6	731	100.0%	Open Space (Poor)	87.0
BW36	731	42.0%	7,000 sq ft lots	85.9
	502	58.0%		
BW38	731	49.0%	Commercial	93.0
	502	51.0%		
BW39	731	100.0%	Commercial	94.3
LR30	502	30.0%	Apartment/ Condos	91.2
	156	70.0%		
LR31	156	100.0%	Apartment/ Condos	93.0
LR32	156	100.0%	Apartment/ Condos	93.0
LR33	156	100.0%	Apartment/ Condos	93.0
LRP4B	156	100.0%	Open Space (Poor)	88.0
LPRW5	156	100.0%	Open Space (Poor)	88.0
RD1	502	100.0%	Streets and Roads	98.0
RD2	731	100.0%	Streets and Roads	98.0
RD3	731	100.0%	Streets and Roads	98.0
RD4	502	100.0%	Streets and Roads	98.0
RD5	156	100.0%	Streets and Roads	98.0
SB1	731	100.0%	Natural desert landscaping	85.3

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

GCW ENGINEERS \ SURVEYORS

HOWARD HUGHES PROPERTIES INC.
SUMMERLIN VILLAGE 23B SKY VISTA DRIVE
INTERIM CONDITION

Project No: 62023B-240
Date: 10-Apr-18
Calculated by: JR

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN (16)	K (2)	AREA Ac (3)	AREA Sq Mi (4)	INITIAL LENGTH Feet (5)	SLOPE % (6)	Ti Min (7)	TRAVEL LENGTH Feet (8)	SLOPE % (9a)	V1 VELOCITY fps (9b)	V2 VELOCITY fps (10)	Tt Min (11)	TOTAL LENGTH Feet (12)	Tc = (L/180)+10 Min (13)	Min (14)	Tlag = 0.6Tc/60 Hours (15)	Remarks:
XOFF1	E	85.3	0.7360	23.4	0.0366	240	6.3	5.5	1880	4.7	3.2	6.4	6.2	2120	N/A	11.7	0.117	3.34
XOFF2	E	83.5	0.7122	21.6	0.0338	150	1.7	7.2	1855	3.9	2.9	5.8	6.8	2005	N/A	14.0	0.140	3.34
XOFF3	E	76.4	0.6185	4.3	0.0067	270	1.5	12.5	210	11.0	4.9	9.8	0.7	480	N/A	13.2	0.132	3.34
XOFF4	E	73.0	0.5736	1.1	0.0017	50	2.0	5.3	250	6.8	3.9	7.7	1.1	300	N/A	6.4	0.100	3.34
XOFF5	E	78.7	0.6488	5.6	0.0088	140	8.2	4.8	600	4.3	3.1	6.1	3.0	740	N/A	7.8	0.100	3.34
XOFF6	E	81.8	0.6898	31.2	0.0488	500	4.9	9.7	2390	4.9	3.3	6.5	7.4	2890	N/A	17.1	0.171	3.34
XOFF7	E	73.0	0.5736	15.1	0.0236	500	5.4	12.0	1780	5.4	3.5	6.9	5.5	2280	N/A	17.6	0.176	3.34
XOFF8	E	73.0	0.5736	3.4	0.0053	350	5.3	10.2	550	5.8	3.6	7.1	2.5	900	N/A	12.6	0.126	3.34
XOFF9	E	73.0	0.5736	9.9	0.0155	130	5.4	6.2	1850	5.2	3.4	6.7	5.8	1980	N/A	12.0	0.120	3.34
XOFF10	E	83.5	0.7122	41.9	0.0655	360	6.4	7.1	3130	5.4	3.4	6.8	8.8	3490	N/A	16.0	0.160	3.34
XOFF11	E	86.6	0.7531	43.1	0.0673	500	5.8	7.8	3670	5.8	3.6	7.1	9.8	4170	N/A	17.5	0.175	3.34
XOFF12	E	86.7	0.7544	28.3	0.0442	270	7.0	5.3	3180	5.8	3.6	7.1	8.7	3450	N/A	14.0	0.140	3.34
RD1	D	98.0	0.9036	2.1	0.0033	40	2.0	1.8	900	1.1	2.1	3.2	6.0	940	15.2	7.8	0.078	3.34
RD2	D	98.0	0.9036	10.1	0.0158	40	2.0	1.8	4050	2.8	3.4	5.1	14.0	4090	32.7	15.8	0.158	3.34

$Tc = Ti + Tt$ $Tlag = 0.6\ Tc$

$Ti = 1.8\ (1.1 - K)\ L^{1/2} / S^{1/3}$

$K = 0.0132\ (CN) - 0.39$

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

Existing: $V1 = 14.8*(S/100)^{1/2}$ $V2 = 29.4*(S/100)^{1/2}$

Developed: $V1 = 20.2*(S/100)^{1/2}$ $V2 = 30.6*(S/100)^{1/2}$

REFERENCE:

STANDARD FORM 4

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   10APR18  TIME  16:34:16  *
*                                      *
****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

```
          LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
                    *DIAGRAM
 *** FREE ***
               1    ID   ************************************************************
               2    ID   * ........................................................ *
               3    ID   * :                  SUMMERLIN VILLAGE 23B                 : *
               4    ID   * :                  SKY VISTA DRIVE                       : *
               5    ID   * :                  INTERIM CONDITIONS                    : *
               6    ID   * :                  DEVELOPED ONSITE                      : *
               7    ID   * :                  UNDEVELOPED OFFSITE                   : *
               8    ID   * :.....................................................: *
               9    ID   * :             RETURN PERIOD_ _ _ _10 & 100-YEAR        : *
              10    ID   * :             DISTRIBUTION_ _ _ _ 6-HOUR SDN3          : *
              11    ID   * :             PROJECT NO_ _ _ _ _ 62023B.100           : *
              12    ID   * :             FILENAME_ _ _ _ _ _ INTERIM.H1           : *
              13    ID   * :             DATE_ _ _ _ _ _ _ _ 02/12/2018           : *
              14    ID   * :             MODELED BY_ _ _ _ _ JAR                  : *
              15    ID   * :.....................................................: *
              16    ID   * :                                                     : *
              17    ID   * :.....................................................: *
              18    ID   ************************************************************
              19    ID
              20    ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
              21    ID
              22    ID                          AREA      DARF
              23    ID                        SQ.MI.
              24    ID
              25    ID                       0.0 - 0.5    1.00
              26    ID                       0.5 - 1.0    0.98
              27    ID                       1.0 - 2.0    0.95
              28    ID                       2.0 - 4.0    0.92
              29    ID                       4.0 - 6.0    0.91
              30    ID                       6.0 - 8.0    0.89
              31    ID
              32    IT       5       0       0     200
              33    IO       5       0
              34    IN       5       0       0
              35    JR    PREC     1.0    0.98    0.95    0.92    0.91    0.89    0.54
                    *
                    * BASIN PARAMETERS FOR OFFSITE BASINS TAKEN
                    * DIRECTLY FROM 2008 MPU AND ONSITE DEVELOPMENT PLANS:
                    *
                    * THE FOLLOWING SECTION OF HYDROLOGY WAS DEVELOPED BASED ON G.C. WALLACE'S
                    * 2006 SUMMERLIN WEST: EXISTING OFFSITE/PROPOSED ONSITE DRAINAGE CONDITION
                    * HYDROLOGIC MODEL (11-20-06); THE HYDROLOGY WAS REVISEED IN ORDER TO
                    * INCORPORATE ALL EXISTING/PROPOSED MPU FACILITIES
                    *
              36    KK  XOFF12
              37    BA   0.044
              38    PB    3.34
              39    PC   0.000   .0200   .0570   .0700   .0870   .1080   .1240   .1300   .1300   .1300
```

```
 40          PC   .1300   .1300   .1300   .1330   .1400   .1420   .1480   .1580   .1720   .1810
 41          PC   .1900   .1970   .1990   .2000   .2010   .2040   .2140   .2290   .2410   .2490
 42          PC   .2510   .2560   .2700   .2780   .2810   .2830   .2950   .3220   .3520   .4090
 43          PC   .4990   .5900   .7100   .7440   .7810   .8120   .8190   .8350   .8510   .8560
```



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

 44          PC   .8600   .8680   .8760   .8880   .9100   .9260   .9370   .9500   .9700   .9760
 45          PC   .9820   .9850   .9870   .9890   .9900   .9930   .9930   .9940   .9950   .9980
 46          PC   .9980   .9990  1.000
 47          LS      0    86.7
 48          UD  0.140
             *

 49          KK  XOFF11
 50          BA   0.067
 51          PB    3.34
 52          LS      0    86.6
 53          UD  0.175
             *

 54          KK  XOFF10
 55          BA   0.066
 56          PB    3.34
 57          LS      0    83.5
 58          UD  0.160
             *

 59          KK    CP2A
 60          HC       3
             *

 61          KK     RD1
 62          KM   ROADWAY
 63          BA 0.0033
 64          LS      0    98.0
 65          UD    .078
             *

 66          KK     CP2
 67          HC       2
             *

 68          KK   XOFF9
 69          BA   0.016
 70          PB    3.34
 71          LS      0    73.0
 72          UD  0.120
             *

 73          KK   XOFF8
 74          BA   0.005
 75          PB    3.34
 76          LS      0    73.0
 77          UD  0.126
             *
```



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

 78          KK   XOFF7
 79          BA   0.024
 80          PB    3.34
 81          LS      0    73.0
 82          UD  0.176
             *

 83          KK   XOFF6
 84          BA   0.049
 85          PB    3.34
 86          LS      0    81.8
 87          UD  0.171
             *

 88          KK     CP4
 89          HC       4
             *

 90          KK     3-1
 91          KM    COMPARE TO MPU BASIN DB54-1 (CURVE NUMBER CHANGED FROM 87.2)
 92          BA    2.22
 93          PB    3.75
 94          LS          0    87.0
 95          UD    0.582
             *

 96          KK   R3-1
```

```
 97          KM    ROUTE R3-1 THROUGH 3-2
 98          KM    EXISTING NATURAL WASH
 99          RD    3322   0.092   0.030       0    TRAP     125      0
             *

100          KK     3-2
101          KM    COMPARE TO MPU BASIN DB54-5 (CURVE NUMBER CHANGED FROM 85. 2)
102          BA    0.226
103          PB    3.67
104          LS           0    85.6
105          UD    0.108
             *

106          KK   CP3.1
107          KM    COMBINE R3-1 AND 3-2
108          HC           2
             *

109          KK RCP3.1
110          KM    ROUTE CP3.1 TO CP3.3 THROUGH 3-E VI A
111          KM    (PORTION OF FACILITY APM50059)
112          RD    7900   0.070   0.013       0    TRAP     125       2
             *
```



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

113          KK     3-D
114          KM    PORTION OF BASINS DB54-6R (PB=3. 56)
115          BA    0.3329
116          PB    3.59
117          LS           0    84.6
118          UD    0.223
             *

119          KK   CP3.3
120          KM    COMBI NE 3-D, RCP3.1,
121          HC           2
             *

122          KK RCP3.3
123          KM    ROUTE CP3.3 TO CP3 . 4 THROUGH 3-E VIA A
124          KM    (PORTION OF FACILITY APM50059)
125          RD    1000   0.070   0.013       0    TRAP     125       2
             *

126          KK     3-3
127          KM    PORTION OF MPU BASIN DB54-3
128          BA    0.1737
129          PB    3.65
130          LS           0    88.0
131          UD    0.081
             *

132          KK  R3-3
133          KM    ROUTE R3 - 3 THROUGH A PORTIO N OF 3- E TO CP 3 . 2
134          KM    NATURAL WASH
135          RD    2233   0.054   0.030       0    TRAP     100       0
             *

136          KK     3-4
137          KM    PORTIO N OF MPU BASI N DB54-3
138          BA    0.3457
139          PB    3.68
140          LS           0    88.0
141          UD    0.092
             *

142          KK    R3-4
143          KM    ROUTE R3 - 4 THROUGH A PORTIO N OF 3- E TO CP3 . 2
144          KM    NATURAL WASH
145          RD    3300   0.097   0.030       0    TRAP     100       0
             *

146          KK     3-5
147          KM    COMPARE TO MPU BASI N DB54- 2 (S LI GHTLY LARGER PORT IO N OF DB54 - 4)
148          BA    0.2936
149          PB    3.65
150          LS           0    87.7
151          UD    0.094
             *
```



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

152          KK    R3-5
153          KM    ROUTE R3 - 5 THROUGH A PORTIO N OF 3 - E TO CP 3 . 2
```

```
154          KM    ( PORTI ON OF FACI LI TY APM5 00 57 )
155          RD    4400   0.068   0.013       0    TRAP      50       2
             *

156          KK   CP3.2
157          KM    COMBINE  R3 - 5  ,   R3- 4  AND  R3 - 3
158          HC           3
             *

159          KK  RCP3.2
160          KM    ROUTE RCP 3 . 2 THROUGH A PORTI ON OF 3- E TO CP 3. 4
161          KM    ( PORTION OF FACI LIT Y APM500 57)
162          RD    5500   0.068   0.013       0    TRAP      50       2
             *

163          KK     3-E
164          KM    PORTI ON OF BASI NS DB54-4 ( PB=3 . 60 ) AND DB54 - 6R ( PB=3. 56)
165          BA    0.5442
166          PB    3.57
167          LS           0    85.8
168          UD    0.238
             *

169          KK   CP3.4
170          KM    COMBI NE 3 - E, RCP3 . 2 AND RCP 3 . 3
171          HC           3
             *

172          KK    RCP3.4
173          KM    ROUTE RCP3 . 4 TO CPDBS
174          KM    ( FACI LI TI ES APM50056, APM500 47 AND APM5 0 0 0 8 )
175          RD    3365   0.052   0.013       0    TRAP      80       2
             *

176          KK     3-6
177          KM    PORTIO N OF MPU BASI N DBSS- 3 AND DBSS-4
178          BA    0.0887
179          PB    3.62
180          LS           0    88.0
181          UD    0.074
             *

182          KK    R3-6
183          KM    ROUTE 3 - 6 THROUGH A PORTION OF 3- J AND A PORTION OF 3 - K TO CP 3. 5
184          KM    EXI STI NG NATURAL WASHES
185          RD    4500   0.080   0.030       0    TRAP     100       0
             *
```



```
1                                    HEC-1 INPUT

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

186          KK     3-7
187          KM    PORTION OF MPU BASI N DBSS- 3 AND DBSS-4
188          BA    0.1714
189          PB    3.61
190          LS           0    87.2
191          UD    0.048
             *

192          KK    R3-7
193          KM    ROUTE 3-7 THROUGH A PORTION OF 3-K TO CP3.5
194          KM    PORTION OF FACILITY ID APM50213
195          RD    4340   0.073   0.013       0    TRAP      50       2
             *

196          KK     3-J
197          KM    PORTION OF MPU BASIN DB55-4
198          BA    0.1529
199          PB    3.59
200          LS           0    78.6
201          UD    0.168
             *

202          KK   R3-J
203          KM    ROUTE 3-J THROUGH A PORTION OF 3-K TO CP3.5
204          KM    NATURAL WASHES
205          RD    2700   0.074   0.030       0    TRAP     100       0
             *

206          KK   CP3.5
207          KM    COMBINE R3-J , R3-7 AND R3-6
208          HC           3
             *

209          KK  RCP3.5
210          KM    ROUTE CP3.5 THROUGH A PORTION OF 3-K TO CP3.6
211          KM    PORTION OF FACILITY ID APM50213
212          RD    2100   0.073   0.013       0    TRAP      50       2
```

```
                *
213             KK     3-8
214             KM    COMPARE TO MPU BASIN DB55-1
215             BA    0.6386
216             PB    3.70
217             LS           0    87.8
218             UD    0.196
                *

219             KK    R3-8
220             KM    ROUTE 3-8 THROUGH A PORTION OF 3-K TO CP3.6
221             KM    FACILITY ID APM50212
222             RD    6695   0.075   0.013       0    TRAP      30       2
                *
```



```
1                                       HEC-1 INPUT

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

223             KK     3-K
224             KM    COMPARE TO MPU BASIN DB55-7
225             BA    0.8890
226             PB    3.54
227             LS           0    87.6
228             UD    0.296
                *

229             KK   CP3.6
230             KM    COMBI NE 3-K, R3-8 AND RCP3.5
231             HC           3
                *

232             KK RCP3.6
233             KM    ROUTE CP3.6 TO CPDB5
234             KM    FACILITY ID APM500009
235             RD    4180   0.058   0.013       0    TRAP      50       2
                *

236             KK     3-N
237             KM    COMPARE TO MPU BASIN DB55-8
238             BA    0.4532
239             PB    3.46
240             LS           0    88.9
241             UD    0.269
                *

242             KK     3-M
243             KM    COMPARE TO MPU BASIN DB55-8
244             BA    0.1924
245             PB    3.48
246             LS           0    88.8
247             UD    0.147
                *

248             KK    R3-M
249             KM    ROUTE 3-M TO CPDB5
250             KM    FACILITY ID PORTION OF APM500009
251             RD    4500  0.0528   0.013       0    TRAP       7       0
                *

252             KK   CPDB5
253             KM    COMBINE 3-M, 3-N, RCP3.6 AND RCP3.4
254             KM    TOTAL INFLOW TO SUMMERLIN #5 DETENTION BASIN
255             KO           0
256             HC           4
                *

257             KK     DB5
258             KM    SUMMERLIN DETENTION BASIN 5
259             KO           0
260             RS           1    STOR     -1
261             SV           0    1.73    4.55    8.45   13.08    18.2   23.81   29.96   36.70   43.93
262             SV   59.55    77.49   99.82  127.17  159.39  196.38  240.07  384.05  405.65  535.25
```



```
1                                       HEC-1 INPUT

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

263             SQ           0     192     276     391     505     616     725     813     900     982
264             SQ    1176    1368    1534    1683    1804    1920    2033    2315    3725   23201
265             SE    3532.5    3535    3536    3537    3538    3539    3540    3541    3542    3543
266             SE    3545    3547    3549    3551    3553    3555    3557    3563    3564    3569
267             SS    3563           435.6   3            1.5
                *

268             KK   60RCP
269             DT     7X5
270             DI           0    1000    1600    2000    2400
271             DQ           0    1000    1400    1700    2000
```

```
                *
272             KK   XOFF5
273             BA   0.009
274             PB    3.34
275             LS       0    78.7
276             UD   0.100
                *
277             KK    CPA1
278             KM   DB5 flow from 60" RCP and XOFF5
279             HC       2
                *
280             KK     CPA
281             HC       2
                *
282             KK   XOFF4
283             BA   0.002
284             PB    3.34
285             LS       0    73.0
286             UD   0.100
                *
287             KK   XOFF3
288             BA   0.007
289             PB    3.34
290             LS       0    76.4
291             UD   0.132
                *
292             KK   XOFF2
293             BA   0.034
294             PB    3.34
295             LS       0    83.5
296             UD   0.140
                *
```



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

297             KK     CP5
298             HC       4
                *
299             KK     7X5
300             DR     7X5
                *
301             KK     CPB
302             HC       2
                *
303             KK   XOFF1
304             BA   0.037
305             PB    3.34
306             LS       0    85.3
307             UD   0.117
                *
308             KK     RD2
309             BA  0.0158
310             LS       0    98.0
311             UD    .158
                *
312             KK     CPC
313             HC       3
                *
314             ZZ
```

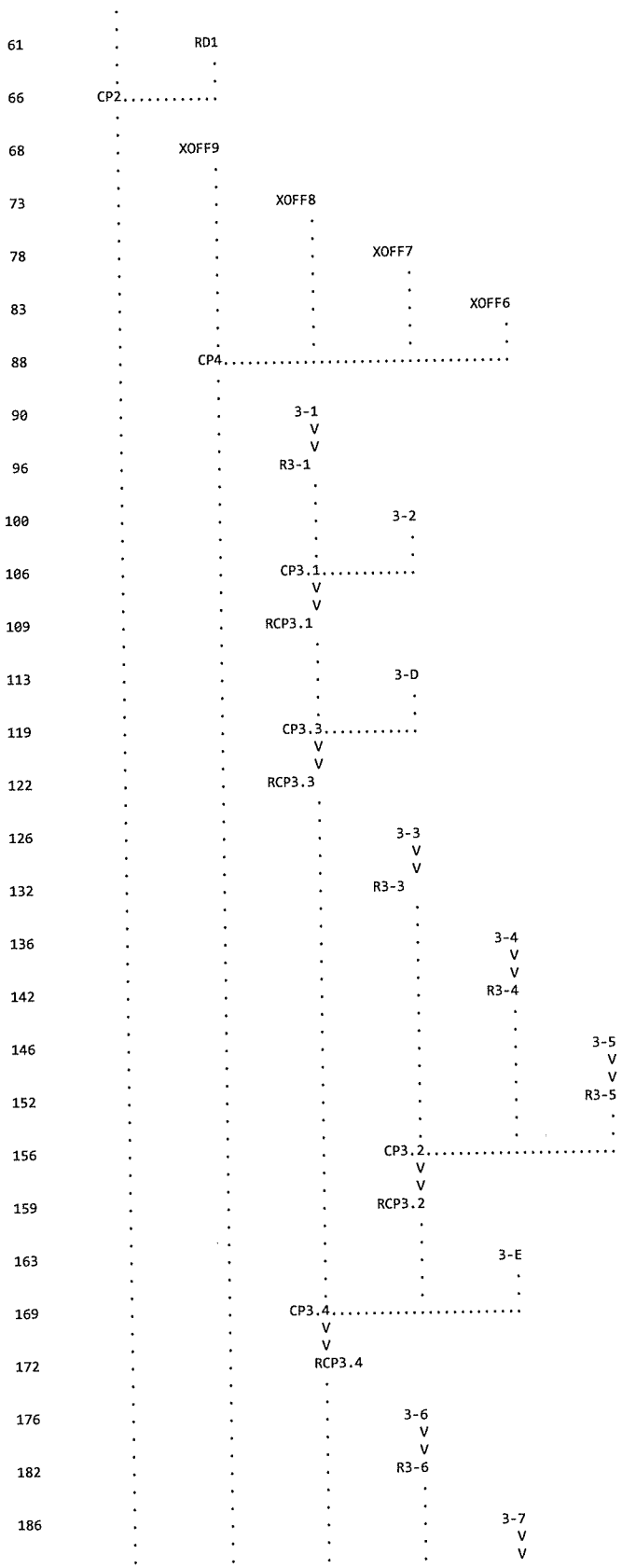
1

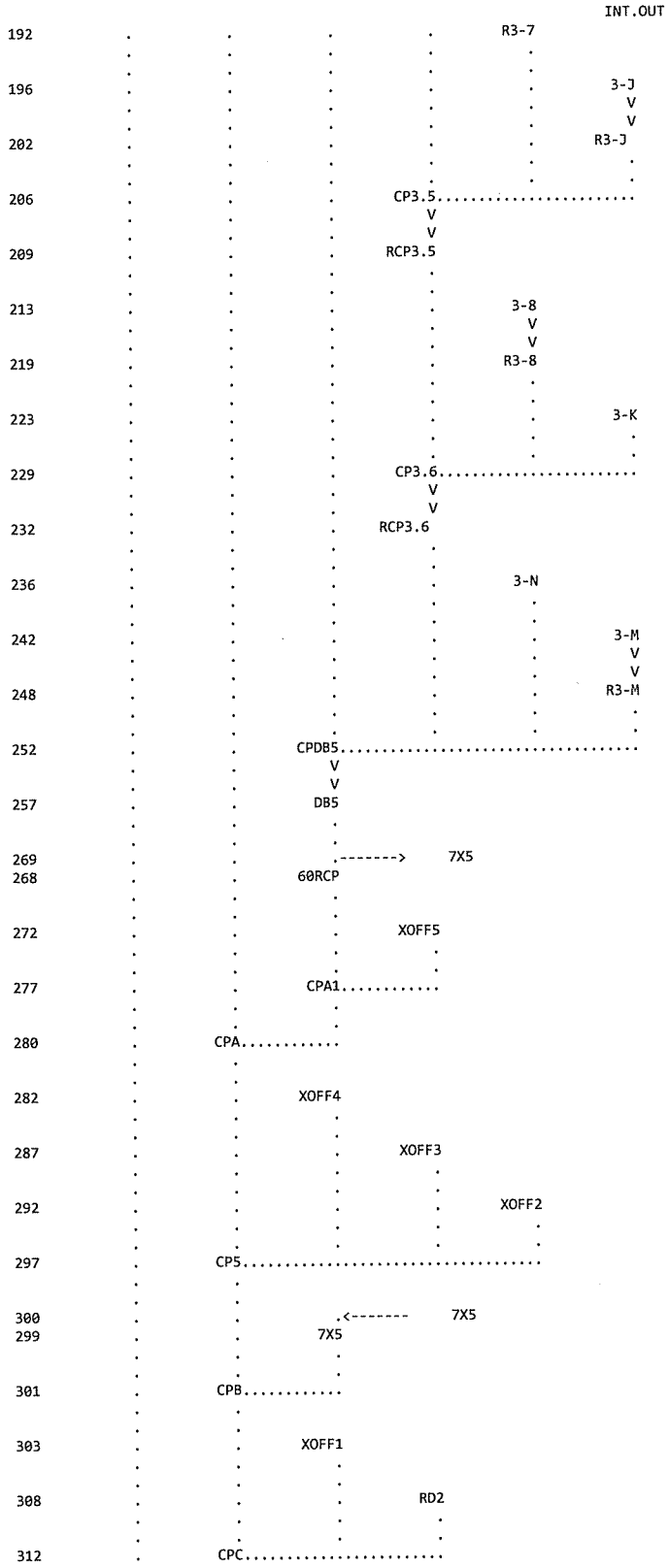
SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    36      XOFF12
              .
              .
    49        .      XOFF11
              .          .
              .          .
    54        .          .      XOFF10
              .          .          .
              .          .          .
    59      CP2A.....................
```


61
RD1
66
CP2
68
XOFF9
73
XOFF8
78
XOFF7
83
XOFF6
88
CP4
90
3-1
96
R3-1
100
3-2
106
CP3.1
109
RCP3.1
113
3-D
119
CP3.3
122
RCP3.3
126
3-3
132
R3-3
136
3-4
142
R3-4
146
3-5
152
R3-5
156
CP3.2
159
RCP3.2
163
3-E
169
CP3.4
172
RCP3.4
176
3-6
182
R3-6
186
3-7



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

*

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

****

*

* U.S. ARMY CORPS OF ENGINEERS *

```
*             JUN   1998             *
*           VERSION 4.1              *
*                                    *
*  RUN DATE   10APR18  TIME  16:34:16 *
*                                    *
**************************************
```

```
*************************************
*   HYDROLOGIC ENGINEERING CENTER   *
*         609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616     *
*          (916) 756-1104           *
*                                   *
*************************************
```

```
*************************************************************
* ......................................................... *
* :                SUMMERLIN VILLAGE 23B                  : *
* :                SKY VISTA DRIVE                        : *
* :                ULTIMATE CONDITIONS                    : *
* :                DEVELOPED ONSITE                       : *
* :                UNDEVELOPED OFFSITE                    : *
* :.......................................................: *
* :           RETURN PERIOD_ _ _ _10 & 100-YEAR           : *
* :           DISTRIBUTION_ _ _ _ 6-HOUR SDN3             : *
* :           PROJECT NO_ _ _ _ _ 620238.100              : *
* :           FILENAME_ _ _ _ _ _ INTERIM.H1              : *
* :           DATE_ _ _ _ _ _ _ _ 02/12/2018              : *
* :           MODELED BY_ _ _ _ _ JAR                     : *
* :.......................................................: *
* :                                                       : *
* :.......................................................: *
*************************************************************
```

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0.0 - 0.5	1.00
0.5 - 1.0	0.98
1.0 - 2.0	0.95
2.0 - 4.0	0.92
4.0 - 6.0	0.91
6.0 - 8.0	0.89

```
33 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          200  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     1   0  ENDING DATE
                    NDTIME        1635  ENDING TIME
                    ICENT           19  CENTURY MARK

                COMPUTATION INTERVAL      .08 HOURS
                    TOTAL TIME BASE   16.58 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       .98       .95       .92       .91       .89       .54
```

*** ***

```
          **************
          *            *
252 KK    *     CPDB5  *
          *            *
          **************

255 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
```

IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

*** ***

257 KK

****
* *
* DB5 *
* *
****

259 KO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .98	RATIO 3 .95	RATIO 4 .92	RATIO 5 .91	RATIO 6 .89	RATIO 7 .54
HYDROGRAPH AT											
+	XOFF12	.04	1	FLOW	75.	73.	70.	67.	66.	64.	29.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	XOFF11	.07	1	FLOW	107.	104.	99.	95.	93.	90.	40.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	XOFF10	.07	1	FLOW	97.	94.	90.	85.	84.	81.	33.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CP2A	.18	1	FLOW	279.	271.	259.	247.	243.	235.	101.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	RD1	.00	1	FLOW	8.	8.	8.	8.	8.	8.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP2	.18	1	FLOW	285.	277.	265.	253.	249.	241.	105.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	XOFF9	.02	1	FLOW	16.	15.	14.	13.	13.	12.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	XOFF8	.00	1	FLOW	5.	5.	4.	4.	4.	4.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	XOFF7	.02	1	FLOW	21.	20.	18.	17.	17.	16.	4.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
HYDROGRAPH AT											
+	XOFF6	.05	1	FLOW	65.	63.	60.	57.	56.	54.	20.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT											
+	CP4	.09	1	FLOW	107.	103.	97.	92.	90.	86.	28.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	3-1	2.22	1	FLOW	2356.	2292.	2196.	2101.	2069.	2005.	927.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
ROUTED TO											
+	R3-1	2.22	1	FLOW	2346.	2282.	2184.	2094.	2057.	1994.	924.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT											
+	3-2	.23	1	FLOW	435.	423.	405.	386.	380.	368.	168.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
2 COMBINED AT											
+	CP3.1	2.45	1	FLOW	2421.	2356.	2255.	2162.	2124.	2058.	957.
				TIME	4.08	4.08	4.00	4.08	4.08	4.08	4.08

ROUTED TO												
+	RCP3.1	2.45	1	FLOW	2409.	2357.	2259.	2154.	2117.	2055.	960.	
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.17	
HYDROGRAPH AT												
+	3-D	.33	1	FLOW	495.	481.	459.	438.	431.	417.	180.	
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	
2 COMBINED AT												
+	CP3.3	2.78	1	FLOW	2582.	2526.	2421.	2309.	2270.	2204.	1015.	
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.17	
ROUTED TO												
+	RCP3.3	2.78	1	FLOW	2580.	2522.	2418.	2306.	2267.	2201.	1014.	
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.17	
HYDROGRAPH AT												
+	3-3	.17	1	FLOW	397.	387.	371.	356.	351.	340.	163.	
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	
ROUTED TO												
+	R3-3	.17	1	FLOW	373.	365.	351.	337.	333.	323.	148.	
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	
HYDROGRAPH AT												
+	3-4	.35	1	FLOW	767.	747.	717.	687.	677.	657.	314.	
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	
ROUTED TO												
+	R3-4	.35	1	FLOW	739.	720.	692.	665.	655.	636.	292.	
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	
HYDROGRAPH AT												
+	3-5	.29	1	FLOW	634.	617.	592.	567.	559.	542.	256.	
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	
ROUTED TO												
+	R3-5	.29	1	FLOW	609.	588.	566.	546.	537.	523.	251.	
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	
3 COMBINED AT												
+	CP3.2	.81	1	FLOW	1721.	1674.	1609.	1548.	1525.	1483.	692.	
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	
ROUTED TO												
+	RCP3.2	.81	1	FLOW	1650.	1605.	1539.	1480.	1459.	1423.	658.	
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	
HYDROGRAPH AT												
+	3-E	.54	1	FLOW	821.	797.	763.	728.	717.	694.	308.	
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	
3 COMBINED AT												
+	CP3.4	4.14	1	FLOW	4121.	4001.	3832.	3675.	3609.	3502.	1501.	
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	
ROUTED TO												
+	RCP3.4	4.14	1	FLOW	4066.	3943.	3767.	3608.	3542.	3432.	1493.	
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	
HYDROGRAPH AT												
+	3-6	.09	1	FLOW	206.	201.	193.	185.	182.	177.	85.	
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	
ROUTED TO												
+	R3-6	.09	1	FLOW	185.	185.	179.	172.	169.	162.	76.	
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	
HYDROGRAPH AT												
+	3-7	.17	1	FLOW	429.	417.	401.	384.	378.	367.	176.	
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	
ROUTED TO												
+	R3-7	.17	1	FLOW	365.	351.	334.	321.	317.	308.	156.	
				TIME	3.50	3.50	3.50	3.58	3.58	3.58	3.58	
HYDROGRAPH AT												
+	3-J	.15	1	FLOW	203.	197.	186.	176.	172.	166.	57.	
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	
ROUTED TO												
+	R3-J	.15	1	FLOW	197.	190.	178.	168.	164.	158.	58.	
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	
3 COMBINED AT												
+	CP3.5	.41	1	FLOW	702.	679.	648.	618.	608.	589.	231.	
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	
ROUTED TO												

							INT.OUT				
+	RCP3.5	.41	1	FLOW	682.	659.	627.	595.	584.	564.	227.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
HYDROGRAPH AT											
+	3-8	.64	1	FLOW	1151.	1121.	1075.	1029.	1014.	983.	461.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	R3-8	.64	1	FLOW	1141.	1112.	1065.	1019.	1002.	974.	456.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	3-K	.89	1	FLOW	1269.	1235.	1184.	1133.	1116.	1082.	506.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
3 COMBINED AT											
+	CP3.6	1.94	1	FLOW	2996.	2929.	2804.	2682.	2639.	2557.	1169.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCP3.6	1.94	1	FLOW	2931.	2860.	2738.	2617.	2571.	2496.	1167.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT											
+	3-N	.45	1	FLOW	687.	669.	642.	615.	606.	588.	279.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	3-M	.19	1	FLOW	367.	358.	344.	329.	325.	315.	152.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	R3-M	.19	1	FLOW	356.	346.	332.	318.	313.	305.	144.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT											
+	CPDB5	6.72	1	FLOW	8005.	7785.	7447.	7128.	7005.	6792.	3049.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
ROUTED TO											
+	DB5	6.72	1	FLOW	2286.	2257.	2214.	2171.	2156.	2129.	1469.
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
			** PEAK STAGES IN FEET **								
			1	STAGE	3562.38	3561.77	3560.85	3559.95	3559.63	3559.05	3548.22
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
DIVERSION TO											
+	7X5	6.72	1	FLOW	1915.	1893.	1860.	1829.	1817.	1797.	1313.
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
HYDROGRAPH AT											
+	60RCP	6.72	1	FLOW	372.	364.	353.	343.	339.	332.	156.
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
HYDROGRAPH AT											
+	XOFF5	.01	1	FLOW	12.	11.	11.	10.	10.	10.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
2 COMBINED AT											
+	CPA1	6.73	1	FLOW	373.	366.	355.	344.	341.	334.	157.
				TIME	5.00	5.00	4.92	4.92	4.92	4.92	4.33
2 COMBINED AT											
+	CPA	6.83	1	FLOW	398.	390.	378.	367.	363.	355.	162.
				TIME	4.92	4.92	4.92	4.92	4.92	4.92	4.33
HYDROGRAPH AT											
+	XOFF4	.00	1	FLOW	2.	2.	2.	2.	2.	2.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	XOFF3	.01	1	FLOW	8.	8.	7.	7.	7.	6.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	XOFF2	.03	1	FLOW	52.	50.	48.	46.	45.	43.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT											
+	CP5	6.87	1	FLOW	411.	402.	390.	378.	374.	366.	164.
				TIME	4.92	4.92	4.92	4.92	4.92	4.92	4.42
HYDROGRAPH AT											
+	7X5	.00	1	FLOW	1915.	1893.	1860.	1829.	1817.	1797.	1313.
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
2 COMBINED AT											
+	CPB	6.87	1	FLOW	2321.	2292.	2248.	2205.	2190.	2162.	1477.

							INT.OUT					
				TIME	4.92	4.92	4.92	4.92	4.92	4.92	4.33
HYDROGRAPH AT												
+	XOFF1	.04	1	FLOW	61.	60.	57.	54.	54.	52.	23.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	RD2	.02	1	FLOW	35.	34.	33.	32.	31.	31.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT												
+	CPC	6.92	1	FLOW	2339.	2309.	2265.	2221.	2206.	2178.	1481.
				TIME	4.92	4.92	4.92	4.92	4.92	4.92	4.33

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1	RATIO= .00								
R3-1	MANE	2.66	2349.13	244.73	2.41	5.00	2345.98	245.00	2.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2851E+03 EXCESS= .0000E+00 OUTFLOW= .2852E+03 BASIN STORAGE= .7278E-02 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
R3-1	MANE	2.69	2285.11	244.75	2.34	5.00	2282.43	245.00	2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2771E+03 EXCESS= .0000E+00 OUTFLOW= .2771E+03 BASIN STORAGE= .6824E-02 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
R3-1	MANE	2.74	2185.83	243.50	2.24	5.00	2184.24	245.00	2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2651E+03 EXCESS= .0000E+00 OUTFLOW= .2651E+03 BASIN STORAGE= .7911E-02 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
R3-1	MANE	2.79	2095.14	242.31	2.14	5.00	2094.17	245.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2531E+03 EXCESS= .0000E+00 OUTFLOW= .2531E+03 BASIN STORAGE= .6890E-02 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
R3-1	MANE	2.80	2059.18	243.79	2.10	5.00	2057.00	245.00	2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2491E+03 EXCESS= .0000E+00 OUTFLOW= .2491E+03 BASIN STORAGE= .6543E-02 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
R3-1	MANE	2.84	1996.02	244.02	2.04	5.00	1993.62	245.00	2.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2412E+03 EXCESS= .0000E+00 OUTFLOW= .2412E+03 BASIN STORAGE= .7632E-02 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
R3-1	MANE	3.86	924.57	247.23	.93	5.00	924.19	245.00	.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1095E+03 EXCESS= .0000E+00 OUTFLOW= .1096E+03 BASIN STORAGE= .7590E-02 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
RCP3.1	MANE	4.25	2420.08	246.38	2.39	5.00	2408.70	245.00	2.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3118E+03 EXCESS= .0000E+00 OUTFLOW= .3118E+03 BASIN STORAGE= .1258E-01 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
RCP3.1	MANE	4.29	2357.23	244.70	2.32	5.00	2356.52	245.00	2.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3030E+03 EXCESS= .0000E+00 OUTFLOW= .3031E+03 BASIN STORAGE= .1132E-01 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .00								
RCP3.1	MANE	4.37	2260.70	244.49	2.22	5.00	2259.16	245.00	2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2899E+03 EXCESS= .0000E+00 OUTFLOW= .2899E+03 BASIN STORAGE= .1066E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.1	MANE	4.44	2154.59	248.48	2.12	5.00	2154.08	245.00	2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2767E+03 EXCESS= .0000E+00 OUTFLOW= .2767E+03 BASIN STORAGE= .1079E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.1	MANE	4.47	2125.42	245.72	2.09	5.00	2117.13	245.00	2.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2723E+03 EXCESS= .0000E+00 OUTFLOW= .2724E+03 BASIN STORAGE= .1141E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.1	MANE	4.52	2056.20	244.17	2.02	5.00	2055.43	245.00	2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2636E+03 EXCESS= .0000E+00 OUTFLOW= .2637E+03 BASIN STORAGE= .9756E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.1	MANE	5.00	960.00	250.00	.92	5.00	960.00	250.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1194E+03 EXCESS= .0000E+00 OUTFLOW= .1194E+03 BASIN STORAGE= .1037E-01 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.52	2581.07	245.48	2.35	5.00	2579.57	245.00	2.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3484E+03 EXCESS= .0000E+00 OUTFLOW= .3484E+03 BASIN STORAGE= .1140E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.53	2524.12	245.47	2.28	5.00	2522.32	245.00	2.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3386E+03 EXCESS= .0000E+00 OUTFLOW= .3386E+03 BASIN STORAGE= .1112E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.54	2419.10	245.19	2.18	5.00	2418.14	245.00	2.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3238E+03 EXCESS= .0000E+00 OUTFLOW= .3238E+03 BASIN STORAGE= .1172E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.55	2307.47	245.31	2.08	5.00	2305.95	245.00	2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3089E+03 EXCESS= .0000E+00 OUTFLOW= .3089E+03 BASIN STORAGE= .1162E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.55	2268.14	245.28	2.05	5.00	2266.54	245.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3040E+03 EXCESS= .0000E+00 OUTFLOW= .3040E+03 BASIN STORAGE= .1162E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.56	2201.96	245.31	1.99	5.00	2200.56	245.00	1.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2943E+03 EXCESS= .0000E+00 OUTFLOW= .2943E+03 BASIN STORAGE= .1098E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.75	1014.41	250.15	.89	5.00	1014.28	250.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1324E+03 EXCESS= .0000E+00 OUTFLOW= .1324E+03 BASIN STORAGE= .1214E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.25	379.69	214.50	2.41	5.00	372.79	215.00	2.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2227E+02 EXCESS= .0000E+00 OUTFLOW= .2232E+02 BASIN STORAGE= .6444E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

					INT.OUT				
R3-3	MANE	3.50	378.94	213.50	2.35	5.00	365.45	215.00	2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2171E+02 EXCESS= .0000E+00 OUTFLOW= .2176E+02 BASIN STORAGE= .5218E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.50	363.45	213.50	2.25	5.00	351.27	215.00	2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2079E+02 EXCESS= .0000E+00 OUTFLOW= .2083E+02 BASIN STORAGE= .5137E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.75	348.62	213.75	2.15	5.00	337.44	215.00	2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1987E+02 EXCESS= .0000E+00 OUTFLOW= .1992E+02 BASIN STORAGE= .6904E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.75	343.46	213.75	2.12	5.00	332.67	215.00	2.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1957E+02 EXCESS= .0000E+00 OUTFLOW= .1961E+02 BASIN STORAGE= .6866E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.75	333.16	213.75	2.05	5.00	323.11	215.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1896E+02 EXCESS= .0000E+00 OUTFLOW= .1900E+02 BASIN STORAGE= .6790E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	4.25	152.47	216.75	.94	5.00	148.36	215.00	.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8704E+01 EXCESS= .0000E+00 OUTFLOW= .8724E+01 BASIN STORAGE= .6768E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.50	759.69	213.50	2.44	5.00	739.13	215.00	2.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4493E+02 EXCESS= .0000E+00 OUTFLOW= .4502E+02 BASIN STORAGE= .8519E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.50	739.47	213.50	2.37	5.00	720.32	215.00	2.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4368E+02 EXCESS= .0000E+00 OUTFLOW= .4377E+02 BASIN STORAGE= .8431E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.50	709.14	213.50	2.27	5.00	692.08	215.00	2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4182E+02 EXCESS= .0000E+00 OUTFLOW= .4190E+02 BASIN STORAGE= .8298E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.75	681.60	213.75	2.17	5.00	664.90	215.00	2.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3998E+02 EXCESS= .0000E+00 OUTFLOW= .4005E+02 BASIN STORAGE= .6833E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.75	671.49	213.75	2.14	5.00	655.40	215.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3936E+02 EXCESS= .0000E+00 OUTFLOW= .3943E+02 BASIN STORAGE= .6797E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.75	651.25	213.75	2.07	5.00	636.39	215.00	2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3813E+02 EXCESS= .0000E+00 OUTFLOW= .3820E+02 BASIN STORAGE= .6722E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	4.25	301.93	216.75	.95	5.00	292.36	215.00	.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1756E+02 EXCESS= .0000E+00 OUTFLOW= .1760E+02 BASIN STORAGE= .6986E-02 PERCENT ERROR= -.2

```
          FOR PLAN = 1  RATIO=  .00
              R3-5  MANE          2.90    613.70    214.79      2.38      5.00    609.16    215.00        2.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3725E+02 EXCESS= .0000E+00 OUTFLOW= .3729E+02 BASIN STORAGE= .2899E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
              R3-5  MANE          2.93    604.21    213.97      2.31      5.00    588.25    215.00        2.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3619E+02 EXCESS= .0000E+00 OUTFLOW= .3622E+02 BASIN STORAGE= .3969E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
              R3-5  MANE          2.98    577.94    214.27      2.21      5.00    566.11    215.00        2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3460E+02 EXCESS= .0000E+00 OUTFLOW= .3464E+02 BASIN STORAGE= .3896E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
              R3-5  MANE          3.02    551.26    214.67      2.12      5.00    545.55    215.00        2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3311E+02 EXCESS= .0000E+00 OUTFLOW= .3315E+02 BASIN STORAGE= .3747E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
              R3-5  MANE          3.04    550.21    212.80      2.09      5.00    537.03    215.00        2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3262E+02 EXCESS= .0000E+00 OUTFLOW= .3265E+02 BASIN STORAGE= .4165E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
              R3-5  MANE          3.07    523.50    215.18      2.02      5.00    523.33    215.00        2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3159E+02 EXCESS= .0000E+00 OUTFLOW= .3162E+02 BASIN STORAGE= .3534E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
              R3-5  MANE          3.75    254.05    213.75       .93      5.00    251.45    215.00         .92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1449E+02 EXCESS= .0000E+00 OUTFLOW= .1451E+02 BASIN STORAGE= .4266E-02 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .00
            RCP3.2  MANE          2.52   1673.65    216.35      2.41      5.00   1650.24    215.00        2.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1046E+03 EXCESS= .0000E+00 OUTFLOW= .1046E+03 BASIN STORAGE= .3557E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
            RCP3.2  MANE          2.54   1627.94    216.02      2.34      5.00   1605.12    215.00        2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1016E+03 EXCESS= .0000E+00 OUTFLOW= .1017E+03 BASIN STORAGE= .4466E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
            RCP3.2  MANE          2.58   1563.67    216.58      2.24      5.00   1538.95    215.00        2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9727E+02 EXCESS= .0000E+00 OUTFLOW= .9734E+02 BASIN STORAGE= .3694E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
            RCP3.2  MANE          2.62   1504.79    217.08      2.15      5.00   1479.90    215.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9307E+02 EXCESS= .0000E+00 OUTFLOW= .9312E+02 BASIN STORAGE= .4279E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
            RCP3.2  MANE          2.63   1478.97    215.63      2.11      5.00   1458.91    215.00        2.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9152E+02 EXCESS= .0000E+00 OUTFLOW= .9158E+02 BASIN STORAGE= .4427E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
            RCP3.2  MANE          2.66   1431.99    217.87      2.05      5.00   1422.82    215.00        2.05
```

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8882E+02 EXCESS= .0000E+00 OUTFLOW= .8887E+02 BASIN STORAGE= .5049E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.2	MANE	3.51	679.30	217.79	.94	5.00	657.61	220.00	.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4070E+02 EXCESS= .0000E+00 OUTFLOW= .4073E+02 BASIN STORAGE= .3590E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.39	4099.79	221.68	2.34	5.00	4065.74	220.00	2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5154E+03 EXCESS= .0000E+00 OUTFLOW= .5154E+03 BASIN STORAGE= .3367E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.41	3993.52	221.35	2.27	5.00	3942.90	220.00	2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5008E+03 EXCESS= .0000E+00 OUTFLOW= .5008E+03 BASIN STORAGE= .3434E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.43	3809.91	220.68	2.17	5.00	3766.97	220.00	2.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4787E+03 EXCESS= .0000E+00 OUTFLOW= .4787E+03 BASIN STORAGE= .3287E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.46	3667.51	221.30	2.07	5.00	3607.57	220.00	2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4572E+03 EXCESS= .0000E+00 OUTFLOW= .4572E+03 BASIN STORAGE= .3352E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.47	3602.57	221.35	2.04	5.00	3541.72	220.00	2.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4496E+03 EXCESS= .0000E+00 OUTFLOW= .4496E+03 BASIN STORAGE= .3514E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.48	3486.18	220.92	1.97	5.00	3431.94	220.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4357E+03 EXCESS= .0000E+00 OUTFLOW= .4357E+03 BASIN STORAGE= .3736E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	2.04	1504.27	222.50	.89	5.00	1493.14	225.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1959E+03 EXCESS= .0000E+00 OUTFLOW= .1959E+03 BASIN STORAGE= .3286E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.25	190.55	217.75	2.39	5.00	184.79	220.00	2.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1124E+02 EXCESS= .0000E+00 OUTFLOW= .1130E+02 BASIN STORAGE= .9859E-02 PERCENT ERROR= -.6

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.50	187.08	217.00	2.33	5.00	185.30	220.00	2.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1097E+02 EXCESS= .0000E+00 OUTFLOW= .1102E+02 BASIN STORAGE= .9474E-02 PERCENT ERROR= -.6

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.50	179.09	217.00	2.23	5.00	178.51	220.00	2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1050E+02 EXCESS= .0000E+00 OUTFLOW= .1056E+02 BASIN STORAGE= .9358E-02 PERCENT ERROR= -.6

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.50	171.74	220.50	2.13	5.00	171.65	220.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1003E+02 EXCESS= .0000E+00 OUTFLOW= .1009E+02 BASIN STORAGE= .9240E-02 PERCENT ERROR= -.7

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.50	169.50	220.50	2.10	5.00	169.35	220.00	2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9874E+01 EXCESS= .0000E+00 OUTFLOW= .9932E+01 BASIN STORAGE= .9200E-02 PERCENT ERROR= -.7

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.75	163.66	217.50	2.04	5.00	161.96	220.00	2.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9573E+01 EXCESS= .0000E+00 OUTFLOW= .9628E+01 BASIN STORAGE= .1160E-01 PERCENT ERROR= -.7

FOR PLAN = 1 RATIO= .00

R3-6	MANE	4.25	78.32	221.00	.93	5.00	75.87	220.00	.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4384E+01 EXCESS= .0000E+00 OUTFLOW= .4414E+01 BASIN STORAGE= .1072E-01 PERCENT ERROR= -.9

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.23	410.12	213.24	2.31	5.00	364.53	210.00	2.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2109E+02 EXCESS= .0000E+00 OUTFLOW= .2113E+02 BASIN STORAGE= .2918E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.25	370.48	211.25	2.23	5.00	350.70	210.00	2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2038E+02 EXCESS= .0000E+00 OUTFLOW= .2042E+02 BASIN STORAGE= .3295E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.31	363.28	211.94	2.13	5.00	334.31	210.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1947E+02 EXCESS= .0000E+00 OUTFLOW= .1951E+02 BASIN STORAGE= .3053E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.25	339.01	211.25	2.04	5.00	320.90	215.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1860E+02 EXCESS= .0000E+00 OUTFLOW= .1864E+02 BASIN STORAGE= .3194E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.25	333.77	211.25	2.01	5.00	316.63	215.00	2.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1831E+02 EXCESS= .0000E+00 OUTFLOW= .1834E+02 BASIN STORAGE= .3176E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.25	323.30	211.25	1.94	5.00	308.06	215.00	1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1772E+02 EXCESS= .0000E+00 OUTFLOW= .1775E+02 BASIN STORAGE= .3141E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.75	164.36	213.75	.89	5.00	156.15	215.00	.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8091E+01 EXCESS= .0000E+00 OUTFLOW= .8111E+01 BASIN STORAGE= .3049E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.50	199.90	220.50	1.61	5.00	197.19	220.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1311E+02 EXCESS= .0000E+00 OUTFLOW= .1314E+02 BASIN STORAGE= .5881E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.50	192.96	220.50	1.55	5.00	190.24	220.00	1.56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1266E+02 EXCESS= .0000E+00 OUTFLOW= .1268E+02 BASIN STORAGE= .7226E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.25	181.58	221.00	1.47	5.00	177.64	220.00	1.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1197E+02 EXCESS= .0000E+00 OUTFLOW= .1198E+02 BASIN STORAGE= .5738E-02 PERCENT ERROR= -.2

```
          FOR PLAN = 1  RATIO=  .00
            R3-J        MANE          4.25    171.61    221.00      1.39      5.00    167.63    220.00        1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1130E+02 EXCESS= .0000E+00 OUTFLOW= .1132E+02 BASIN STORAGE= .5623E-02 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .00
            R3-J        MANE          4.25    168.30    221.00      1.36      5.00    164.30    220.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1108E+02 EXCESS= .0000E+00 OUTFLOW= .1110E+02 BASIN STORAGE= .5585E-02 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .00
            R3-J        MANE          4.25    161.70    221.00      1.31      5.00    157.68    220.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1065E+02 EXCESS= .0000E+00 OUTFLOW= .1066E+02 BASIN STORAGE= .7355E-02 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .00
            R3-J        MANE          2.50     58.36    225.00       .47      5.00     58.36    225.00         .47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3850E+01 EXCESS= .0000E+00 OUTFLOW= .3861E+01 BASIN STORAGE= .6928E-02 PERCENT ERROR=   -.5

          FOR PLAN = 1  RATIO=  .00
            RCP3.5  MANE          1.30    691.02    216.53      2.07      5.00    681.83    215.00        2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4551E+02 EXCESS= .0000E+00 OUTFLOW= .4552E+02 BASIN STORAGE= .1608E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            RCP3.5  MANE          1.32    670.61    216.54      2.01      5.00    658.89    215.00        2.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4424E+02 EXCESS= .0000E+00 OUTFLOW= .4424E+02 BASIN STORAGE= .1361E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            RCP3.5  MANE          1.34    643.19    216.34      1.91      5.00    627.37    215.00        1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4213E+02 EXCESS= .0000E+00 OUTFLOW= .4213E+02 BASIN STORAGE= .1317E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            RCP3.5  MANE          1.37    609.77    215.94      1.82      5.00    594.65    215.00        1.82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4012E+02 EXCESS= .0000E+00 OUTFLOW= .4013E+02 BASIN STORAGE= .1406E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            RCP3.5  MANE          1.38    598.94    215.88      1.79      5.00    584.20    215.00        1.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3946E+02 EXCESS= .0000E+00 OUTFLOW= .3946E+02 BASIN STORAGE= .1413E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            RCP3.5  MANE          1.39    576.40    215.64      1.73      5.00    563.86    215.00        1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3810E+02 EXCESS= .0000E+00 OUTFLOW= .3811E+02 BASIN STORAGE= .1590E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            RCP3.5  MANE          1.96    231.25    217.58       .74      5.00    227.09    220.00         .74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1636E+02 EXCESS= .0000E+00 OUTFLOW= .1637E+02 BASIN STORAGE= .1368E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
              R3-8  MANE          2.99   1146.42    218.06      2.44      5.00   1140.71    220.00        2.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8291E+02 EXCESS= .0000E+00 OUTFLOW= .8295E+02 BASIN STORAGE= .3930E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
              R3-8  MANE          3.02   1112.86    220.14      2.37      5.00   1111.91    220.00        2.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8059E+02 EXCESS= .0000E+00 OUTFLOW= .8062E+02 BASIN STORAGE= .3451E-02 PERCENT ERROR=    .0
```

FOR PLAN = 1 RATIO= .00
R3-8 MANE 3.06 1066.78 220.33 2.27 5.00 1064.96 220.00 2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7714E+02 EXCESS= .0000E+00 OUTFLOW= .7717E+02 BASIN STORAGE= .3354E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
R3-8 MANE 3.11 1020.55 220.62 2.16 5.00 1018.52 220.00 2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7370E+02 EXCESS= .0000E+00 OUTFLOW= .7373E+02 BASIN STORAGE= .3197E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
R3-8 MANE 3.12 1008.27 218.65 2.13 5.00 1001.92 220.00 2.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7257E+02 EXCESS= .0000E+00 OUTFLOW= .7261E+02 BASIN STORAGE= .3516E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
R3-8 MANE 3.16 974.22 221.01 2.06 5.00 973.86 220.00 2.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7030E+02 EXCESS= .0000E+00 OUTFLOW= .7033E+02 BASIN STORAGE= .4242E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
R3-8 MANE 4.12 459.85 222.32 .95 5.00 455.52 220.00 .95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3241E+02 EXCESS= .0000E+00 OUTFLOW= .3243E+02 BASIN STORAGE= .3195E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RCP3.6 MANE 1.64 2993.73 221.55 2.28 5.00 2930.53 220.00 2.28

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2362E+03 EXCESS= .0000E+00 OUTFLOW= .2362E+03 BASIN STORAGE= .3355E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP3.6 MANE 1.65 2926.24 221.73 2.22 5.00 2860.03 220.00 2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2295E+03 EXCESS= .0000E+00 OUTFLOW= .2296E+03 BASIN STORAGE= .3270E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP3.6 MANE 1.68 2796.23 221.93 2.12 5.00 2737.54 220.00 2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2194E+03 EXCESS= .0000E+00 OUTFLOW= .2194E+03 BASIN STORAGE= .2980E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP3.6 MANE 1.71 2667.41 222.18 2.02 5.00 2616.93 220.00 2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2094E+03 EXCESS= .0000E+00 OUTFLOW= .2094E+03 BASIN STORAGE= .3387E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP3.6 MANE 1.72 2637.47 221.77 1.99 5.00 2571.40 220.00 1.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2062E+03 EXCESS= .0000E+00 OUTFLOW= .2062E+03 BASIN STORAGE= .2964E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP3.6 MANE 1.74 2532.53 222.61 1.93 5.00 2496.34 220.00 1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1994E+03 EXCESS= .0000E+00 OUTFLOW= .1995E+03 BASIN STORAGE= .2862E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP3.6 MANE 2.32 1171.05 224.78 .87 5.00 1167.16 225.00 .87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9011E+02 EXCESS= .0000E+00 OUTFLOW= .9013E+02 BASIN STORAGE= .2992E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
R3-M MANE 1.71 358.75 215.64 2.32 5.00 355.58 215.00 2.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2381E+02 EXCESS= .0000E+00 OUTFLOW= .2381E+02 BASIN STORAGE= .2177E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.73	352.09	216.18	2.26	5.00	346.39	215.00	2.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2315E+02 EXCESS= .0000E+00 OUTFLOW= .2316E+02 BASIN STORAGE= .2503E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.76	337.84	216.20	2.16	5.00	332.40	215.00	2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2217E+02 EXCESS= .0000E+00 OUTFLOW= .2218E+02 BASIN STORAGE= .2005E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.79	324.05	216.30	2.07	5.00	318.47	215.00	2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2120E+02 EXCESS= .0000E+00 OUTFLOW= .2120E+02 BASIN STORAGE= .2026E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.80	316.53	215.76	2.03	5.00	313.41	215.00	2.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2087E+02 EXCESS= .0000E+00 OUTFLOW= .2088E+02 BASIN STORAGE= .2435E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.82	310.73	216.51	1.97	5.00	304.65	215.00	1.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2023E+02 EXCESS= .0000E+00 OUTFLOW= .2023E+02 BASIN STORAGE= .2004E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	2.43	148.01	216.62	.92	5.00	143.89	215.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9402E+01 EXCESS= .0000E+00 OUTFLOW= .9405E+01 BASIN STORAGE= .2331E-02 PERCENT ERROR= -.1

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

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

GCW ENGINEERS \ SURVEYORS

HOWARD HUGHES PROPERTIES INC.
SUMMERLIN VILLAGE 23B SKY VISTA DRIVE
ULTIMATE CONDITION

Project No: 62023B-240
Date: 10-Apr-18
Calculated by: ME

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN (16)	K (2)	AREA Ac (3)	AREA Sq Mi (4)	INITIAL LENGTH Feet (5)	SLOPE % (6)	Ti Min (7)	TRAVEL LENGTH Feet (8)	SLOPE % (9a)	V1 VELOCITY fps (9b)	V2 VELOCITY fps (10)	Tt Min (11)	TOTAL LENGTH Feet (12)	Tc = (L/180)+10 Min (13)	Min (14)	Tlag = 0.6Tc/60 Hours (15)	Remarks:
BW34	D	93.3	0.8416	35.8	0.0560	100	1.0	4.7	1000	5.6	4.8	7.2	2.9	1100	16.1	7.5	0.075	3.34
BW35	D	93.1	0.8389	15.8	0.0247	100	1.0	4.7	750	4.8	4.4	6.7	2.5	850	14.7	7.2	0.072	3.34
BWP6	D	82.8	0.7030	1.9	0.0030	50	7.3	2.6	220	7.3	5.4	8.3	0.7	270	11.5	3.3	0.050	3.34
BWPW6	D	87.0	0.7584	2.9	0.0045	140	14.2	3.0	570	14.2	7.6	11.5	1.2	710	13.9	4.2	0.050	3.34
BW36	D	85.9	0.7439	28.4	0.0444	100	1.0	6.4	1530	5.0	4.5	6.8	4.4	1630	19.1	10.8	0.108	3.34
BW38	D	93.0	0.8376	22.2	0.0346	100	1.0	4.7	1560	4.7	4.4	6.6	4.6	1660	19.2	9.3	0.093	3.34
BW39	D	94.3	0.8548	22.0	0.0344	100	1.0	4.4	1550	6.0	4.9	7.5	4.0	1650	19.2	8.4	0.084	3.34
LR30	D	91.2	0.8138	25.0	0.0391	100	1.0	5.2	1750	2.8	3.4	5.1	6.5	1850	20.3	11.7	0.117	3.34
LR31	D	93.0	0.8376	6.6	0.0103	100	1.0	4.7	780	4.7	4.4	6.7	2.6	880	14.9	7.3	0.073	3.34
LR32	D	93.0	0.8376	10.3	0.0161	100	1.0	4.7	1000	5.5	4.7	7.2	2.9	1100	16.1	7.6	0.076	3.34
LR33	D	93.0	0.8376	6.7	0.0104	100	1.0	4.7	700	6.1	5.0	7.6	2.1	800	14.4	6.8	0.068	3.34
LRP4B	D	88.0	0.7716	1.1	0.0017	100	3.5	3.9	230	3.5	3.8	5.7	1.0	330	11.8	4.9	0.050	3.34
LPRW5	D	88.0	0.7716	4.2	0.0066	50	3.5	2.8	400	3.5	3.8	5.7	1.8	450	12.5	4.5	0.050	3.34
RD1	D	98.0	0.9036	2.1	0.0033	40	2.0	1.8	900	1.1	2.1	3.2	6.0	940	15.2	7.8	0.078	3.34
RD2	D	98.0	0.9036	10.1	0.0158	40	2.0	1.8	4050	2.8	3.4	5.1	14.0	4090	32.7	15.8	0.158	3.34
RD3	D	98.0	0.9036	1.3	0.0020	20	2.0	1.3	450	2.5	3.2	4.8	2.3	470	12.6	3.6	0.050	3.34
RD4	D	98.0	0.9036	2.8	0.0043	20	2.0	1.3	1300	2.8	3.4	5.1	5.1	1320	17.3	6.3	0.063	3.34
RD5	D	98.0	0.9036	2.0	0.0031	20	2.0	1.3	1250	3.0	3.5	5.3	4.7	1270	17.1	6.0	0.060	3.34
SB1	D	85.3	0.7360	2.9	0.0045	70	12.0	2.4	300	6.0	4.9	7.5	1.0	370	12.1	3.4	0.050	3.34

$Tc = Ti + Tt$ $Tlag = 0.6\ Tc$

$Ti = 1.8\ (1.1 - K)\ L^{1/2} / S^{1/3}$

$K = 0.0132\ (CN) - 0.39$

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

Existing: $V1 = 14.8*(S/100)^{1/2}$ $V2 = 29.4*(S/100)^{1/2}$

Developed: $V1 = 20.2*(S/100)^{1/2}$ $V2 = 30.6*(S/100)^{1/2}$

REFERENCE:

STANDARD FORM 4

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998                *
*          VERSION 4.1                 *
*                                      *
*  RUN DATE   10APR18  TIME  16:34:20  *
*                                      *
****************************************
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**************************************
*                                    *
*   U.S. ARMY CORPS OF ENGINEERS     *
*   HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET          *
*      DAVIS, CALIFORNIA 95616       *
*          (916) 756-1104            *
*                                    *
**************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

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

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


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

                       *DIAGRAM
 *** FREE ***
              1        ID   ************************************************************
              2        ID   * ..........................................................  *
              3        ID   * :                  SUMMERLIN VILLAGE 23B                 : *
              4        ID   * :                      SKY VISTA DRIVE                   : *
              5        ID   * :                    ULTIMATE CONDITIONS                 : *
              6        ID   * :                     DEVELOPED ONSITE                   : *
              7        ID   * :                     DEVELOPED OFFSITE                  : *
              8        ID   * :.........................................................: *
              9        ID   * :             RETURN PERIOD_ _ _ _10 & 100-YEAR          : *
             10        ID   * :             DISTRIBUTION_ _ _ _ 6-HOUR SDN3            : *
             11        ID   * :             PROJECT NO_ _ _ _ _ 62023B-240             : *
             12        ID   * :             FILENAME_ _ _ _ _ _ UL.H1                  : *
             13        ID   * :             DATE_ _ _ _ _ _ _ _ 03/15/2018             : *
             14        ID   * :             MODELED BY_ _ _ _ _ ME                     : *
             15        ID   * :.........................................................: *
             16        ID   * :                                                         : *
             17        ID   * :.........................................................: *
             18        ID   ************************************************************
             19        ID
             20        ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
             21        ID
             22        ID                          AREA      DARF
             23        ID                        SQ.MI.
             24        ID
             25        ID                       0.0 - 0.5    1.00
             26        ID                       0.5 - 1.0    0.98
             27        ID                       1.0 - 2.0    0.95
             28        ID                       2.0 - 4.0    0.92
             29        ID                       4.0 - 6.0    0.91
             30        ID                       6.0 - 8.0    0.89
             31        ID
             32        IT      5       0       0     200
             33        IO      5       0
             34        IN      5       0       0
             35        JR    PREC     1.0    0.98    0.95    0.92    0.91    0.89    0.54
                       *
             36        KK   LPRW5
             37        BA  0.0066
             38        PB    3.43
             39        PC   0.000   .0200   .0570   .0700   .0870   .1080   .1240   .1300   .1300   .1300
             40        PC   .1300   .1300   .1300   .1330   .1400   .1420   .1480   .1580   .1720   .1810
             41        PC   .1900   .1970   .1990   .2000   .2010   .2040   .2140   .2290   .2410   .2490
             42        PC   .2510   .2560   .2700   .2780   .2810   .2830   .2950   .3220   .3520   .4090
             43        PC   .4990   .5900   .7100   .7440   .7810   .8120   .8190   .8350   .8510   .8560
             44        PC   .8600   .8680   .8760   .8880   .9100   .9260   .9370   .9500   .9700   .9760
             45        PC   .9820   .9850   .9870   .9890   .9900   .9930   .9930   .9940   .9950   .9980
             46        PC   .9980   .9990  1.000
             47        LS      0    88.0
```

```
     48          UD   0.050
                 *
1                                        HEC-1 INPUT                                        PAGE  2

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

     49          KK    LR31
     50          BA  0.0103
     51          LS       0    93.0
     52          UD    .073
                 *

     53          KK     RD5
     54          KM   ROADWAY
     55          BA  0.0031
     56          LS       0    98.0
     57          UD    .060
                 *

     58          KK   DUMMY
     59          KM   COMBINE RD5, LPRW5 & LR31
     60          HC       3
                 *

     61          KK    LR30
     62          BA  0.0391
     63          LS       0    91.2
     64          UD    .117
                 *

     65          KK    LR32
     66          BA  0.0161
     67          LS       0    93.0
     68          UD    .076
                 *

     69          KK    LR33
     70          BA  0.0104
     71          LS       0    93.0
     72          UD    .068
                 *

     73          KK   LRP4B
     74          BA  0.0017
     75          LS       0    88.0
     76          UD    .050
                 *

     77          KK    CP2A
     78          KM   COMBINE RD5, LR31, LPRW5, LR30, LR32, LR33 & LRP4B
     79          HC       5
                 *

     80          KK     RD1
     81          KM   ROADWAY
     82          BA  0.0033
     83          LS       0    98.0
     84          UD    .078
                 *
1                                        HEC-1 INPUT                                        PAGE  3

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

     85          KK     CP2
     86          HC       2
                 *

     87          KK    BW39
     88          BA  0.0344
     89          LS       0    94.3
     90          UD    .084
                 *

     91          KK     RD3
     92          BA  0.0020
     93          LS       0    98.0
     94          UD    .050
                 *

     95          KK     SB1
     96          BA  0.0045
     97          LS       0    85.3
     98          UD    .050
                 *

     99          KK     CP3
    100          KM   COMBINE BW39, RD3 & SB1
```

```
101          HC       3
             *

102          KK    BW38
103          BA  0.0346
104          LS       0    93.0
105          UD    .093
             *

106          KK    BW36
107          BA  0.0444
108          LS       0    85.9
109          UD    .108
             *

110          KK   BWPW6
111          BA  0.0045
112          LS       0    87.0
113          UD    .050
             *

114          KK    BW35
115          BA  0.0247
116          LS       0    93.1
117          UD    .072
             *
```



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

118          KK    BWP6
119          BA  0.0030
120          LS       0    82.8
121          UD    .050
             *

122          KK    BW34
123          BA  0.0560
124          LS       0    93.3
125          UD    .075
             *

126          KK     RD4
127          BA  0.0043
128          LS       0    98.0
129          UD    .063
             *

130          KK     CP1
131          KM   COMBINE BWPW6, RD4, BW35, BWP6, AND BW34
132          HC       5
             *

133          KK     CP4
134          KM   COMBINE CP1 & BW36
135          HC       2
             *

136          KK     3-1
137          KM    COMPARE TO MPU BASIN DB54-1 (CURVE NUMBER CHANGED FROM 87.2)
138          BA    2.22
139          PB    3.75
140          LS           0    87.0
141          UD    0.582
             *

142          KK   R3-1
143          KM    ROUTE R3-1 THROUGH 3-2
144          KM    EXISTING NATURAL WASH
145          RD    3322   0.092   0.030       0    TRAP     125      0
             *

146          KK     3-2
147          KM    COMPARE TO MPU BASIN DB54-5 (CURVE NUMBER CHANGED FROM 85. 2)
148          BA    0.226
149          PB    3.67
150          LS           0    85.6
151          UD    0.108
             *
```



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

152          KK   CP3.1
153          KM    COMBINE R3-1 AND 3-2
154          HC           2
             *
```

```
155          KK RCP3.1
156          KM    ROUTE CP3.1 TO CP3.3 THROUGH 3-E VI A
157          KM    (PORTION OF FACILITY APM50059)
158          RD    7900   0.070   0.013       0    TRAP     125       2
             *

159          KK     3-D
160          KM    PORTION OF BASINS DB54-6R (PB=3. 56)
161          BA    0.3329
162          PB    3.59
163          LS            0    84.6
164          UD    0.223
             *

165          KK   CP3.3
166          KM    COMBI NE 3-D, RCP3.1,
167          HC           2
             *

168          KK RCP3.3
169          KM    ROUTE CP3.3 TO CP3 . 4 THROUGH 3-E VIA A
170          KM    (PORTION OF FACILITY APM50059)
171          RD    1000   0.070   0.013       0    TRAP     125       2
             *

172          KK     3-3
173          KM    PORTION OF MPU BASIN DB54-3
174          BA    0.1737
175          PB    3.65
176          LS           0    88.0
177          UD    0.081
             *

178          KK  R3-3
179          KM    ROUTE R3 - 3 THROUGH A PORTIO N OF 3- E TO CP 3 . 2
180          KM    NATURAL WASH
181          RD    2233   0.054   0.030       0    TRAP     100       0
             *

182          KK     3-4
183          KM    PORTIO N OF MPU BASI N DB54-3
184          BA    0.3457
185          PB    3.68
186          LS           0    88.0
187          UD    0.092
             *
```



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

188          KK    R3-4
189          KM    ROUTE R3 - 4 THROUGH A PORTIO N OF 3- E TO CP3 . 2
190          KM    NATURAL WASH
191          RD    3300   0.097   0.030       0    TRAP     100       0
             *

192          KK     3-5
193          KM    COMPARE TO MPU BASI N DB54- 2 (S LI GHTLY LARGER PORT IO N OF DB54 - 4)
194          BA    0.2936
195          PB    3.65
196          LS           0    87.7
197          UD    0.094
             *

198          KK    R3-5
199          KM    ROUTE R3 - 5 THROUGH A PORTIO N OF 3 - E TO CP 3 . 2
200          KM    ( PORTI ON OF FACI LI TY APM5 00 57 )
201          RD    4400   0.068   0.013       0    TRAP      50       2
             *

202          KK   CP3.2
203          KM    COMBINE  R3 - 5  ,   R3- 4  AND  R3 - 3
204          HC           3
             *

205          KK  RCP3.2
206          KM    ROUTE RCP 3 . 2 THROUGH A PORTI ON OF 3- E TO CP 3. 4
207          KM    ( PORTION OF FACI LIT Y APM500 57)
208          RD    5500   0.068   0.013       0    TRAP      50       2
             *

209          KK     3-E
210          KM    PORTI ON OF BASI NS DB54-4 ( PB=3 . 60 ) AND DB54 - 6R ( PB=3. 56)
211          BA    0.5442
212          PB    3.57
213          LS           0    85.8
214          UD    0.238
```

```
                *
215             KK   CP3.4
216             KM    COMBI NE 3 - E, RCP3 . 2 AND RCP 3 . 3
217             HC            3
                *

218             KK    RCP3.4
219             KM    ROUTE RCP3 . 4 TO CPDBS
220             KM    ( FACI LI TI ES APM50056, APM500 47 AND APM5 0 0 0 8 )
221             RD    3365   0.052   0.013       0    TRAP      80       2
                *
```



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


222             KK     3-6
223             KM    PORTIO N OF MPU BASI N DBSS- 3 AND DBSS-4
224             BA    0.0887
225             PB    3.62
226             LS            0    88.0
227             UD    0.074
                *

228             KK    R3-6
229             KM    ROUTE 3 - 6 THROUGH A PORTION OF 3- J AND A PORTION OF 3 - K TO CP 3. 5
230             KM    EXI STI NG NATURAL WASHES
231             RD    4500   0.080   0.030       0    TRAP     100       0
                *

232             KK     3-7
233             KM    PORTION OF MPU BASI N DBSS- 3 AND DBSS-4
234             BA    0.1714
235             PB    3.61
236             LS            0    87.2
237             UD    0.048
                *

238             KK    R3-7
239             KM    ROUTE 3-7 THROUGH A PORTION OF 3-K TO CP3.5
240             KM    PORTION OF FACILITY ID APM50213
241             RD    4340   0.073   0.013       0    TRAP      50       2
                *

242             KK     3-J
243             KM    PORTION OF MPU BASIN DB55-4
244             BA    0.1529
245             PB    3.59
246             LS            0    78.6
247             UD    0.168
                *

248             KK   R3-J
249             KM    ROUTE 3-J THROUGH A PORTION OF 3-K TO CP3.5
250             KM    NATURAL WASHES
251             RD    2700   0.074   0.030       0    TRAP     100       0
                *

252             KK   CP3.5
253             KM    COMBINE R3-J , R3-7 AND R3-6
254             HC            3
                *

255             KK  RCP3.5
256             KM    ROUTE CP3.5 THROUGH A PORTION OF 3-K TO CP3.6
257             KM    PORTION OF FACILITY ID APM50213
258             RD    2100   0.073   0.013       0    TRAP      50       2
                *
```



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


259             KK     3-8
260             KM    COMPARE TO MPU BASIN DB55-1
261             BA    0.6386
262             PB    3.70
263             LS            0    87.8
264             UD    0.196
                *

265             KK    R3-8
266             KM    ROUTE 3-8 THROUGH A PORTION OF 3-K TO CP3.6
267             KM    FACILITY ID APM50212
268             RD    6695   0.075   0.013       0    TRAP      30       2
                *

269             KK     3-K
```

```
270          KM    COMPARE TO MPU BASIN DB55-7
271          BA    0.8890
272          PB    3.54
273          LS            0    87.6
274          UD    0.296
             *

275          KK   CP3.6
276          KM    COMBI NE 3-K, R3-8 AND RCP3.5
277          HC            3
             *

278          KK RCP3.6
279          KM    ROUTE CP3.6 TO CPDB5
280          KM    FACILITY ID APM500009
281          RD    4180   0.058   0.013       0    TRAP      50       2
             *

282          KK     3-N
283          KM    COMPARE TO MPU BASIN DB55-8
284          BA    0.4532
285          PB    3.46
286          LS            0    88.9
287          UD    0.269
             *

288          KK     3-M
289          KM    COMPARE TO MPU BASIN DB55-8
290          BA    0.1924
291          PB    3.48
292          LS            0    88.8
293          UD    0.147
             *
```

1 HEC-1 INPUT PAGE 9

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

294          KK    R3-M
295          KM    ROUTE 3-M TO CPDB5
296          KM    FACILITY ID PORTION OF APM500009
297          RD    4500  0.0528   0.013       0    TRAP       7       0
             *

298          KK   CPDB5
299          KM    COMBINE 3-M, 3-N, RCP3.6 AND RCP3.4
300          KM    TOTAL INFLOW TO SUMMERLIN #5 DETENTION BASIN
301          KO            0
302          HC            4
             *

303          KK     DB5
304          KM    SUMMERLIN DETENTION BASIN 5
305          KO            0
306          RS            1    STOR     -1
307          SV            0    1.73    4.55    8.45   13.08    18.2   23.81   29.96   36.70   43.93
308          SV   59.55    77.49   99.82  127.17  159.39  196.38  240.07  384.05  405.65  535.25
309          SQ            0     192     276     391     505     616     725     813     900     982
310          SQ    1176    1368    1534    1683    1804    1920    2033    2315    3725   23201
311          SE    3532.5    3535    3536    3537    3538    3539    3540    3541    3542    3543
312          SE    3545    3547    3549    3551    3553    3555    3557    3563    3564   3569
313          SS    3563            435.6   3            1.5
             *

314          KK   60RCP
315          DT     7X5
316          DI            0    1000    1600    2000    2400
317          DQ            0    1000    1400    1700    2000
             *

318          KK     CPA
319          KM   CP4 & DB5 flow from 60" RCP
320          HC       2
             *

321          KK     CP5
322          KM   COMBINE CP4 & BW38
323          HC       2
             *

324          KK     7X5
325          DR     7X5
             *

326          KK     CPB
327          HC       2
             *
```

1 HEC-1 INPUT PAGE 10

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

 328          KK     RD2
 329          BA  0.0158
 330          LS       0    98.0
 331          UD    .158
              *
 332          KK     CPC
 333          HC       3
              *
 334          ZZ
```

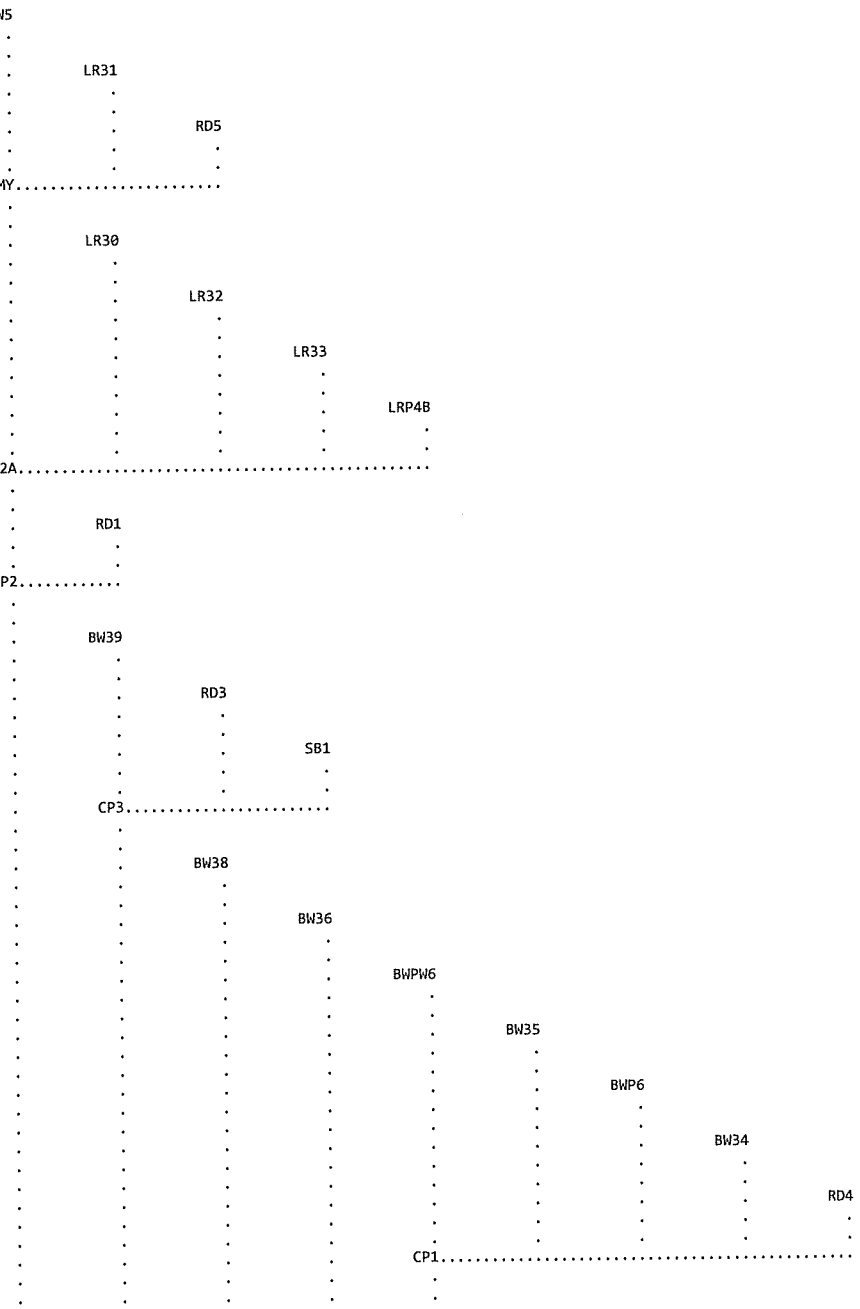
1

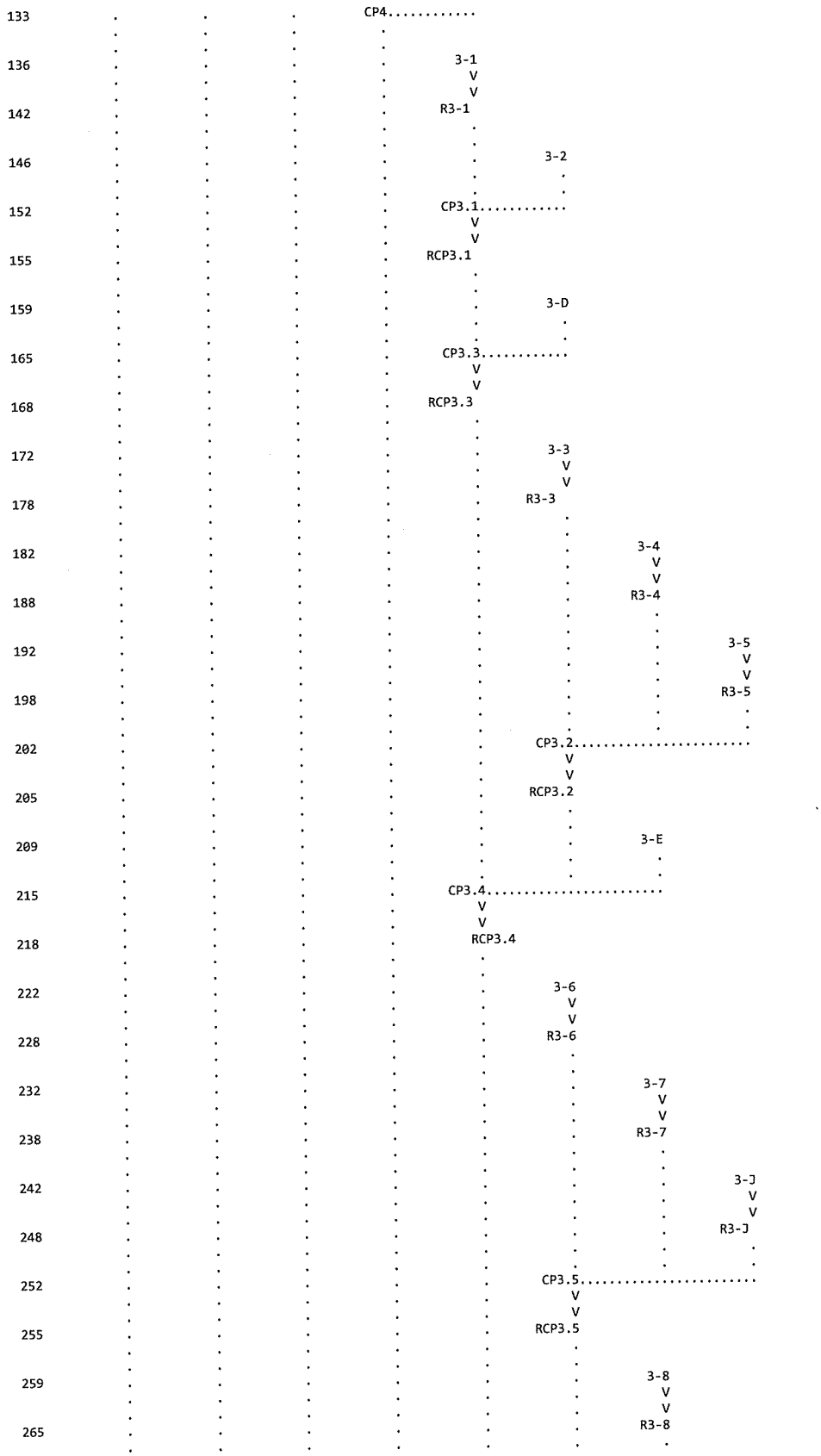
SCHEMATIC DIAGRAM OF STREAM NETWORK

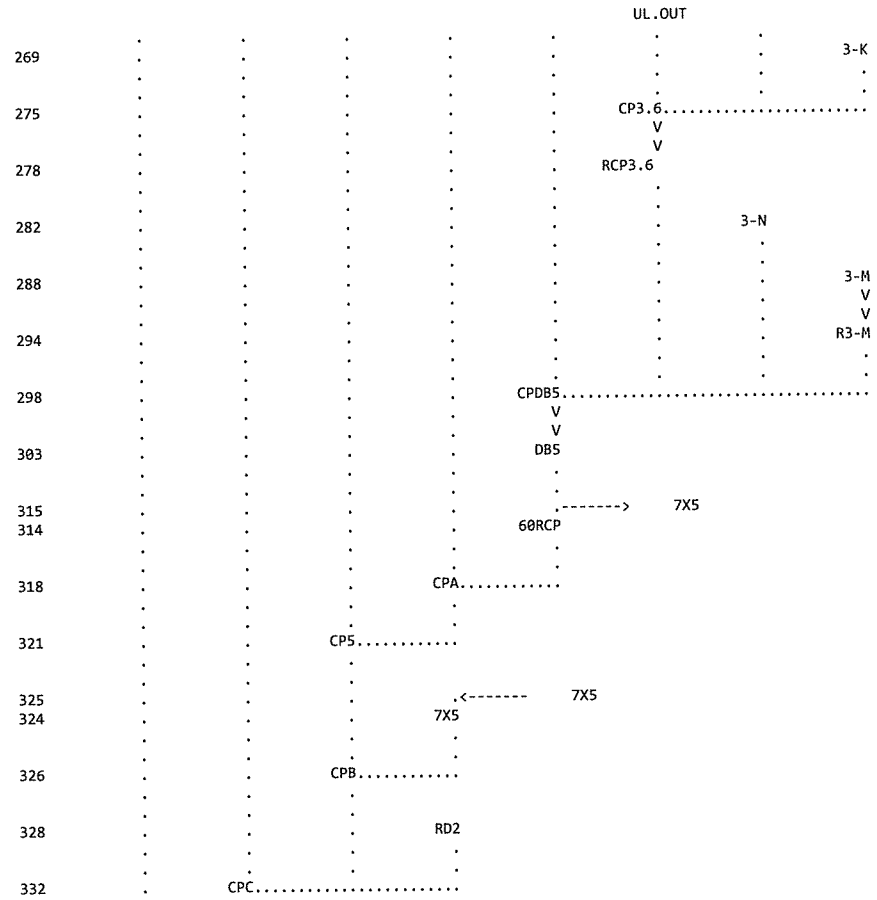
INPUT LINE NO.

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

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW




133
CP4
136
3-1
142
R3-1
146
3-2
152
CP3.1
155
RCP3.1
159
3-D
165
CP3.3
168
RCP3.3
172
3-3
178
R3-3
182
3-4
188
R3-4
192
3-5
198
R3-5
202
CP3.2
205
RCP3.2
209
3-E
215
CP3.4
218
RCP3.4
222
3-6
228
R3-6
232
3-7
238
R3-7
242
3-J
248
R3-J
252
CP3.5
255
RCP3.5
259
3-8
265
R3-8



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   10APR18  TIME  16:34:20   *
*                                       *
*****************************************
```

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

```
************************************************************
* ........................................................ *
* :                SUMMERLIN VILLAGE 23B                 : *
* :                    SKY VISTA DRIVE                   : *
* :                 ULTIMATE CONDITIONS                  : *
* :                  DEVELOPED ONSITE                    : *
* :                  DEVELOPED OFFSITE                   : *
* :......................................................: *
* :            RETURN PERIOD_ _ _ _10 & 100-YEAR         : *
* :            DISTRIBUTION_ _ _ _ 6-HOUR SDN3           : *
* :            PROJECT NO_ _ _ _ _ 62023B-240            : *
* :            FILENAME_ _ _ _ _ _ UL.H1                 : *
* :            DATE_ _ _ _ _ _ _ _ 03/15/2018            : *
* :            MODELED BY_ _ _ _ _ ME                    : *
* :......................................................: *
* :                                                      : *
* :......................................................: *
************************************************************
```

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0.0 - 0.5	1.00
0.5 - 1.0	0.98
1.0 - 2.0	0.95

```
                                    2.0 - 4.0    0.92
                                    4.0 - 6.0    0.91
                                    6.0 - 8.0    0.89


 33 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          200  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME         1635  ENDING TIME
                      ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE   16.58 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       .98       .95       .92       .91       .89       .54


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


            **************
            *            *
 298 KK     *     CPDB5  *
            *            *
            **************

 301 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


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


            **************
            *            *
 303 KK     *       DB5  *
            *            *
            **************

 305 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
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  RATIO 3  RATIO 4  RATIO 5  RATIO 6  RATIO 7
                                                             1.00       .98       .95       .92       .91       .89       .54

 HYDROGRAPH AT
+                  LPRW5       .01      1   FLOW            16.       15.       15.       14.       14.       13.       6.
                                             TIME           3.50      3.50      3.50      3.50      3.50      3.50      3.50

 HYDROGRAPH AT
+                   LR31       .01      1   FLOW            25.       25.       24.       23.       23.       22.       12.
                                             TIME           3.50      3.50      3.50      3.50      3.50      3.50      3.50

 HYDROGRAPH AT
```

							UL.OUT					
+	RD5	.00	1	FLOW	9.	9.	8.	8.	8.	8.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	DUMMY	.02	1	FLOW	50.	49.	47.	45.	45.	43.	23.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	LR30	.04	1	FLOW	80.	78.	75.	72.	71.	69.	36.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	LR32	.02	1	FLOW	39.	39.	37.	36.	35.	34.	19.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	LR33	.01	1	FLOW	26.	26.	25.	24.	23.	23.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	LRP4B	.00	1	FLOW	4.	4.	4.	4.	4.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT											
+	CP2A	.09	1	FLOW	199.	194.	187.	180.	177.	173.	90.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RD1	.00	1	FLOW	9.	9.	8.	8.	8.	8.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP2	.09	1	FLOW	207.	202.	195.	188.	185.	180.	95.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	BW39	.03	1	FLOW	84.	82.	80.	77.	76.	74.	41.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RD3	.00	1	FLOW	6.	6.	5.	5.	5.	5.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	SB1	.00	1	FLOW	10.	10.	9.	9.	9.	8.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP3	.04	1	FLOW	100.	98.	94.	91.	90.	88.	48.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	BW38	.03	1	FLOW	80.	78.	75.	73.	72.	70.	37.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	BW36	.04	1	FLOW	78.	76.	73.	70.	68.	66.	30.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT											
+	BWPW6	.00	1	FLOW	10.	10.	10.	9.	9.	9.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	BW35	.02	1	FLOW	61.	60.	58.	56.	55.	54.	29.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	BWP6	.00	1	FLOW	6.	6.	6.	5.	5.	5.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	BW34	.06	1	FLOW	139.	135.	131.	126.	124.	121.	66.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RD4	.00	1	FLOW	12.	12.	11.	11.	11.	11.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT											
+	CP1	.09	1	FLOW	228.	223.	215.	207.	205.	200.	107.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP4	.14	1	FLOW	307.	299.	288.	277.	273.	266.	136.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	3-1	2.22	1	FLOW	2356.	2292.	2196.	2101.	2069.	2005.	927.

								UL.OUT					
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08		
ROUTED TO													
+	R3-1	2.22	1	FLOW	2346.	2282.	2184.	2094.	2057.	1994.	924.		
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08		
HYDROGRAPH AT													
+	3-2	.23	1	FLOW	435.	423.	405.	386.	380.	368.	168.		
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58		
2 COMBINED AT													
+	CP3.1	2.45	1	FLOW	2421.	2356.	2255.	2162.	2124.	2058.	957.		
				TIME	4.08	4.08	4.00	4.08	4.08	4.08	4.08		
ROUTED TO													
+	RCP3.1	2.45	1	FLOW	2409.	2357.	2259.	2154.	2117.	2055.	960.		
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.17		
HYDROGRAPH AT													
+	3-D	.33	1	FLOW	495.	481.	459.	438.	431.	417.	180.		
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67		
2 COMBINED AT													
+	CP3.3	2.78	1	FLOW	2582.	2526.	2421.	2309.	2270.	2204.	1015.		
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.17		
ROUTED TO													
+	RCP3.3	2.78	1	FLOW	2580.	2522.	2418.	2306.	2267.	2201.	1014.		
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.17		
HYDROGRAPH AT													
+	3-3	.17	1	FLOW	397.	387.	371.	356.	351.	340.	163.		
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50		
ROUTED TO													
+	R3-3	.17	1	FLOW	373.	365.	351.	337.	333.	323.	148.		
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58		
HYDROGRAPH AT													
+	3-4	.35	1	FLOW	767.	747.	717.	687.	677.	657.	314.		
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50		
ROUTED TO													
+	R3-4	.35	1	FLOW	739.	720.	692.	665.	655.	636.	292.		
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58		
HYDROGRAPH AT													
+	3-5	.29	1	FLOW	634.	617.	592.	567.	559.	542.	256.		
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50		
ROUTED TO													
+	R3-5	.29	1	FLOW	609.	588.	566.	546.	537.	523.	251.		
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58		
3 COMBINED AT													
+	CP3.2	.81	1	FLOW	1721.	1674.	1609.	1548.	1525.	1483.	692.		
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58		
ROUTED TO													
+	RCP3.2	.81	1	FLOW	1650.	1605.	1539.	1480.	1459.	1423.	658.		
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67		
HYDROGRAPH AT													
+	3-E	.54	1	FLOW	821.	797.	763.	728.	717.	694.	308.		
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67		
3 COMBINED AT													
+	CP3.4	4.14	1	FLOW	4121.	4001.	3832.	3675.	3609.	3502.	1501.		
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67		
ROUTED TO													
+	RCP3.4	4.14	1	FLOW	4066.	3943.	3767.	3608.	3542.	3432.	1493.		
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75		
HYDROGRAPH AT													
+	3-6	.09	1	FLOW	206.	201.	193.	185.	182.	177.	85.		
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50		
ROUTED TO													
+	R3-6	.09	1	FLOW	185.	185.	179.	172.	169.	162.	76.		
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67		
HYDROGRAPH AT													
+	3-7	.17	1	FLOW	429.	417.	401.	384.	378.	367.	176.		
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50		
ROUTED TO													
+	R3-7	.17	1	FLOW	365.	351.	334.	321.	317.	308.	156.		
				TIME	3.50	3.50	3.50	3.58	3.58	3.58	3.58		

HYDROGRAPH AT											
+	3-J	.15	1	FLOW	203.	197.	186.	176.	172.	166.	57.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	R3-J	.15	1	FLOW	197.	190.	178.	168.	164.	158.	58.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
3 COMBINED AT											
+	CP3.5	.41	1	FLOW	702.	679.	648.	618.	608.	589.	231.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCP3.5	.41	1	FLOW	682.	659.	627.	595.	584.	564.	227.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
HYDROGRAPH AT											
+	3-8	.64	1	FLOW	1151.	1121.	1075.	1029.	1014.	983.	461.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	R3-8	.64	1	FLOW	1141.	1112.	1065.	1019.	1002.	974.	456.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	3-K	.89	1	FLOW	1269.	1235.	1184.	1133.	1116.	1082.	506.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
3 COMBINED AT											
+	CP3.6	1.94	1	FLOW	2996.	2929.	2804.	2682.	2639.	2557.	1169.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCP3.6	1.94	1	FLOW	2931.	2860.	2738.	2617.	2571.	2496.	1167.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT											
+	3-N	.45	1	FLOW	687.	669.	642.	615.	606.	588.	279.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	3-M	.19	1	FLOW	367.	358.	344.	329.	325.	315.	152.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	R3-M	.19	1	FLOW	356.	346.	332.	318.	313.	305.	144.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT											
+	CPDB5	6.72	1	FLOW	8005.	7785.	7447.	7128.	7005.	6792.	3049.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
ROUTED TO											
+	DB5	6.72	1	FLOW	2286.	2257.	2214.	2171.	2156.	2129.	1469.
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
			** PEAK STAGES IN FEET **								
			1	STAGE	3562.38	3561.77	3560.85	3559.95	3559.63	3559.05	3548.22
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
DIVERSION TO											
+	7X5	6.72	1	FLOW	1915.	1893.	1860.	1829.	1817.	1797.	1313.
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
HYDROGRAPH AT											
+	60RCP	6.72	1	FLOW	372.	364.	353.	343.	339.	332.	156.
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
2 COMBINED AT											
+	CPA	6.86	1	FLOW	422.	414.	402.	391.	387.	379.	177.
				TIME	4.83	4.83	4.58	4.58	4.58	4.58	4.50
2 COMBINED AT											
+	CP5	6.89	1	FLOW	485.	468.	442.	416.	408.	393.	184.
				TIME	3.58	3.58	3.58	3.58	3.58	4.58	4.58
HYDROGRAPH AT											
+	7X5	.00	1	FLOW	1915.	1893.	1860.	1829.	1817.	1797.	1313.
				TIME	5.08	5.08	5.08	5.08	5.08	5.00	4.33
2 COMBINED AT											
+	CPB	6.89	1	FLOW	2342.	2313.	2270.	2227.	2212.	2184.	1490.
				TIME	4.83	4.83	4.83	4.83	4.83	4.83	4.50
HYDROGRAPH AT											
+	RD2	.02	1	FLOW	36.	35.	34.	33.	33.	32.	19.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58

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  3 COMBINED AT
+                    CPC       6.95     1   FLOW        2365.    2336.    2291.    2248.    2232.    2204.    1500.
                                             TIME         4.83     4.83     4.83     4.83     4.83     4.83     4.50

1
                                          SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                              (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                    INTERPOLATED TO
                                                                                  COMPUTATION INTERVAL
            ISTAQ     ELEMENT        DT        PEAK      TIME TO      VOLUME       DT        PEAK      TIME TO      VOLUME
                                                                        PEAK                              PEAK

                                    (MIN)      (CFS)       (MIN)       (IN)      (MIN)      (CFS)       (MIN)        (IN)

          FOR PLAN = 1  RATIO=  .00
             R3-1          MANE          2.66   2349.13    244.73       2.41      5.00    2345.98    245.00         2.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2851E+03 EXCESS= .0000E+00 OUTFLOW= .2852E+03 BASIN STORAGE= .7278E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             R3-1          MANE          2.69   2285.11    244.75       2.34      5.00    2282.43    245.00         2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2771E+03 EXCESS= .0000E+00 OUTFLOW= .2771E+03 BASIN STORAGE= .6824E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             R3-1          MANE          2.74   2185.83    243.50       2.24      5.00    2184.24    245.00         2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2651E+03 EXCESS= .0000E+00 OUTFLOW= .2651E+03 BASIN STORAGE= .7911E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             R3-1          MANE          2.79   2095.14    242.31       2.14      5.00    2094.17    245.00         2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2531E+03 EXCESS= .0000E+00 OUTFLOW= .2531E+03 BASIN STORAGE= .6890E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             R3-1          MANE          2.80   2059.18    243.79       2.10      5.00    2057.00    245.00         2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2491E+03 EXCESS= .0000E+00 OUTFLOW= .2491E+03 BASIN STORAGE= .6543E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             R3-1          MANE          2.84   1996.02    244.02       2.04      5.00    1993.62    245.00         2.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2412E+03 EXCESS= .0000E+00 OUTFLOW= .2412E+03 BASIN STORAGE= .7632E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             R3-1          MANE          3.86    924.57    247.23        .93      5.00     924.19    245.00          .93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1095E+03 EXCESS= .0000E+00 OUTFLOW= .1096E+03 BASIN STORAGE= .7590E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             RCP3.1        MANE          4.25   2420.08    246.38       2.39      5.00    2408.70    245.00         2.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3118E+03 EXCESS= .0000E+00 OUTFLOW= .3118E+03 BASIN STORAGE= .1258E-01 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             RCP3.1        MANE          4.29   2357.23    244.70       2.32      5.00    2356.52    245.00         2.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3030E+03 EXCESS= .0000E+00 OUTFLOW= .3031E+03 BASIN STORAGE= .1132E-01 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             RCP3.1        MANE          4.37   2260.70    244.49       2.22      5.00    2259.16    245.00         2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2899E+03 EXCESS= .0000E+00 OUTFLOW= .2899E+03 BASIN STORAGE= .1066E-01 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
             RCP3.1        MANE          4.44   2154.59    248.48       2.12      5.00    2154.08    245.00         2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2767E+03 EXCESS= .0000E+00 OUTFLOW= .2767E+03 BASIN STORAGE= .1079E-01 PERCENT ERROR=    .0
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FOR PLAN = 1 RATIO= .00

RCP3.1	MANE	4.47	2125.42	245.72	2.09	5.00	2117.13	245.00	2.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2723E+03 EXCESS= .0000E+00 OUTFLOW= .2724E+03 BASIN STORAGE= .1141E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.1	MANE	4.52	2056.20	244.17	2.02	5.00	2055.43	245.00	2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2636E+03 EXCESS= .0000E+00 OUTFLOW= .2637E+03 BASIN STORAGE= .9756E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.1	MANE	5.00	960.00	250.00	.92	5.00	960.00	250.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1194E+03 EXCESS= .0000E+00 OUTFLOW= .1194E+03 BASIN STORAGE= .1037E-01 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.52	2581.07	245.48	2.35	5.00	2579.57	245.00	2.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3484E+03 EXCESS= .0000E+00 OUTFLOW= .3484E+03 BASIN STORAGE= .1140E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.53	2524.12	245.47	2.28	5.00	2522.32	245.00	2.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3386E+03 EXCESS= .0000E+00 OUTFLOW= .3386E+03 BASIN STORAGE= .1112E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.54	2419.10	245.19	2.18	5.00	2418.14	245.00	2.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3238E+03 EXCESS= .0000E+00 OUTFLOW= .3238E+03 BASIN STORAGE= .1172E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.55	2307.47	245.31	2.08	5.00	2305.95	245.00	2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3089E+03 EXCESS= .0000E+00 OUTFLOW= .3089E+03 BASIN STORAGE= .1162E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.55	2268.14	245.28	2.05	5.00	2266.54	245.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3040E+03 EXCESS= .0000E+00 OUTFLOW= .3040E+03 BASIN STORAGE= .1162E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.56	2201.96	245.31	1.99	5.00	2200.56	245.00	1.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2943E+03 EXCESS= .0000E+00 OUTFLOW= .2943E+03 BASIN STORAGE= .1098E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.3	MANE	.75	1014.41	250.15	.89	5.00	1014.28	250.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1324E+03 EXCESS= .0000E+00 OUTFLOW= .1324E+03 BASIN STORAGE= .1214E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.25	379.69	214.50	2.41	5.00	372.79	215.00	2.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2227E+02 EXCESS= .0000E+00 OUTFLOW= .2232E+02 BASIN STORAGE= .6444E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.50	378.94	213.50	2.35	5.00	365.45	215.00	2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2171E+02 EXCESS= .0000E+00 OUTFLOW= .2176E+02 BASIN STORAGE= .5218E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.50	363.45	213.50	2.25	5.00	351.27	215.00	2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2079E+02 EXCESS= .0000E+00 OUTFLOW= .2083E+02 BASIN STORAGE= .5137E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.75	348.62	213.75	2.15	5.00	337.44	215.00	2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1987E+02 EXCESS= .0000E+00 OUTFLOW= .1992E+02 BASIN STORAGE= .6904E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.75	343.46	213.75	2.12	5.00	332.67	215.00	2.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1957E+02 EXCESS= .0000E+00 OUTFLOW= .1961E+02 BASIN STORAGE= .6866E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	3.75	333.16	213.75	2.05	5.00	323.11	215.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1896E+02 EXCESS= .0000E+00 OUTFLOW= .1900E+02 BASIN STORAGE= .6790E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-3	MANE	4.25	152.47	216.75	.94	5.00	148.36	215.00	.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8704E+01 EXCESS= .0000E+00 OUTFLOW= .8724E+01 BASIN STORAGE= .6768E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.50	759.69	213.50	2.44	5.00	739.13	215.00	2.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4493E+02 EXCESS= .0000E+00 OUTFLOW= .4502E+02 BASIN STORAGE= .8519E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.50	739.47	213.50	2.37	5.00	720.32	215.00	2.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4368E+02 EXCESS= .0000E+00 OUTFLOW= .4377E+02 BASIN STORAGE= .8431E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.50	709.14	213.50	2.27	5.00	692.08	215.00	2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4182E+02 EXCESS= .0000E+00 OUTFLOW= .4190E+02 BASIN STORAGE= .8298E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.75	681.60	213.75	2.17	5.00	664.90	215.00	2.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3998E+02 EXCESS= .0000E+00 OUTFLOW= .4005E+02 BASIN STORAGE= .6833E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.75	671.49	213.75	2.14	5.00	655.40	215.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3936E+02 EXCESS= .0000E+00 OUTFLOW= .3943E+02 BASIN STORAGE= .6797E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	3.75	651.25	213.75	2.07	5.00	636.39	215.00	2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3813E+02 EXCESS= .0000E+00 OUTFLOW= .3820E+02 BASIN STORAGE= .6722E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-4	MANE	4.25	301.93	216.75	.95	5.00	292.36	215.00	.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1756E+02 EXCESS= .0000E+00 OUTFLOW= .1760E+02 BASIN STORAGE= .6986E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-5	MANE	2.90	613.70	214.79	2.38	5.00	609.16	215.00	2.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3725E+02 EXCESS= .0000E+00 OUTFLOW= .3729E+02 BASIN STORAGE= .2899E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-5	MANE	2.93	604.21	213.97	2.31	5.00	588.25	215.00	2.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3619E+02 EXCESS= .0000E+00 OUTFLOW= .3622E+02 BASIN STORAGE= .3969E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-5	MANE	2.98	577.94	214.27	2.21	5.00	566.11	215.00	2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3460E+02 EXCESS= .0000E+00 OUTFLOW= .3464E+02 BASIN STORAGE= .3896E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-5	MANE	3.02	551.26	214.67	2.12	5.00	545.55	215.00	2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3311E+02 EXCESS= .0000E+00 OUTFLOW= .3315E+02 BASIN STORAGE= .3747E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-5	MANE	3.04	550.21	212.80	2.09	5.00	537.03	215.00	2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3262E+02 EXCESS= .0000E+00 OUTFLOW= .3265E+02 BASIN STORAGE= .4165E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-5	MANE	3.07	523.50	215.18	2.02	5.00	523.33	215.00	2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3159E+02 EXCESS= .0000E+00 OUTFLOW= .3162E+02 BASIN STORAGE= .3534E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-5	MANE	3.75	254.05	213.75	.93	5.00	251.45	215.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1449E+02 EXCESS= .0000E+00 OUTFLOW= .1451E+02 BASIN STORAGE= .4266E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

RCP3.2	MANE	2.52	1673.65	216.35	2.41	5.00	1650.24	215.00	2.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1046E+03 EXCESS= .0000E+00 OUTFLOW= .1046E+03 BASIN STORAGE= .3557E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.2	MANE	2.54	1627.94	216.02	2.34	5.00	1605.12	215.00	2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1016E+03 EXCESS= .0000E+00 OUTFLOW= .1017E+03 BASIN STORAGE= .4466E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.2	MANE	2.58	1563.67	216.58	2.24	5.00	1538.95	215.00	2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9727E+02 EXCESS= .0000E+00 OUTFLOW= .9734E+02 BASIN STORAGE= .3694E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.2	MANE	2.62	1504.79	217.08	2.15	5.00	1479.90	215.00	2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9307E+02 EXCESS= .0000E+00 OUTFLOW= .9312E+02 BASIN STORAGE= .4279E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.2	MANE	2.63	1478.97	215.63	2.11	5.00	1458.91	215.00	2.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9152E+02 EXCESS= .0000E+00 OUTFLOW= .9158E+02 BASIN STORAGE= .4427E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.2	MANE	2.66	1431.99	217.87	2.05	5.00	1422.82	215.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8882E+02 EXCESS= .0000E+00 OUTFLOW= .8887E+02 BASIN STORAGE= .5049E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.2	MANE	3.51	679.30	217.79	.94	5.00	657.61	220.00	.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4070E+02 EXCESS= .0000E+00 OUTFLOW= .4073E+02 BASIN STORAGE= .3590E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.39	4099.79	221.68	2.34	5.00	4065.74	220.00	2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5154E+03 EXCESS= .0000E+00 OUTFLOW= .5154E+03 BASIN STORAGE= .3367E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.41	3993.52	221.35	2.27	5.00	3942.90	220.00	2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5008E+03 EXCESS= .0000E+00 OUTFLOW= .5008E+03 BASIN STORAGE= .3434E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.43	3809.91	220.68	2.17	5.00	3766.97	220.00	2.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4787E+03 EXCESS= .0000E+00 OUTFLOW= .4787E+03 BASIN STORAGE= .3287E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.46	3667.51	221.30	2.07	5.00	3607.57	220.00	2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4572E+03 EXCESS= .0000E+00 OUTFLOW= .4572E+03 BASIN STORAGE= .3352E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.47	3602.57	221.35	2.04	5.00	3541.72	220.00	2.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4496E+03 EXCESS= .0000E+00 OUTFLOW= .4496E+03 BASIN STORAGE= .3514E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	1.48	3486.18	220.92	1.97	5.00	3431.94	220.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4357E+03 EXCESS= .0000E+00 OUTFLOW= .4357E+03 BASIN STORAGE= .3736E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.4	MANE	2.04	1504.27	222.50	.89	5.00	1493.14	225.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1959E+03 EXCESS= .0000E+00 OUTFLOW= .1959E+03 BASIN STORAGE= .3286E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.25	190.55	217.75	2.39	5.00	184.79	220.00	2.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1124E+02 EXCESS= .0000E+00 OUTFLOW= .1130E+02 BASIN STORAGE= .9859E-02 PERCENT ERROR= -.6

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.50	187.08	217.00	2.33	5.00	185.30	220.00	2.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1097E+02 EXCESS= .0000E+00 OUTFLOW= .1102E+02 BASIN STORAGE= .9474E-02 PERCENT ERROR= -.6

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.50	179.09	217.00	2.23	5.00	178.51	220.00	2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1050E+02 EXCESS= .0000E+00 OUTFLOW= .1056E+02 BASIN STORAGE= .9358E-02 PERCENT ERROR= -.6

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.50	171.74	220.50	2.13	5.00	171.65	220.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1003E+02 EXCESS= .0000E+00 OUTFLOW= .1009E+02 BASIN STORAGE= .9240E-02 PERCENT ERROR= -.7

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.50	169.50	220.50	2.10	5.00	169.35	220.00	2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9874E+01 EXCESS= .0000E+00 OUTFLOW= .9932E+01 BASIN STORAGE= .9200E-02 PERCENT ERROR= -.7

FOR PLAN = 1 RATIO= .00

R3-6	MANE	3.75	163.66	217.50	2.04	5.00	161.96	220.00	2.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9573E+01 EXCESS= .0000E+00 OUTFLOW= .9628E+01 BASIN STORAGE= .1160E-01 PERCENT ERROR= -.7

FOR PLAN = 1 RATIO= .00

R3-6	MANE	4.25	78.32	221.00	.93	5.00	75.87	220.00	.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4384E+01 EXCESS= .0000E+00 OUTFLOW= .4414E+01 BASIN STORAGE= .1072E-01 PERCENT ERROR= -.9

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.23	410.12	213.24	2.31	5.00	364.53	210.00	2.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2109E+02 EXCESS= .0000E+00 OUTFLOW= .2113E+02 BASIN STORAGE= .2918E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.25	370.48	211.25	2.23	5.00	350.70	210.00	2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2038E+02 EXCESS= .0000E+00 OUTFLOW= .2042E+02 BASIN STORAGE= .3295E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.31	363.28	211.94	2.13	5.00	334.31	210.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1947E+02 EXCESS= .0000E+00 OUTFLOW= .1951E+02 BASIN STORAGE= .3053E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.25	339.01	211.25	2.04	5.00	320.90	215.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1860E+02 EXCESS= .0000E+00 OUTFLOW= .1864E+02 BASIN STORAGE= .3194E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.25	333.77	211.25	2.01	5.00	316.63	215.00	2.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1831E+02 EXCESS= .0000E+00 OUTFLOW= .1834E+02 BASIN STORAGE= .3176E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.25	323.30	211.25	1.94	5.00	308.06	215.00	1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1772E+02 EXCESS= .0000E+00 OUTFLOW= .1775E+02 BASIN STORAGE= .3141E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-7	MANE	3.75	164.36	213.75	.89	5.00	156.15	215.00	.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8091E+01 EXCESS= .0000E+00 OUTFLOW= .8111E+01 BASIN STORAGE= .3049E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.50	199.90	220.50	1.61	5.00	197.19	220.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1311E+02 EXCESS= .0000E+00 OUTFLOW= .1314E+02 BASIN STORAGE= .5881E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.50	192.96	220.50	1.55	5.00	190.24	220.00	1.56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1266E+02 EXCESS= .0000E+00 OUTFLOW= .1268E+02 BASIN STORAGE= .7226E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.25	181.58	221.00	1.47	5.00	177.64	220.00	1.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1197E+02 EXCESS= .0000E+00 OUTFLOW= .1198E+02 BASIN STORAGE= .5738E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.25	171.61	221.00	1.39	5.00	167.63	220.00	1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1130E+02 EXCESS= .0000E+00 OUTFLOW= .1132E+02 BASIN STORAGE= .5623E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.25	168.30	221.00	1.36	5.00	164.30	220.00	1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1108E+02 EXCESS= .0000E+00 OUTFLOW= .1110E+02 BASIN STORAGE= .5585E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-J	MANE	4.25	161.70	221.00	1.31	5.00	157.68	220.00	1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1065E+02 EXCESS= .0000E+00 OUTFLOW= .1066E+02 BASIN STORAGE= .7355E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R3-J	MANE	2.50	58.36	225.00	.47	5.00	58.36	225.00	.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3850E+01 EXCESS= .0000E+00 OUTFLOW= .3861E+01 BASIN STORAGE= .6928E-02 PERCENT ERROR= -.5

FOR PLAN = 1 RATIO= .00

RCP3.5	MANE	1.30	691.02	216.53	2.07	5.00	681.83	215.00	2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4551E+02 EXCESS= .0000E+00 OUTFLOW= .4552E+02 BASIN STORAGE= .1608E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.5	MANE	1.32	670.61	216.54	2.01	5.00	658.89	215.00	2.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4424E+02 EXCESS= .0000E+00 OUTFLOW= .4424E+02 BASIN STORAGE= .1361E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.5	MANE	1.34	643.19	216.34	1.91	5.00	627.37	215.00	1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4213E+02 EXCESS= .0000E+00 OUTFLOW= .4213E+02 BASIN STORAGE= .1317E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.5	MANE	1.37	609.77	215.94	1.82	5.00	594.65	215.00	1.82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4012E+02 EXCESS= .0000E+00 OUTFLOW= .4013E+02 BASIN STORAGE= .1406E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.5	MANE	1.38	598.94	215.88	1.79	5.00	584.20	215.00	1.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3946E+02 EXCESS= .0000E+00 OUTFLOW= .3946E+02 BASIN STORAGE= .1413E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.5	MANE	1.39	576.40	215.64	1.73	5.00	563.86	215.00	1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3810E+02 EXCESS= .0000E+00 OUTFLOW= .3811E+02 BASIN STORAGE= .1590E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.5	MANE	1.96	231.25	217.58	.74	5.00	227.09	220.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1636E+02 EXCESS= .0000E+00 OUTFLOW= .1637E+02 BASIN STORAGE= .1368E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-8	MANE	2.99	1146.42	218.06	2.44	5.00	1140.71	220.00	2.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8291E+02 EXCESS= .0000E+00 OUTFLOW= .8295E+02 BASIN STORAGE= .3930E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-8	MANE	3.02	1112.86	220.14	2.37	5.00	1111.91	220.00	2.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8059E+02 EXCESS= .0000E+00 OUTFLOW= .8062E+02 BASIN STORAGE= .3451E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-8	MANE	3.06	1066.78	220.33	2.27	5.00	1064.96	220.00	2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7714E+02 EXCESS= .0000E+00 OUTFLOW= .7717E+02 BASIN STORAGE= .3354E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-8	MANE	3.11	1020.55	220.62	2.16	5.00	1018.52	220.00	2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7370E+02 EXCESS= .0000E+00 OUTFLOW= .7373E+02 BASIN STORAGE= .3197E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-8	MANE	3.12	1008.27	218.65	2.13	5.00	1001.92	220.00	2.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7257E+02 EXCESS= .0000E+00 OUTFLOW= .7261E+02 BASIN STORAGE= .3516E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-8	MANE	3.16	974.22	221.01	2.06	5.00	973.86	220.00	2.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7030E+02 EXCESS= .0000E+00 OUTFLOW= .7033E+02 BASIN STORAGE= .4242E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-8	MANE	4.12	459.85	222.32	.95	5.00	455.52	220.00	.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3241E+02 EXCESS= .0000E+00 OUTFLOW= .3243E+02 BASIN STORAGE= .3195E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCP3.6	MANE	1.64	2993.73	221.55	2.28	5.00	2930.53	220.00	2.28

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2362E+03 EXCESS= .0000E+00 OUTFLOW= .2362E+03 BASIN STORAGE= .3355E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.6	MANE	1.65	2926.24	221.73	2.22	5.00	2860.03	220.00	2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2295E+03 EXCESS= .0000E+00 OUTFLOW= .2296E+03 BASIN STORAGE= .3270E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.6	MANE	1.68	2796.23	221.93	2.12	5.00	2737.54	220.00	2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2194E+03 EXCESS= .0000E+00 OUTFLOW= .2194E+03 BASIN STORAGE= .2980E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.6	MANE	1.71	2667.41	222.18	2.02	5.00	2616.93	220.00	2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2094E+03 EXCESS= .0000E+00 OUTFLOW= .2094E+03 BASIN STORAGE= .3387E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.6	MANE	1.72	2637.47	221.77	1.99	5.00	2571.40	220.00	1.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2062E+03 EXCESS= .0000E+00 OUTFLOW= .2062E+03 BASIN STORAGE= .2964E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.6	MANE	1.74	2532.53	222.61	1.93	5.00	2496.34	220.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1994E+03 EXCESS= .0000E+00 OUTFLOW= .1995E+03 BASIN STORAGE= .2862E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP3.6	MANE	2.32	1171.05	224.78	.87	5.00	1167.16	225.00	.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9011E+02 EXCESS= .0000E+00 OUTFLOW= .9013E+02 BASIN STORAGE= .2992E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.71	358.75	215.64	2.32	5.00	355.58	215.00	2.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2381E+02 EXCESS= .0000E+00 OUTFLOW= .2381E+02 BASIN STORAGE= .2177E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.73	352.09	216.18	2.26	5.00	346.39	215.00	2.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2315E+02 EXCESS= .0000E+00 OUTFLOW= .2316E+02 BASIN STORAGE= .2503E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.76	337.84	216.20	2.16	5.00	332.40	215.00	2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2217E+02 EXCESS= .0000E+00 OUTFLOW= .2218E+02 BASIN STORAGE= .2005E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.79	324.05	216.30	2.07	5.00	318.47	215.00	2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2120E+02 EXCESS= .0000E+00 OUTFLOW= .2120E+02 BASIN STORAGE= .2026E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.80	316.53	215.76	2.03	5.00	313.41	215.00	2.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2087E+02 EXCESS= .0000E+00 OUTFLOW= .2088E+02 BASIN STORAGE= .2435E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	1.82	310.73	216.51	1.97	5.00	304.65	215.00	1.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2023E+02 EXCESS= .0000E+00 OUTFLOW= .2023E+02 BASIN STORAGE= .2004E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R3-M	MANE	2.43	148.01	216.62	.92	5.00	143.89	215.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9402E+01 EXCESS= .0000E+00 OUTFLOW= .9405E+01 BASIN STORAGE= .2331E-02 PERCENT ERROR= -.1

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

APPENDIX B

Hydraulic Calculations and Information

Worksheet for Ditch - 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.0	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	30.00	ft
Discharge	76.00	ft^3/s

Results

Normal Depth	0.48	ft
Flow Area	15.19	ft^2
Wetted Perimeter	33.05	ft
Hydraulic Radius	0.46	ft
Top Width	32.90	ft
Critical Depth	0.57	ft
Critical Slope	0.01124	ft/ft
Velocity	5.00	ft/s
Velocity Head	0.39	ft
Specific Energy	0.87	ft
Froude Number	1.30	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.48	ft
Critical Depth	0.57	ft
Channel Slope	2.0	%

Worksheet for Ditch - 1

GVF Output Data

Critical Slope	0.01124	ft/ft

Cross Section for Ditch - 1

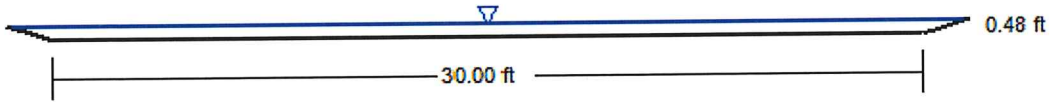
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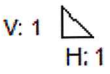
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.0	%
Normal Depth	0.48	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	30.00	ft
Discharge	76.00	ft^3/s

Cross Section Image





Worksheet for Ditch - 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.0	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	100.00	ft^3/s

Results

Normal Depth	0.45	ft
Flow Area	20.75	ft^2
Wetted Perimeter	47.83	ft
Hydraulic Radius	0.43	ft
Top Width	47.69	ft
Critical Depth	0.53	ft
Critical Slope	0.01144	ft/ft
Velocity	4.82	ft/s
Velocity Head	0.36	ft
Specific Energy	0.81	ft
Froude Number	1.29	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.45	ft
Critical Depth	0.53	ft
Channel Slope	2.0	%

Worksheet for Ditch - 2

GVF Output Data

Critical Slope	0.01144	ft/ft

Cross Section for Ditch - 2

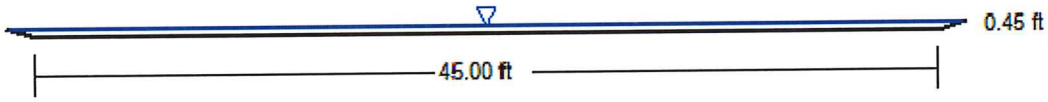
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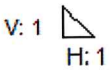
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.0	%
Normal Depth	0.45	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	100.00	ft³/s

Cross Section Image





Worksheet for Ditch - 3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.7	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	16.00	ft^3/s

Results

Normal Depth	0.55	ft
Flow Area	3.65	ft^2
Wetted Perimeter	8.47	ft
Hydraulic Radius	0.43	ft
Top Width	8.30	ft
Critical Depth	0.60	ft
Critical Slope	0.01202	ft/ft
Velocity	4.38	ft/s
Velocity Head	0.30	ft
Specific Energy	0.85	ft
Froude Number	1.16	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.60	ft
Channel Slope	1.7	%

Worksheet for Ditch - 3

GVF Output Data

Critical Slope	0.01202	ft/ft

Cross Section for Ditch - 3

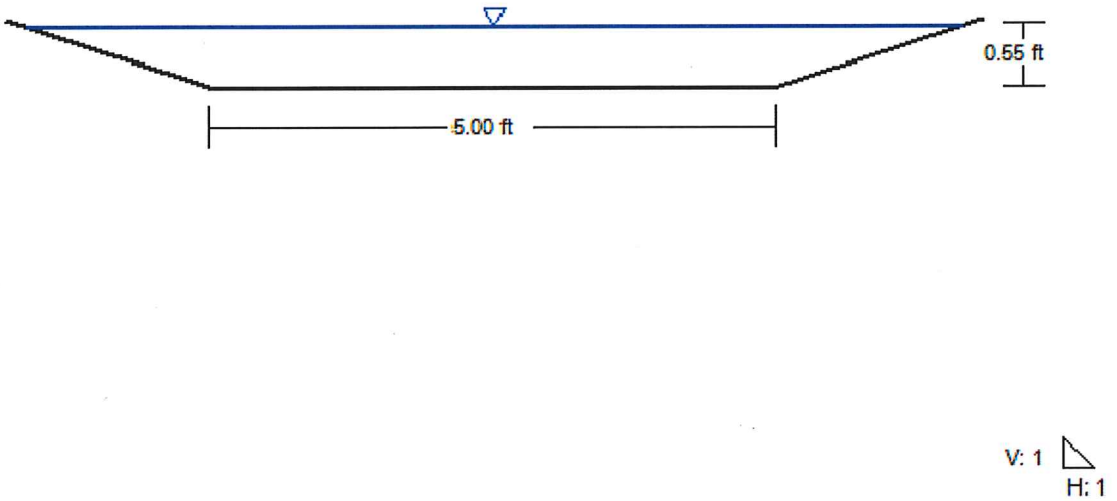
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.7	%
Normal Depth	0.55	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	16.00	ft³/s

Cross Section Image



Worksheet for Ditch - 4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.6	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	33.00	ft^3/s

Results

Normal Depth	0.59	ft
Flow Area	6.93	ft^2
Wetted Perimeter	13.72	ft
Hydraulic Radius	0.50	ft
Top Width	13.53	ft
Critical Depth	0.65	ft
Critical Slope	0.01128	ft/ft
Velocity	4.76	ft/s
Velocity Head	0.35	ft
Specific Energy	0.94	ft
Froude Number	1.17	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.59	ft
Critical Depth	0.65	ft
Channel Slope	1.6	%

Worksheet for Ditch - 4

GVF Output Data

Critical Slope	0.01128	ft/ft

Cross Section for Ditch - 4

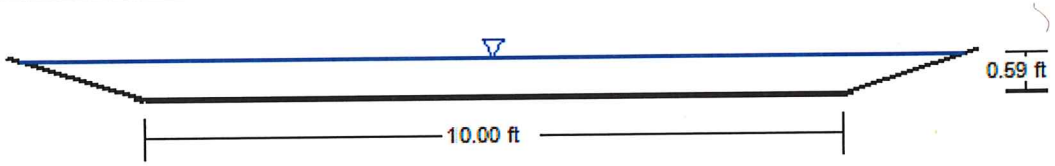
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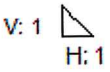
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.6	%
Normal Depth	0.59	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	33.00	ft³/s

Cross Section Image





Worksheet for Ditch - 5

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.4	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	13.50	ft^3/s

Results

Normal Depth	0.74	ft
Flow Area	5.34	ft^2
Wetted Perimeter	9.68	ft
Hydraulic Radius	0.55	ft
Top Width	9.44	ft
Critical Depth	0.54	ft
Critical Slope	0.01235	ft/ft
Velocity	2.53	ft/s
Velocity Head	0.10	ft
Specific Energy	0.84	ft
Froude Number	0.59	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.74	ft
Critical Depth	0.54	ft
Channel Slope	0.4	%

Worksheet for Ditch - 5

GVF Output Data

Critical Slope	0.01235	ft/ft

Cross Section for Ditch - 5

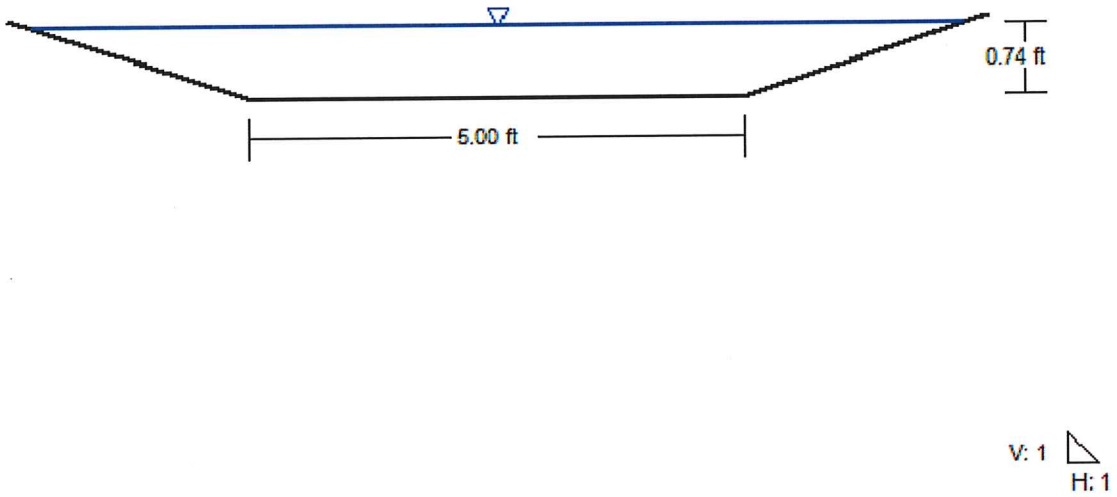
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.4	%
Normal Depth	0.74	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	13.50	ft³/s

Cross Section Image



Worksheet for Ditch - 6

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.5	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	344.00	ft^3/s

Results

Normal Depth	1.41	ft
Flow Area	69.25	ft^2
Wetted Perimeter	53.90	ft
Hydraulic Radius	1.28	ft
Top Width	53.44	ft
Critical Depth	1.19	ft
Critical Slope	0.00889	ft/ft
Velocity	4.97	ft/s
Velocity Head	0.38	ft
Specific Energy	1.79	ft
Froude Number	0.77	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.41	ft
Critical Depth	1.19	ft
Channel Slope	0.5	%

Worksheet for Ditch - 6

GVF Output Data

Critical Slope	0.00889	ft/ft

Cross Section for Ditch - 6

Project Description

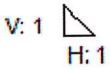
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.5	%
Normal Depth	1.41	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	344.00	ft³/s

Cross Section Image





Worksheet for Ditch - 7

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	3.7	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	10.00	ft^3/s

Results

Normal Depth	0.18	ft
Flow Area	2.81	ft^2
Wetted Perimeter	16.14	ft
Hydraulic Radius	0.17	ft
Top Width	16.08	ft
Critical Depth	0.24	ft
Critical Slope	0.01505	ft/ft
Velocity	3.56	ft/s
Velocity Head	0.20	ft
Specific Energy	0.38	ft
Froude Number	1.50	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.18	ft
Critical Depth	0.24	ft
Channel Slope	3.7	%

Worksheet for Ditch - 7

GVF Output Data

Critical Slope	0.01505	ft/ft

Cross Section for Ditch - 7

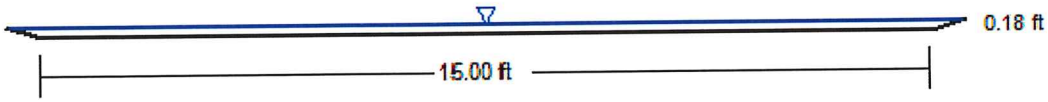
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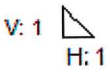
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	3.7	%
Normal Depth	0.18	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	10.00	ft^3/s

Cross Section Image





Worksheet for Ditch - 8

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	4.1	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	25.00	ft
Discharge	20.40	ft^3/s

Results

Normal Depth	0.20	ft
Flow Area	5.07	ft^2
Wetted Perimeter	26.25	ft
Hydraulic Radius	0.19	ft
Top Width	26.19	ft
Critical Depth	0.27	ft
Critical Slope	0.01427	ft/ft
Velocity	4.03	ft/s
Velocity Head	0.25	ft
Specific Energy	0.45	ft
Froude Number	1.61	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.20	ft
Critical Depth	0.27	ft
Channel Slope	4.1	%

Worksheet for Ditch - 8

GVF Output Data

Critical Slope	0.01427	ft/ft

Cross Section for Ditch - 8

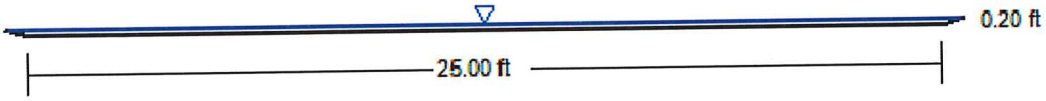
Project Description

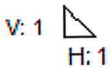
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	4.1	%
Normal Depth	0.20	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	25.00	ft
Discharge	20.40	ft³/s

Cross Section Image





Worksheet for Ditch - 9

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.9	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	27.30	ft^3/s

Results

Normal Depth	0.87	ft
Flow Area	6.60	ft^2
Wetted Perimeter	10.49	ft
Hydraulic Radius	0.63	ft
Top Width	10.21	ft
Critical Depth	0.82	ft
Critical Slope	0.01108	ft/ft
Velocity	4.14	ft/s
Velocity Head	0.27	ft
Specific Energy	1.13	ft
Froude Number	0.91	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	0.82	ft
Channel Slope	0.9	%

Worksheet for Ditch - 9

GVF Output Data

Critical Slope	0.01108	ft/ft

Cross Section for Ditch - 9

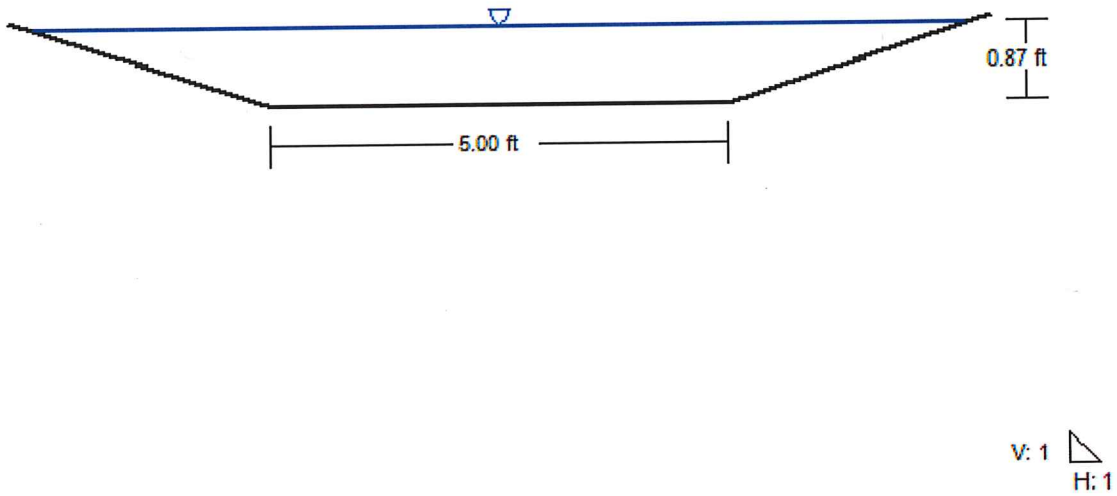
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.9	%
Normal Depth	0.87	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	27.30	ft³/s

Cross Section Image



Worksheet for Ditch - 10

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.6	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	32.70	ft^3/s

Results

Normal Depth	0.41	ft
Flow Area	6.57	ft^2
Wetted Perimeter	17.56	ft
Hydraulic Radius	0.37	ft
Top Width	17.43	ft
Critical Depth	0.51	ft
Critical Slope	0.01188	ft/ft
Velocity	4.98	ft/s
Velocity Head	0.39	ft
Specific Energy	0.79	ft
Froude Number	1.43	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.51	ft
Channel Slope	2.6	%

Worksheet for Ditch - 10

GVF Output Data

Critical Slope	0.01188	ft/ft

Cross Section for Ditch - 10

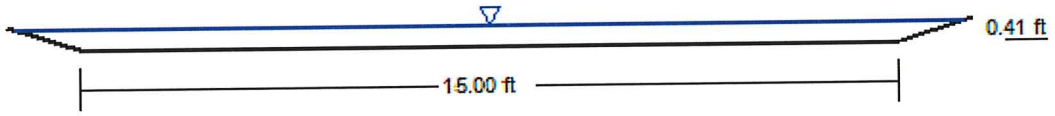
Project Description

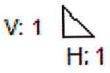
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.6	%
Normal Depth	0.41	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	32.70	ft³/s

Cross Section Image





Worksheet for Ditch - 11

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.8	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	42.60	ft^3/s

Results

Normal Depth	0.53	ft
Flow Area	8.83	ft^2
Wetted Perimeter	18.37	ft
Hydraulic Radius	0.48	ft
Top Width	18.19	ft
Critical Depth	0.60	ft
Critical Slope	0.01130	ft/ft
Velocity	4.82	ft/s
Velocity Head	0.36	ft
Specific Energy	0.89	ft
Froude Number	1.22	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.53	ft
Critical Depth	0.60	ft
Channel Slope	1.8	%

Worksheet for Ditch - 11

GVF Output Data

Critical Slope	0.01130	ft/ft

Cross Section for Ditch - 11

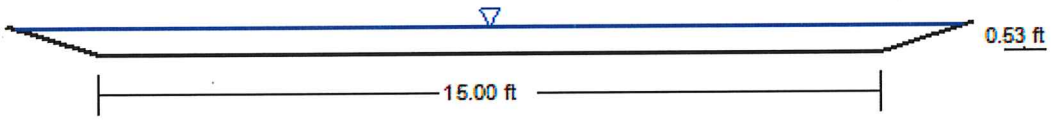
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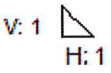
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.8	%
Normal Depth	0.53	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	42.60	ft³/s

Cross Section Image





Worksheet for Cross Section 1 - Half Street

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.83	%
Discharge	4.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+34.6	1.370
0+94.8	0.170
0+94.8	0.130
0+96.3	0.000
0+96.3	0.500
0+96.8	0.500

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+34.6, 1.370)	(0+94.8, 0.130)	0.016
(0+94.8, 0.130)	(0+96.8, 0.500)	0.013

Options

Current Roughness Weighted Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results

Normal Depth	0.39	ft
Elevation Range	0.00 to 1.37 ft	
Flow Area	1.73	ft²
Wetted Perimeter	13.08	ft
Hydraulic Radius	0.13	ft
Top Width	12.66	ft

Worksheet for Cross Section 1 - Half Street

Results

Normal Depth		0.39	ft
Critical Depth		0.42	ft
Critical Slope		0.00527	ft/ft
Velocity		2.60	ft/s
Velocity Head		0.10	ft
Specific Energy		0.50	ft
Froude Number		1.24	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.39	ft
Critical Depth	0.42	ft
Channel Slope	0.83	%
Critical Slope	0.00527	ft/ft

Messages

Notes

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Cross Section for Cross Section 1 - Half Street

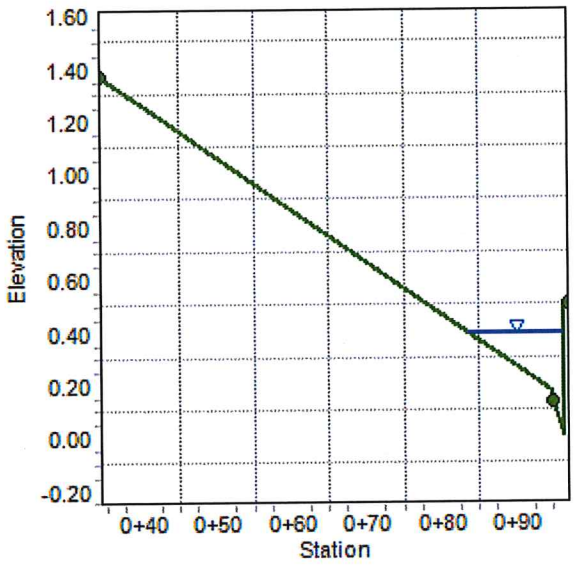
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.83	%
Normal Depth	0.39	ft
Discharge	4.50	ft³/s

Cross Section Image



Worksheet for Cross Section 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	4.32	%
Discharge	36.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.500
0+00.5	0.500
0+00.5	0.000
0+02.0	0.130
0+02.0	0.170
0+29.2	0.710
0+29.2	1.130
0+29.7	1.130
0+38.0	1.300
0+46.3	1.130
0+46.8	1.130
0+46.8	0.710
0+74.0	0.170
0+74.0	0.130
0+75.5	0.000
0+75.5	0.500
0+76.0	0.500

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.500)	(0+02.0, 0.130)	0.013
(0+02.0, 0.130)	(0+29.2, 0.710)	0.016
(0+29.2, 0.710)	(0+46.8, 0.710)	0.013
(0+46.8, 0.710)	(0+74.0, 0.130)	0.016

Worksheet for Cross Section 2

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+74.0, 0.130)	(0+76.0, 0.500)	0.013

Options

Current Roughness Weighted Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results

Normal Depth		0.46	ft
Elevation Range	0.00 to 1.30 ft		
Flow Area		5.52	ft²
Wetted Perimeter		33.53	ft
Hydraulic Radius		0.16	ft
Top Width		32.53	ft
Normal Depth		0.46	ft
Critical Depth		0.63	ft
Critical Slope		0.00485	ft/ft
Velocity		6.52	ft/s
Velocity Head		0.66	ft
Specific Energy		1.12	ft
Froude Number		2.79	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.46	ft
Critical Depth	0.63	ft

Worksheet for Cross Section 2

GVF Output Data

Channel Slope	4.32	%
Critical Slope	0.00485	ft/ft

Messages

Notes

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Cross Section for Cross Section 2

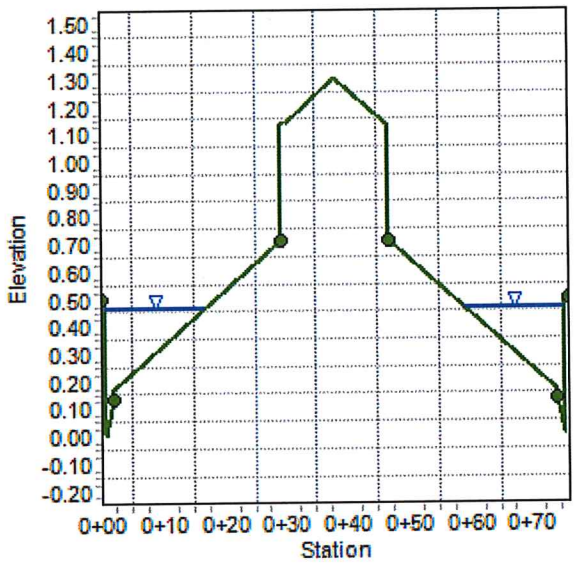
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	4.32	%
Normal Depth	0.46	ft
Discharge	36.00	ft³/s

Cross Section Image



Worksheet for Cross Section 3 - East Half

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.00	%
Discharge	9.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.500
0+00.5	0.500
0+00.5	0.000
0+02.0	0.130
0+02.0	0.170
0+29.2	0.710

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.500)	(0+02.0, 0.170)	0.013
(0+02.0, 0.170)	(0+29.2, 0.710)	0.016

Options

Current Roughness Weighted Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results

Normal Depth		0.40	ft
Elevation Range	0.00 to 0.71 ft		
Flow Area		1.82	ft²
Wetted Perimeter		13.46	ft
Hydraulic Radius		0.13	ft
Top Width		13.02	ft

Worksheet for Cross Section 3 - East Half

Results

Normal Depth		0.40	ft
Critical Depth		0.51	ft
Critical Slope		0.00493	ft/ft
Velocity		4.95	ft/s
Velocity Head		0.38	ft
Specific Energy		0.78	ft
Froude Number		2.34	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Downstream Velocity		Infinity	ft/s
Upstream Velocity		Infinity	ft/s
Normal Depth		0.40	ft
Critical Depth		0.51	ft
Channel Slope		3.00	%
Critical Slope		0.00493	ft/ft

Messages

Notes

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Cross Section for Cross Section 3 - East Half

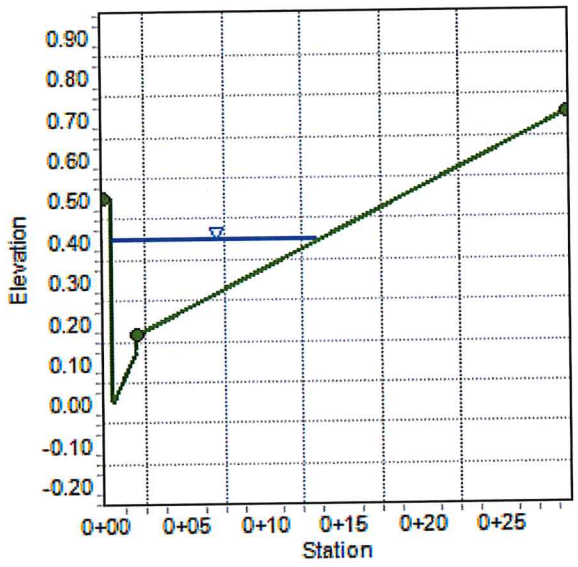
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.00	%
Normal Depth	0.40	ft
Discharge	9.00	ft³/s

Cross Section Image



Worksheet for Cross Section 3 - West Half

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.00	%
Discharge	10.60	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.500
0+00.5	0.500
0+00.5	0.000
0+02.0	0.130
0+02.0	0.170
0+29.2	0.710

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.500)	(0+02.0, 0.130)	0.013
(0+02.0, 0.130)	(0+29.2, 0.710)	0.016

Options

Current Roughness Weighted Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results

Normal Depth	0.42	ft
Elevation Range	0.00 to 0.71 ft	
Flow Area	2.08	ft²
Wetted Perimeter	14.45	ft
Hydraulic Radius	0.14	ft
Top Width	13.99	ft

Worksheet for Cross Section 3 - West Half

Results

Normal Depth		0.42	ft
Critical Depth		0.54	ft
Critical Slope		0.00493	ft/ft
Velocity		5.10	ft/s
Velocity Head		0.40	ft
Specific Energy		0.82	ft
Froude Number		2.33	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.54	ft
Channel Slope	3.00	%
Critical Slope	0.00493	ft/ft

Messages

Notes

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Cross Section for Cross Section 3 - West Half

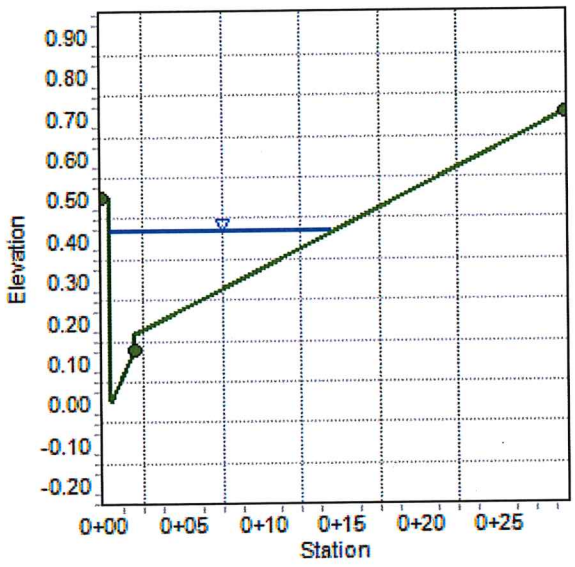
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.00	%
Normal Depth	0.42	ft
Discharge	10.60	ft³/s

Cross Section Image



Worksheet for Cross Section 4 - West Half

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.00	%
Discharge	2.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.500
0+00.5	0.500
0+00.5	0.000
0+02.0	0.130
0+02.0	0.170
0+29.2	0.710

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.500)	(0+02.0, 0.130)	0.013
(0+02.0, 0.130)	(0+29.2, 0.710)	0.016

Options

Current Roughness Weighted Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results

Normal Depth	0.28	ft
Elevation Range	0.00 to 0.71 ft	
Flow Area	0.62	ft²
Wetted Perimeter	7.30	ft
Hydraulic Radius	0.08	ft
Top Width	6.97	ft

Worksheet for Cross Section 4 - West Half

Results

Normal Depth	0.28	ft
Critical Depth	0.33	ft
Critical Slope	0.00749	ft/ft
Velocity	3.24	ft/s
Velocity Head	0.16	ft
Specific Energy	0.44	ft
Froude Number	1.92	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.28	ft
Critical Depth	0.33	ft
Channel Slope	3.00	%
Critical Slope	0.00749	ft/ft

Messages

Notes

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Cross Section for Cross Section 4 - West Half

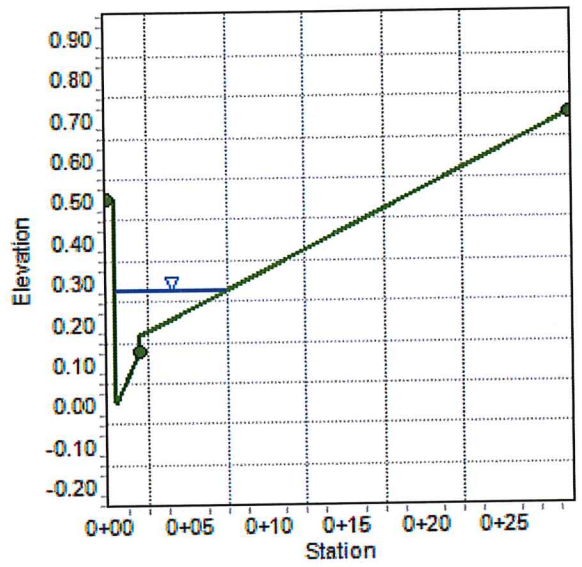
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.00	%
Normal Depth	0.28	ft
Discharge	2.00	ft³/s

Cross Section Image



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Drop Inlet Sizing Calculation

Project Name: Village 23B Sky Vista Drive
By: Masih Edalat
Date: 03/30/2018

Drop Inlet Sizing on a Continuous Grade

10' CM2

DI# 1 - 359+66.01

Known:

Q_s=	Street Flow	18.0	cfs
S_o=	Longitudinal Slope	0.0432	ft/ft
n=	Manning's Roughness Coefficient	0.016	
V_s=	Flow Velocity	6.52	fps
D=	Flow Depth	0.46	ft
S_x=	Street Transverse Slope	0.02	ft/ft
W=	Grate Width	1.5	ft
a=	Gutter Depression	5.0	in
L_g=	Length of Grate	7.5	ft
L_c=	Length of Curb Opening	10.0	ft
C_{fg}=	Clogging Factor for Grate	50	%
C_{fc}=	Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

R_f=	Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00
	V_o= Splash over velocity=$p+q*(L_g*(1-(C_{fg}/100)))-r*(L_g*(1-(C_{fg}/100)))^2+s*(L_g*(1-(C_{fg}/100)))^3$†	8.71 fps
E_o=	Grate flow ratio = Q_w/Q_s	0.23
	Q_w= Frontal flow=A_w*V_s	4.09 cfs
	Q_x= Side flow = Q_s-Q_w	13.91 cfs
R_s=	Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*(L_g*(1-C_{fg}/100))^{2.3}))$	0.09
Q_{ig}=	Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	5.3 cfs
	†p=1.76;q=3.12;r=0.45;s=0.03 (based on Bar P 1-1/8 grate)	

Curb Opening Capacity Calculations

S_e=	Equivalent cross slope = Sx+Sw*Eo	0.085 ft/ft
S_w=	Gutter cross slope = (0.137+afeet)/W	0.285 ft/ft
L_t=	Total interception L = $0.60*Q_s^{0.42}*So^{0.30}*(1/n*S_e)^{0.6}$	41.33 ft
Q_{ic}=	Flow intercepted = $(1-(1-(L_c*(1-C_{fc}/100))/L_t)^{1.8})*Q_s$	3.7 cfs

Total Inlet Calculations

Q_{ti}=	**Total flow intercepted = $Q_{ig}+Q_{ic}$**	**9.0 cfs**
Q_{tq}=	**Flow bypass = Q_s-Q_{ti}**	**9.0 cfs**
q=	Interception per unit ratio = Q_{ti}/L_g	0.90 cfs/ft
E_q=	Efficiency = (Qti/Qs)*100	50 %

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Drop Inlet Sizing Calculation

Project Name: Village 23B Sky Vista Drive
By: Masih Edalat
Date: 03/30/2018

Drop Inlet Sizing on a Continuous Grade

7.5' CM2
DI# 2 - 362+99

Known:

Q_s=	Street Flow	18.0	cfs
S_o=	Longitudinal Slope	0.0432	ft/ft
n=	Manning's Roughness Coefficient	0.016	
V_s=	Flow Velocity	6.51	fps
D=	Flow Depth	0.46	ft
S_x=	Street Transverse Slope	0.02	ft/ft
W=	Grate Width	1.5	ft
a=	Gutter Depression	5.0	in
L_g=	Length of Grate	5.0	ft
L_c=	Length of Curb Opening	7.5	ft
C_{fg}=	Clogging Factor for Grate	50	%
C_{fc}=	Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

R_f=	Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00
	V_o= Splash over velocity=$p+q*(L_g*(1-(C_{fg}/100)))-r*(L_g*(1-(C_{fg}/100)))^2+s*(L_g*(1-(C_{fg}/100)))^3$†	7.22 fps
E_o=	Grate flow ratio = Q_w/Q_s	0.23
	Q_w= Frontal flow=A_w*V_s	4.09 cfs
	Q_x= Side flow = Q_s-Q_w	13.91 cfs
R_s=	Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*(L_g*(1-C_{fg}/100))^{2.3}))$	0.04
Q_{ig}=	Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	4.6 cfs
	†p=1.76;q=3.12;r=0.45;s=0.03 (based on Bar P 1-1/8 grate)	

Curb Opening Capacity Calculations

S_e=	Equivalent cross slope = Sx+Sw*Eo	0.085 ft/ft
S_w=	Gutter cross slope = (0.137+afeet)/W	0.285 ft/ft
L_t=	Total interception L = $0.60*Q_s^{0.42}*So^{0.30}*(1/n*S_e)^{0.6}$	41.36 ft
Q_{ic}=	Flow intercepted = $(1-(1-(L_c*(1-C_{fc}/100))/L_t)^{1.8})*Q_s$	2.8 cfs

Total Inlet Calculations

Q_{ti}=	**Total flow intercepted = $Q_{ig}+Q_{ic}$**	**7.4 cfs**
Q_{tq}=	**Flow bypass = Q_s-Q_{ti}**	**10.6 cfs**
q=	Interception per unit ratio = Q_{ti}/L_g	0.99 cfs/ft
E_q=	Efficiency = (Qti/Qs)*100	41 %

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Drop Inlet Sizing Calculation

Project Name: Village 23B Sky Vista Drive
By: Masih Edalat
Date: 03/30/2018

Drop Inlet Sizing in Sump

5' CM2

DI# 5 - 402+48.84

Known:

Q=	Design Flow	4.5	cfs
D_p=	Ponding Depth at Inlet	0.83	ft
W=	Grate Width	1.5	ft
L_g=	Length of Grate	2.5	ft
L_c=	Length of Curb Opening	5.0	ft
H_c=	Curb Opening Height	0.5	ft
C_{wc}=	Weir coefficient for curb opening	2.3	
C_{wg}=	Weir coefficient for grate	3.0	
C_o=	Orifice coefficient	0.67	
R_o=	Grate opening factor	0.60	
C_{fg}=	Clogging Factor for Grate	50	%
C_{fc}=	Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

P_g=	Active grate weir length (agwl) = 2*W+Lg	5.50 ft
P_{agl}	Adjusted agwl = 2*(1-Cfg/100)*W+Lg	4.00 ft
A_g=	Grate area = W*L_g	3.75 ft^2
A_{aga}=	Adjusted open grate area = Ag*Ro*(1-Cfg/100)	1.13 ft^2
	check - If Dp<1.792*Aaga/Pagl; weir; else orifice	orifice
Q_{ig}=	Flow intercepted by grate If "weir" controls Qig=Cwg*Pagl*$Dp^{1.5}$ If "orifice" controls Qig=Co*Aaga*$(64.4*Dp)^{0.5}$	5.5 cfs

Curb Opening Capacity Calculations

Pc =	Active curb opening weir length (acowl) = Lc+1.8*W	7.70 ft
Pacl	Adjusted acowl = Lc+1.8*(1-Cfc/100)*W	6.35 ft
Ac=	curb opening area (coa) = Lc*Hc	2.50 ft^2
A_{aca}=	Adjusted coa = Ac*(1-Cfc/100)	1.25 ft^2
	check - If Dp<Hc; weir; else orifice	orifice
Qic=	Flow intercepted by curb opening If "weir" controls Qic=Cwc*Pacl*Dp1.5 If "orifice" controls Qic=Co*Aaca*(64.4*Dp-Hc/2)0.5	6.1 cfs

Total Inlet Calculations

Qti =	Flow Interception Capacity = Qig+Qic	11.6 cfs
q =	Interception per unit ratio = Q_{ti}/L_g	2.32 cfs/ft

Actual Flow Collected by Drop Inlet **5 cfs**

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Drop Inlet Sizing Calculation

Project Name: Village 23B Sky Vista Drive
By: Masih Edalat
Date: 03/30/2018

Drop Inlet Sizing in Sump

5' CM2

DI# 6 - 403+33.69

Known:

$Q=$	Design Flow	4.5	cfs
$D_p=$	Ponding Depth at Inlet	0.83	ft
$W=$	Grate Width	1.5	ft
$L_g=$	Length of Grate	2.5	ft
$L_c=$	Length of Curb Opening	5.0	ft
$H_c=$	Curb Opening Height	0.5	ft
$C_{wc}=$	Weir coefficient for curb opening	2.3	
$C_{wg}=$	Weir coefficient for grate	3.0	
$C_o=$	Orifice coefficient	0.67	
$R_o=$	Grate opening factor	0.60	
$C_{fg}=$	Clogging Factor for Grate	50	%
$C_{fc}=$	Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

$P_g=$	Active grate weir length (agwl) = 2*W+Lg	5.50 ft
P_{agl}	Adjusted agwl = 2*(1-Cfg/100)*W+Lg	4.00 ft
$A_g=$	Grate area = $W*L_g$	3.75 ft^2
$A_{aga}=$	Adjusted open grate area = Ag*Ro*(1-Cfg/100)	1.13 ft^2
	check - If Dp<1.792*Aaga/Pagl; weir; else orifice	orifice
$Q_{ig}=$	Flow intercepted by grate If "weir" controls Qig=Cwg*Pagl*$Dp^{1.5}$ If "orifice" controls Qig=Co*Aaga*$(64.4*Dp)^{0.5}$	5.5 cfs

Curb Opening Capacity Calculations

Pc =	Active curb opening weir length (acowl) = Lc+1.8*W	7.70 ft
Pacl	Adjusted acowl = Lc+1.8*(1-Cfc/100)*W	6.35 ft
Ac=	curb opening area (coa) = Lc*Hc	2.50 ft^2
$A_{aca}=$	Adjusted coa = Ac*(1-Cfc/100)	1.25 ft^2
	check - If Dp<Hc; weir; else orifice	orifice
Qic=	Flow intercepted by curb opening If "weir" controls Qic=Cwc*Pacl*Dp1.5 If "orifice" controls Qic=Co*Aaca*(64.4*Dp-Hc/2)0.5	6.1 cfs

Total Inlet Calculations

Qti =	Flow Interception Capacity = Qig+Qic	11.6 cfs
q =	Interception per unit ratio = Q_{ti}/L_g	2.32 cfs/ft

Actual Flow Collected by Drop Inlet **5 cfs**

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Drop Inlet Sizing Calculation

Project Name: Village 23B Sky Vista Drive
By: Masih Edalat
Date: 03/30/2018

Drop Inlet Sizing on a Continuous Grade

Ex. 15' CM2
354+00

Known:

Q_s= Street Flow	9.0	cfs
S_o= Longitudinal Slope	0.03	ft/ft
n= Manning's Roughness Coefficient	0.016	
V_s= Flow Velocity	4.95	fps
D= Flow Depth	0.4	ft
S_x= Street Transverse Slope	0.02	ft/ft
W= Grate Width	1.5	ft
a= Gutter Depression	5.0	in
L_g= Length of Grate	12.5	ft
L_c= Length of Curb Opening	15.0	ft
C_{fg}= Clogging Factor for Grate	50	%
C_{fc}= Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*(L_g*(1-(C_{fg}/100)))-r*(L_g*(1-(C_{fg}/100)))^2+s*(L_g*(1-(C_{fg}/100)))^3†	11.01 fps
E_o= Grate flow ratio = Q_w/Q_s	0.30
Q_w= Frontal flow=A_w*V_s	2.66 cfs
Q_x= Side flow = Q_s-Q_w	6.34 cfs
R_s= Side flow factor = 1/(1+(0.15*$V_s^{1.8}$)/(S_x*(L_g*(1-C_{fg}/100))$^{2.3}$))	0.34
Q_{ig}= Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	4.8 cfs
†p=1.76;q=3.12;r=0.45;s=0.03 (based on Bar P 1-1/8 grate)	

Curb Opening Capacity Calculations

S_e= Equivalent cross slope = Sx+Sw*Eo	0.104 ft/ft
S_w= Gutter cross slope = (0.137+afeet)/W	0.285 ft/ft
L_t= Total interception L = 0.60*$Q_s^{0.42}$*$So^{0.30}$*(1/n*S_e)$^{0.6}$	24.46 ft
Q_{ic}= Flow intercepted = (1-(1-(L_c*(1-C_{fc}/100))/L_t)$^{1.8}$)*Q_s	4.3 cfs

Total Inlet Calculations

Q_{ti}= Total flow intercepted = Q_{ig}+Q_{ic}	**9.0 cfs**
Q_{tq}= Flow bypass = Q_s-Q_{ti}	**0.0 cfs**
q= Interception per unit ratio = Q_{ti}/L_g	0.60 cfs/ft
E_q= Efficiency = (Qti/Qs)*100	100 %

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Drop Inlet Sizing Calculation

Project Name: Village 23B Sky Vista Drive
By: Masih Edalat
Date: 03/30/2018

Drop Inlet Sizing on a Continuous Grade

Ex. 12.5' CM2
355+50

Known:

Q_s= Street Flow	10.6	cfs
S_o= Longitudinal Slope	0.03	ft/ft
n= Manning's Roughness Coefficient	0.016	
V_s= Flow Velocity	5.10	fps
D= Flow Depth	0.42	ft
S_x= Street Transverse Slope	0.02	ft/ft
W= Grate Width	1.5	ft
a= Gutter Depression	5.0	in
L_g= Length of Grate	10.0	ft
L_c= Length of Curb Opening	12.5	ft
C_{fg}= Clogging Factor for Grate	50	%
C_{fc}= Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*(L_g*(1-(C_{fg}/100)))-r*(L_g*(1-(C_{fg}/100)))^2+s*(L_g*(1-(C_{fg}/100)))^3†	9.86 fps
E_o= Grate flow ratio = Q_w/Q_s	0.27
Q_w= Frontal flow=A_w*V_s	2.89 cfs
Q_x= Side flow = Q_s-Q_w	7.71 cfs
R_s= Side flow factor = 1/(1+(0.15*$V_s^{1.8}$)/(S_x*(L_g*(1-C_{fg}/100))$^{2.3}$))	0.22
Q_{ig}= Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	4.6 cfs
†p=1.76;q=3.12;r=0.45;s=0.03 (based on Bar P 1-1/8 grate)	

Curb Opening Capacity Calculations

S_e= Equivalent cross slope = Sx+Sw*Eo	0.098 ft/ft
S_w= Gutter cross slope = (0.137+afeet)/W	0.285 ft/ft
L_t= Total interception L = 0.60*$Q_s^{0.42}$*$So^{0.30}$*(1/n*S_e)$^{0.6}$	27.22 ft
Q_{ic}= Flow intercepted = (1-(1-(L_c*(1-C_{fc}/100))/L_t)$^{1.8}$)*Q_s	4.0 cfs

Total Inlet Calculations

Q_{ti}= Total flow intercepted = Q_{ig}+Q_{ic}	**8.6 cfs**
Q_{tq}= Flow bypass = Q_s-Q_{ti}	**2.0 cfs**
q= Interception per unit ratio = Q_{ti}/L_g	0.69 cfs/ft
E_q= Efficiency = (Qti/Qs)*100	81 %

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Drop Inlet Sizing Calculation

Project Name: Village 23B Sky Vista Drive
By: Masih Edalat
Date: 03/30/2018

Drop Inlet Sizing on a Continuous Grade

Ex. 5' CM2
353+90

Known:

Q_s=	Street Flow	2.0	cfs
S_o=	Longitudinal Slope	0.03	ft/ft
n=	Manning's Roughness Coefficient	0.016	
V_s=	Flow Velocity	3.24	fps
D=	Flow Depth	0.28	ft
S_x=	Street Transverse Slope	0.02	ft/ft
W=	Grate Width	1.5	ft
a=	Gutter Depression	5.0	in
L_g=	Length of Grate	2.5	ft
L_c=	Length of Curb Opening	5.0	ft
C_{fg}=	Clogging Factor for Grate	50	%
C_{fc}=	Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

R_f=	Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
	V_o= Splash over velocity=p+q*(L_g*(1-(C_{fg}/100)))-r*(L_g*(1-(C_{fg}/100)))^2+s*(L_g*(1-(C_{fg}/100)))^3†	5.02 fps
E_o=	Grate flow ratio = Q_w/Q_s	0.58
	Q_w= Frontal flow=A_w*V_s	1.16 cfs
	Q_x= Side flow = Q_s-Q_w	0.84 cfs
R_s=	Side flow factor = 1/(1+(0.15*$V_s^{1.8}$)/(S_x*(L_g*(1-C_{fg}/100))$^{2.3}$))	0.03
Q_{ig}=	Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	1.2 cfs
	†p=1.76;q=3.12;r=0.45;s=0.03 (based on Bar P 1-1/8 grate)	

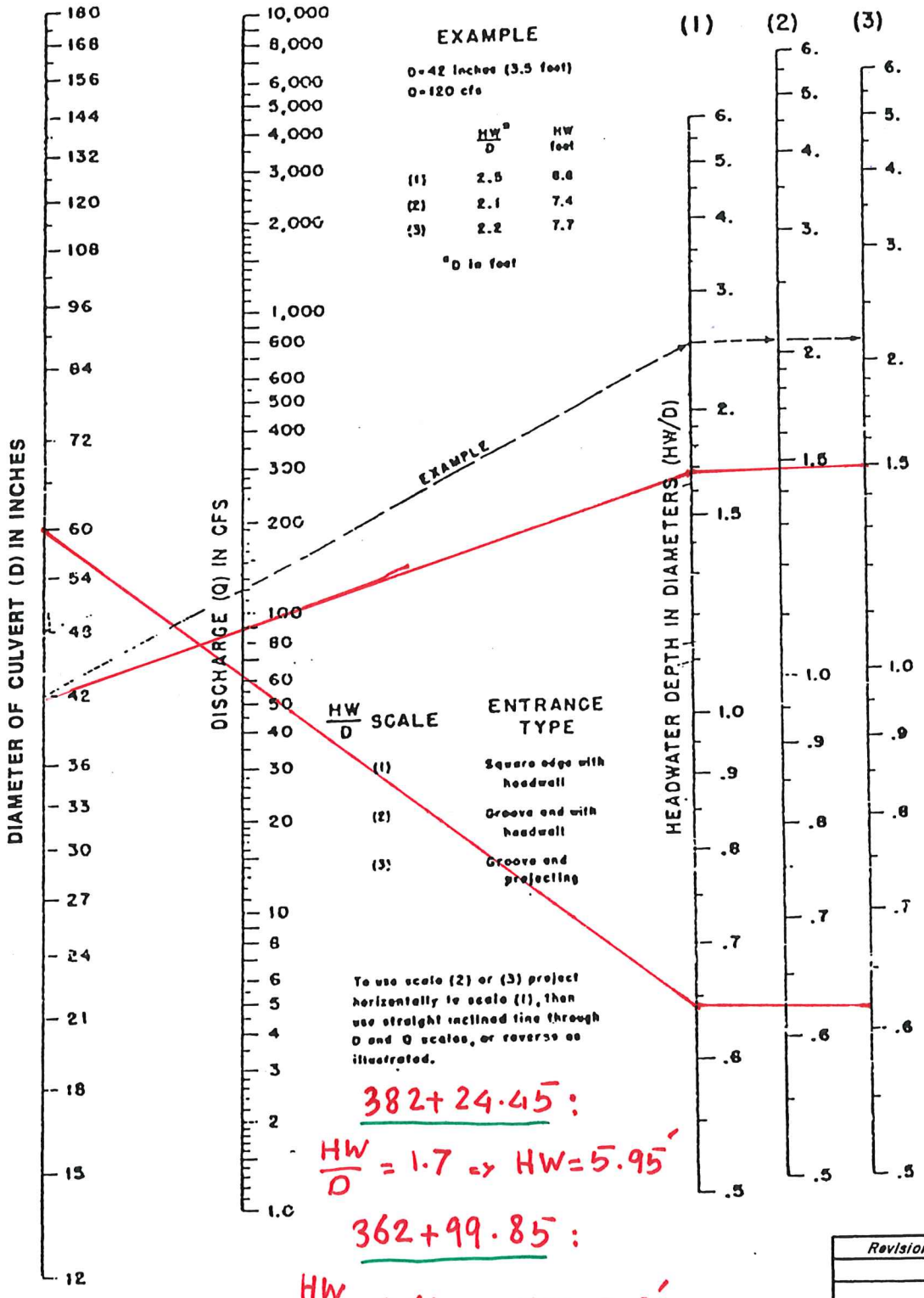
Curb Opening Capacity Calculations

S_e=	Equivalent cross slope = Sx+Sw*Eo	0.185 ft/ft
S_w=	Gutter cross slope = (0.137+afeet)/W	0.285 ft/ft
L_t=	Total interception L = 0.60*$Q_s^{0.42}$*$So^{0.30}$*(1/n*S_e)$^{0.6}$	9.22 ft
Q_{ic}=	Flow intercepted = (1-(1-(L_c*(1-C_{fc}/100))/L_t)$^{1.8}$)*Q_s	0.9 cfs

Total Inlet Calculations

Q_{ti}=	**Total flow intercepted = Q_{ig}+Q_{ic}**	**2.0 cfs**
Q_{tq}=	**Flow bypass = Q_s-Q_{ti}**	**0.0 cfs**
q=	Interception per unit ratio = Q_{ti}/L_g	0.40 cfs/ft
E_q=	Efficiency = (Qti/Qs)*100	100 %

NOMOGRAPH – INLET CONTROL RCP



382+24.45 :

$\frac{HW}{D} = 1.7 \Rightarrow HW = 5.95'$

362+99.85 :

$\frac{HW}{D} = 0.64 \Rightarrow HW = 3.2'$

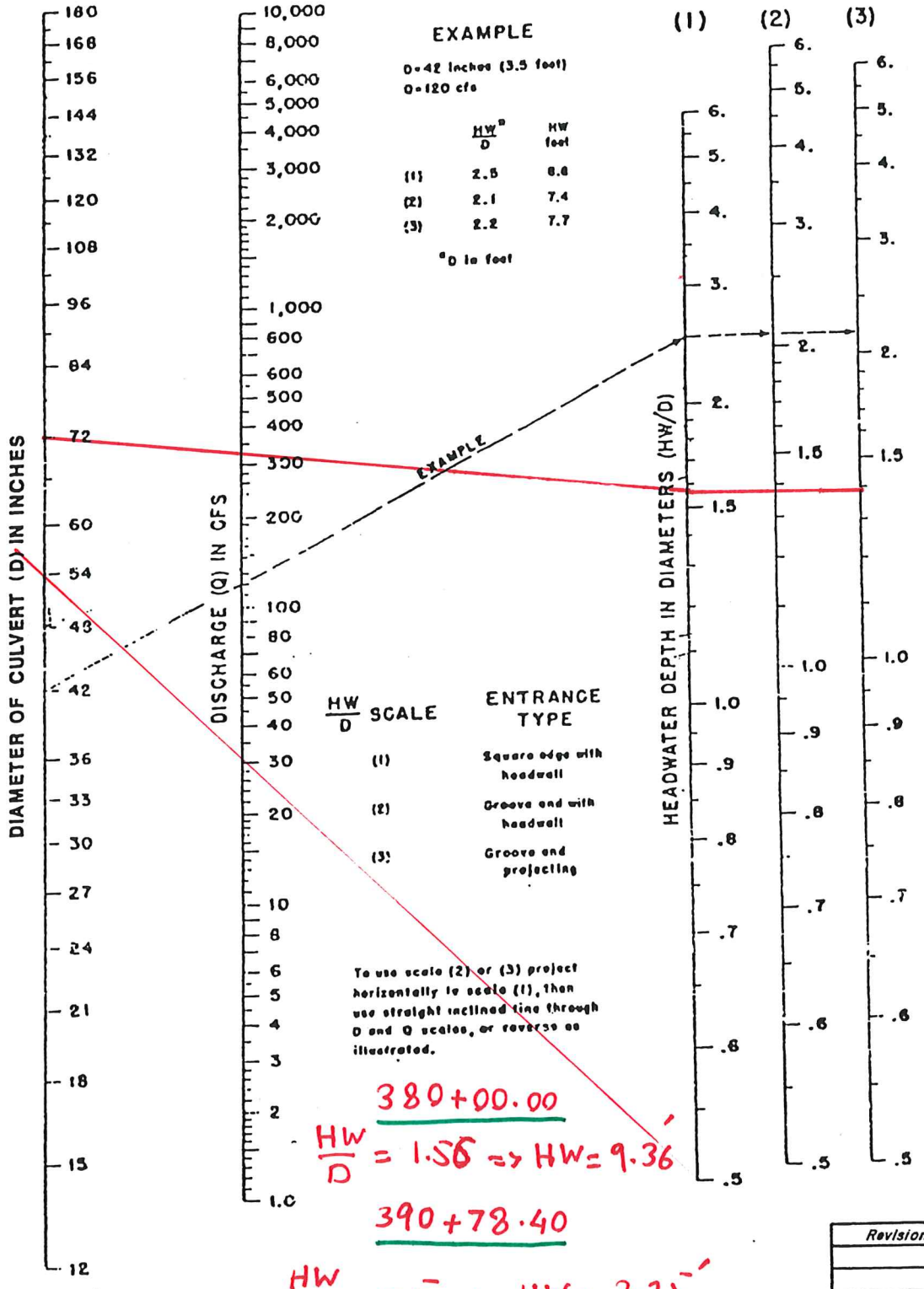
Revision	Date

WRC ENGINEERING

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

FIGURE 1005

NOMOGRAPH – INLET CONTROL RCP



380+00.00

$\frac{HW}{D} = 1.56 \Rightarrow HW = 9.36'$

390+78.40

$\frac{HW}{D} = 0.5 \Rightarrow HW = 2.25'$

Revision	Date

WRC ENGINEERING

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

FIGURE 1005

Worksheet for 42" RCP - 382+24.45

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	3.5	%
Normal Depth	3.50	ft
Diameter	42	in
Discharge	188.21	ft³/s

Results

Discharge	188.21	ft³/s
Normal Depth	3.50	ft
Flow Area	9.62	ft²
Wetted Perimeter	11.00	ft
Hydraulic Radius	0.88	ft
Top Width	0.00	ft
Critical Depth	3.45	ft
Percent Full	100.0	%
Critical Slope	0.03188	ft/ft
Velocity	19.56	ft/s
Velocity Head	5.95	ft
Specific Energy	9.45	ft
Froude Number	0.00	
Maximum Discharge	202.46	ft³/s
Discharge Full	188.21	ft³/s
Slope Full	0.03500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 42" RCP - 382+24.45

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.50	ft
Critical Depth	3.45	ft
Channel Slope	3.5	%
Critical Slope	0.03188	ft/ft

Cross Section for 42" RCP - 382+24.45

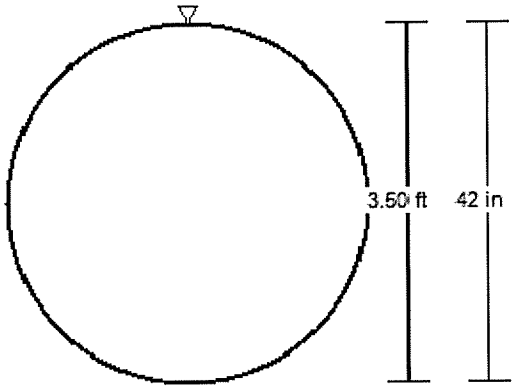
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	3.5	%
Normal Depth	3.50	ft
Diameter	42	in
Discharge	188.21	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for 60" RCP - 380+00.00

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	1.5	%
Normal Depth	5.00	ft
Diameter	60	in
Discharge	318.96	ft³/s

Results

Discharge	318.96	ft³/s
Normal Depth	5.00	ft
Flow Area	19.63	ft²
Wetted Perimeter	15.71	ft
Hydraulic Radius	1.25	ft
Top Width	0.00	ft
Critical Depth	4.73	ft
Percent Full	100.0	%
Critical Slope	0.01298	ft/ft
Velocity	16.24	ft/s
Velocity Head	4.10	ft
Specific Energy	9.10	ft
Froude Number	0.00	
Maximum Discharge	343.11	ft³/s
Discharge Full	318.96	ft³/s
Slope Full	0.01500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 60" RCP - 380+00.00

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.00	ft
Critical Depth	4.73	ft
Channel Slope	1.5	%
Critical Slope	0.01298	ft/ft

Cross Section for 60" RCP - 380+00.00

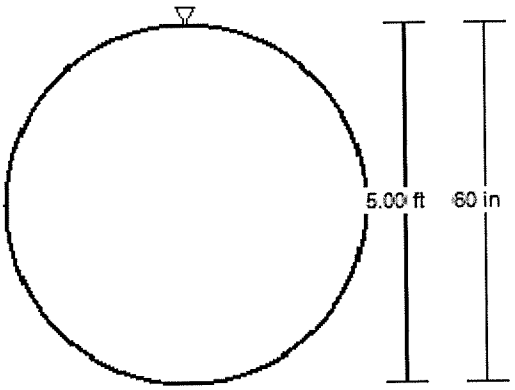
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	1.5	%
Normal Depth	5.00	ft
Diameter	60	in
Discharge	318.96	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for 60" RCP - 362+99.85

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	3.0	%
Normal Depth	5.00	ft
Diameter	60	in
Discharge	451.08	ft³/s

Results

Discharge	451.08	ft³/s
Normal Depth	5.00	ft
Flow Area	19.63	ft²
Wetted Perimeter	15.71	ft
Hydraulic Radius	1.25	ft
Top Width	0.00	ft
Critical Depth	4.93	ft
Percent Full	100.0	%
Critical Slope	0.02725	ft/ft
Velocity	22.97	ft/s
Velocity Head	8.20	ft
Specific Energy	13.20	ft
Froude Number	0.00	
Maximum Discharge	485.22	ft³/s
Discharge Full	451.08	ft³/s
Slope Full	0.03000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 60" RCP - 362+99.85

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.00	ft
Critical Depth	4.93	ft
Channel Slope	3.0	%
Critical Slope	0.02725	ft/ft

Cross Section for 60" RCP - 362+99.85

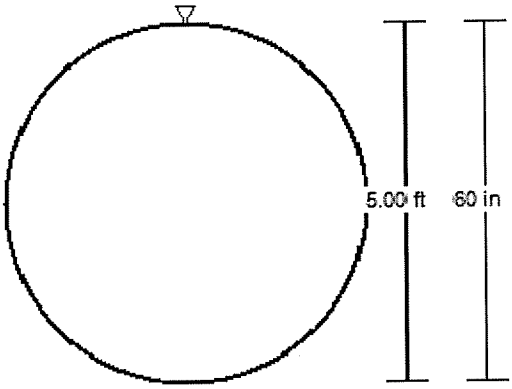
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	3.0	%
Normal Depth	5.00	ft
Diameter	60	in
Discharge	451.08	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for 24" RCP - 359+66.01

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	5.8	%
Normal Depth	2.00	ft
Diameter	24	in
Discharge	54.24	ft³/s

Results

Discharge	54.24	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.99	ft
Percent Full	100.0	%
Critical Slope	0.05357	ft/ft
Velocity	17.27	ft/s
Velocity Head	4.63	ft
Specific Energy	6.63	ft
Froude Number	0.00	
Maximum Discharge	58.35	ft³/s
Discharge Full	54.24	ft³/s
Slope Full	0.05750	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 24" RCP - 359+66.01

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.99	ft
Channel Slope	5.8	%
Critical Slope	0.05357	ft/ft

Cross Section for 24" RCP - 359+66.01

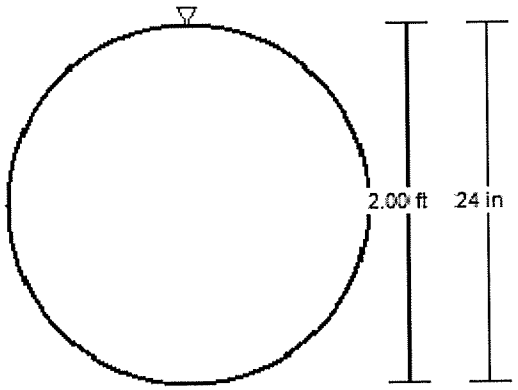
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	5.8	%
Normal Depth	2.00	ft
Diameter	24	in
Discharge	54.24	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for 24" RCP - 403+76.77

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	3.9	%
Normal Depth	2.00	ft
Diameter	24	in
Discharge	44.62	ft^3/s

Results

Discharge	44.62	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.97	ft
Percent Full	100.0	%
Critical Slope	0.03520	ft/ft
Velocity	14.20	ft/s
Velocity Head	3.13	ft
Specific Energy	5.13	ft
Froude Number	0.00	
Maximum Discharge	47.99	ft^3/s
Discharge Full	44.62	ft^3/s
Slope Full	0.03890	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 24" RCP - 403+76.77

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.97	ft
Channel Slope	3.9	%
Critical Slope	0.03520	ft/ft

Cross Section for 24" RCP - 403+76.77

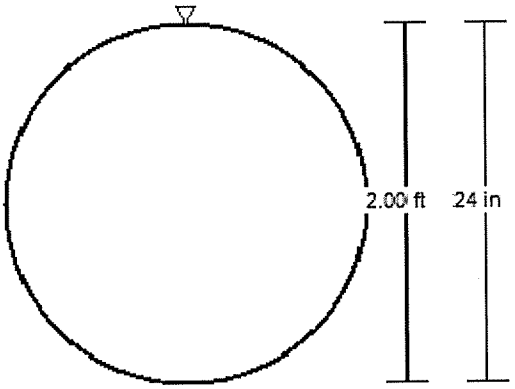
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	3.9	%
Normal Depth	2.00	ft
Diameter	24	in
Discharge	44.62	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for 24" RCP - 402+50.33

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	20.0	%
Normal Depth	2.00	ft
Diameter	24	in
Discharge	101.16	ft³/s

Results

Discharge	101.16	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	2.00	ft
Percent Full	100.0	%
Critical Slope	0.19589	ft/ft
Velocity	32.20	ft/s
Velocity Head	16.11	ft
Specific Energy	18.11	ft
Froude Number	0.00	
Maximum Discharge	108.82	ft³/s
Discharge Full	101.16	ft³/s
Slope Full	0.20000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 24" RCP - 402+50.33

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	2.00	ft
Channel Slope	20.0	%
Critical Slope	0.19589	ft/ft

Cross Section for 24" RCP - 402+50.33

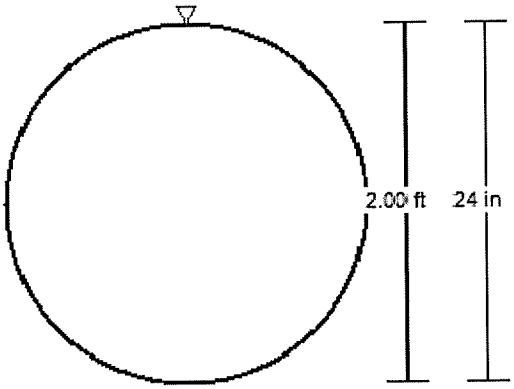
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	20.0	%
Normal Depth	2.00	ft
Diameter	24	in
Discharge	101.16	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for 54" RCP - 390+78.40

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	6.0	%
Normal Depth	4.50	ft
Diameter	54	in
Discharge	481.66	ft³/s

Results

Discharge	481.66	ft³/s
Normal Depth	4.50	ft
Flow Area	15.90	ft²
Wetted Perimeter	14.14	ft
Hydraulic Radius	1.13	ft
Top Width	0.00	ft
Critical Depth	4.48	ft
Percent Full	100.0	%
Critical Slope	0.05693	ft/ft
Velocity	30.29	ft/s
Velocity Head	14.25	ft
Specific Energy	18.75	ft
Froude Number	0.00	
Maximum Discharge	518.13	ft³/s
Discharge Full	481.66	ft³/s
Slope Full	0.06000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 54" RCP - 390+78.40

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.50	ft
Critical Depth	4.48	ft
Channel Slope	6.0	%
Critical Slope	0.05693	ft/ft

Cross Section for 54" RCP - 390+78.40

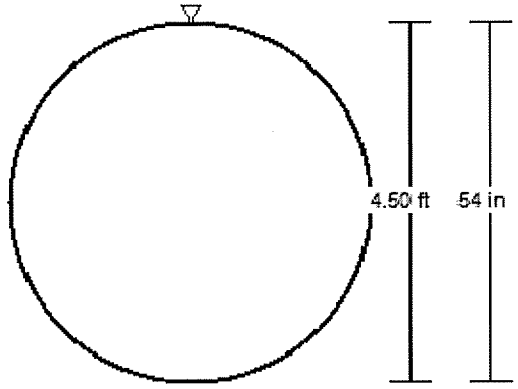
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	6.0	%
Normal Depth	4.50	ft
Diameter	54	in
Discharge	481.66	ft³/s

Cross Section Image



V: 1
H: 1

GCW
ENGINEERS \ SURVEYORS

MINOR STORM DRAIN LATERAL - CCRFCD MANUAL FRICTION LOSS CALCULATION SHEET

STORM DRAIN DESIGN						PIPE HYDRAULIC CHARACTERISTICS						LOSS	HGL			DESCRIPTION	
Q_{DESIGN}			INVERTS			A	R		V	H_V =	S_f	PIPE	PIPE				
(CFS)	DIAMETER (FT)	MANNING'S 'n'	D / S ELEV.	U / S ELEV.	LENGTH	(FT^2)	(FT)	Φ	(FPS)	$V^2/2g$ (FT)	(FT/FT)	H_f (FT)	TRUNK WSE (from Model)	LATERAL PIPE D/S HGL ELEV.[1]	LATERAL PIPE U/S HGL ELEV.[1]	PARTIAL FLOW?	LATERAL
9	2	0.013	3462.50	3464.93	42	3.14	0.5	0.004925	2.86	0.127438	0.001577792	0.066	3465.00	3465.0	3466.9	No	24" LATERAL 359+66.01
4.5	2	0.013	3549.29	3553.83	22.72	3.14	0.5	0.004925	1.43	0.03186	0.000394448	0.009	3558.00	3558.0	3558.0	No	24" LATERAL 402+50.33
4.5	2	0.013	3550.67	3554.11	88.24	3.14	0.5	0.004925	1.43	0.03186	0.000394448	0.035	3557.50	3557.5	3557.5	No	24" LATERAL 403+76.77

Pipe Friction Loss Calculations per CCRFCD Manual 804.2.1

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

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

$H_f = \text{Length} \times S_f$

1 - Where HGL in lateral is below top of pipe (PARTIAL FLOW), assume HGL is at top of pipe.

SV2.WSW
0

```
T1 Summerlin Village 23B
T2 Sky Vista Drive
T3 Mainline
SO   1740.1513462.800  9                              3470.000
R    1767.2053463.660  9      .013                                    .000  40.000 1
R    1791.5283464.520  9      .013                                    .000   5.000 0
R    1822.9443465.910  9      .013                                    .000   5.000 0
R    1985.9463473.121  9      .013                                    .000    .000 1
JX   1985.9563473.122 11 10   .013   14.000          3473.121         75.0         .000
R    2636.0963496.080 11      .013                                    .000    .000 2
R    3014.8363507.070 11      .013                                   9.860    .000 1
R    3438.5463519.350 11      .013                                   6.040    .000 2
R    3666.4963525.380 11      .013                                    .000    .000 1
JX   3666.5063525.400 11 12   .013   72.000          3525.380         45.0         .000
R    3892.1763528.730 11      .013                                   5.390    .000 1
JX   3892.1863528.930 13 14   .013   79.000          3528.900         45.0         .000
R    4192.8963538.490 13      .013                                   8.090    .000 1
R    4532.7563544.440 13      .013                                   5.730    .000 1
R    4773.2563548.650 13      .013                                    .000  90.000 1
R    4838.7563552.579 13      .013                                    .000    .000 0
SH   4838.7563552.579 13                              3552.579
CD   1  3   0    .000   8.000   10.000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   3  3   0    .000   8.000   10.000  .000  .000   .00
CD   4  4   1    .000   3.500     .000  .000  .000   .00
CD   5  3   0    .000   8.000   10.000  .000  .000   .00
CD   6  4   1    .000   2.000     .000  .000  .000   .00
CD   7  3   0    .000   8.000   10.000  .000  .000   .00
CD   8  3   0    .000   8.000   10.000  .000  .000   .00
CD   9  4   1    .000   5.000     .000  .000  .000   .00
CD  10  4   1    .000   5.000     .000  .000  .000   .00
CD  11  4   1    .000   5.000     .000  .000  .000   .00
CD  12  4   1    .000   5.000     .000  .000  .000   .00
CD  13  4   1    .000   4.500     .000  .000  .000   .00
CD  14  4   1    .000   3.500     .000  .000  .000   .00
CD  15  4   1    .000   3.500     .000  .000  .000   .00
Q           228.000   .0
```

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	8.000	10.000	.000	.000	.00										
CD	2	4	1		2.000														
CD	3	3	0	.000	8.000	10.000	.000	.000	.00										
CD	4	4	1		3.500														
CD	5	3	0	.000	8.000	10.000	.000	.000	.00										
CD	6	4	1		2.000														
CD	7	3	0	.000	8.000	10.000	.000	.000	.00										
CD	8	3	0	.000	8.000	10.000	.000	.000	.00										
CD	9	4	1		5.000														
CD	10	4	1		5.000														
CD	11	4	1		5.000														
CD	12	4	1		5.000														
CD	13	4	1		4.500														
CD	14	4	1		3.500														
CD	15	4	1		3.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

Summerlin Village 23B

HEADING LINE NO 2 IS -

Sky Vista Drive

HEADING LINE NO 3 IS -

Mainline

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1740.151	3462.800	9	3470.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1767.205	3463.660	9	.013	.000	.000	40.000	1

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1791.528	3464.520	9	.013	.000	.000	5.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1822.944	3465.910	9	.013	.000	.000	5.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1985.946	3473.121	9	.013	.000	.000	.000	1

ELEMENT NO 6 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1985.956	3473.122	11	10	0	.013	14.000	.000	3473.121	.000	75.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2636.096	3496.080	11	.013	.000	.000	.000	2

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3014.836	3507.070	11	.013	2200.832	9.860	.000	1

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3438.546	3519.350	11	.013	4019.337	6.040	.000	2

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3666.496	3525.380	11	.013	.000	.000	.000	1

ELEMENT NO 11 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	3666.506	3525.400	11	12	0	.013	72.000	.000	3525.380	.000	45.000	.000

RADIUS	ANGLE
.000	.000

W S P G W PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 12 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3892.176	3528.730	11	.013	2398.875	5.390	.000	1

ELEMENT NO 13 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	3892.186	3528.930	13	14	0	.013	79.000	.000	3528.900	.000	45.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 14 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4192.896	3538.490	13	.013	2129.717	8.090	.000	1

ELEMENT NO 15 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4532.756	3544.440	13	.013	3398.348	5.730	.000	1

ELEMENT NO 16 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4773.256	3548.650	13	.013	.000	.000	90.000	1

ELEMENT NO 17 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4838.756	3552.579	13	.013	.000	.000	.000	0

ELEMENT NO 18 IS A SYSTEM HEADWORKS *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	4838.756	3552.579	13	3552.579

Summerlin Village 23B
Sky Vista Drive
Mainline

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
1740.151	3462.800	3.324	3466.124	393.00	28.35	12.48	3478.61	.00	4.88	4.72	5.000	.000	.00	1 .0
27.054	.0318					.0377	1.02	3.32	2.92	3.53	.013	.00	.00	PIPE
1767.205	3463.660	3.303	3466.963	393.00	28.56	12.66	3479.63	.00	4.88	4.74	5.000	.000	.00	1 .0
24.323	.0354					.0382	.93	3.30	2.95	3.39	.013	.00	.00	PIPE
1791.528	3464.520	3.293	3467.813	393.00	28.65	12.75	3480.56	.00	4.88	4.74	5.000	.000	.00	1 .0
31.416	.0442					.0379	1.19	3.29	2.97	3.13	.013	.00	.00	PIPE
1822.944	3465.910	3.319	3469.229	393.00	28.40	12.52	3481.75	.00	4.88	4.72	5.000	.000	.00	1 .0
82.383	.0442					.0361	2.98	3.32	2.92	3.13	.013	.00	.00	PIPE
1905.327	3469.554	3.413	3472.968	393.00	27.52	11.76	3484.73	.00	4.88	4.65	5.000	.000	.00	1 .0
80.619	.0442					.0329	2.65	3.41	2.77	3.13	.013	.00	.00	PIPE
1985.946	3473.121	3.565	3476.686	393.00	26.24	10.69	3487.38	.00	4.88	4.52	5.000	.000	.00	1 .0
JUNCT STR	.0976					.0331	.00	3.56	2.54		.013	.00	.00	PIPE
1985.956	3473.122	3.305	3476.427	379.00	27.52	11.76	3488.19	.00	4.86	4.73	5.000	.000	.00	1 .0
469.216	.0353					.0338	15.88	3.31	2.84	3.30	.013	.00	.00	PIPE
2455.172	3489.691	3.409	3493.100	379.00	26.57	10.97	3504.07	.00	4.86	4.66	5.000	.000	.00	1 .0
180.924	.0353					.0306	5.54	3.41	2.68	3.30	.013	.00	.00	PIPE
2636.096	3496.080	3.561	3499.641	379.00	25.34	9.97	3509.61	.04	4.86	4.53	5.000	.000	.00	1 .0
378.740	.0290					.0285	10.79	3.60	2.46	3.55	.013	.00	.00	PIPE

Summerlin Village 23B
Sky Vista Drive
Mainline

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
3014.836	3507.070	3.601	3510.671	379.00	25.03	9.73	3520.40	.02	4.86	4.49	5.000	.000	.00	1 .0
293.620	.0290					.0268	7.85	3.62	2.40	3.56	.013	.00	.00	PIPE
3308.456	3515.580	3.752	3519.332	379.00	23.97	8.93	3528.26	.02	4.86	4.33	5.000	.000	.00	1 .0
130.090	.0290					.0242	3.14	3.77	2.21	3.56	.013	.00	.00	PIPE
3438.546	3519.350	3.936	3523.286	379.00	22.86	8.11	3531.40	.00	4.86	4.09	5.000	.000	.00	1 .0
53.197	.0265					.0225	1.20	3.94	2.00	3.69	.013	.00	.00	PIPE
3491.743	3520.757	4.010	3524.767	379.00	22.45	7.83	3532.59	.00	4.86	3.98	5.000	.000	.00	1 .0
91.958	.0265					.0211	1.94	4.01	1.92	3.69	.013	.00	.00	PIPE
3583.701	3523.190	4.227	3527.417	379.00	21.40	7.11	3534.53	.00	4.86	3.62	5.000	.000	.00	1 .0
55.101	.0265					.0194	1.07	4.23	1.70	3.69	.013	.00	.00	PIPE
3638.802	3524.647	4.485	3529.132	379.00	20.41	6.47	3535.60	.00	4.86	3.04	5.000	.000	.00	1 .0
27.694	.0265					.0187	.52	4.49	1.46	3.69	.013	.00	.00	PIPE
3666.496	3525.380	4.859	3530.239	379.00	19.46	5.88	3536.12	.00	4.86	1.66	5.000	.000	.00	1 .0
JUNCT STR	2.0000					.0163	.00	4.87	1.00		.013	.00	.00	PIPE

3666.506	3525.400	8.631	3534.031	307.00	15.64	3.80	3537.83	.00	4.69	.00	5.000	.000	.00	1	.0			
225.670	.0148					.0139	3.14	.00	.00	3.97	.013	.00	.00	PIPE				
3892.176	3528.730	8.812	3537.542	307.00	15.64	3.80	3541.34	.00	4.69	.00	5.000	.000	.00	1	.0			
JUNCT STR 19.9756						.0137	.00	.00	.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
3892.186	3528.930	10.487	3539.417	228.00	14.34	3.19	3542.61	.00	4.19	.00	4.500	.000	.00	1	.0			
300.710	.0318					.0134	4.04	.00	.00	2.64	.013	.00	.00	PIPE				
4192.896	3538.490	5.320	3543.810	228.00	14.34	3.19	3547.00	.00	4.19	.00	4.500	.000	.00	1	.0			
24.148	.0175					.0134	.32	.00	.00	3.26	.013	.00	.00	PIPE				
4217.044	3538.913	5.239	3544.152	228.00	14.34	3.19	3547.34	.00	4.19	.00	4.500	.000	.00	1	.0			
HYDRAULIC JUMP																		
4217.044	3538.913	3.245	3542.158	228.00	18.57	5.35	3547.51	.01	4.19	4.04	4.500	.000	.00	1	.0			
21.402	.0175					.0178	.38	3.26	1.88	3.26	.013	.00	.00	PIPE				
4238.447	3539.287	3.243	3542.531	228.00	18.58	5.36	3547.89	.01	4.19	4.04	4.500	.000	.00	1	.0			
294.309	.0175					.0189	5.55	3.26	1.88	3.26	.013	.00	.00	PIPE				
4532.756	3544.440	3.105	3547.544	228.00	19.48	5.89	3553.44	.00	4.19	4.16	4.500	.000	.00	1	.0			
61.512	.0175					.0204	1.25	3.10	2.05	3.26	.013	.00	.00	PIPE				
4594.268	3545.517	3.051	3548.568	228.00	19.86	6.12	3554.69	.00	4.19	4.21	4.500	.000	.00	1	.0			
104.476	.0175					.0222	2.32	3.05	2.12	3.26	.013	.00	.00	PIPE				
4698.744	3547.345	2.926	3550.271	228.00	20.83	6.73	3557.01	.00	4.19	4.29	4.500	.000	.00	1	.0			
74.512	.0175					.0250	1.86	2.93	2.30	3.26	.013	.00	.00	PIPE				
4773.256	3548.650	2.808	3551.458	228.00	21.84	7.41	3558.87	.00	4.19	4.36	4.500	.000	.00	1	.0			
3.460	.0600					.0261	.09	2.81	2.49	2.18	.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
4776.716	3548.858	2.831	3551.689	228.00	21.64	7.27	3558.96	.00	4.19	4.35	4.500	.000	.00	1	.0			
15.217	.0600					.0244	.37	2.83	2.45	2.18	.013	.00	.00	PIPE				
4791.933	3549.771	2.950	3552.721	228.00	20.63	6.61	3559.33	.00	4.19	4.28	4.500	.000	.00	1	.0			
12.361	.0600					.0217	.27	2.95	2.26	2.18	.013	.00	.00	PIPE				
4804.294	3550.512	3.077	3553.589	228.00	19.67	6.01	3559.60	.00	4.19	4.18	4.500	.000	.00	1	.0			
10.054	.0600					.0193	.19	3.08	2.08	2.18	.013	.00	.00	PIPE				
4814.348	3551.115	3.214	3554.329	228.00	18.75	5.46	3559.79	.00	4.19	4.07	4.500	.000	.00	1	.0			
8.130	.0600					.0172	.14	3.21	1.91	2.18	.013	.00	.00	PIPE				
4822.478	3551.603	3.363	3554.966	228.00	17.88	4.97	3559.93	.00	4.19	3.91	4.500	.000	.00	1	.0			
6.479	.0600					.0155	.10	3.36	1.75	2.18	.013	.00	.00	PIPE				
4828.957	3551.991	3.526	3555.518	228.00	17.05	4.51	3560.03	.00	4.19	3.71	4.500	.000	.00	1	.0			

4.942	.0600					.0140	.07	3.53	1.58	2.18	.013	.00	.00	PIPE			
4833.899	3552.288	3.709	3555.997	228.00	16.26	4.10	3560.10	.00	4.19	3.43	4.500	.000	.00	1	.0		
3.411	.0600					.0128	.04	3.71	1.42	2.18	.013	.00	.00	PIPE			
4837.310	3552.492	3.921	3556.414	228.00	15.50	3.73	3560.14	.00	4.19	3.01	4.500	.000	.00	1	.0		
1.446	.0600					.0119	.02	3.92	1.24	2.18	.013	.00	.00	PIPE			
4838.756	3552.579	4.192	3556.771	228.00	14.78	3.39	3560.16	.00	4.19	2.27	4.500	.000	.00	1	.0		

```
                                                                    60RCP.WSW
T1 Summerlin Village 23B                                                 0
T2 Sky Vista Drive
T3 60 inch pipe for DB5
SO   1000.0003525.380  1                          3534.031
R    1033.2403526.300  1      .013                                .000  45.000 1
R    1097.0503527.260  1      .013                                .000  45.000 1
R    1359.3103536.000  1      .013                                .000    .000 1
SH   1359.3103536.000  1                          3536.000
CD   1  4   1    .000   5.000     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q           332.000   .0
```

FILE: 60RCP.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 4- 5-2018 Time: 1:46:51

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		5.000														
CD	2	4	1		2.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

Summerlin Village 23B

HEADING LINE NO 2 IS -

Sky Vista Drive

HEADING LINE NO 3 IS -

60 inch pipe for DB5

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	3525.380	1	3534.031

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1033.240	3526.300	1	.013	.000	.000	45.000	1

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1097.050	3527.260	1	.013	.000	.000	45.000	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1359.310	3536.000	1	.013	.000	.000	.000	1

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1359.310	3536.000	1	3536.000

Summerlin Village 23B
Sky Vista Drive
60 inch pipe for DB5

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
1000.000	3525.380	8.651	3534.031	332.00	16.91	4.44	3538.47	.00	4.77	.00	5.000	.000	.00	1 .0
33.240	.0277					.0162	.54	8.65	.00	3.28	.013	.00	.00	PIPE
1033.240	3526.300	9.152	3535.452	332.00	16.91	4.44	3539.89	.00	4.77	.00	5.000	.000	.00	1 .0
63.810	.0150					.0162	1.04	9.15	.00	4.30	.013	.00	.00	PIPE
1097.050	3527.260	10.111	3537.371	332.00	16.91	4.44	3541.81	.00	4.77	.00	5.000	.000	.00	1 .0
262.260	.0333					.0162	4.26	10.11	.00	3.08	.013	.00	.00	PIPE
1359.310	3536.000	5.854	3541.854	332.00	16.91	4.44	3546.29	.00	4.77	.00	5.000	.000	.00	1 .0

APPENDIX C

Referenced Material and Supporting Documents

Addendum #2 to the FLOOD CONTROL MASTER PLAN UPDATE

SUMMERLIN WEST PLANNING AREA

Las Vegas, Nevada

W.O. # 7809

Prepared for:
Howard Hughes Corp.

Submitted to:
Public Works Department
City of Las Vegas



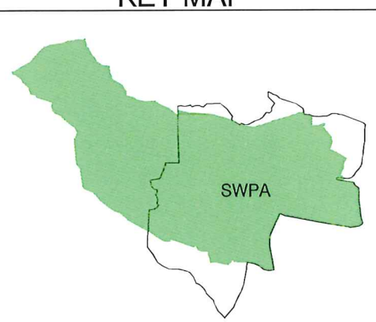
HEC-1 SUMMARY TABLE
DB5/ALTA TRIBUTARY
PROPOSED CONDITION

Basin / Concentration Point	Area (acre)	Q_{100} (cfs)	SDN	Basin / Concentration Point	Area (acre)	Q_{100} (cfs)	SDN
3-1	1422.67	2117	SDN3	3-G2	82.23	286	SDN3
3-2	144.58	429	SDN3	3-L2	59.53	178	SDN3
CP3.1	-	2172	SDN3	CP3.8	-	695	SDN3
3-D	213.07	488	SDN3	3-A	239.21	458	SDN3
CP3.3	-	2319	SDN3	3-B	446.26	853	SDN3
3-3	111.16	392	SDN3	3-C	184.83	363	SDN3
3-4	221.26	757	SDN3	CPDBA-B	-	1561	SDN3
3-5		625	SDN3	GPDB	-	142	SDN3
CP3.2	-	1606	SDN3	3-G1	110.4	478	SDN3
3-E	348.31	792	SDN3	CP3-G1	-	529	SDN3
CP3.4	-	3596	SDN3	3-G2	95.50	341	SDN3
3-6	56.74	203	SDN3	CP3-G2	-	795	SDN3
3-7	109.69	423	SDN3	3-H1	80.61	295	SDN3
3-J	97.87	200	SDN3	CP3-H1	-	1053	SDN3
CP3.5	-	689	SDN3	3-I	187.75	501	SDN3
3-8	408.73	1113	SDN3	CP3.9	-	2269	SDN3
3-K	568.98	1226	SDN3	3-H2	64.21	209	SDN3
CP3.6	-	2804	SDN3	3-I2	75.83	201	SDN3
3-H	290.04	678	SDN3	CP3.10A	-	406	SDN3
3-M	123.16	382	SDN3	CP3.10	-	2626	SDN3
CPDB5	-	6854	SDN3	3-O	55.79	182	SDN3
DB5	-	2137	SDN3	3-P2	55.73	155	SDN3
3-L	152.22	402	SDN3	3-P1	85.52	283	SDN3
CP3-L	-	2206	SDN3	CP3-P	-	612	SDN3
RCSWAA-1	-	2209	SDN3	3-Q	65.66	197	SDN3
SWAA-2		948	SDN3	CP3-Q	-	788	SDN3
CSWAA-2	-	2858	SDN3	3-H3	89.8	256	SDN3
SWAA-3		668	SDN3	CP3.11	-	3515	SDN3
CSWAA-3	-	3076	SDN4	ANGLPKIN	-	8877	SDN5
3-F	180.18	472	SDN3	ANGLPKDB	-	405	SDN5

LEGEND

- CONCENTRATION POINT
- BASIN BOUNDARY
- LOT BOUNDARY
- 3-A ONSITE BASIN ID
- 3-3 OFFSITE BASIN ID
- LM3 LOT ID
- FLOW ARROW

KEY MAP



GRAPHIC SCALE
1000 0 500 1000 2000
1" = 1000'

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

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5149
PH. (702) 873-2500 FAX (702) 362-2227 WEB WWW.VTNV.COM
CONSULTING ENGINEERING ■ PLANNING ■ LAND SURVEYORS

NO.	DATE	BY
ADDENDUM #1	02/2017	JFA

REVISION

2017 SUMMERLIN WEST
PLANNING AREA

A.6.3
DB5/Alta Tributary

DRAWN BY: JFA/DB/BAC/? JAN 2018
DESIGNED BY: JFA/DB JAN 2018
CHECKED BY:
PROJECT NO: 7689
SCALE: 1"=1000' HORIZ. VERT.

SHEET
OF SHEETS
DRAWING NO.

H:\7689\Drainage\3_Add\2A Figures\A.6.3_DB5+Alta Tributary\A.6.3_DB5+Alta Tributary.dwg

CURVE NUMBERS FOR SOILS - W.O. #7609

Soil # 112 Arizo very gravelly loamy sand, flooded, 0 to 4 percent slopes

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Arizo	100%	A	63	98	77	81	80	76	61	54	68	89	81	46
Total	**100%**		**63**	**98**	**77**	**81**	**80**	**76**	**61**	**54**	**68**	**89**	**81**	**46**

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

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo))	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Cave	100%	D	88	98	94	93	92	91	87	85	89	95	93	82
Total	**100%**		**88**	**98**	**94**	**93**	**92**	**91**	**87**	**85**	**89**	**95**	**93**	**82**

Soil # 155 Cave gravelly fine sandy loam, 4 to 15 percent slopes

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo))	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Cave	100%	D	88	98	94	93	92	91	87	85	89	95	93	82
Total	**100%**		**88**	**98**	**94**	**93**	**92**	**91**	**87**	**85**	**89**	**95**	**93**	**82**

Soil # 156 Vace - Wechech association

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Vace and Similar	45%	D	88	98	94	93	92	91	87	85	89	95	93	82
Wechech and Similar	25%	D	88	98	94	93	92	91	87	85	89	95	93	82
Wechech, steep, and similar	15%	D	88	98	94	93	92	91	87	85	89	95	93	82
Weiser	8%	B	77	98	86	88	87	84	75	70	79	92	88	65
Irongold	4%	D	88	98	94	93	92	91	87	85	89	95	93	82
Commski	2%	B	77	98	86	88	87	84	75	70	79	92	88	65
Threelakes	1%	A	63	98	77	81	80	76	61	54	68	89	81	46
Total	**100%**		**87**	**98**	**94**	**93**	**92**	**91**	**86**	**84**	**88**	**95**	**93**	**80**

Soil # 191 Dallan very cobbly fine sandy loam, 2 to 8 percent slopes

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Dallan	100%	A	63	98	77	81	80	76	61	54	68	89	81	46
Total	**100%**		**63**	**98**	**77**	**81**	**80**	**76**	**61**	**54**	**68**	**89**	**81**	**46**

Soil # 294 Rock outcrop, sand stone

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Rock outcrop	90%	D	88	98	94	93	92	91	87	85	89	95	93	82
Nupper	5%	D	88	98	94	93	92	91	87	85	89	95	93	82
Moentria	5%	D	88	98	94	93	92	91	87	85	89	95	93	82
Total	**100%**		**88**	**98**	**94**	**93**	**92**	**91**	**87**	**85**	**89**	**95**	**93**	**82**

Soil # 320 Boxspring - Zeheme - Rock outcrop association

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Boxspring	50%	D	88	98	94	93	92	91	87	85	89	95	93	82
Zeheme	33%	D	88	98	94	93	92	91	87	85	89	95	93	82
Rock Outcrop	15%	D	88	98	94	93	92	91	87	85	89	95	93	82
Typic Haplocalcids	2%	D	88	98	94	93	92	91	87	85	89	95	93	82
Total	**100%**		**88**	**98**	**94**	**93**	**92**	**91**	**87**	**85**	**89**	**95**	**93**	**82**

Soil # 323 Boxspring - Scrapy - Rock Outcrop Association

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Boxspring	40%	D	88	98	94	93	92	91	87	85	89	95	93	82
Scrapy	30%	D	88	98	94	93	92	91	87	85	89	95	93	82
Rock outcrop	15%	D	88	98	94	93	92	91	87	85	89	95	93	82
Lithic calciustolls	9%	D	88	98	94	93	92	91	87	85	89	95	93	82
Typic Haplustolls	6%	D	88	98	94	93	92	91	87	85	89	95	93	82
Total	**100%**		**88**	**98**	**94**	**93**	**92**	**91**	**87**	**85**	**89**	**95**	**93**	**82**

Soil # 351 Seralin extremeely gravelly loam, 30 to 75 percent slopes

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Seralin	85%	D	88	98	94	93	92	91	87	85	89	95	93	82
Potosi	7%	D	88	98	94	93	92	91	87	85	89	95	93	82
Lithic Torriorthents	4%	D	88	98	94	93	92	91	87	85	89	95	93	82
Rock Outcrop	4%	D	88	98	94	93	92	91	87	85		95	93	82
Total	**100%**		**88**	**98**	**94**	**93**	**92**	**91**	**87**	**85**		**95**	**93**	**82**
Total		**100%**		**0**	**0**									

Soil # 360 Rock outcrop - St. Thomas Complex

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Rock outcrop	50%	D	88	98	94	93	92	91	87	85	89	95	93	82
St. Thomas	35%	D	88	98	94	93	92	91	87	85	89	95	93	82
Weiser	10%	A	63	98	77	81	80	76	61	54	68	89	81	46
Bracken	5%	A	63	98	77	81	80	76	61	54	68	89	81	46
Total	**100%**		**85**	**98**	**92**	**92**	**91**	**89**	**84**	**81**	**86**	**95**	**92**	**77**

Soil # 502 Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Canutio	55%	A	63	98	77	81	80	76	61	54	68	89	81	46
Cave	40%	D	88	98	94	93	92	91	87	85	89	95	93	82
Arizo	5%	D	88	98	94	93	92	91	87	85	89	95	93	82
Total	**100%**		**75**	**98**	**85**	**87**	**86**	**83**	**73**	**68**	**78**	**92**	**87**	**63**

Soil # 640 Rock outcrop, sand stone

Soil	Percent	Group	Existing$_1$	Impervious$_2$	Newly Graded Areas$_3$	Residential$_4$ (Apartment/Condo)	Residential$_5$ (6,000 Ft^2 or Less)	Residential$_6$ (7,000 Ft^2)	Residential$_7$ (10,000 Ft^2)	Residential$_8$ (20,000 Ft^2)	Open Space$_9$ (Poor Condition)	Urban Districts$_{10}$ (Comercial and Business)	Industrial$_{11}$	Residential$_{(80,000\ sq\ FT)}$
Rock outcrop	90%	D	88	98	94	93	92	91	87	85	89	95	93	82
Moentria	5%	D	88	98	94	93	92	91	87	85	89	95	93	82
Nupper	5%	D	88	98	94	93	92	91	87	85	89	95	93	82
Total	**100%**		**88**	**98**	**94**	**93**	**92**	**91**	**87**	**85**	**89**	**95**	**93**	**82**

Soil # 731 Purob-Irongold association

Soil	Percent	Group	Existing[1]	Impervious[2]	Newly Graded Areas[3]	Residential[4] (Apartment/Condo)	Residential[5] (6,000 Ft² or Less)	Residential[6] (7,000 Ft²)	Residential[7] (10,000 Ft²)	Residential[8] (20,000 Ft²)	Open Space[9] (Poor Condition)	Urban Districts[10] (Comercial and Business)	Industrial[11]	Residential[12] (80,000 sq FT)
Purob	60%	D	88	98	94	93	92	91	87	85	89	95	93	82
Irongold	25%	D	88	98	94	93	92	91	87	85	89	95	93	82
Typic torriorthents	5%	A	63	98	77	81	80	76	61	54	68	89	81	46
Arizo	3%	A	63	98	77	81	80	76	61	54	68	89	81	46
Purob	3%	D	88	98	94	93	92	91	87	85	89	95	93	82
Typic haplocalcids	2%	B	77	98	86	88	87	84	75	70	79	92	88	65
Xeric haplocambids	1%	A	63	98	77	81	80	76	61	54	68	89	81	46
Aridic calcixerolls	1%	A	63	98	77	81	80	76	61	54	68	89	81	46
Total	**100%**		**86**	**98**	**93**	**92**	**91**	**90**	**85**	**82**	**87**	**95**	**92**	**79**

1-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page 4 of 4
* Desert Shrub in Poor Hydrologic Condition
2-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page1 of 4
* Streets and Roads
3-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page 1 of 4
* Newly Graded Areas
4-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602A
* Apartments / Condos **(MF/SFA-MU > 10 UNITS per ACRE)**
5-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602A
* Townhouses / 6,000 sq ft lots or less **(SF/SFA 7-10 UNITS per ACRE)**
6-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602A
* 7,000 sq ft lots **(SF/SFA 5-7 UNITS per ACRE)**
7-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602A
* 10,000 sq ft lots **(SF LOW 3-5 UNITS Per ACRE)**
8-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602A
* 20,000 sq ft lots **(SF ESTATE 1.5-3 UNITS per ACRE)**
9-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page 1 of 4
* Open spaces in poor condition (grass cover < 50%)
10-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page 1 of 4
* Commercial and Business
11-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602 page 1 of 4
* Industrial
12-Referenced Clark County's Hydrologic Criteria and Drainage Design Manual Table 602a
* 80,000 sq ft lots **(SF ESTATE 0-.5 UNITS per ACRE)**

GCW Modified CN for realistic development projection.

Curve Number calculations for basins

Basin	Total Area	Subbasin	Area	%Area	Type	Soil Percentage	1	2	3	4	5	6	7	8	9	10	11	12	Weighted CN	Composite CN	CN Value
	(ACRE)	DEVELOPED CONDITION ONSITE																			
3-A	233.21	LM1	16.52	7.08%	731	72%								100%					5.3	81.5	74.2
					191	28%								100%							
		LM2	10.91	4.68%	731	100%			100%										4.4		93.0
		LM3	40.45	17.34%	155	18%								100%					12.7		73.3
					191	33%								100%							
					731	49%								100%							
		LM4	7.03	3.01%	155	100%								100%					2.6		85.0
		LM5	38.45	16.49%	155	73%							100%						13.7		83.1
					191	1%							100%								
					502	26%							100%								
		LM6	39.36	16.88%	156	3%							100%						13.4		79.2
					191	7%							100%								
					502	35%							100%								
					731	55%							100%								
		LM10	16.83	7.22%	155	7%						100%							6.1		85.0
					156	18%						100%									
					502	75%						100%									
		LM17	13.84	5.93%	155	52%					100%								5.3		89.1
					502	48%					100%										
		LMP1	3.11	1.33%	731	100%									100%				1.2		87.0
		LMP2	1.41	0.60%	191	100%									100%				0.4		68.0
		LMP5	0.49	0.21%	155	9%									100%				0.2		79.0
					502	91%									100%						
		LR4	20.22	8.67%	191	27%	100%												6.9		79.8
					731	73%	100%														
		LR5	10.69	4.58%	191	9%								100%					3.6		79.5
					731	91%								100%							
		ROADS	13.90	5.96%	NA	100%		100%											5.8		98.0
3-B	446.26	LR1	65.59	14.70%	112	11%	4%							96%					11.6	83.1	79.2
					731	89%	7%							93%							
		LR2	2.61	0.58%	731	100%			100%										0.5		93.0
		LR3	2.28	0.51%	731	100%								100%					0.4		82.0
		LR6	20.49	4.59%	112	67%												100%	2.6		57.0
					731	30%												100%			
					640	3%												100%			
		LR7	26.41	5.92%	112	8%								100%					4.9		82.2
					731	95%								100%							
		LR8	44.88	10.06%	731	100%								100%					8.2		82.0
		LR10	34.73	7.78%	731	100%							100%						6.6		85.0
		LR11	16.51	3.70%	731	100%							100%						3.1		85.0
		LR12	11.54	2.59%	731	100%							100%						2.2		85.0
		LR13	31.51	7.06%	731	100%							100%						6.0		85.0
		LR14	31.19	6.99%	731	100%							100%						5.9		85.0
		LR15	21.72	4.87%	731	100%							100%						4.1		85.0
		LRG1	109.78	24.60%	731	100%									100%				21.4		87.0
		LRP2	1.68	0.38%	112	93%									100%				0.3		69.4
					731	5%									100%						
					640	2%									100%						
		LRP3	0.97	0.22%	731	100%									100%				0.2		87.0
					112	33%	100%														

3-J	97.87	LR18	0.09	0.09%	323	100%			100%											0.1	78.6	94.0
		UB1	58.93	60.21%	731	83%								100%						49.7		82.5
					323	17%								100%								
		UB2	33.25	33.97%	731	100%								100%						27.9		82.0
		UBP1	1.07	1.09%	731	100%									100%					1.0		87.0
		ROADS	4.53	4.63%	NA	100%																0.0
3-K	568.98	LR22	10.00	1.76%	731	100%			100%											1.6	87.6	93.0
		LR23	42.65	7.50%	731	100%							100%							6.4		85.0
		LR24	11.93	2.10%	731	100%				100%										1.9		92.0
		UB3	26.49	4.66%	731	100%												100%		4.4		95.0
		UB6	34.51	6.07%	731	100%							100%							5.2		85.0
		UB7	37.99	6.68%	731	100%							100%							5.7		85.0
		UB8	15.84	2.78%	731	100%						100%								2.5		90.0
		UB9	22.89	4.02%	731	100%							100%							3.4		85.0
		UB10	42.23	7.42%	731	100%							100%							6.3		85.0
		UB11	5.99	1.05%	731	100%							100%							0.9		85.0
		UB12	30.37	5.34%	731	100%							100%							4.5		85.0
		UB13	48.06	8.45%	731	100%							100%							7.2		85.0
		UB15	6.51	1.14%	731	100%							100%							1.0		85.0
		UB17	0.14	0.02%	731	100%							100%							0.0		85.0
		UBG1	105.19	18.49%	731	100%										100%				16.1		87.0
		UBG2	7.75	1.36%	731	100%										100%				1.2		87.0
		UBG3	46.62	8.19%	731	100%										100%				7.1		87.0
		UBG4	5.65	0.99%	731	100%										100%				0.9		87.0
		UBPW1	2.98	0.52%	731	100%										100%				0.5		87.0
		UBPW2	20.37	3.58%	731	100%										100%				3.1		87.0
		ROADS	44.82	7.88%	NA	100%		100%												7.7		98.0
3-L	152.22	BW34	35.84	23.54%	731	24%						100%								20.5	86.8	87.2
					502	44%						100%										
					156	32%						100%										
		BW35	15.83	10.40%	502	52%						100%								9.0		86.8
					156	48%						100%										
		BWP6	1.94	1.27%	502	52%										100%				1.1		82.8
					156	48%										100%						
		BWPW6	2.8	1.84%	731	100%										100%				1.6		87.0
		BW36	28.38	18.64%	731	42%							100%							14.5		78.0
					502	58%							100%									
		BW38	22.17	14.56%	731	49%						100%								12.6		86.4
					502	51%						100%										
		BW39	31.53	20.71%	731	100%						100%								18.6		90.0
		ROADS	13.73	9.02%	NA	100%		100%												8.8		98.0
3-L2	59.53	LR30	22.03	37.01%	502	30%				100%										33.8	92.5	91.2
					156	70%				100%												
		LR31	6.60	11.09%	156	100%				100%										10.3		93.0
		LR32	10.27	17.25%	156	100%				100%										16.0		93.0
		LR33	6.68	11.22%	156	100%				100%										10.4		93.0
		LRP4B	1.55	2.61%	156	100%										100%				2.3		88.0
		LPRW5	4.52	7.59%	156	100%										100%				6.7		88.0
		ROADS	7.88	13.24%	156	100%		100%												13.0		98.0
3-M	123.16	BW3	16.06	13.04%	731	100%						100%								11.7	88.8	90.0
		BW4	10.68	8.67%	731	100%						100%								7.8		90.0
		BW5	5.40	4.38%	731	100%						100%								3.9		90.0
		BW6	4.74	3.85%	731	100%						100%								3.5		90.0
		BW7	2.49	2.02%	731	100%												100%		1.9		95.0
		BW8	8.46	6.87%	731	100%				100%										6.3		92.0
		BW24	16.71	13.57%	731	100%							100%							11.5		85.0
		BWP4	1.1	0.89%	731	100%										100%				0.8		87.0
		BWPW10	1.2	0.97%	731	100%										100%				0.8		87.0
		UB16	18.52	15.04%	731	100%							100%							12.8		85.0
		UBG4	27.07	21.98%	731	100%										100%				19.1		87.0
		ROADS	10.73	8.71%	NA	100%		100%												8.5		98.0
3-N	290.04	BW25	13.49	4.65%	731	100%							100%							4.0	88.9	85.0
		BW26	18.67	6.44%	731	100%						100%								5.8		90.0
		BW27	16.99	5.86%	731	100%							100%							5.0		85.0
		BW28	25.35	8.74%	731	100%							100%							7.4		85.0
		BW29	18.51	6.38%	731	100%							100%							5.4		85.0
		BW30	1.97	0.68%	731	100%							100%							0.6		85.0
		BW31	3.90	1.34%	731	100%												100%		1.3		95.0
		BW32	17.76	6.12%	731	100%												100%		5.8		95.0
		BW33	29.12	10.04%	731	100%							100%							8.5		85.0
		BW37	38.76	13.36%	731	63%			100%											12.0		90.0
					502	37%			100%													
		BWP5	1.08	0.37%	731	100%										100%				0.3		87.0
		BWP7	9.71	3.35%	731	100%										100%				2.9		87.0
		BWPW1	7.94	2.74%	731	100%										100%				2.4		87.0
		BWPW2	5.02	1.73%	731	100%										100%				1.5		87.0
		BWPW3	3.46	1.19%	731	100%										100%				1.0		87.0
		BWPW4	3.49	1.20%	731	100%										100%				1.0		87.0
		BWPW5	6.76	2.33%	731	100%										100%				2.0		87.0
		BWPW6	2.81	0.97%	731	100%										100%				0.8		87.0
		BWSC1	37.86	13.05%	731	100%		50%								50%				12.1		92.5
		LR29	12.46	4.30%	731	78%						100%								3.9		90.2
					502	22%						100%										
		ROADS	14.93	5.15%	NA	100%		100%												5.0		98.0

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *               JUN  1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   22FEB18  TIME  12:51:53  *
 *                                      *
 ****************************************
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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

                       *DIAGRAM
*** FREE ***
              1        ID   THIS VERSION OF THE CCRFCD 2008 MPU GOWAN WATERSHED HAS BEEN UPDATED BY VTN
              2        ID   TO SHOW THE EFFECTS OF THE NEW PLACEMENT OF THE DETENTION BASIN HAS ON
              3        ID   DOWNSTREAM HOLDING FACILITIES
              4        ID
              5        ID   MODELED BY VTN, NEVADA SVB/JYA
              6        ID   Feb 19, 2018
              7        ID
              8        ID
              9        ID    CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT 2008 MASTER PLAN UPDATE
             10        ID    GOWAN WATERSHED (ALL)
             11        ID    RECOMMENDED DRAINAGE SYSTEM WITH ULTIMATE DEVELOPMENT
             12        ID    INPUT FILE = Alta-sdn3.DAT
             13        ID    INPUT FILE DATE = MAY 5, 2008
             14        ID    DESIGN STORM = 100-YEAR 6-HR STORM
             15        ID    STORM DISTRIBUTION = SDN 3
             16        ID    MODELED BY PBS&J (MICHELE L. D'ALESSANDRO, E.I., CFM)
             17        ID    CHECKED BY PBS&J (HARSHAL B. DESAI, P.E., CFM)
             18        ID    STORM CENTERING = FULL WATERSHEDCP
             19        ID
             20        ID    REFERENCED HYDROLOGIC MODELS:
             21        ID    CITY OF LAS VEGAS CITY WIDE HYDROLOGY ANALYSIS (PBS&J 1997)
             22        ID    NORTHWEST NEIGHBORHOOD STUDY PHASE 1 (PBS&J 1997)
             23        ID    RESPONSE TO COMMENTS ON THE 2006 SUMMERLIN WEST PLANNING AREA FLOOD
             24        ID    CONTROL MASTER PLAN UPDATE (G.C. WALLACE 2006)
             25        ID    3RD RESPONSE TO COMMENTS ON THE 2006 SUMMERLIN WEST PLANNING AREA FLOOD
             26        ID    CONTROL MASTER PLAN UPDATE (G.C. WALLACE 2006)
             27        ID    SUPPLEMENT FOR THE 2006 SUMMERLIN WEST PLANNING AREA FLOOD CONTROL
             28        ID    MASTER PLAN UPDATE (G.C. WALLACE 2006)
             29        ID    GOWAN OUTFALL - LONE MOUNTAIN BRANCH PRELIMINARY DESIGN REPORT
             30        ID    (G.C. WALLACE 2007)
             31        ID    LONE MOUNTAIN WESTERN BELTWAY DETENTION BASIN PARAMETERS (RECEIVED
             32        ID    FROM G.C. WALLACE ON JANUARY 31, 2008)
             33        ID    US 95/RANCHO FIS RESTUDY (PBS&J 1998)
             34        ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
             35        ID
             36        ID                          AREA    DARF
             37        ID                          SQ. MI.
             38        ID                          0-0.5   0.99
             39        ID                          0.5-1   0.975
             40        ID                          1-2     0.95
             41        ID                          2-3     0.925
             42        ID                          3-4     0.915
             43        ID                          4-5     0.908
             44        ID                          5-6     0.903
             45        ID                          6-7     0.895
             46        ID                          7-8     0.885
             47        ID
             48        ID
             49        ID
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 50          ID
 51          ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
 52          ID
 53          ID  100-YEAR,  6-HOUR STORM,  SDN3
1                                   HEC-1 INPUT                                    PAGE  2

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

 54          ID
 55          IT       5       0       0     300
 56          IO       5       0       0
 57          IN       5       0       0
 58          ID         0-0.5    0.5-1   1-2     2-3     3-4     4-5     5-6     6-7     7-8
 59          JR    PREC    0.99   0.975    0.95   0.925   0.915   0.908   0.903   0.895   0.885
             *

 60          KK     3-1
 61          KM   COMPARE TO MPU BASIN DB54-1 (CURVE NUMBER CHANGED FROM 87.2)
 62          BA    2.22
 63          PB    3.75
 64          PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13   0.130
 65          PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
 66          PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
 67          PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
 68          PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
 69          PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
 70          PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
 71          PC   0.998   0.999       1
 72          LS       0    87.0
 73          UD   0.582
             *

 74          KK    R3-1
 75          KM   ROUTE R3-1 THROUGH 3-2
 76          KM   EXISTING NATURAL WASH
 77          RD    3322   0.092   0.030       0    TRAP     125       0
             *

 78          KK     3-2
 79          KM   COMPARE TO MPU BASIN DB54-5 (CURVE NUMBER CHANGED FROM 85.2)
 80          BA   0.226
 81          PB    3.67
 82          LS       0    85.6
 83          UD   0.108
             *

 84          KK   CP3.1
 85          KM   COMBINE R3-1 AND 3-2
 86          HC       2
             *

 87          KK  RCP3.1
 88          KM   ROUTE CP3.1 TO CP3.3 THROUGH 3-E VIA
 89          KM   (PORTION OF FACILITY APM50059)
 90          RD    7900   0.070   0.013       0    TRAP     125       2
             *

 91          KK     3-D
 92          KM   PORTION OF BASINS DB54-6R (PB=3.56)
 93          BA  0.3329
 94          PB    3.59
 95          LS       0    84.6
 96          UD   0.223
             *
1                                   HEC-1 INPUT                                    PAGE  3

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

 97          KK   CP3.3
 98          KM   COMBINE 3-D, RCP3.1,
 99          HC       2
             *

100          KK  RCP3.3
101          KM   ROUTE CP3.3 TO CP3.4 THROUGH 3-E VIA A
102          KM   (PORTION OF FACILITY APM50059)
103          RD    1000   0.070   0.013       0    TRAP     125       2
             *

104          KK     3-3
105          KM   PORTION OF MPU BASIN DB54-3
106          BA  0.1737
107          PB    3.65
108          LS       0    88.0
109          UD   0.081
             *

110          KK    R3-3
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```
111          KM   ROUTE R3-3 THROUGH A PORTION OF 3-E TO CP3.2
112          KM   NATURAL WASH
113          RD    2233   0.054   0.030       0    TRAP     100       0
             *

114          KK     3-4
115          KM   PORTION OF MPU BASIN DB54-3
116          BA  0.3457
117          PB    3.68
118          LS       0    88.0
119          UD   0.092
             *

120          KK    R3-4
121          KM   ROUTE R3-4 THROUGH A PORTION OF 3-E TO CP3.2
122          KM   NATURAL WASH
123          RD    3300   0.097   0.030       0    TRAP     100       0
             *

124          KK     3-5
125          KM   COMPARE TO MPU BASIN DB54-2 (SLIGHTLY LARGER PORTION OF DB54-4)
126          BA  0.2936
127          PB    3.65
128          LS       0    87.7
129          UD   0.094
             *

130          KK    R3-5
131          KM   ROUTE R3-5 THROUGH A PORTION OF 3-E TO CP3.2
132          KM   (PORTION OF FACILITY APM50057)
133          RD    4400   0.068   0.013       0    TRAP      50       2
             *
```



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

134          KK   CP3.2
135          KM   COMBINE R3-5 , R3-4 AND R3-3
136          HC       3
             *

137          KK  RCP3.2
138          KM   ROUTE RCP3.2 THROUGH A PORTION OF 3-E TO CP3.4
139          KM   (PORTION OF FACILITY APM50057)
140          RD    5500   0.068   0.013       0    TRAP      50       2
             *

141          KK     3-E
142          KM   PORTION OF BASINS DB54-4 (PB=3.60) AND DB54-6R (PB=3.56)
143          BA  0.5442
144          PB    3.57
145          LS       0    85.8
146          UD   0.238
             *

147          KK   CP3.4
148          KM   COMBINE 3-E, RCP3.2 AND RCP3.3
149          HC       3
             *

150          KK  RCP3.4
151          KM   ROUTE RCP3.4 TO CPDB5
152          KM   (FACILITIES APM50056, APM50047 AND APM50008)
153          RD    3365   0.052   0.013       0    TRAP      80       2
             *

154          KK     3-6
155          KM   PORTION OF MPU BASIN DB55-3 AND DB55-4
156          BA  0.0887
157          PB    3.62
158          LS       0    88.0
159          UD   0.074
             *

160          KK    R3-6
161          KM   ROUTE 3-6 THROUGH A PORTION OF 3-J AND A PORTION OF 3-K TO CP3.5
162          KM   EXISTING NATURAL WASHES
163          RD    4500   0.080   0.030       0    TRAP     100       0
             *

164          KK     3-7
165          KM   PORTION OF MPU BASIN DB55-3 AND DB55-4
166          BA  0.1714
167          PB    3.61
168          LS       0    87.2
169          UD   0.048
             *
```

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

 170      KK    R3-7
 171      KM   ROUTE 3-7 THROUGH A PORTION OF 3-K TO CP3.5
 172      KM   PORTION OF FACILITY ID APM50213
 173      RD    4340   0.073   0.013       0    TRAP      50       2
          *

 174      KK     3-J
 175      KM   PORTION OF MPU BASIN DB55-4
 176      BA  0.1529
 177      PB    3.59
 178      LS       0    78.6
 179      UD   0.168
          *

 180      KK    R3-J
 181      KM   ROUTE 3-J THROUGH A PORTION OF 3-K TO CP3.5
 182      KM   NATURAL WASHES
 183      RD    2700   0.074   0.030       0    TRAP     100       0
          *

 184      KK   CP3.5
 185      KM   COMBINE R3-J, R3-7 AND R3-6
 186      HC       3
          *

 187      KK  RCP3.5
 188      KM   ROUTE CP3.5 THROUGH A PORTION OF 3-K TO CP3.6
 189      KM   PORTION OF FACILITY ID APM50213
 190      RD    2100   0.073   0.013       0    TRAP      50       2
          *

 191      KK     3-8
 192      KM   COMPARE TO MPU BASIN DB55-1
 193      BA  0.6386
 194      PB    3.70
 195      LS       0    87.8
 196      UD   0.196
          *

 197      KK    R3-8
 198      KM   ROUTE 3-8 THROUGH A PORTION OF 3-K TO CP3.6
 199      KM   FACILITY ID APM50212
 200      RD    6695   0.075   0.013       0    TRAP      30       2
          *

 201      KK     3-K
 202      KM   COMPARE TO MPU BASIN DB55-7
 203      BA  0.8890
 204      PB    3.54
 205      LS       0    87.6
 206      UD   0.296
          *
```



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

 207      KK   CP3.6
 208      KM   COMBINE 3-K, R3-8 AND RCP3.5
 209      HC       3
          *

 210      KK  RCP3.6
 211      KM   ROUTE CP3.6 TO CPDB5
 212      KM   FACILITY ID APM500009
 213      RD    4180   0.058   0.013       0    TRAP      50       2
          *

 214      KK     3-N
 215      KM   COMPARE TO MPU BASIN DB55-8
 216      BA  0.4532
 217      PB    3.46
 218      LS       0    88.9
 219      UD   0.269
          *

 220      KK     3-M
 221      KM   COMPARE TO MPU BASIN DB55-8
 222      BA  0.1924
 223      PB    3.48
 224      LS       0    88.8
 225      UD   0.147
          *

 226      KK    R3-M
```

```
227          KM   ROUTE 3-M TO CPDB5
228          KM   FACILITY ID PORTION OF APM500009
229          RD    4500  0.0528   0.013       0    TRAP       7       0
             *

230          KK   CPDB5
231          KM    COMBINE 3-M, 3-N, RCP3.6 AND RCP3.4
232          KM    TOTAL INFLOW TO SUMMERLIN #5 DETENTION BASIN
233          KO       0
234          HC       4
             *

235          KK     DB5
236          KM    SUMMERLIN DETENTION BASIN 5
237          KM    FACILITY = ANGEL PARK - MIDDLE 5 BRANCH
238          KM    FACILITY # = APM5 0000
239          KM    STORAGE VOLUME = 384.1 ACRE-FEET
240          KM    OUTLET = 2: 7' x 5.5' RCBS
241          KM    100-YEAR DISCHARGE = 2,150 CFS
242          KM    SPILLWAY LENGTH = 453.6'
243          KM    SPILLWAY HEIGHT =
244          KM    SPILLWAY CREST ELEVATION = 3563'
245          KM    SPILLWAY TYPE = CONCRETE BROAD CRESTED WEIR
246          KM    PMF DISCHARGE = 12,153 CFS
247          KM    TOP OF EMBANKMENT ELEVATION = 3569'
248          KM    DETENTION BASIN PARAMETERS REFERENCED FROM "DETENTION BASIN NO. 5
```

1 HEC-1 INPUT PAGE 7

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

249          KM    EXPANSION AND DIVERSION BERM" PLANS BY G.C. WALLACE (5-23-2001)
250          KM    STAGE-STORAGE-DISCHARGE CURVE REFERENCED FROM "2006 SUMMERLIN WEST
251          KM    CONCEPTUAL DRAINAGE STUDY MASTER PLAN AMENDMENT: EXISTING OFFSITE/PROPOSED
252          KM    ONSITE DRAINAGE CONDITION" HYDROLOGIC MODEL DATED 8-7-2006 AND SUBMITTED
253          KM    WITH THE SUPPLEMENT FOR THE 2006 SUMMERLIN WEST PLANNING AREA FLOOD
254          KM    CONTROL MASTER PLAN UPDATE BY G.C. WALLACE (08-2006)
255          KO       0
256          RS       1    STOR      -1
257          SV       0    1.73    4.55    8.45   13.08    18.2   23.81   29.96    36.7   43.93
258          SV   59.55   77.49   99.82  127.17  159.39  196.38  240.07  384.05  405.65  535.25
259          SQ       0     192     276     391     505     616     725     813     900     982
260          SQ    1176    1368    1534    1683    1804    1920    2033    2315    3725   23201
261          SE  3532.5    3535    3536    3537    3538    3539    3540    3541    3542    3543
262          SE    3543    3547    3549    3551    3553    3555    3557    3563    3564    3569
263          SS    3563   435.6       3     1.5
             *

264          KK     3-L
265          KM   COMPARE TO MPU BASIN SWAA-1
266          BA  0.2378
267          PB    3.44
268          LS       0    86.8
269          UD   0.164
             *

270          KK   CP3-L
271          KM   COMBINE 3-L AND DB3
272          KM   THIS IS CSWAA-1 IN GOWAN MPU HEC-1
273          HC       2
             *
             * END OF SECTION MODELED BY VTN, NEVADA SVB
             * TIE VTN SECTION TO 2008 MPU HEC-1
             *

274          KKRCSWAA-1
275          KM  ROUTE CSWAA-1 TO CSWAA-2
276          KM  FACILITY = ANGEL PARK - ALTA DRIVE
277          KM  FACILITY # = APAD 0115, 0146
278          KM  LINING = RCB
279          RD    4640   0.044   0.015       0    TRAP      10       0
             *

280          KK  SWAA-2
281          BA   0.700
282          PB    3.39
283          LS       0    90.9
284          UD   0.346
             *

285          KK CSWAA-2
286          KM  COMBINE RCSWAA-1 AND SWAA-2
287          HC       2
             *
```

1 HEC-1 INPUT PAGE 8

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

288          KKRCSWAA-2
```

CONCEPTUAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23B

62023.050

September 2003

Prepared for:

The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89134
Phone: (702) 791- 4300
Fax: (702) 791- 4453

G. C. WALLACE, INC.
Engineers/Planners/Surveyors

6 2023.050

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: December 9, 2003
TO: Land Development Services Department of Public Works			FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Conceptual Drainage Study for: Summerlin Village 23B		COPIES TO: G.C. Wallace Inc.
Cross Streets:	NWC of Alta Drive & Desert Foothills Drive		Howard Hughes Corp.
File Number:	F:\Depot\DSMEMOS\DS3420C.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-010		CCRFCD
Zoning Action:			
FEMA Flood Zone:	YES	NO X	
Proposed Storm Drain:	YES X	NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. No.
1st Submittal	9/15/2003	9/29/2003	Not Approved	$250.00	110938: $250
2nd Submittal	10/10/2003	10/24/2003	Conditionally Approved	$400.00	112511: $400
CCRFCD	11/25/2003	12/9/2003	Concurrence	N/C	N/C
			TOTAL FEES (LDDRS):	$650.00	--

REMARKS:

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.

1. *The proposed public drainage easement (privately maintained) in Figure 7 will be dedicated and recorded in the final map of individual parcel upon site development.*
2. *Hydraulic calculations for the storm drains must be provided in a technical drainage study for this Village upon site development.*
3. *Projects that disturb more than one acre of land must submit to the Nevada Division of Environmental Protection: (1) a "Notice of Intent" to discharge, (2) a request for inclusion in the Stormwater General Permit No. GNV0022241, and (3) a stormwater pollution prevention plan. For more information, please call (775) 687-4670, ext. 3138.*

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 Amendment 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.

END OF REMARKS
B&H/ays

Post-it® Fax Note 7671	Date 12/9	# of pages ▶ 1
To Randall Gremlich	From Albert Sung	
Co./Dept. GC Wallace	Co. CLV Flood	
Phone #	Phone #	
Fax # 804-2299	Fax #	

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

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

BOARD OF DIRECTORS

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Chairman
City of Las Vegas

Chip Maxfield
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Shari Buck
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City of Las Vegas

Mayor Bill Nicholes
City of Mesquite

Bruce L. Woodbury
Clark County

November 20, 2003

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. Fourth St
Las Vegas, NV 89101

DISTRICT CONCURRENCE: SUMMERLIN VILLAGE 23B (DS3420)
(RFCD NO. 03-5463)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Conceptual Drainage Study dated October 10, 2003, for the above-mentioned project as submitted by G. C. Wallace, Inc. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated October 24, 2003.

District concurs with acceptance of this Conceptual Drainage Study by City of Las Vegas Public Works.

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

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

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

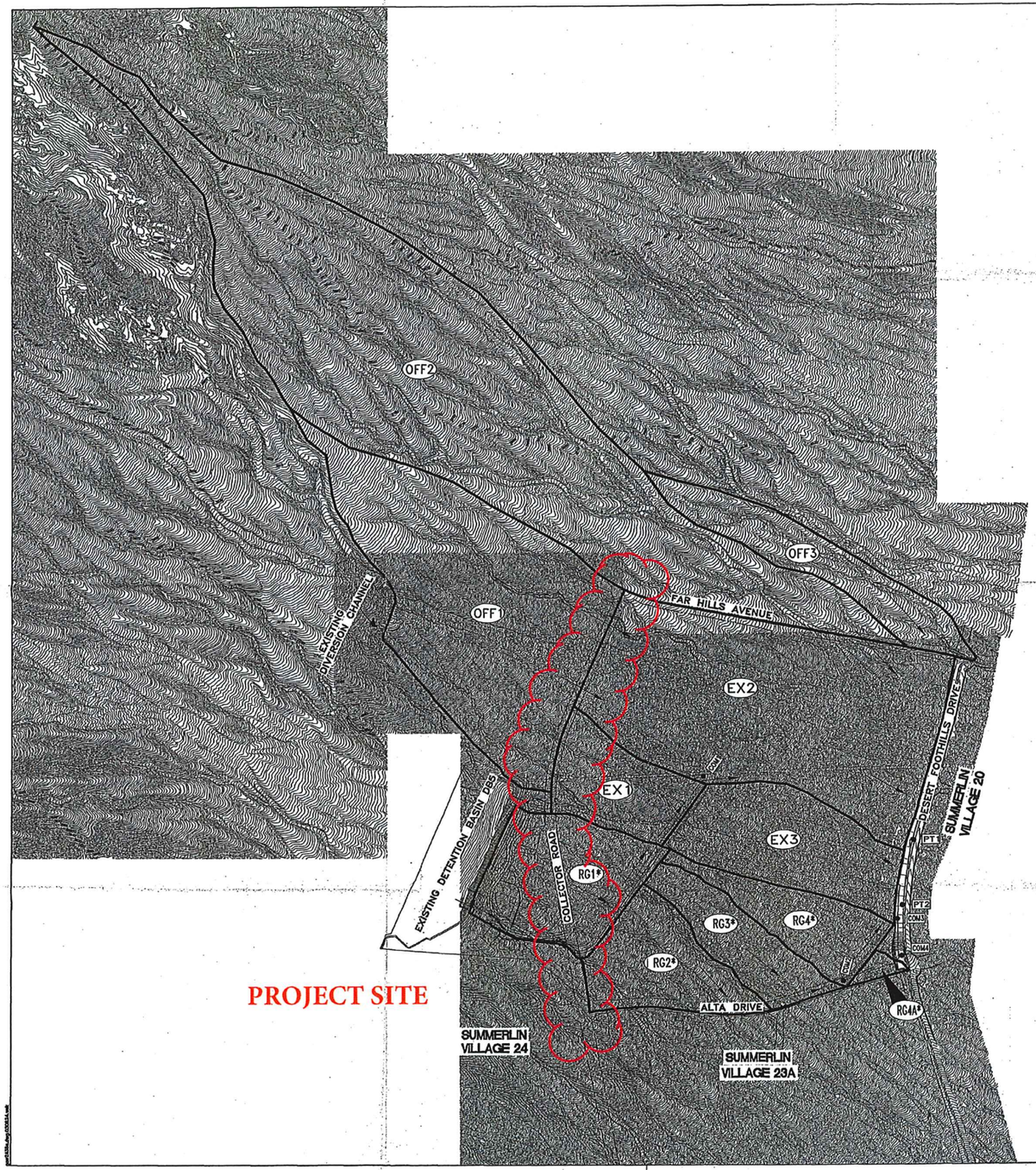
BY: _____
Andrew R. Trelease, P.E.
Senior Civil Engineer

ART:css

c: Randall K. Gremlich, P.E., G. C. Wallace, Inc.

File: 20-59-34.GCW

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: http://www.ccrfcd.org



NORTH

SCALE 1"=600'

GRAPHIC SCALE

(IN FEET)

1 inch = 600 ft.

LEGEND

- SUBBASIN BOUNDARY
- (ON3) SUBBASIN DESIGNATION
- CP 3 COMBINATION POINT
- FLOW DIRECTION
- 5' CONTOUR
- 1' CONTOUR

SUMMARY OF HEC-1 MODEL

BASIN/CONCENTRATION POINT	AREA (AC)	Q10 (CFS)	Q100 (CFS)
OFF2	346.9	322	753
RG1*	60.7	42	117
EX1	37.2	38	92
COM1	–	79	205
OFF1	174.7	177	430
EX2	188.2	171	413
PT1	–	720	1688
EX3	63.4	62	147
PT2	–	776	1826
RG2*	44.1	28	87
RG3*	33.1	23	68
COM2*	–	50	153
RG4*	33.0	18	55
COM3	–	842	1963
RG4A*	3.4	4	11
COM4	–	844	1971
OFF3	46.3	46	109

* REFERENCED FROM VILLAGE 23A ROUGH GRADE STUDY

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 06-10-03

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
TELEPHONE (702) 804-2100 FAX (702) 804-2899

SUMMERLIN VILLAGE 23B

FIGURE 5

EXISTING CONDITIONS DRAINAGE MAP

DRAWING
FIG5
1 OF SHT

SUMMERLIN

SM

DETENTION BASIN NO. 5 EXPANSION AND DIVERSION BERM IMPROVEMENT PLANS

MAY 2001

DEVELOPER

The Howard Hughes Corporation SM
An Affiliate of THE ROUSE COMPANY

THE HOWARD HUGHES CORPORATION,
a Delaware corporation

10000 W. CHARLESTON, SUITE 200
LAS VEGAS, NEVADA 89135
OFFICE PHONE NO. (702) 791-4300
OFFICE FAX NO. (702) 791-4450

32562

ENGINEER

G.C. WALLACE, INC.
Engineers/Planners/Surveyors

1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
OFFICE: (702) 804-2000, FAX: (702) 804-2299
SUMMERLIN OFFICE 10000 CHARLESTON BLVD., STE. 130
OFFICE: (702) 804--2160, FAX: (702) 804-2295

APPROVALS

DRAINAGE CERTIFICATION

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

DENNIS R. BROWN R.P.E. 12252 — DATE May 23 2001

"APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE INDICATED RIGHTS-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 STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA".

CHARLES KAJKOWSKI, Jr.; PE #478 — DATE 5-30-2001
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

THE HOWARD HUGHES CORPORATION,
a Delaware corporation

By: JOHN J. POTTS — DATE 5-24-01

Title: SENIOR VICE PRESIDENT, DEVELOPMENT

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 05-23-01
PLOT TIME: 16:43:44

REV.	DATE	DESCRIPTION	DATE	CHK.	APP.	DATE	CHK.	APP.

DATE: May 23 2001

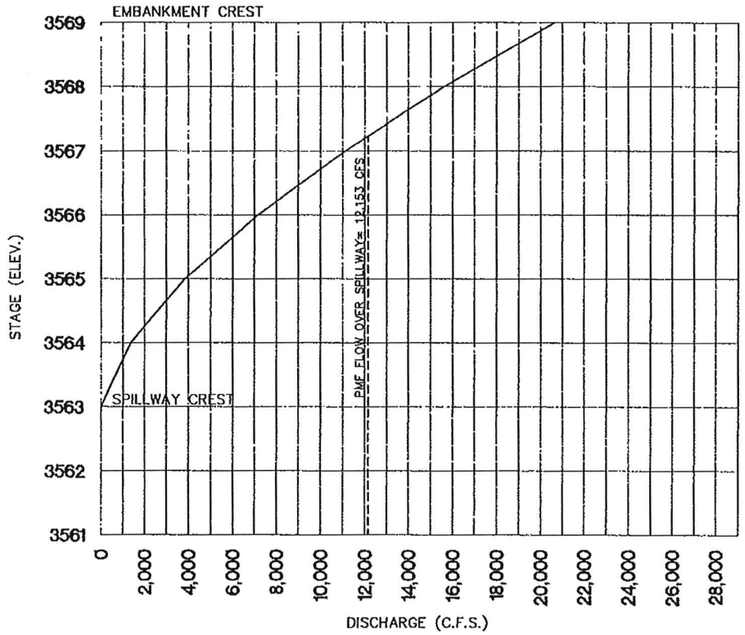
G.C. WALLACE, INC.
Engineering/Architecture
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
TELEPHONE: (702) 804-2000 • FAX: (702) 804-2299

THE HOWARD HUGHES CORPORATION
DETENTION BASIN NO. 5 EXPANSION AND DIVERSION BERM
COVER SHEET

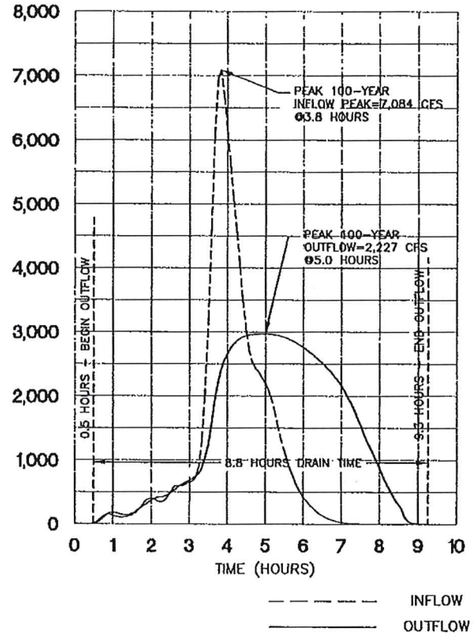
SHEET
C-1
1 OF 24 SHTS

731-75

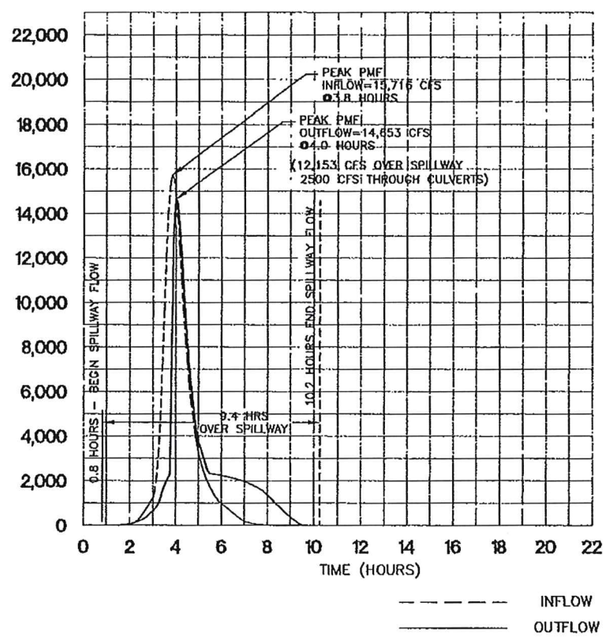
STAGE/DISCHARGE



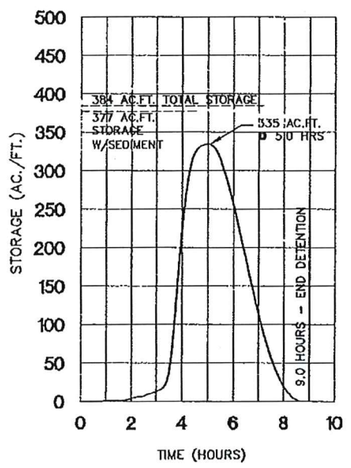
100-YEAR INFLOW/OUTFLOW HYDROGRAPHS



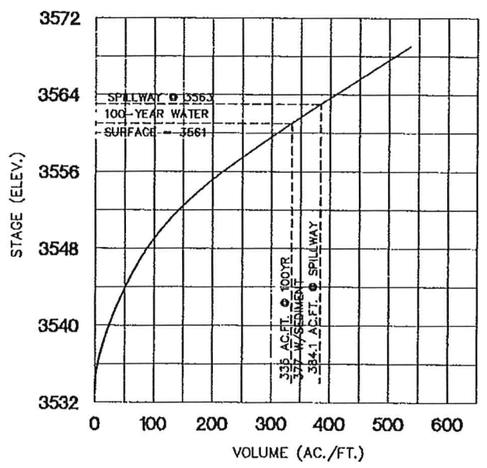
PMF INFLOW/OUTFLOW HYDROGRAPHS



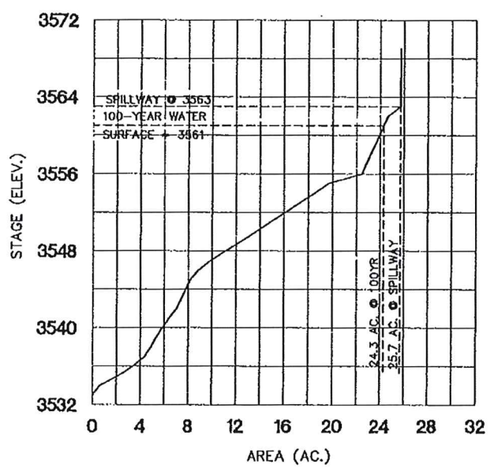
STORAGE/TIME



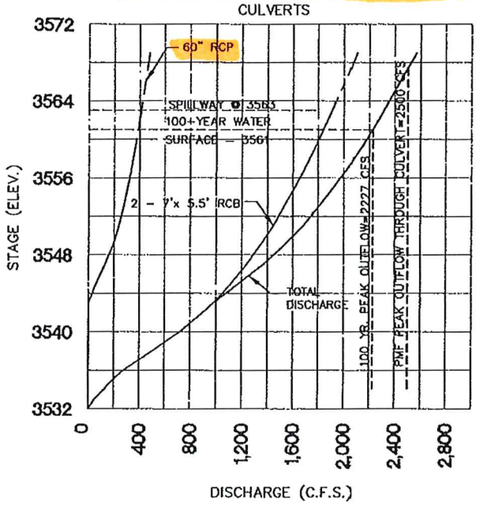
STAGE/VOLUME



STAGE/AREA



STAGE/DISCHARGE



32565

G.C. WALLACE, INC.
Engineering/Architecture
1333 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
TELEPHONE (702) 804-2000 • FAX (702) 804-2299

DESIGN DRB
DRAWN DRB
CHECK
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE 05-23-21
PLOT TIME 16:47:21

DATE May 21 Issue
DESCRIPTION
BY DATE

THE HOWARD HUGHES CORPORATION
DETENTION BASIN NO. 5 EXPANSION AND DIVERSION BERM
STAGE RELATIONSHIPS

SHEET
C-4
4 OF 24 SHTS

731-75

CURRENT DATE: 12-19-2000
CURRENT TIME: 08:12:29

FILE DATE: 12-19-2000
FILE NAME: DB5-60

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS / SHAPE / MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	3543.96	3536.00	203.66	1 RCP	5.00	5.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: DB5-60 DATE: 12-19-2000

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
3543.96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3546.59	48.0	48.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3548.05	96.0	96.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3549.38	144.0	144.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3551.00	192.0	192.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3553.10	240.0	240.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3555.73	288.0	288.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3558.85	336.0	336.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3562.41	384.0	384.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3562.89	390.0	390.0	0.0	0.0	0.0	0.0	0.0	0.00	1
3569.06	480.0	460.3	0.0	0.0	0.0	0.0	0.0	0.00	1
3569.00	459.6	459.6	0.0	0.0	0.0	0.0	0.0	16.67	18
								OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: DB5-60 DATE: 12-19-2000

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
3543.96	0.000	0.00	0.00	0.00
3546.59	0.000	48.00	0.00	0.00
3548.05	0.000	96.00	0.00	0.00
3549.38	0.000	144.00	0.00	0.00
3551.00	0.000	192.00	0.00	0.00
3553.10	0.000	240.00	0.00	0.00
3555.73	0.000	288.00	0.00	0.00
3558.85	0.000	336.00	0.00	0.00
3562.41	0.000	384.00	0.00	0.00
3562.89	0.000	390.00	0.00	0.00
3569.06	-0.004	480.00	3.07	0.64

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 12-19-2000
CURRENT TIME: 08:12:29

FILE DATE: 12-19-2000
FILE NAME: DB5-60

PERFORMANCE CURVE FOR CULVERT 1 - 1(5.00 (ft) BY 5.00 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	3543.96	0.00	0.00	0-NF	0.00	0.00	0.00	-3.00	0.00	0.00
48.00	3546.59	2.63	2.63	1-S2n	1.03	1.93	1.03	-2.66	16.49	4.53
96.00	3548.05	4.09	4.09	1-S2n	1.45	2.78	1.53	-2.48	18.95	5.89
144.00	3549.38	5.42	5.42	5-S2n	1.79	3.43	1.92	-2.34	20.66	6.86
192.00	3551.00	7.04	7.04	5-S2n	2.11	3.96	2.30	-2.22	21.80	7.63
240.00	3553.10	9.14	9.14	5-S2n	2.39	4.33	2.63	-2.11	22.96	8.28
288.00	3555.73	11.77	11.77	5-S2n	2.67	4.69	2.96	-2.01	23.84	8.84
336.00	3558.85	14.89	7.23	6-S2n	2.94	5.00	3.27	-1.92	24.73	9.34
384.00	3562.41	18.45	10.35	6-S2n	3.22	5.00	3.57	-1.83	25.63	9.79
390.00	3562.89	18.93	10.77	6-S2n	3.25	5.00	3.60	-1.82	25.81	9.85
460.26	3569.06	25.10	16.16	6-S2n	3.69	5.00	4.06	-1.67	26.99	10.59

El. inlet face invert 3543.96 ft El. outlet invert 3536.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	3543.96 ft
OUTLET STATION	203.50 ft
OUTLET ELEVATION	3536.00 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0391
CULVERT LENGTH ALONG SLOPE	203.66 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

CURRENT DATE: 12-19-2000
CURRENT TIME: 08:12:29

FILE DATE: 12-19-2000
FILE NAME: DB5-60

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	30.00 ft
SIDE SLOPE H/V (X:1)	3.0
CHANNEL SLOPE V/H (ft/ft)	0.050
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	3533.00 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	3536.00 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	3533.00	0.000	0.00	0.00	0.00

48.00	3533.34	1.365	0.34	4.53	1.07
96.00	3533.52	1.446	0.52	5.89	1.61
144.00	3533.66	1.492	0.66	6.86	2.05
192.00	3533.78	1.524	0.78	7.63	2.43
240.00	3533.89	1.548	0.89	8.28	2.77
288.00	3533.99	1.567	0.99	8.84	3.08
336.00	3534.08	1.583	1.08	9.34	3.38
384.00	3534.17	1.596	1.17	9.79	3.65
390.00	3534.18	1.597	1.18	9.85	3.68
480.00	3534.33	1.617	1.33	10.59	4.16

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH	20.00 ft
CREST LENGTH	400.00 ft
OVERTOPPING CREST ELEVATION	3569.00 ft

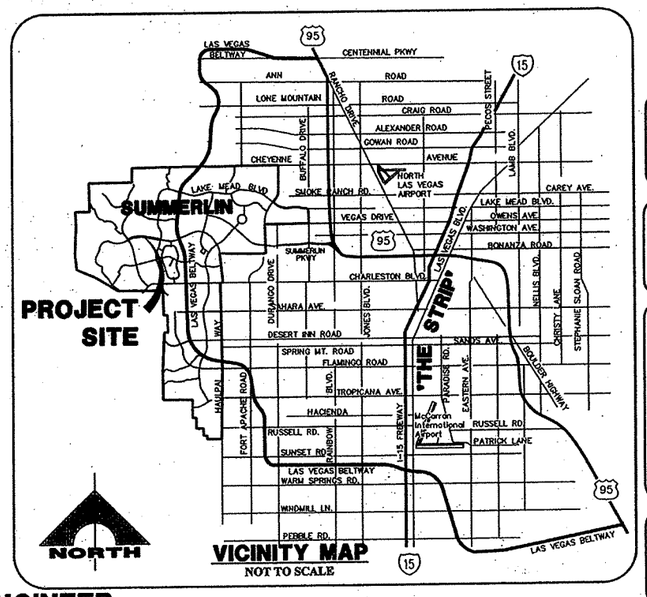
SUMMERLIN

SM

VILLAGE 23B
FAR HILLS AVENUE RCB IMPROVEMENTS
SKY VISTA DRIVE TO DESERT FOOTHILLS DRIVE
2013

A.P.N. 137-22-000-015 (PORTION)

SID NO. 808 PROJECT 33



OWNER/DEVELOPER

THE HOWARD HUGHES COMPANY, LLC
10801 W. CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NEVADA 89146
OFFICE PHONE NO. (702) 791-4300
OFFICE FAX NO. (702) 791-4450

ENGINEER

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BLVD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

THE HOWARD HUGHES COMPANY, LLC

KEVIN ORRICK
TITLE: VICE PRESIDENT — 8/6/13 DATE

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

JOSHUA L. JOHNSON P.E. 15789 — 7/16/13 DATE

DAVID BOWERS, P.E. PTOE, P.E. 16736 — 8/08/13 DATE
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-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 STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CLV BUILDING AND SAFETY DEPARTMENT

THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT

N/A — 8/27/13 DATE
CHRIS KNIGHT, DIRECTOR, BUILDING AND SAFETY

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. 12118 DATE: 7/30/13
DRAWINGS C1, C3, P1-P11, L1-L2, S2, M1, E1-E3

UTILITY/AGENCY APPROVALS

COX COMMUNICATIONS LAS VEGAS, INC. — 7/17/13 DATE

CENTRAL TELEPHONE CO. DBA CENTURYLINK — 7-17-13 DATE

THE AFFIXED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

NV ENERGY — 7-17-2013 DATE

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

Sharon McShea — 7-29-2013 DATE
NV ENERGY – TRANSMISSION ENGINEERING

SOUTHWEST GAS CORP. — 7/18/13 DATE

H #50002
CLV # 10745996

JOSHUA L. JOHNSON — 7/16/13 DATE

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM
LAS VEGAS
F:\Projects\800\002\39-227\dwg\Production\1-227-C01.dwg
Daniel Kelley

PROJECT NO. 800239-227
DESIGN: DPK
DRAWN: DPK
CHECK: JLJ
PLOT DATE: 07-16-13
PLOT TIME: 14:44:15

NO	DATE	DESCRIPTION	DATE	ARCH APP	DATE	CONST APP
1	7/24/13	REVISED SHEET 2	7/24/13		7/16/13	
2	8/27/13	REVISED SHEET 2				

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B FAR HILLS AVE RCB IMPROVEMENTS
SKY VISTA DRIVE TO DESERT FOOTHILLS DRIVE

COVER SHEET

DRAWING
C1
1 OF 25 SHTS

FOR EXISTING WATER LINE, REFER TO THE FOLLOWING IMPROVEMENTS SET: "3665 ZONE PUMP STATION DISCHARGE PIPELINE AND PRV" BY G.C WALLACE CLV # 565-396

NOTE: SEE DWG G1-G3 FOR TEMPORARY GRADING

VILLAGE 28
APN 137-22-000-016

FUTURE FAR HILLS AVENUE (PUBLIC)

SEE DWG P1 FOR CONTINUATION

SKY VISTA DRIVE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LOW PT. STA: 403+22.46
LOW PT ELEV: 3560.26
PVI STA: 403+12.46
PVI ELEV: 3560.10
K: 74.99
LVC: 100.00'
A.D.: 1.33%

BVCS: 402+62.46
BVCE: 3560.50
EVCS: 403+62.46
EVCE: 3560.37

SDMH #13 STA. 402+60.20 23.2' LT. TMH=60.04 INV THRU=47.40

SDMH #14 402+08.33 23.17' LT. TMH=60.56 INV THRU=47.60

PROPOSED FG ● ROADWAY ℄

FUT FG ● ROADWAY ℄

-0.80%

0.53%

-0.54%

100-YR HGL (ULT)

100-YR HGL (INT)

100 YEAR HGL (ULTIMATE) Q100=6 CFS (ULTIMATE)

53.87 LF 66" CL III RCP ● 0.39%
Q100=320 CFS (INTERIM)
Q100=188 CFS (ULTIMATE)

24" RCP INV-93-3

116.57 LF 66" CL III RCP ● 0.39%
Q100=320 CFS (INTERIM)
Q100=188 CFS (ULTIMATE)

24" RCP INV-90-7

81.33 LF 66" CL III RCP
● 0.39%
Q100=320 CFS (INTERIM)
Q100=188 CFS (ULTIMATE)

8 LF 24" RCP ● 2.50%
PLUG FOR FUTURE CONNECTION
INV 49.99

14.97 LF 66" CL III RCP
● 2.34%

STA. 404+72.67 ℄
FAR HILLS STA. 241+67.45
24" RCP INV. 3559.78 (N)
66" RCP INV. 3546.28 (S)
8'X8' RCB INV. 3545.78

2-90° CUR

EXISTING 36" MLTMCP WATER

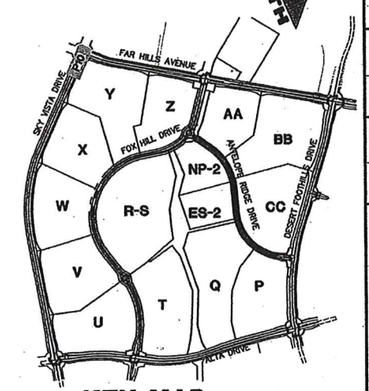
EX STEEL CASING

3570
3560
3550
3540

402+00
403+00
404+00
405+00

KEY MAP

NOT TO SCALE



SCALE 20 0 20 40 FEET

NORTH

STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL 48" TYPE IA STORM DRAIN MANHOLE PER DTL 1, DWG D1
2. INSTALL NDOT TYPE 4 MANHOLE PER "NDOT STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" (LATEST EDITION) R-4.3.2
3. ABANDON EXISTING STORM DRAIN
4. INSTALL PRECAST CONCRETE JUNCTION BOX
5. CONNECT TO EXISTING STORM DRAIN (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EXISTING STORM DRAIN)
6. INSTALL TEMPORARY PLUG AND CAP
7. PROTECT EXISTING FACILITY AND ADJUST TO GRADE AND BACK OF CURB (AS REQUIRED). WATER VALVES TO REMAIN ACCESSIBLE AT ALL TIMES
8. INSTALL STORM DRAIN WITH WATERTIGHT JOINTS USING LVVWD APPROVED INTERNAL ELASTOMERIC JOINT SEALANT PER UDACS SECTION 2.22.02 D.2, LVVWD TO SUPERVISE APPLICATION OF SEALANT.
9. ENCASE STORM DRAIN IN A MINIMUM OF (4) INCHES OF CEMENT SLURRY (CLSM II) PER UDACS SEC 2.22.02
10. PROTECT WATERLINE IN PLACE. WHEREVER A WATERLINE IS ABOVE A STORM DRAIN OR SEWER WHERE COMPACTION REQUIREMENTS UNDER A WATERLINE CANNOT BE MET, BACKFILL TRENCH WITH CLASS I/CLASS II CONTROLLED LOW STRENGTH MATERIAL (CLSM I) TO THE SPRINGLINE OF THE WATERLINE.

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
BLVD9-34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

BASIS OF BEARINGS

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

CONTRACTOR NOTE:

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

APPROVED FOR CONSTRUCTION
M. Dishari for DOA Meade
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. 121998 DATE: 7/30/13

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

Call before you Dig
Avoid cutting underground utility lines. It's easy.
Call 811 or 1-800-227-2600 and CLARK COUNTY TRAFFIC OPERATIONS (702-455-7541)

AVOID WORKING OVERHEAD POWER LINES. IT'S EASY!
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

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

H #50002
CLV # 107V5996

ENGINEER - STATE OF NEVADA
DANIEL J. KELLEY
No. 15015
PROFESSIONAL ENGINEER
7/30/13

REV	DATE	DESCRIPTION	BY	CHK	APP
1	7/30/13	REVISED TMH CALLOUT	DJK	MJF	DJK

PROJECT NO. 62023B-227
DESIGN: DJK
DRAWN: DJK
CHECK: MJF
PLOT DATE: 07-29-13
PLOT TIME: 11:23:06

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
2880 SAHARA WEST, SUITE 100, LAS VEGAS, NV 89102
T: 702.804.3000 F: 702.804.3299 GCWALLACE.COM
LAS VEGAS · MESQUITE

LAS VEGAS

F:\Projects\62023B-227\DWG\Production\P-227-PP.dwg
Daniel Kelley

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 28B FAR HILLS AVE RCB IMPROVEMENTS
SKY VISTA DRIVE TO DESERT FOOTHILLS DRIVE

PLAN AND PROFILE 10

DRAWING
P10
20 OF 25 SHTS

SUMMERLIN

SM

VILLAGE 23A/23B ALTA DRIVE RCB REGIONAL DRAINAGE IMPROVEMENTS

SID #808 PROJECT NO. 32
(SUMMERLIN REGIONAL PROJECT NUMBERS: R5, R6, AND R7)
APN # 137-22-000-006

2003

DEVELOPER

The Howard Hughes Corporation SM
An Affiliate of THE ROUSE COMPANY

THE HOWARD HUGHES CORPORATION
a Delaware corporation

10000 W. CHARLESTON, SUITE 200
LAS VEGAS, NEVADA 89135
OFFICE PHONE NO. (702) 791-4300
OFFICE FAX NO. (702) 791-4450

59776 63458 74253
RL

ENGINEER

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
OFFICE: (702) 804-2000, FAX: (702) 804-2299
SUMMERLIN OFFICE 10000 CHARLESTON BLVD., STE. 130
OFFICE: (702) 804-2160, FAX: (702) 804-2295

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

BERT A. HUGHES R.P.E. 10259 — 9/30/03 DATE

THE HOWARD HUGHES CORPORATION,
a Delaware corporation

By: LARRY BROCATO — 9/26/03 DATE

Title: EXECUTIVE VICE PRESIDENT

"APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND / OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND / OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARD. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA".

CHARLES KAJKOWSKI, Jr.: PE #4784 — 10/22/2003 DATE
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

CLV PLANNING DEPARTMENT
THIS PLAN MEETS THE APPLICABLE STANDARDS IF THE PLANNING AND DEVELOPMENT DEPARTMENT

M. MARGO WHEELER, AICP, CURRENT PLANNING MANAGER — 10/16/03 DATE

SPRINT NEVADA DISCLAIMER

NOTE:
THE AFFIXED SPRINT NEVADA APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SPRINT — REVIEWED BY — 9/30/03 DATE

NEVADA POWER COMPANY DISCLAIMER

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

CALL BEFORE YOU DIG: 1(800)227-2600

NEVADA POWER Co. — REVIEWED BY — 10-2-03 DATE

NO WATER IMPROVEMENTS IN THIS SET

LAS VEGAS VALLEY WATER DISTRICT — DATE — 10-2-03

CLV FIRE DEPARTMENT — DATE — 10-13-03

SOUTHWEST GAS CORP. — DATE

CITY OF LAS VEGAS DRAWING NO 3271/269 **SHEET 1 OF 32**

NEVADA STATE OF NEVADA PROFESSIONAL ENGINEER BERT A. HUGHES No. 10259 CIVIL — DATE 9/30/03

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	DGN. APP
2	5/16/03	PER CLV COMMENTS DTD 4/30/03	11-04-03	MWW		
1	7/16/03	REVISED PER CLV COMMENTS DTD 6/30/03	11-04-03	MWW		

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 09-25-03
PLOT TIME: 11:38:38
gpatterson

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
OFFICE: (702) 804-2000, FAX: (702) 804-2299
SUMMERLIN OFFICE 10000 CHARLESTON BLVD., STE. 130
OFFICE: (702) 804-2160, FAX: (702) 804-2295

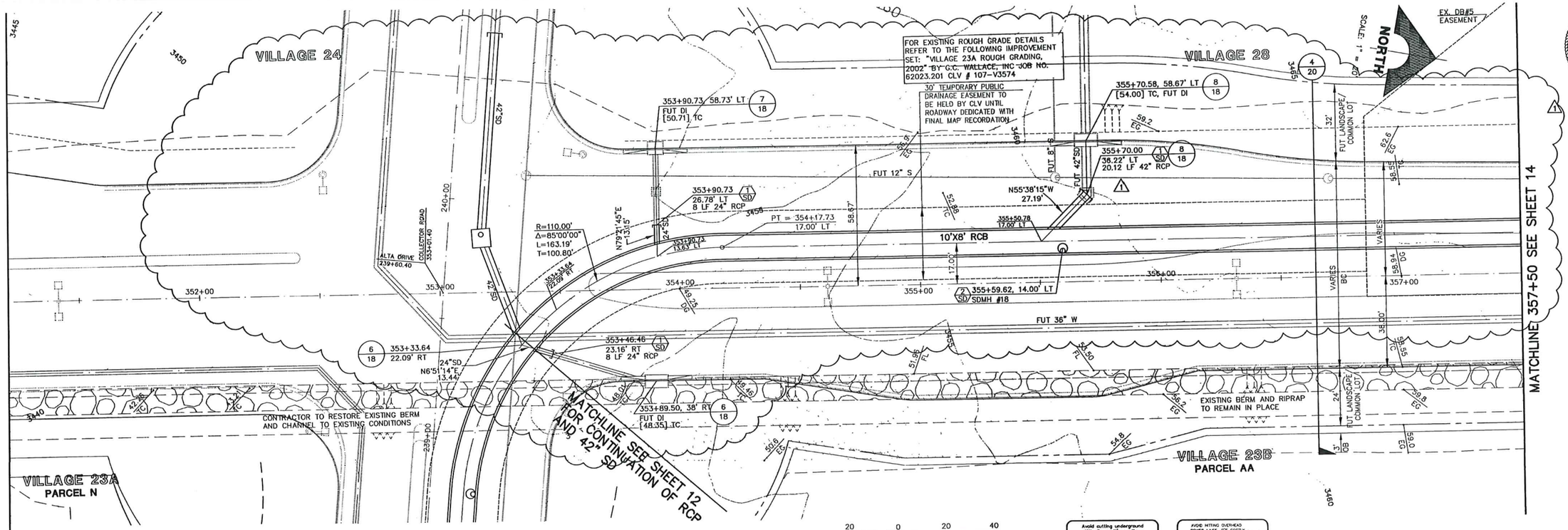
F:\V23\ALTA-RCB\DWG\MPS\ALSD001.dwg gpatterson

ISSUE DATE: 10/07/03 ISSUE FOR AGENCY APPROVAL

SUMMERLIN
VILL. 23A/23B ALTA DR. RCB REG. DRAINAGE IMPROVEMENTS
COVER SHEET

JOB NO. 62052.233

SHEET 1 OF 32 SHTS



COLLECTOR ROAD (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

20 0 20 40
SCALE FEET

REFER TO SHEET 2 FOR CONSTRUCTION NOTES

BENCHMARK

BM #	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. D368 3	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.	3246.71 (FEET)	989.599 (METERS)

BASIS OF BEARINGS

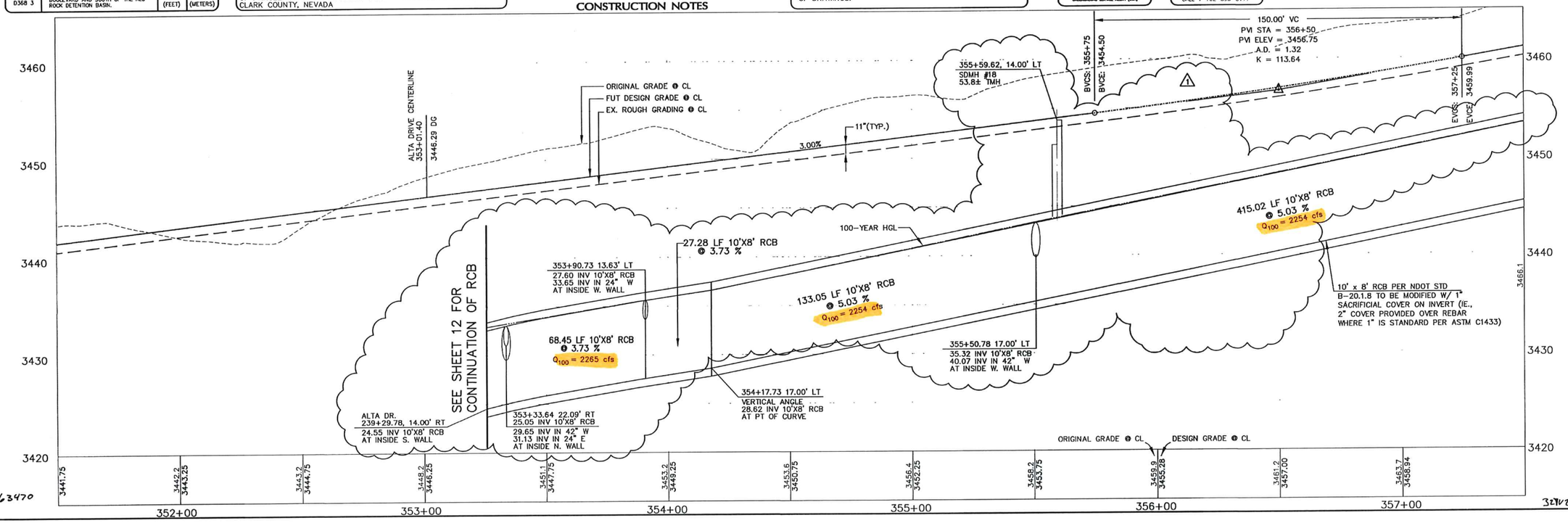
NORTH 89°45'05" EAST BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN BY MAP ON FILE IN FILE 91, PAGE 28 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM, PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

Avoid cutting underground utility lines. It's costly.
Call before you Dig.
1-800-227-2600
UNDERGROUND SERVICE ALERT (USA)

AVOID HITTING OVERHEAD POWER LINES IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
CALL 1-702-593-6111



63470

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
TELEPHONE: (702) 804-2000• FAX: (702) 804-2299

F:\V23\ALTA-RCB\DWG\MPS\ALSD5D13.dwg gpeterson

SUMMERLIN

VILL. 23A/23B ALTA DR. RCB REG. DRAINAGE IMPROVEMENTS

COLLECTOR ROAD PLAN AND PROFILE
STA 353+00 TO STA 357+50

JOB NO 62059.233

SHEET 13
13 OF 32 SHTS

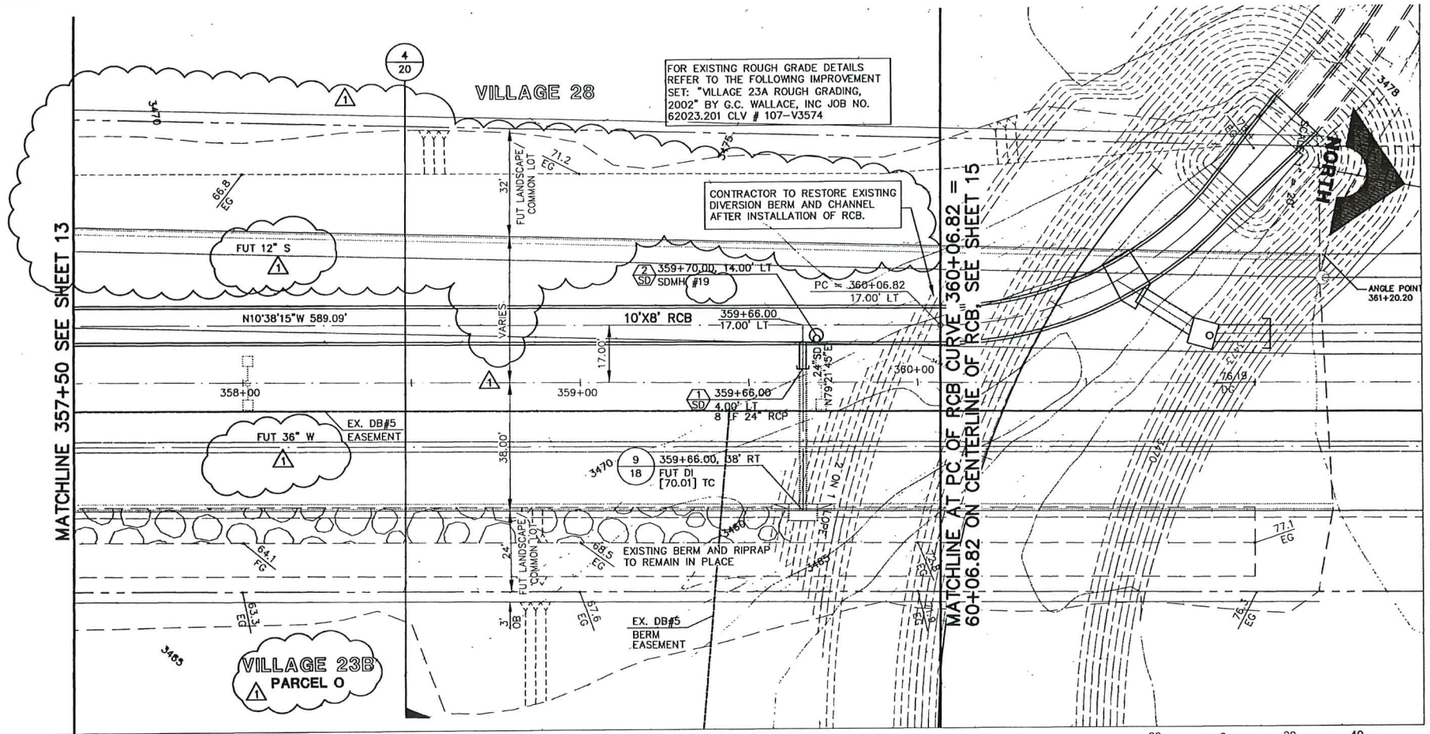
DESIGN: GBW/GTP
DRAWN: GTP
CHECK: BAH
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 01-18-04
PLOT TIME: 14:19:22

REV	DATE	DESCRIPTION
1	1/26/04	REVISED STORM DRAIN LATERALS, REVISED FUTURE SEWER AND TRANSITION WITH LINE

DATE:

BENJAMIN A. HOSKINS
No. 10254
REGISTERED ENGINEER
STATE OF NEVADA

DATE: 1/26/04 APPROVED BY: CITY ENGINEER



COLLECTOR ROAD (ROAD)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

20 0 20 40
SCALE FEET

REFER TO SHEET 2 FOR CONSTRUCTION NOTES

BENCHMARK

BM #	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. D368 3	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.	3246.71 (FEET)	989.599 (METERS)

BASIS OF BEARINGS

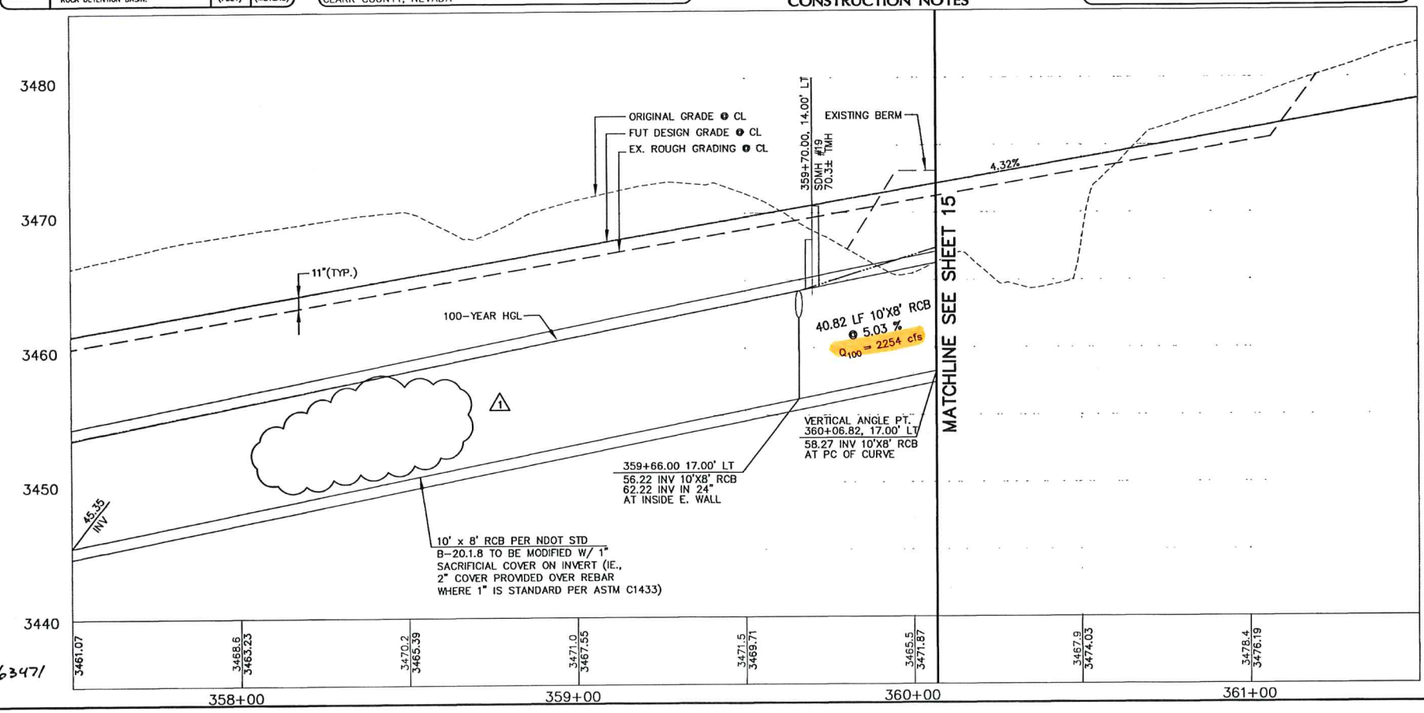
NORTH 89°45'05" EAST BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN BY MAP ON FILE IN FILE 91, PAGE 28 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

Avoid cutting underground utility lines. It's costly.
Call before you Dig.
1-800-227-2600
UNDERGROUND SERVICE ALERT (USA)

AVOID HITTING OVERHEAD POWER LINES IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
CALL 1-702-593-6111



63471

3274609

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
TELEPHONE: (702) 804-2000 • FAX: (702) 804-2299

F:\V23\ALTA-RCB\DWG\MPS\ALSD014.dwg

SUMMERLIN

VILL. 23A/23B ALTA DR. RCB REG. DRAINAGE IMPROVEMENTS

COLLECTOR ROAD PLAN AND PROFILE
STA 357+50 TO STA 360+06.82

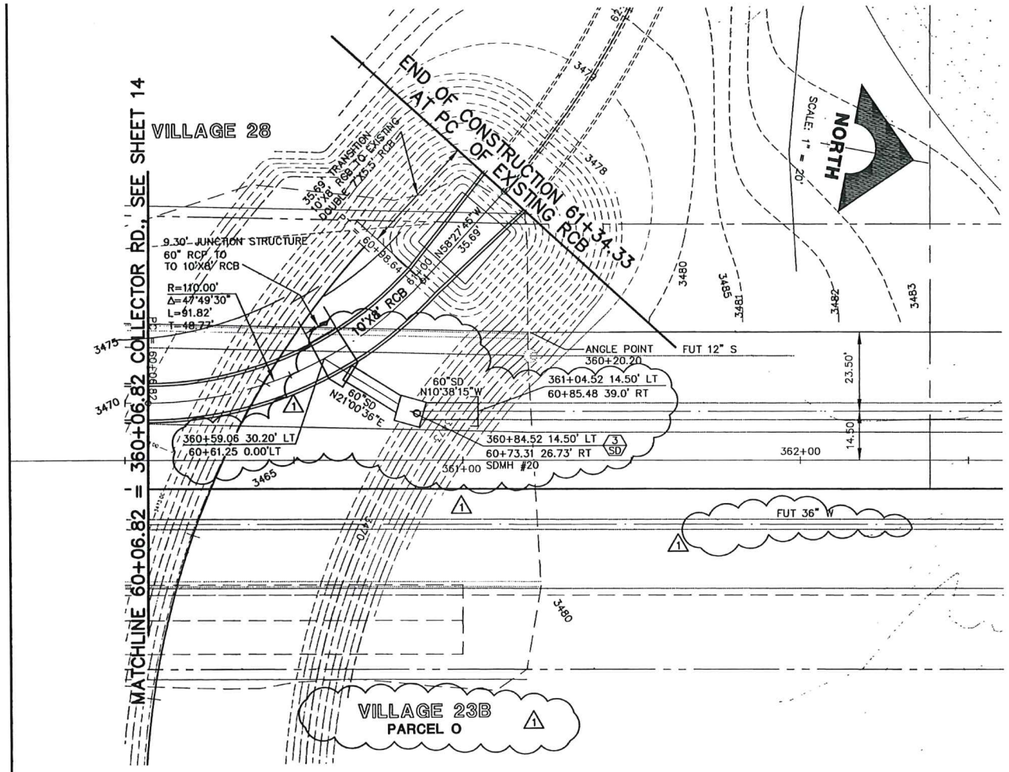
SHEET 14
14 OF 32 SHTS

DESIGN: GBW/GTP
DRAWN: GTP
CHECK: BAH
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 01-15-04
PLOT TIME: 14:18:11
gpaterson

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	CCRV. APP'S
1	1/15/03	REVISED FUTURE BEND AND TRANSITION WATER LINE	12-31-02		1/14/03	

DATE: 1/14/03

ENGINEER'S SEAL — STATE OF NEVADA — BRENT A. HUGHES — No. 10259 — CIVIL — 12/31/02



BENCHMARK			
BM #	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. 0368 3	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.	3246.71 (FEET)	989.599 (METERS)

BASIS OF BEARINGS

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

COLLECTOR ROAD (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

REFER TO SHEET 2 FOR CONSTRUCTION NOTES

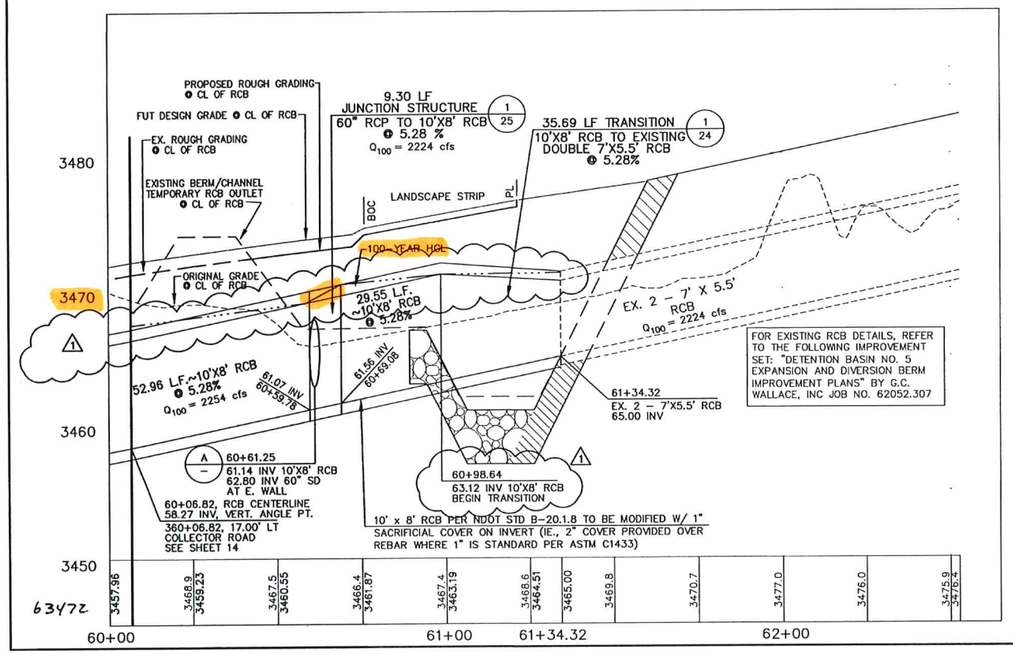
20 0 20 40
SCALE FEET

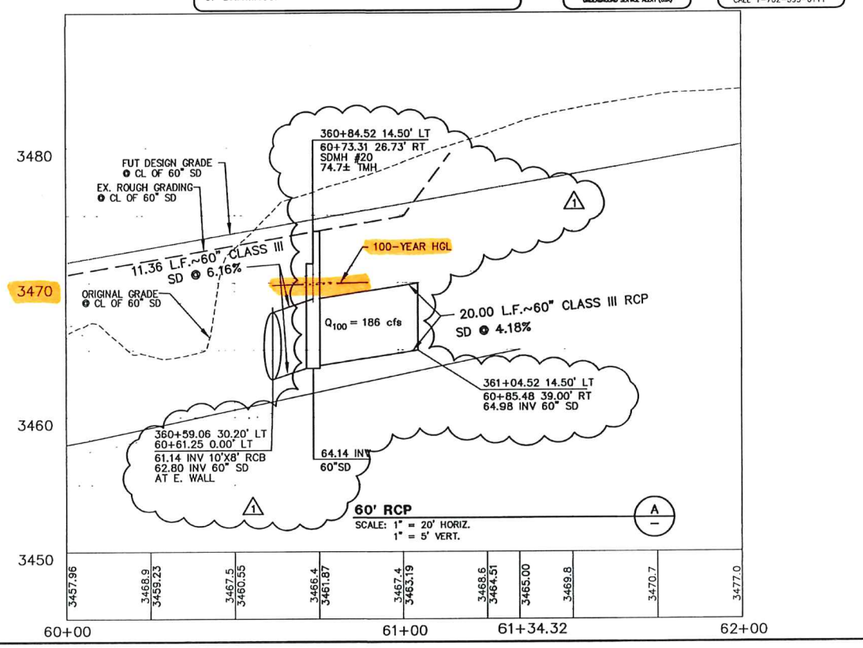
NOTE

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Avoid cutting underground utility lines. It's costly.
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1-800-227-2600
(NEVADA UNDERGROUND SERVICE ALERT (NAV))

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CALL 1-702-593-6111





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Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
TELEPHONE: (702) 804-2000 • FAX: (702) 804-2299

F:\V23\VALTA-RCB\DWG\MPS\ALSD-015.dwg

DESIGN: GDW/GTP
DRAWN: GTP
CHECK: BAH
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 01-16-04
PLOT TIME: 10:35:50

REV	DATE	DESCRIPTION
1	1/16/04	REVISED STORM DRAIN LABELS - RELEASE FOR BID

DATE:

SUMMERLIN
VILL. 23A/23B ALTA DR. RCB REG. DRAINAGE IMPROVEMENTS
CONNECTION TO DB#5 RCB PLAN AND PROFILE

SHEET 15
15 OF 32 SHTS

JOB NO. 62052.233

SUMMERLIN

SM

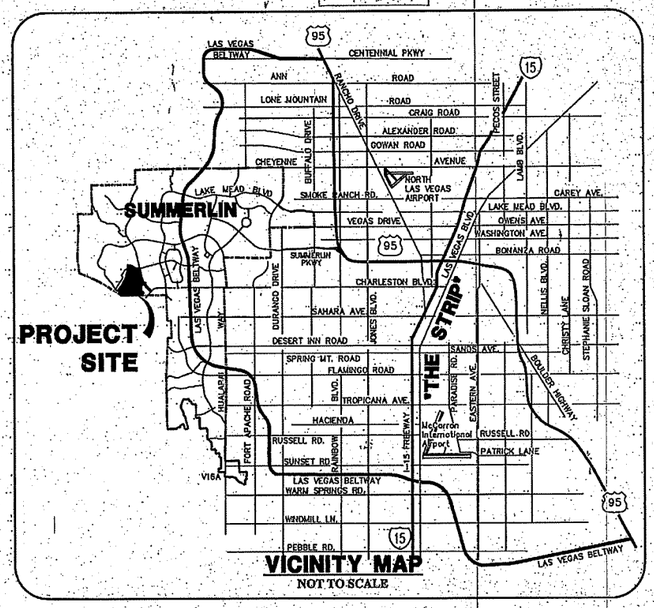
VILLAGE 23A/24
SKY VISTA IMPROVEMENT PLANS

FROM DESERT MOON DRIVE TO ALTA DRIVE
INCLUDING SUNCREEK ROAD

SID # 812 PROJECTS 6, 7, 9 & 11
#809 PROJECT 13 & #810 PROJECT 8

A.P.N. 137-33-801-001

2015



VICINITY MAP
NOT TO SCALE



NOT TO SCALE

OWNER/DEVELOPER

THE HOWARD HUGHES COMPANY, LLC
10801 W. CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NEVADA 89146
OFFICE PHONE NO. (702) 791-4300

ENGINEER

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BLVD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

Call before you Dig — Call 811 or 1-800-227-2600 — 1-702-433-8980
Call before you Dig Overhead — 1-702-227-2929
FAST — Call before you UnderGround — 1-702-432-5500

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

JOSHUA L. JOHNSON, P.E. 15789 — 2/6/15 DATE

ALLEN PAVELKA, PE # 9029 — 4-8-15 DATE
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-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 STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY, AREA NEVADA.

BUILDING AND SAFETY

CLV PLANNING DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE CITY OF LAS VEGAS PLANNING DEPARTMENT

NA
CHRIS KNIGHT, DIRECTOR BUILDING AND SAFETY — DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. #123258 — DATE 3/24/15
DRAWINGS: 1-3, 5-18, 20-40, & 43

THE HOWARD HUGHES COMPANY, LLC
KEVIN ORROCK — DATE 01/23/15
VICE PRESIDENT

APPROVED FOR CONSTRUCTION

CITY OF LAS VEGAS FIRE DEPARTMENT — DATE 3/10/15

UTILITY/AGENCY APPROVALS

COX COMMUNICATIONS LAS VEGAS, INC. — DATE 1-29-15

CENTRAL TELEPHONE CO., DBA CENTURYLINK — DATE 1-29-15

THE AFFIXED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

NV ENERGY — DATE 1-29-2015

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

NV ENERGY / TRANSMISSION ENGINEERING — DATE 1-30-15

SOUTHWEST GAS CORPORATION — DATE 2-5-15

SHEET INDEX

SHT #	DESCRIPTION
1	COVER SHEET
2	LEGEND AND ABBREVIATIONS
3	GENERAL NOTES
4	HORIZONTAL CONTROL
5	MASTER UTILITY PLAN – WATER
6	MASTER UTILITY PLAN – STORM DRAIN
7	MASTER UTILITY PLAN – SEWER
8	SKY VISTA DRIVE – ROADWAY PLAN AND PROFILE 1
9	SKY VISTA DRIVE – ROADWAY PLAN AND PROFILE 2
10	SKY VISTA DRIVE – ROADWAY PLAN AND PROFILE 3
11	SKY VISTA DRIVE – ROADWAY PLAN AND PROFILE 4
12	SKY VISTA DRIVE – ROADWAY PLAN AND PROFILE 5
13	SKY VISTA DRIVE – ROADWAY PLAN AND PROFILE 6
14	SKY VISTA DRIVE – ROADWAY PLAN AND PROFILE 7
15	SKY VISTA DRIVE – ROADWAY PLAN AND PROFILE 8
16	ALTA DRIVE – ROADWAY PLAN AND PROFILE 9
17	SUNCREEK ROAD – ROADWAY PLAN AND PROFILE 10
18	SUNCREEK ROAD – ROADWAY PLAN AND PROFILE 11
19	CONSTRUCTION DETAILS
20	SKY VISTA DRIVE – ROUGH GRADING PLAN 1
21	ALTA DRIVE – ROUGH GRADING PLAN 2
22	ALTA DRIVE – ROUGH GRADING PLAN 3
23	ALTA DRIVE – ROUGH GRADING PLAN 4
24	CROSSBRIDGE DRIVE – ROUGH GRADING PLAN 5
25	CS-1 BOUNDARY – ROUGH GRADING PLAN 6
26	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 1
27	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 2
28	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 3
29	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 4
30	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 5
31	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 6
32	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 7
33	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 8
34	SKY VISTA DRIVE – UTILITY PLAN AND PROFILE 9
35	ALTA DRIVE – ROADWAY PLAN AND PROFILE 10
36	SUNCREEK ROAD – UTILITY PLAN AND PROFILE 11
37	SUNCREEK ROAD – UTILITY PLAN AND PROFILE 12
38	LATERAL PROFILES 1
39	LATERAL PROFILES 2
40	LATERAL PROFILES 3
41	ROADWAY SECTIONS
42	UTILITY DETAILS 1
43	UTILITY DETAILS 2
44	GRADING DETAILS
45	SKY VISTA DRIVE – STRIPING AND SIGNAGE PLAN 1
46	SKY VISTA DRIVE – STRIPING AND SIGNAGE PLAN 2
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48	STREET LIGHT NOTES AND DETAILS
49	STREET LIGHT, MASTER CONDUIT AND ELECTRICAL PLAN 1
50	STREET LIGHT, MASTER CONDUIT AND ELECTRICAL PLAN 2
51	STREET LIGHT, MASTER CONDUIT AND ELECTRICAL PLAN 3
52	STRUCTURAL DETAILS 1
53	STRUCTURAL DETAILS 2
54	STRUCTURAL DETAILS 3

PROJECT NO. 6202224221

DESIGN	GCW
DRAWN	GCW
CHECK	
PLOT DATE	01-23-15
PLOT TIME	9:21

DATE	APP	DESCRIPTION
1/23/15	JLJ	PER CITY COMMENTS
2/6/15	JLJ	PER CITY COMMENTS
3/10/15	JLJ	PER CITY COMMENTS
3/24/15	JLJ	PER CITY COMMENTS

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T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

F:\Projects\6202224-221\DWG\Production\V24-221_01-CV.dwg
LAS VEGAS
Raul Brimmer

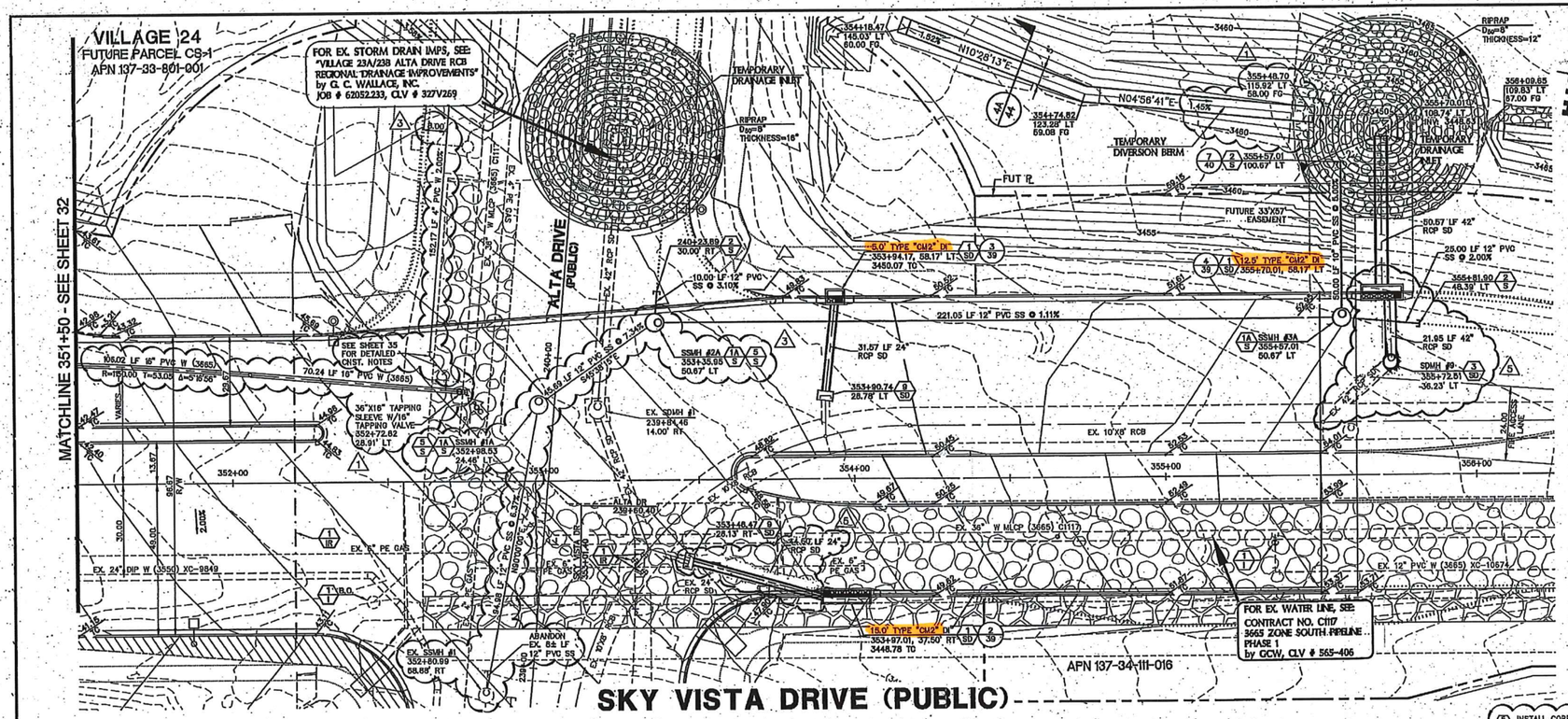
THE HOWARD HUGHES COMPANY, LLC

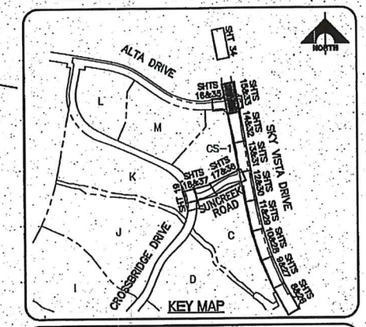
VILLAGE 23A/24 - SKY VISTA IMPROVEMENT PLANS
DESERT MOON DR TO ALTA DR INCLUDING SUNCREEK RD

COVER SHEET

SID NO. 812 PROJECT 6, 7, 9 AND 11
SID NO. 809 PROJECT 13 AND 810 PROJECT 8

T. 21 S. R. 59 E. M.D.B.&M.





IMPROVEMENT NOTES:

1. PROTECT IN PLACE AND ADJUST TO GRADE AS REQUIRED
2. RELOCATE WATER APPURTENANCES (VALVES TO REMAIN ACCESSIBLE AT ALL TIMES)

WATER CONSTRUCTION NOTES:

1. INSTALL FIRE HYDRANT PER UDACS PLT. NO. 39 & 40
2. INSTALL FIRE HYDRANT ASSEMBLY PER UDACS PLT. NO. 39 & 40
3. INSTALL TEE/CROSS PER UDACS PLT. NO. 31
4. INSTALL BEND PER UDACS PLT. NO. 31. (SEE PLAN FOR #)
5. INSTALL GATE VALVE PER UDACS PLT. NO. 30 AND 39
6. INSTALL REDUCER PER UDACS PLT. NO. 30
7. INSTALL CAP W/ 2" BLOW-OFF ASSEMBLY PER UDACS PLT. NO. 38
8. INSTALL 8" MANUAL BLOW OFF ASSY PER UDACS PLT. NO. 37
9. INSTALL 4" COMBINATION AIR VALVE PER UDACS PLT. NO. 38
10. INSTALL STEEL CASING PER UDACS PLATE 22 & 23
11. INSTALL VERT. 45° BEND PER UDACS PLT. NO. 31
12. REMOVE CAP & BLOWOFF PER UDACS PLT. NO. 38 AND CONNECT TO EXISTING WATER LINE

SEWER CONSTRUCTION NOTES:

1. INSTALL 48" SEWER MANHOLE
2. INSTALL 60" SEWER MANHOLE
3. INSTALL TEMPORARY PLUG AND CAP SEWER STUB
4. INSTALL ELASTOMERIC JOINT SEALANT AT ALL MANHOLE JOINTS
5. REMOVE EXISTING PLUG AND CONNECT TO EXISTING SEWER LINE

STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
2. NOT USED
3. INSTALL TYPE M MANHOLE PER USD DWG. NO. 406
4. INSTALL JUNCTION STRUCTURE
5. INSTALL PRECAST MANHOLE TEE W/ 48" DIA. RISER
6. INSTALL PRECAST MANHOLE TEE W/ 60" DIA. RISER
7. INSTALL PRECAST ELBOW (SEE PLAN FOR #)
8. INSTALL TEMPORARY PLUG AND CAP STORM DRAIN LINE
9. INSTALL CONCRETE COLLAR PER DETAIL 5 ON SHEET 42
10. REMOVE EXISTING PLUG AND CONNECT TO EXISTING STORM DRAIN LINE

IRRIGATION CONSTRUCTION NOTES:

1. BANK "A": 1-6" & 2-4" SCH 40 PVC PER DETAIL 1 ON SHEET 42
2. BANK "B" : 2-4" SCHD. 40 PVC PER DETAIL 2 ON SHEET 42

* CONTRACTOR TO VERIFY SIZE AND LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION

SCALE: 20 0 20 40 FEET

NOTE

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BASIS OF BEARINGS

SOUTH 89°47'23" EAST, BEING THE BEARING OF THE NORTH LINE OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN IN FILE 115, PAGE 100 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. D368	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.	3246.63 (FEET)	989.574 (METERS)

APPROVED FOR CONSTRUCTION

CITY OF LAS VEGAS FIRE DEPARTMENT — 3 12/17/15 DATE

APPROVED FOR CONSTRUCTION 1ST APPD. 03/24/15

3 LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER — DATE 12/22/15

PROJECT No. 123250

Call before you Dig — Avoid outages and injuries. It's free and it's easy. Call 811 — 1-800-227-2600 (NON CLARK COUNTY LOCATION) 1-702-486-4900

CALL BEFORE YOU DIG OVERHEAD — AVOID POWER OUTAGES AND POWER LINES ARE DEADLY — 1-702-227-2929

FAST — Call before you UnderGround — 1-702-482-6900 — FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

REV	DATE	DESCRIPTION	BY	AGEN. APP	DATE
1	8/19/14	REVISED STORM DRAIN STUBS	GCW		
2	10/27/14	ADDED SHO SHEETS TO REF. CORRECTED 4" AWAY LINE AND EASEMENT	GCW		
3	8/14/15	SECTION 10, REVISED SEWER & ALTA, REVISED 10" TO 12" @ SUNCREEK	GCW		
4	9/24/15	REVISED SSMH #3A, ADDED SSMH #3, REVISED 8" TO 10" @ SUNCREEK	GCW		
5	9/29/15	REVISED 48" SD LAT. SHAD PA, CURVE, RAILS, AND STREET SECTIONS	GCW	GCW	12/16/2015

PROJECT NO. 62024-221
DESIGN: GCW
DRAWN: GCW
CHECK: S.J.
PLOT DATE: 12-16-15
PLOT TIME: 10:38:30

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
3555 S. RAINBOW BLVD. LAS VEGAS NV 89146
P 702.804.2000 F 702.804.2299 GCWALLACE.COM

LAS VEGAS

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Paul Brennan

THE HOWARD HUGHES COMPANY, LLC

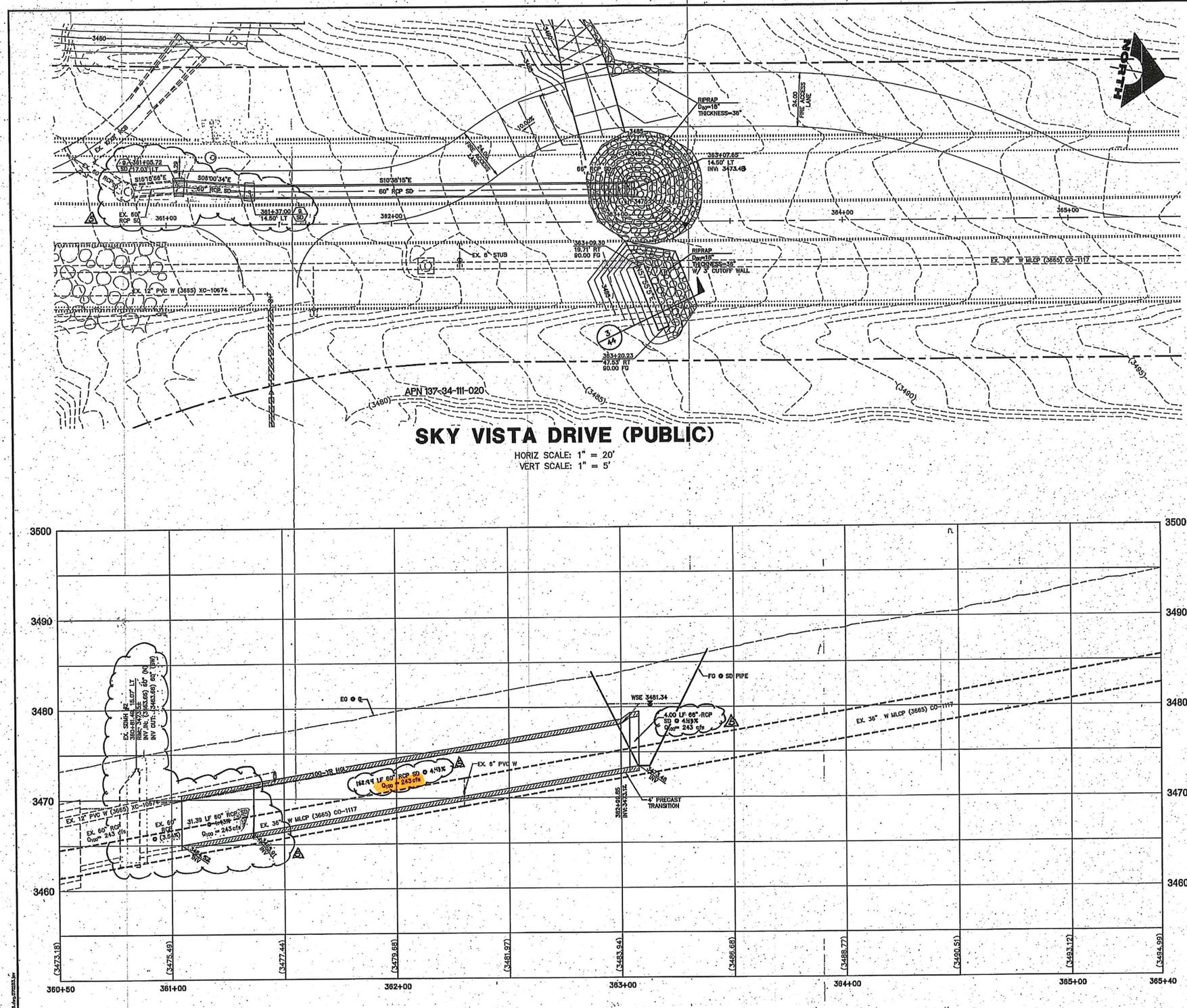
VILLAGE 23A/24 - SKY VISTA IMPROVEMENT PLANS
DESERT MOON DR TO ALTA DR INCLUDING SUNCREEK RD

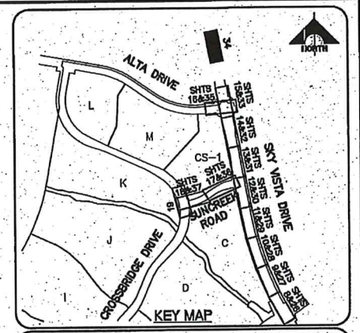
SKY VISTA DRIVE
UTILITY PLAN AND PROFILE 8

SID NO. 862 PROJECT 5 AND 12
SID NO. 809 PROJECT 18 AND 800 PROJECT 8

DRAWING 33
33 OF 54 SHTS

H#: 57159 CLV#: 107V6423





IMPROVEMENT NOTES:

(1) PROTECT IN PLACE AND ADJUST TO GRADE AS REQUIRED
(2) RELOCATE WATER APPURTENANCES (VALVES TO REMAIN ACCESSIBLE AT ALL TIMES)

WATER CONSTRUCTION NOTES:

(W1) INSTALL FIRE HYDRANT PER UDACS PLT. NO. 39 & 40
(W2) INSTALL FIRE HYDRANT ASSEMBLY PER UDACS PLT. NO. 39 & 40
(W3) INSTALL TEE/CROSS PER UDACS PLT. NO. 31
(W4) INSTALL BEND PER UDACS PLT. NO. 31. (SEE PLAN FOR Δ)
(W5) INSTALL GATE VALVE PER UDACS PLT. NO. 30 AND 39
(W6) INSTALL REDUCER PER UDACS PLT. NO. 30
(W7) INSTALL CAP W/ 2" BLOW-OFF ASSEMBLY PER UDACS PLT. NO. 38
(W8) INSTALL 6" MANUAL BLOW OFF ASSY PER UDACS PLT. NO. 37
(W9) INSTALL 4" COMBINATION AIR VALVE PER UDACS PLT. NO. 38
(W10) INSTALL STEEL CASING PER UDACS PLATE 22 & 23
(W11) INSTALL VERT. 45° BEND PER UDACS PLT. NO. 31
(W12) REMOVE CAP & BLOWOFF PER UDACS PLT. NO. 38 AND CONNECT TO EXISTING WATER LINE

SEWER CONSTRUCTION NOTES:

(S1) INSTALL 48" SEWER MANHOLE
(S2) INSTALL 60" SEWER MANHOLE
(S3) INSTALL TEMPORARY PLUG AND CAP SEWER STUB
(S4) INSTALL ELASTOMERIC JOINT SEALANT AT ALL MANHOLE JOINTS
(S5) REMOVE EXISTING PLUG AND CONNECT TO EXISTING SEWER LINE

STORM DRAIN CONSTRUCTION NOTES:

(SD1) INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
(SD2) NOT USED
(SD3) INSTALL TYPE III MANHOLE PER USD DWG. NO. 406
(SD4) INSTALL JUNCTION STRUCTURE
(SD5) INSTALL PRECAST MANHOLE TEE W/ 48" DIA. RISER
(SD6) INSTALL PRECAST MANHOLE TEE W/ 60" DIA. RISER
(SD7) INSTALL PRECAST ELBOW (SEE PLAN FOR Δ)
(SD8) INSTALL TEMPORARY PLUG AND CAP STORM DRAIN LINE
(SD9) INSTALL CONCRETE COLLAR PER DETAIL 5 ON SHEET 42
(SD10) REMOVE EXISTING PLUG AND CONNECT TO EXISTING STORM DRAIN LINE

IRRIGATION CONSTRUCTION NOTES:

(I1) BANK "A": 1-6" & 2-4" SCH 40 PVC PER DETAIL 1 ON SHEET 42
(I2) BANK "B": 2-4" SCHD. 40 PVC PER DETAIL 2 ON SHEET 42

* CONTRACTOR TO VERIFY SIZE AND LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION

40 0 40 80
SCALE FEET

NOTE

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BASIS OF BEARINGS

SOUTH 89°47'23" EAST, BEING THE BEARING OF THE NORTH LINE OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN IN FILE 118, PAGE 100 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. D368	U.S.G. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.	3246.63 (FEET)	989.574 (METERS)

APPROVED FOR CONSTRUCTION

CITY OF LAS VEGAS FIRE DEPARTMENT — DATE 3/23/15

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER — DATE: 3/24/15
PROJECT NO. #123259

Call before you Dig — Call 811 — 1-800-227-2600 OR CLARK COUNTY BOOK HOLDERS 1-702-455-6980

1-702-227-2929

FAST — Call before you UnderGround — 1-702-432-5300

HE57159 107V6423

UDR

ENGINEER - STATE OF NEVADA — JOSHUA M. WALLACE — No. 15719 — DATE: 3/19/2015

REV	DATE	DESCRIPTION	DRAWN APP	DATE	CHECK APP	DATE
A	02/26/15	REVISED TIE-IN TO EXISTING 66" STORM DRAIN ON SKY VISTA			GCW	3/19/2015

PROJECT NO. 62024-221
DESIGN: GCW
DRAWN: GCW
CHECK: JJJ
PLOT DATE: 03-19-15
PLOT TIME: 14:34:54

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
7710 S. JONES BLVD. LAS VEGAS, NEVADA 89139
T: 702.263.3000 - F: 702.836.7299 - GCWALLACE.COM
LAS VEGAS

F:\Projects\600\62024-221\Dwg\Production\024-221_34-37-UT.dwg
Paul Brennard

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23A/24 - SKY VISTA IMPROVEMENT PLANS
DESERT MOON DR TO ALTA DR INCLUDING SUNCREEK RD

SKY VISTA DRIVE
UTILITY PLAN AND PROFILE 9

DRAWING 34
34 OF 54 SHTS

SID NO. 812 PROJECT 5 AND 12
SID NO. 809 PROJECT 13 AND 810 PROJECT 8

HTE: 100→00000

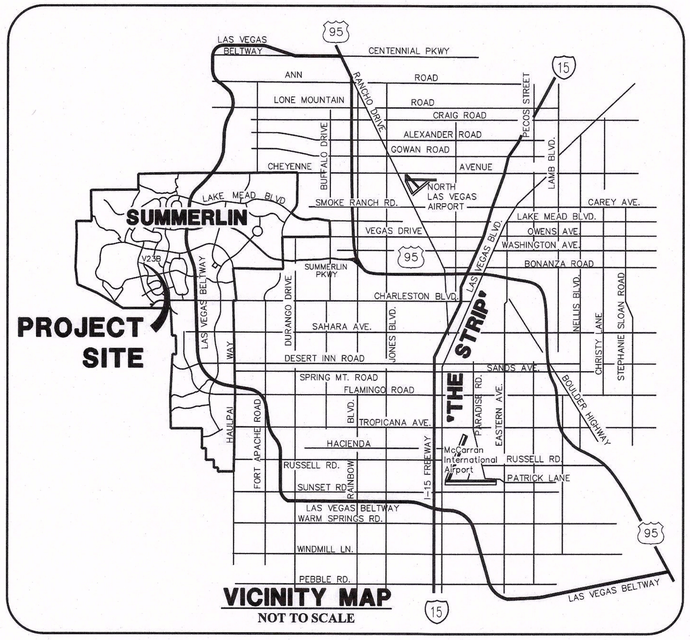
SUMMERLIN

SM

VILLAGE 23B
SKY VISTA DRIVE IMPROVEMENTS
ALTA DRIVE TO FAR HILLS AVENUE
2018

A.P.N. 137-22-000-017 (PORTION), 137-34-111-010, 137-34-111-011, 137-27-410-002, 137-27-310-002, 137-27-210-004

SID NO. 810 PROJECTS 8A, 8B, AND 8C



VICINITY MAP
NOT TO SCALE

APPROVED FOR CONSTRUCTION

CITY OF LAS VEGAS FIRE DEPARTMENT — DATE

CLV BUILDING AND SAFETY DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE CITY OF LAS VEGAS PLANNING DEPARTMENT

CITY OF LAS VEGAS PLANNING DEPARTMENT — DATE

THE HOWARD HUGHES COMPANY, LLC

KEVIN ORROCK — DATE
TITLE: VICE PRESIDENT

ALLEN PAVELKA, PE, PE# 9029 — DATE
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-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 STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXXX DATE: _____
DRAWINGS

UTILITY/AGENCY APPROVALS

COX COMMUNICATIONS LAS VEGAS, INC. — DATE

CENTRAL TELEPHONE CO. DBA CENTURYLINK — DATE

THE AFFIXED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

NV ENERGY — DATE

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

NV ENERGY – TRANSMISSION ENGINEERING — DATE

SOUTHWEST GAS CORP. — DATE

OWNER/DEVELOPER

THE HOWARD HUGHES COMPANY, LLC
10801 W. CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NEVADA 89146
OFFICE PHONE NO. (702) 791-4300

ENGINEER

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-227-2600
CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-6000

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

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

CLV #

PROFESSIONAL ENGINEER - STATE OF NEVADA
MICHAEL FANG
EXP. 06/30/2019
CIVIL
No. 24464
4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	CGW APP

DATE: 4/11/18

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 12:10:16

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
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gcwengineering.com

F:\Projects\600\62023B-240\DWG\Production\240-01.dwg
Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

COVER SHEET

DRAWING
1
1 OF 43 SHTS

LEGEND

- PROPOSED UTILITIES
- EXISTING UTILITIES
- FUTURE UTILITIES
- SECTION LINE
- EASEMENT LINE
- RIGHT-OF-WAY LINE
- PROPERTY LINE
- CENTERLINE
- 100 YR HYDRAULIC GRADE LINE (ULT)
- 100 YR HYDRAULIC GRADE LINE (INT)
- PROPOSED UTILITY (BY OTHERS)
- PROPOSED SEWER LINE W/MH
- FUTURE SEWER LINE W/MH
- 16" SS — EXISTING SEWER LINE W/MH
- 4" W — EXISTING WATER LINE & GATE VALVE
- 6" – 12" PVC WTR — PROPOSED WATER LINE & GATE VALVE
- GREATER THAN 12" PVC WTR — PROPOSED WATER LINE & GATE VALVE
- FUT WTR — FUTURE WATER LINE & GATE VALVE
- 2" G — EXISTING GAS LINE
- 2–6" E — EXISTING UNDERGROUND ELECTRICAL
- CATV — EXISTING CABLE TV
- TEL — EXISTING TELEPHONE
- OHP — EXISTING OVERHEAD AND POWER POLES
- PROPOSED STORM DRAIN W/MH
- 6'X6" SD — EXISTING STORM DRAIN W/MH
- 6'X6" SD — FUTURE STORM DRAIN W/MH
- EXISTING SIDEWALK AND RAMP
- CONSTRUCT CURB DEPRESSION FOR FUTURE HANDICAP RAMP
- VIEW FENCE
- NEW ABANDONED PIPE
- EXISTING ABANDONMENT
- SAWCUT
- STEEL CASING
- APPROXIMATE PAVEMENT RESTORATION
- TO BE ABANDONED PROFILE HATCH
- WATER STUB WITH BLOW-OFF
- FUTURE WATER STUB WITH BLOW-OFF
- SEWER STUB WITH CAP
- FUTURE SEWER STUB WITH CAP
- EDGE OF PAVEMENT (OUTSIDE EDGE)
- CUT LIMIT LINE
- FILL LIMIT LINE

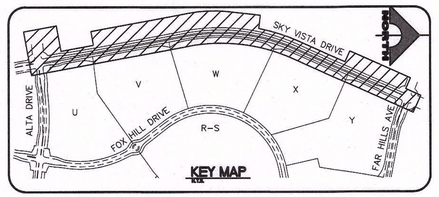
- 1 / CD1 — DRAWING NUMBER FOR DETAIL W/ REF. TO THE SHEET WHERE IT IS SHOWN
- BENCHMARK
- POTHOLE LOCATION
- EXISTING NPC RS-100
- EXISTING DROP INLET
- FUTURE DROP INLET
- EXISTING GATE VALVE
- FUTURE GATE VALVE
- EXISTING WATER METER
- PROPOSED WATER FITTINGS
- PROPOSED GATE VALVE
- PROPOSED WATER METER
- EXISTING TRAFFIC SIGNAL PULL BOX
- EXISTING TELEPHONE MANHOLE
- EXISTING POWER POLE
- EXISTING ELEC MARKER
- EXISTING TRAFFIC SIGNAL
- EXISTING FIRE HYDRANT
- FUTURE FIRE HYDRANT
- EXISTING UTILITY BOX
- EXISTING METER BOX
- EXISTING POLE
- 3005 — PROPOSED CONTOUR
- (3005) — EXISTING CONTOUR
- 60.50 TC — SPOT ELEVATION
- (60.50) TC — EXISTING SPOT ELEVATION
- 1.00% — ROAD SLOPE
- EXISTING CLARK COUNTY STREET LIGHT (STLT)
- EXISTING SUMMERLIN STREET LIGHT (STLT)
- PROPOSED SUMMERLIN STREET LIGHT (STLT)
- PROPOSED TRANSFORMER PAD
- PROPOSED SERVICE PEDESTAL
- PROPOSED PULLBOX
- TOP SLOPE / TOE SLOPE — 3:1 SLOPE UNLESS OTHERWISE NOTED ON PLAN
- RETAINING WALL
- STORM DRAIN MANHOLE (SEE PLAN FOR SIZE AND TYPE)

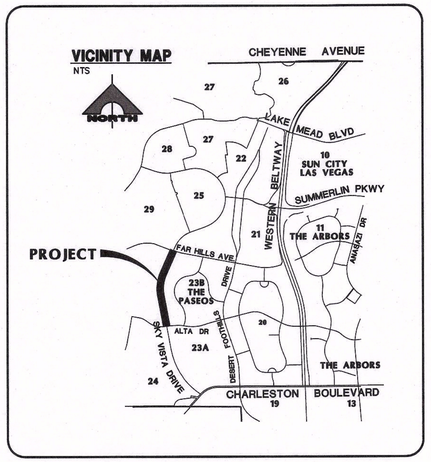
ABBREVIATIONS

A	AIR	FH	FIRE HYDRANT	R, RAD	RADIAL, RADIUS
AC	ASPHALT CONCRETE, ACRE	FL	FLOW LINE	R, RT	RIGHT
ACP	ASBESTOS CEMENT PIPE	FO	FIBER OPTIC	RCB	REINFORCED CONCRETE BOX
ADD'L	ADDITIONAL	FRP	FIBERGLASS REINFORCED PLASTIC	RCP	REINFORCED CONCRETE PIPE
AP	ANGLE POINT	FS	FINISH SURFACE	RD	ROAD
APN	ASSESSOR'S PARCEL NUMBER	FT	FOOT/FEET	RDWY	ROADWAY
APPROX	APPROXIMATELY	FTG	FOOTING	REC	RECTANGULAR
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS	FUT	FUTURE	REF	REFERENCE
		G	GAS	REINF	REINFORCED
		GA	GAGE, GUY ANCHOR	REQD	REQUIRED
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	GB	GRADE BREAK	RIM	TOP OF RIM ELEVATION
		GND	GROUND	RND	ROUND
AVE	AVENUE	GRD	GRADE, GROUND	ROW,R/W	RIGHT OF WAY
AVAR	AIR VALVE, AIR RELEASE ASSEMBLY	H, HGT	HEIGHT	RP	RADIUS POINT
		HDWL	HEADWALL	RPM	RAISED PAVEMENT MARKERS
AWWA	AMERICAN WATER WORKS ASSOCIATION	HGL	HYDRAULIC GRADE LINE	RSGV	RESILIENT SEAT GATE VALVE
		HORIZ	HORIZONTAL	S	SEWER, SOUTH
BC	BACK OF CURB	HP	HIGH POINT, HIGH PRESSURE	SCH	SCHEDULE
BCR	BEGIN CURB RETURN	HPS	HIGH PRESSURE SODIUM	SD	STORM DRAIN
BLM	BUREAU OF LAND MANAGEMENT	IBC	INTERNATIONAL BUILDING CODE	SDMH	STORM DRAIN MANHOLE
BLVD	BOULEVARD	INV	INVERT	SECT	SECTION
BM	BENCHMARK	INT	INTERIM	SF	SQUARE FOOT/FEET
BO	BLOW-OFF	JT	JOINT	SHLDR	SHOULDER
BVCE	BEGIN VERTICAL CURVE ELEVATION	L	LENGTH	SHT	SHEET
BVCS	BEGIN VERTICAL CURVE STATION	L, LT	LEFT	SIS	SUMMERLIN IMPROVEMENT STANDARDS
BVP	BEGIN VERTICAL POINT	LF	LINEAR FEET		
BW	BACK OF SIDEWALK	LIP	LIP OF GUTTER	SL	STREET LIGHT
C, ℄	CENTERLINE	LN	LANE	SP	SERVICE POINT
C&G	CURB AND GUTTER	LP	LOW POINT, LIGHT POLE	SQ	SQUARE
CATV	UNDERGROUND CABLE TV	LSCP	LANDSCAPE	SR	SEWER RECLAIM MAIN
CCBM	CLARK COUNTY BENCH MARK	LVVWD	LAS VEGAS VALLEY WATER DISTRICT	SS	SANITARY SEWER
CCPW	CLARK COUNTY PUBLIC WORKS	MAX	MAXIMUM	SSMH	SANITARY SEWER MANHOLE
CCTV	CLOSED-CIRCUIT TELEVISION	MH	MANHOLE	STA	STATION
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT	MIN	MINIMUM	ST	STREET
		MLCP	MORTAR LINED AND COATED PIPE	STD	STANDARD
CFS	CUBIC FEET PER SECOND	MLCTWP	MORTAR LINED & COATED	STL	STEEL
CIP	CAPITAL IMPROVEMENTS PROJECT, CORRUGATED IRON PIPE		TAPE WRAPPED PIPE	STRUCT	STRUCTURE
		MP	MESA PARK	SV	SKY VISTA DRIVE
CIPM	CURED-IN-PLACE MANHOLE	MOD	MODIFY/MODIFIED	SVZ	SIGHT VISIBILITY ZONE
CIPP	CURED-IN-PLACE PIPE	MON	MONUMENT	SW	SIDEWALK
CIR	CIRCLE	MPH	MILES PER HOUR	SWG	SOUTHWEST GAS
CLR	CLEAR OR CLEARANCE	N	NORTH	T	TELEPHONE OR TOP
CLSM	CONTROLLED LOW STRENGTH MATERIAL	NAP	NOT A PART	TAN	TANGENT
		NDOT	NEVADA DEPARTMENT OF TRANSPORTATION	TB	TOP OF BERM
CLV	CITY OF LAS VEGAS			TC	TOP OF CURB
CMP	CORRUGATED METAL PIPE	NO	NUMBER	TCE	TEMPORARY CONSTRUCTION ESMT
CMU	CONCRETE MASONRY UNIT	NOSHA	STATE OF NEVADA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	TEL,TELE	TELEPHONE
CNLV	CITY OF NORTH LAS VEGAS			TEMP	TEMPORARY
CO	CLEANOUT			TF	TOP OF FOOTING
CONC	CONCRETE	NPC	NEVADA POWER COMPANY	TG	TOP OF GRATE
COND	CONDUIT	NTS	NOT TO SCALE	TMH	TOP OF MANHOLE
CONST	CONSTRUCT OR CONSTRUCTION	NVE	NV ENERGY	TOP	TOP OF PIPE
COORD	COORDINATE	OB	OVERBUILD	TP	TELEPHONE POLE
COR	CORNER	OC	ON CENTER	TRANS	TRANSITION
CPEP	CORRUGATED POLYETHELYNE PIPE	OHC	OVERHEAD COX COMMUNICATION	TRW	TOP OF RETAINING WALL
CT	COURT	OHP	OVERHEAD POWER LINE	TS	TEST STATION
CY	CUBIC YARD(S)	P	POWER LINE	TS&V	TAPPING SLEEVE & VALVE
Δ	DELTA	PB	PULL BOX	TW	TOP OF WALL
DBL	DOUBLE	PBS	PLANTMIX BITUMINOUS SURFACE	TYP,(TYP)	TYPICAL
DCS\ DCSWCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEM (LATEST EDITION)	PC	POINT OF CURVE, PRESSURE CLASS	UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS (LATEST EDITION)
		PCC	POINT OF COMPOUND CURVE		
		PE	PROJECT ENGINEER OR POLYETHYLENE	UG	UNDERGROUND
DEFL	DEFLECTION	PED	PEDESTRIAN	ULT	ULTIMATE
DG	DESIGN GRADE	PGL	PROFILE GRADE LINE	USD, USDCCA, CCAUSD	UNIFORM STD. DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS CLARK COUNTY AREA, NEVADA (LATEST EDITION)
DI/D.I.	DROP INLET	PH	POTHOLE		
DIA, ⌀	DIAMETER	PI	POINT OF INTERSECTION		
DIP	DUCTILE IRON PIPE	PIV	POST INDICATOR VALVE		
DIST	DISTANCE	PL	PROPERTY LINE		
DR	DRIVE	PLCP	POLYURETHANE LINED AND COATED STEEL PIPE		
DS	DOWNSPOUT				
DTL	DETAIL	PMF	PAVEMENT MARKING FILM	UT	UNDERGROUND TELEPHONE
DW	DRIVEWAY	POB	POINT OF BEGINNING	VAR	VARIABLE/VARIES
DWG	DRAWING	POC	POINT ON CURVE, POINT OF CONNECTION	VC	VERTICAL CURVE
E	EAST			VCP	VITRIFIED CLAY PIPE
ECR	END CURB RETURN	POT	POINT ON TANGENT	VERT	VERTICAL
ELE,ELEC	ELECTRICAL	PP	POWER POLE	VG	VALLEY GUTTER
ELEV	ELEVATION	PROP	PROPOSED	VOL	VOLUME
EP, EOP	EDGE OF PAVEMENT	PRC	POINT OF REVERSE CURVE	W	WATER, WEST
ESMT	EASEMENT	PRVC	POINT OF REVERSE VERTICAL CURVE	W/	WITH
EVC	END VERTICAL CURVE			WMH	WATER MANHOLE
EVP	END VERTICAL POINT	PSI	POUNDS PER SQUARE INCH	WS	WATER SUPPLY
EXIST,EX	EXISTING	PT	POINT OF TANGENCY	WT	WEIGHT
EXP	EXPANSION JOINT	PVC	POLYVINYL CHLORIDE	WTR	WATER
FC	FACE OF CURB	PVI	POINT OF VERTICAL INTERSECTION	XING	CROSSING
FF, FFE	FINISH FLOOR ELEVATION	PVMT	PAVEMENT	YD	YARD, YARD DRAIN
FG	FINISH GRADE	PZ	PRESSURE ZONE	Z	PRESSURE ZONE

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CAUTION: HIGH PRESSURE GAS!!

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

SOUTHWEST GAS CONSTRUCTION NOTES

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

LOCATION

LYING WITHIN SECTIONS 27 & 34 TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

BASIS OF BEARINGS

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.

BENCHMARK

DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)
CLV BM No. 5LV09 34NE6		

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE: _____

CLV #

STATE OF NEVADA — ENGINEER — MICHAEL TANG — Exp. 06/30/2019 — CIVIL — No. 21484 — PROFESSIONAL
DATE: 4/11/18

REV	DATE	DESCRIPTION
		AGENCY REVIEW - NOT FOR CONSTRUCTION
	DATE	AGEN APP
	DATE	GCW APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JJJ
PLOT DATE: 04-11-18
PLOT TIME: 12:10:24

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\600\62023B-240\DWG\Production\240-G2.dwg
Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

LEGEND AND ABBREVIATIONS

DRAWING 2
2 OF 43 SHTS

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" 'S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVWD 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 STREETLIGHT NOTES

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

REVISED 06/28/16 (LD VERSION)

STORMWATER RUNOFF MANAGEMENT

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

FOR TRENCHES 4-FEET WIDE AND GREATER:

CONTRACTOR MUST SUBMIT SHOP DRAWINGS TO LVWD ENGINEERING SERVICES BEFORE CONSTRUCTION TO SHOW HOW WATERLINES SPANNING A TRENCH WILL BE SUPPORTED DURING EXCAVATION AND BACKFILL.

SUPPORTED PIPELINES MAY BE EXPOSED FOR NO LONGER THAN 90 DAYS MAXIMUM. IF THE PIPE WILL BE EXPOSED FOR MORE THAN 90 DAYS, PIPE MUST BE RELOCATED PER APPROVED PLANS.

IF THE PIPE MATERIAL IS ACP, REPLACE FROM COUPLING TO COUPLING WITH DUCTILE IRON PIPE.

FLOOD ZONE NOTE

NO PORTION OF THE SITE FALLS WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA. SITE LOCATED ON PANEL 32003C2150E, DATED SEPTEMBER 27, 2002, TO REFLECT A LOMR. THIS PANEL SHOWS THAT THE PROJECT IS LOCATED WITHIN A ZONE X AND NOT LOCATED WITHIN A FEMA DESIGNATED 100-YEAR ZONE A OR SPECIAL FLOOD HAZARD AREA.

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

- 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 HIM OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 4/15/10

LAS VEGAS VALLEY WATER DISTRICT
LVWD PROJECT
(REVISED 08/01/2017)

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVWD COMMUNICATION SUPPORT CENTER (258–7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVWD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVWD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS
9. ALL WATER FACILITIES AND APPURTENANCES SHALL BE DISINFECTED, PRESSURE TESTED, AND HAVE AN ACCEPTABLE PASSING HEALTH WATER SAMPLE OBTAINED, PRIOR TO OPERATION AND USE.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVWD CENTRAL STORES. TELEPHONE 258–3152 OR 258–3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVWD APPROVED PRODUCTS LIST FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS BY SUBMITTING SHOP DRAWINGS.
13. TELEPHONE "CALL BEFORE YOU DIG" AT 811 OR 1–800–227–2600
14. THE INSTALLATION OF LVVWD MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORMED STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR ON THE STREET SURFACE.

    ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.
15. NO LEAD COMPLIANCE NOTE:
    TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORK BRASS PRODUCTS PORPOSED TO BE RELOCATED, OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEADED PRODUCT MAY NOT BE REUSED.

CONDITIONAL APPROVAL OF VALVED OUTLET (6" AND LARGER)

THE WATER PLANS SHOW ONE OR MORE VALVED OUTLETS EXTENDING OUT OF PAVED AREAS. INSTALLATION OF THESE OUTLETS IS ACCEPTABLE. HOWEVER, IF THE OUTLETS ARE INCORRECTLY LOCATED OR NOT USED FOR ANY REASON WHEN THE PROPERTY IS ACTUALLY DEVELOPED, THE DEVELOPER SHALL ABANDON THE OUTLETS AT THE CONNECTION TO THE ACTIVE MAIN IN ACCORDANCE WITH THE DISTRICT'S STANDARDS AND AT THE DEVELOPER'S EXPENSE. APPROVAL OF THE VALVED OUTLET DOES NOT PROVIDE OR IMPLY A WATER COMMITMENT.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. _____ FIRST APPROVAL DATE: _____

CITY OF LAS VEGAS TRAFFIC SIGNAL NOTES

1. ALL WORK PERFORMED ON ANY TRAFFIC SIGNAL COMPONENT MUST BE UNDER THE DIRECT ON-SITE SUPERVISION OF AN IMSA CERTIFIED TECHNICIAN. THE LEVEL OF CERTIFICATION REQUIRED SHALL BE LEVEL II.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO ALL EXISTING UTILITIES. THE LOCATIONS OF UNDERGROUND UTILITIES AS SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES TO VERIFY IN THE FIELD THE LOCATIONS OF THEIR INSTALLATIONS 72 HOURS PRIOR TO CONSTRUCTION.

    CALL–BEFORE–YOU–OVERHEAD1–702–227–2929
    CALL–BEFORE–YOU–DIG 1–800–227–2600
    STREETLIGHTS 1–702–229–6331
    F.A.S.T. 1–702–432–5300
3. ALL TRAFFIC SIGNAL INSTALLATIONS SHALL CONFORM TO THE UNIFORM STANDARD DRAWINGS SPECIFICATIONS AND SPECIAL PROVISIONS FOR PUBLIC WORKS' CONSTRUCTION OFF–SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, VOLUMES I AND II, ADOPTED BY THE REGIONAL TRANSPORTATION COMMISSION APRIL 8, 1992 WITH ALL SUBSEQUENT REVISIONS. BRACKET MOUNTED (SIDE–MOUNTED) VEHICLE SIGNAL HEADS SHALL BE USED ON 2 OR MORE SIGNAL HEADS SHALL HAVE AN ADDITIONAL ELBOW AS SHOWN IN UNIFORM STANDARD DRAWING NUMBER 863 AND SHOWN AS OPTION B IN UNIFORM STANDARD DRAWING NUMBER 844, AND SHALL HAVE A MENERALLAC SUPPORT AS SHOWN IN UNIFORM STANDARD DRAWING NUMBER 863 IF ONE OF THE SIGNAL HEADS CONTAINS 4 OR MORE SIGNAL MODULES.
4. SERVICE SHALL HAVE 1–60 AMP SINGLE POLE BREAKER FOR SIGNAL, AND ONE 40 AMP SINGLE POLE BREAKERS FOR STREET LIGHTS. SERVICE SHALL BE 200 AMP PADMOUNT.
5. LINE SIDE OF METER TO BE WIRED WITH THREE #3/0 AWG THW. LOAD SIDE SHALL BE WIRED WITH FOUR #4 AWG THW (2 BLACK, 2 WHITE) AND ONE #8 AWG THW (GREEN).
6. LUMINAIRES ON ALL SIGNAL POLES SHALL BE L.E.D. AS APPROVED BY THE CITY OF LAS VEGAS (CLV). INTERSECTION LIGHTING SHALL MEET THE REQUIREMENTS OF UNIFORM STANDARD DRAWING NUMBER 300.S3. EACH LUMINAIRE SHALL HAVE AN EMINIMUM 150 WATT RATING. CONTROL FOR LUMINAIRES THERE SHALL BE 2(TWO)–#4 AWG THW CONDUCTORS FROM THE SERVICE TO THE CABINET. IN THE CABINET, THE #4 AWG THW CONDUCTORS SHALL BRANCH OFF INTO #10 AWG THW CONDUCTORS INDIVIDUALLY FUSED WITH 10 AMP FUSES. THERE SHALL BE NO SPLICES BETWEEN THE CABINET AND LUMINAIRE FIXTURES.
7. THE INTERNALLY ILLUMINATED STREET NAME SIGNS SHALL BE WIRED TO THE LUMINAIRES PHOTO CELL FOR CONTROL WITH #10 AWG THW COPPER STRANDED WIRE (TYPICAL). THE SIGN SHALL BE WIRED TO THE LUMINAIRE DIRECTLY ABOVE IT. IN THE EVENT THERE IS NO LUMINAIRE ON THE TRAFFIC SIGNAL POLE, THE 1000 WATT P.E. CONTROL SHALL BE MOUNTED ON THE POLE CAP. ALL NEW ILLUMINATED STREET NAME SIGNS SHALL HAVE LIGHT EMITTING DIODE (LED) LAMPS PER SECTION 623 T.02.16 OF THE SPECIAL PROVISIONS.
8. CHECK CONDUIT AND CABLE SCHEDULE FOR CONDUIT, CABLE, AND WIRE SIZE. VERIFY ALL EXISTING CONDUIT RUNS.
9. ALL PULLBOXES SHALL BE IN ACCORDANCE WITH UNIFORM STANDARD DRAWINGS NO. 705, NO. 706, AND NO. 707.
10. TRAFFIC SIGNAL CABLE SHALL BE 15 OR 25 CONDUCTOR #14 AWG SOLID (TYPICAL) CABLE AND SHALL CONFORM TO IMSA SPEC. NO. 20–1.
11. PEDESTRIAN PUSH BUTTONS SHALL BE AUDIBLE TACTILE "POLARA INAVGATOR" TYPE (2–WIRE PEDESTRIAN PUSHBUTTON SYSTEM WITH IN2 PUSH BUTTON STATIONS AND SHELF–MOUNT BIU CONTROL UNIT WITH SDLC CABLE) OR CAMPBELL COMPANY WIAPPS WIRELESS PEDESTRIAN PUSHBUTTON SYSTEM WITH APS IN ACCORDANCE WITH CITY OF LAS VEGAS SPECIAL PROVISIONS AND SECTION 623 OF THE CCA USS. PUSH BUTTON SIGNS SHALL BE R10–3E PER MUTCD, 2009 EDITION, WITH FULL MOUNTING BRACKETS, AS MODIFIED BY THE MANUFACTURER TO FIT ON A 9"X12" SIGN, AND SHALL BE PORCELAIN–ENAMELED METAL. ALL PUSH BUTTONS TO BE MOUNTED 42" ABOVE SIDEWALK. THE MAXIMUM HORIZONTAL REACH DISTANCE IS TO BE 10". SIDEWALK RAMPS WILL BE ACCORDING TO U.S.D. NO. 235 (1–4) LATEST EDITION. WHEN AN EXISTING SIGNAL WITH EXISTING AUDIBLE–TACILE PUSH BUTTONS IS MODIFIED, THE CONTRACTOR SHALL VERIFY IF NEW PEDESTRIAN PUSH BUTTONS OR CABINET EQUIPMENT MATCHES THE MANUFACTURE AND MODEL OF ANY EXISTING EQUIPMENT SCHEDULED TO REMAIN, TO PROVIDE A FULLY FUNCTIONING SYSTEM. THE CONTRACTOR SHALL PROGRAM AND INSTALL ALL CABINET EQUIPMENT, INCLUDING THE PEDESTRIAN PUSH BUTTON CONTROL UNIT, INTERFACE PANEL AND ANY REQUIRED HARNESSES, TO PROVIDE A FULLY FUNCTIONING SYSTEM.
12. THE ROUTING AND TERMINATION OF CONDUITS AND THE PLACING OF POLES AND CABINETS SHALL BE AS INDICATED ON THE PLANS. ALL CHANGES SHALL BE APPROVED BY THE ENGINEER.
13. MAST ARM R10–12 SIGNS TO BE ADJACENT (NO GAP) TO THE M–5 SIGNAL HEAD. WHERE FLASHING YELLOW ARROW LEFT TURN SIGNALS ARE USED, A MAST ARM R10–12F "LEFT TURN YIELD ON FLASHING YELLOW ARROW" SIGN SHALL BE MOUNTED ADJACENT TO THE M–4 SIGNAL HEAD.
14. TRAFFIC SIGNAL CABINET SHALL BE A TYPE VIII CABINET UNLESS OTHERWISE SPECIFIED IN THE PLANS. THIS IS COMMONLY REFERRED TO AS AN "R" CABINET. THE CABINET SHALL CONFORM TO THE CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS AND THE CITY OF LAS VEGAS SPECIAL PROVISIONS. INSTALL CABINET NEAR THE R.O.W. LINE OR AS SHOWN ON THE DRAWINGS. THE TRAFFIC SIGNAL CONTROLLER CABINET, SHALL BE EQUIPPED WITH 16 LOAD BAY POSITIONS,SHALL BE A 48 DETECTOR CHANNEL R CABINET AND SHALL INCLUDE TWO (2) RACK–MOUNTED, 12 SLOT, LOOP DETECTOR RACKS, WITH 2 DETECTOR LOOP CHANNELS PER SLOT FULLY WIRED SO THAT ALL CHANNELS ARE USED AND A CHANNEL SLOTS THAT CAN ACCOMODATE VIDEO DETECTION CARDS. THE CABINET SHALL CONTAIN A 764 OPTICOM PHASE SELECTOR IN A 760 RACK, WITH A 768 AUXILIARY INTERFACE PANEL MOUNTED IN THE CABINET AND FULLY WIRED FOR GREEN SENSE CAPABILITIES.
15. THE CONTRACTOR SHALL SUPPLY A MALFUNCTION MANAGEMENT UNIT (MMU) AND TRAFFIC SIGNAL CONTROLLER TO THE CITY OF LAS VEGAS TRAFFIC SIGNAL REPAIR SHOP A MINIMUM OF FOURTEEN DAYS PRIOR TO SIGNAL TURN–ON OR PRIOR TO CONVERTING TO A NEW PHASING SCHEME, FOR TESTING AND PROGRAMMING PURPOSES. THE CONTROLLER SHALL BE A NAZTEC 980 ATC TS2 TYPE 2 NTCIP COMPLIANT SIGNAL CONTROLLER WITH INSTALLED AND LICENSED ADVANCED CONTROLLER SOFTWARE, LATEST VERSION, AND THE MMU SHALL BE A MODEL MMU–1500QE AS MANUFACTURED BY RENO A&E, OR APPROVED EQUAL. THE CONTRACTOR SHALL DELIVER THE CONTROLLER AND MMU TO, OR PICKUP THE CONTROLLER AT 2985 RONEMUS DRIVE. CONTRACTOR SHALL NOTIFY THE TRAFFIC SIGNAL REPAIR SHOP (229–6076) SEVEN DAYS PRIOR TO PICK UP. THE CITY, AT ITS DISCRETION, MAY PROVIDE A DIFFERENT MODEL OF MMU OR CONTROLLER FOR INITIAL TURN–ON, IN WHICH CASE CITY PERSONNEL WILL SWAP THE CONTROLLER OR MMU AFTER THE PROJECT IS ACCEPTED.
16. CONTRACTOR SHALL POTHOLE SIGNAL POLE LOCATIONS PRIOR TO ORDERING OF POLES.
17. ALL MAST ARMS TO BE HOT–DIP GALVANIZED BY THE MANUFACTURER THE MAST ARM IS TO BE FABRICATED WITH END TENON ONLY. THE END TENON SHALL BE FACTORY INSTALLED AND THE REMAINING TENONS SHALL BE FABRICATED IN THE FIELD AT THE LOCATION SHOWN ON THE PLANS OR AS DIRECTED BY THE TRAFFIC ENGINEER AND/OR HIS AUTHORIZED REPRESENTATIVE. FOR TENON FABRICATION DETAILS SEE CLARK COUNTY AREA U.S.D. NO. 808 SHEET 2. ALL WELDING SHALL CONFORM TO AWS D 2.0, "SPECIFICATION FOR WELDED HIGHWAYS AND RAILWAY BRIDGES," AND TO ANY ADDITIONAL REQUIREMENTS OF SECTION 623 OF THE SPECIFICATIONS. ALL EXPOSED WELDS, SHALL BE PAINTED AS PROVIDED FOR REPAIRING DAMAGED GALVANIZED SURFACES.
18. ALL VEHICLE AND PEDESTRIAN SIGNAL INDICATIONS SHALL HAVE LIGHT EMITTING DIODE (LED) TYPE INDICATIONS, IN CONFORMANCE TO CITY OF LAS VEGAS SPECIAL PROVISIONS AND TO SECTION 623 OF THE CCA USS. ALL PEDESTRIAN SIGNAL FACES SHALL PROVIDE "HAND" AND "WALKING PERSON" SYMBOLS, AND "COUNTDOWN" MESSAGES AS PROVIDED BY DURALIGHT MODEL #UXM–400–VMEIL OR DIALIGHT MODEL #430–6479–001X, OR APPROVED EQUAL. THE "COUNTDOWN" MESSAGE SHALL NOT FLASH. WHERE EXISTING SIGNALS ARE MODIFIED, THE CONTRACTOR SHALL VERIFY THAT LED PEDESTRIAN INDICATIONS FOR A SPECIFIC PHASE ARE OF THE SAME MANUFACTURE SO THAT THEY FUNCTION CORRECTLY, OR SHALL REPLACE ALL COUNTDOWN PEDESTRIAN INDICATIONS FOR THAT PHASE.
19. VIDEO DETECTION SYSTEMS WILL BE EITHER ITERIS EDGE 2 WITH EDGECONNECT PAK, (IP ADDRESSABLE); PEEK VIDEOTRAK WITH ETHERNET PORT); OR TRAFICON V4P WITH VEMDOM IP SOFTWARE. WHEN VIDEO DETECTION IS SPECIFIED ON THE TRAFFIC SIGNAL PLANS. ALL VIDEO DETECTION SYSTEMS WILL BE STAND ALONE SYSTEMS TO INCLUDE ALL NECESSARY EQUIPMENT TO PROGRAM THE VIDEO DETECTION SYSTEM. A PROGRAMING "MOUSE", KEYPAD OR LAPTAOP COMPUTER (IF REQUIRED FOR PROGRAMMING THE VIDEO DETECTION SYSTEM) AND APPROPRIATE SOFTWARE WILL BE SUPPLIED WITH EACH VIDEO SYSTEM. PERSONAL COMPUTERS (PCS) MAY NOT BE SUBSTITUTED FOR LAPTOPS. A VIDEO MONITOR (COLOR LCD, 640 X 480 SCREEN) 9" TO 13" WILL BE SUPPLIED WITH EACH VIDEO DETECTION SYSTEM. EACH VIDEO CAMERA WILL HAVE POWER AND VIDEO CABLE DIRECTLY FROM THE CABINET. COAXIAL CABLE WILL BE TYPE RG59/U (SOLID COPPER CENTER CONDUCTOR). CAMERAS THAT USE A PREFABRICATED CABLE INTEGRATING POWER AND COAXIAL CABLE INTO A SINGLE WEATHERPROOF CONNECTOR ARE ACCEPTABLE. "BNC" ARE THE ONLY ACCEPTABLE TERMINATION OF COAXIAL CABLES. CAMERAS WILL BE MOUNTED PER MANUFACTURER'S RECOMMENDATIONS AND PER CLV TRAFFIC ENGINEER APPROVAL. VIDEO CAMERAS SHALL BE COLOR AND SHALL BE MOUNTED ON A MINIMUM 6 FOOT RISER ON THE SIGNAL MAST ARM WITH EXTENSION BRACKETS (TYPE AB–0166–5–62 OR EQUIVALENT). THE LOCATION OF THE CAMERA ON THE MAST ARM SHALL BE APPROVED BY THE TRAFFIC SIGNAL SUPERVISOR. A VIDEO FILTER (CXO6–BNYC OR EQUIVALENT) WILL BE INSTALLED IN THE SIGNAL CABINET FOR EACH CAMERA VIDEO INPUT. VIDEO DETECTION PROCESSORS AND COMMUNICATIONS CARDS SHALL BE PROVIDED WITH THE LATEST VERSION OF THE MANUFACTURER'S SOFTWARE, INSTALLED AND PROGRAMMED TO PROVIDE A FULLY FUNCTIONING PROGRAM AND CONFIGURE THE VIDEO DETECTION PROCESSORS TO PROVIDE A FULLY FUNCTIONING SYSTEM.
20. WHERE NEW LOOPS WILL BE OVERLAID WITH NEW PAVEMENT, LOOP DETECTORS SHALL BE PREFORMED LOOPS AS MANUFACTURED BY RENO A & E OR NEVER–FAIL LOOP SYSTEMS, AND ALL LOOPS SHALL BE IN

SKY VISTA DRIVE (PUBLIC)

SCALE: 1" = 40'

SCALE 40 0 40 80 FEET

IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
4. EXISTING WATER TEST STATION PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
5. EXISTING WATER FIBER OPTIC PULLBOX PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
6. EXISTING WATER ACCESS MANHOLE PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
7. EXISTING WATER VALVE VAULT PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
8. EXISTING WATER AIR-VAC PROTECT IN PLACE. ADJUST TO FINISH GRADE IF REQUIRED.
9. EXISTING MANHOLE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. SEE PLAN AND PROFILE SHEETS FOR FINISH GRADE ELEVATIONS.
10. EXISTING DROP INLET PROTECT IN PLACE.
11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

REMOVAL NOTES:

1. REMOVE EXISTING CHANNEL RIP-RAP.
2. EXISTING FIRE ACCESS. CONTRACTOR TO MAINTAIN A FIRE ACCESS ROUTE TO PARCELS AT ALL TIMES.
3. REMOVE EXISTING FIRE ACCESS RIPRAP.
4. REMOVE EXISTING RIPRAP IN SUMP.
5. REMOVE EXISTING CURB & GUTTER

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LV09-34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

BASIS OF BEARINGS

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

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-227-2600
CLARK COUNTY BLDG. DEPARTMENT 1-702-455-6000

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

FAST
Call before you UnderGround
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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

CLV

STATE OF NEVADA — ENGINEER — No. 23444 — MICHAEL FANG — CIVIL — Exp. 06/30/2019 — PROFESSIONAL
DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 620238-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 14:59:53

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

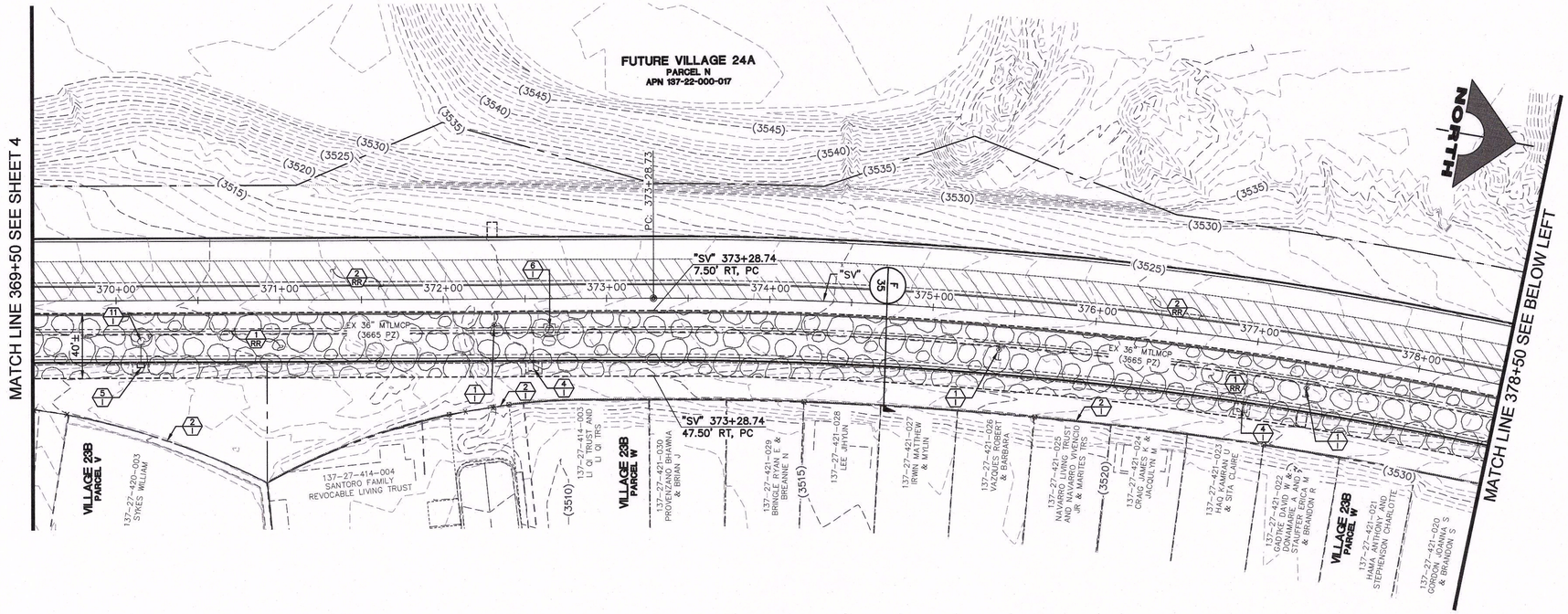
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Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

REMOVAL PLAN 1

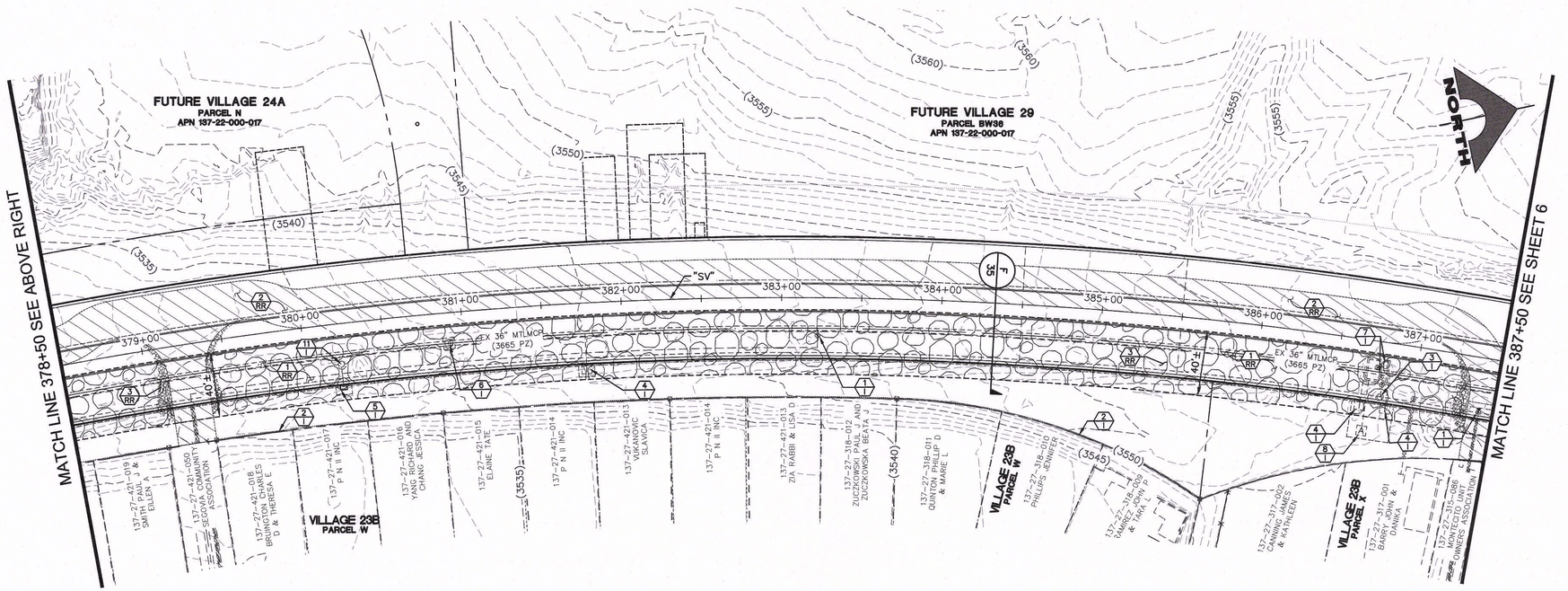
DRAWING 4
4 OF 43 SHTS

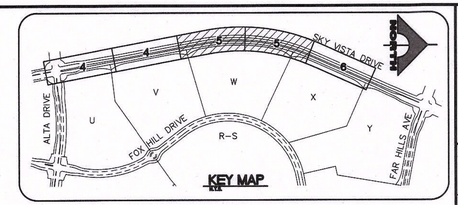


SKY VISTA DRIVE (PUBLIC)

SCALE: 1" = 40'

SCALE 40 0 40 80 FEET





IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
4. EXISTING WATER TEST STATION PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
5. EXISTING WATER FIBER OPTIC PULLBOX PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
6. EXISTING WATER ACCESS MANHOLE PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
7. EXISTING WATER VALVE VAULT PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
8. EXISTING WATER AIR-VAC PROTECT IN PLACE. ADJUST TO FINISH GRADE IF REQUIRED.
9. EXISTING MANHOLE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. SEE PLAN AND PROFILE SHEETS FOR FINISH GRADE ELEVATIONS.
10. EXISTING DROP INLET PROTECT IN PLACE.
11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

REMOVAL NOTES:

1. RR REMOVE EXISTING CHANNEL RIP-RAP.
2. RR EXISTING FIRE ACCESS. CONTRACTOR TO MAINTAIN A FIRE ACCESS ROUTE TO PARCELS AT ALL TIMES.
3. RR REMOVE EXISTING FIRE ACCESS RIPRAP.
4. RR REMOVE EXISTING RIPRAP IN SUMP.
5. RR REMOVE EXISTING CURB & GUTTER

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LV09-34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

BASIS OF BEARINGS

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

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AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-6000

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FAST
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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

CLV #

STATE OF NEVADA — PROFESSIONAL ENGINEER — MICHAEL FANG — Exp. 06/30/2019 — CIVIL — No. 23464 — DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

RCV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:00:10

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

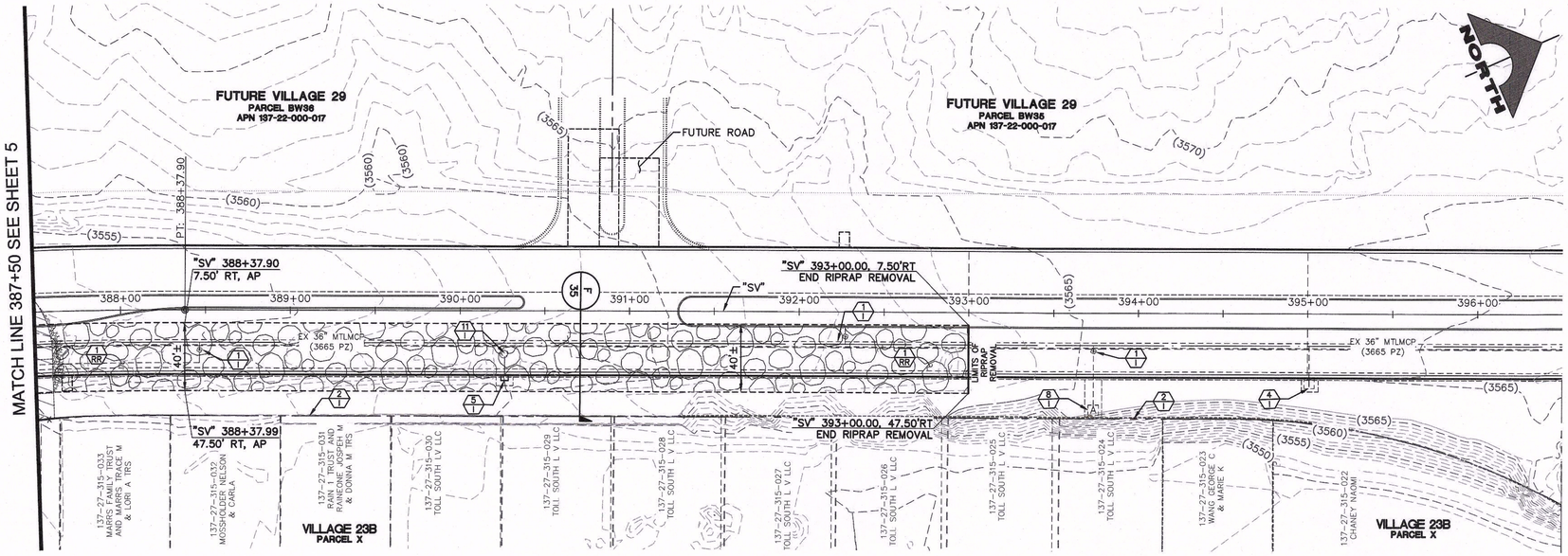
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Nicholas DeRose

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

REMOVAL PLAN 2

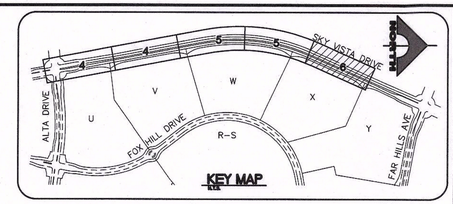
DRAWING 5
5 OF 43 SHTS



SKY VISTA DRIVE (PUBLIC)

SCALE: 1" = 40'

SCALE 40 0 40 80 FEET



IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
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10. EXISTING DROP INLET PROTECT IN PLACE.
11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

REMOVAL NOTES:

1. REMOVE EXISTING CHANNEL RIP-RAP.
2. EXISTING FIRE ACCESS. CONTRACTOR TO MAINTAIN A FIRE ACCESS ROUTE TO PARCELS AT ALL TIMES.
3. REMOVE EXISTING FIRE ACCESS RIPRAP.
4. REMOVE EXISTING RIPRAP IN SUMP.
5. REMOVE EXISTING CURB & GUTTER

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LV09-34NE6	RIVET AND PLATE IN TOP OF CURB ● NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWNGS.

BASIS OF BEARINGS

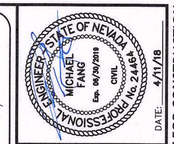
NORTH 89°45'05" EAST BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN BY MAP ON FILE IN FILE 91, PAGE 28 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

CLV #



DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 620238-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:00:22

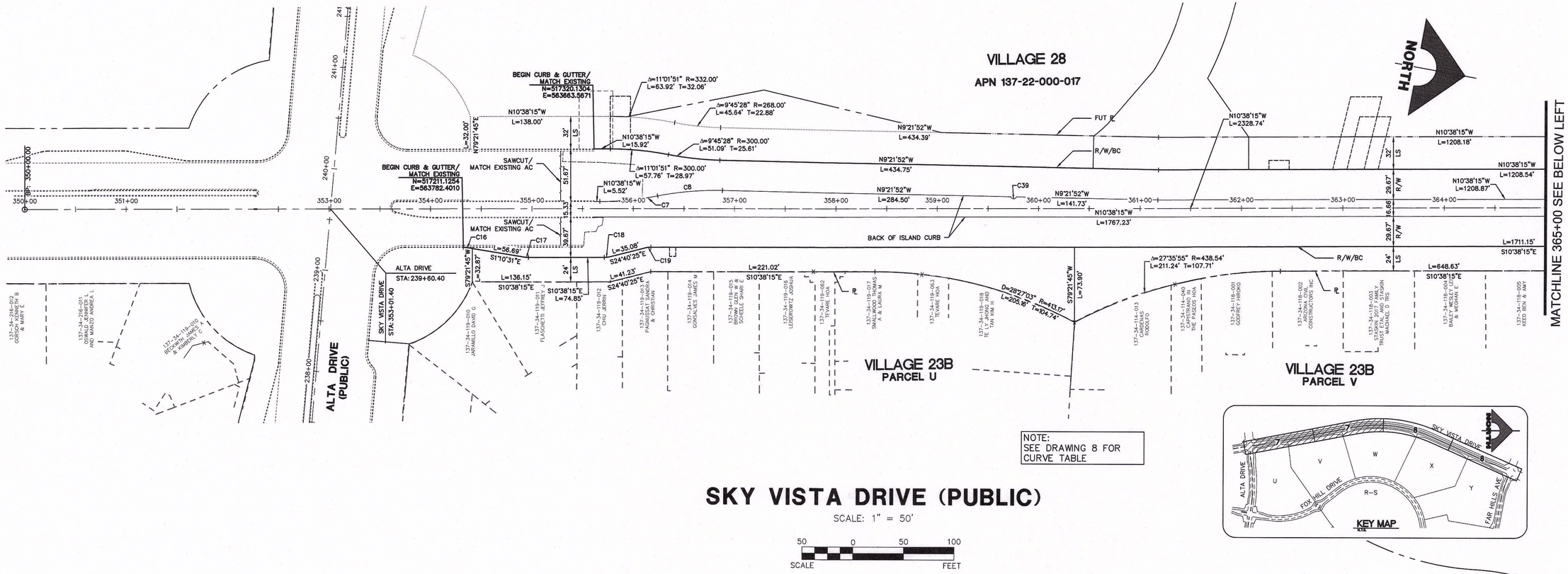
GCW ENGINEERS \ SURVEYORS
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LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\600\620238-240\DWG\Production\240-RDWRR.dwg
Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

REMOVAL PLAN 3

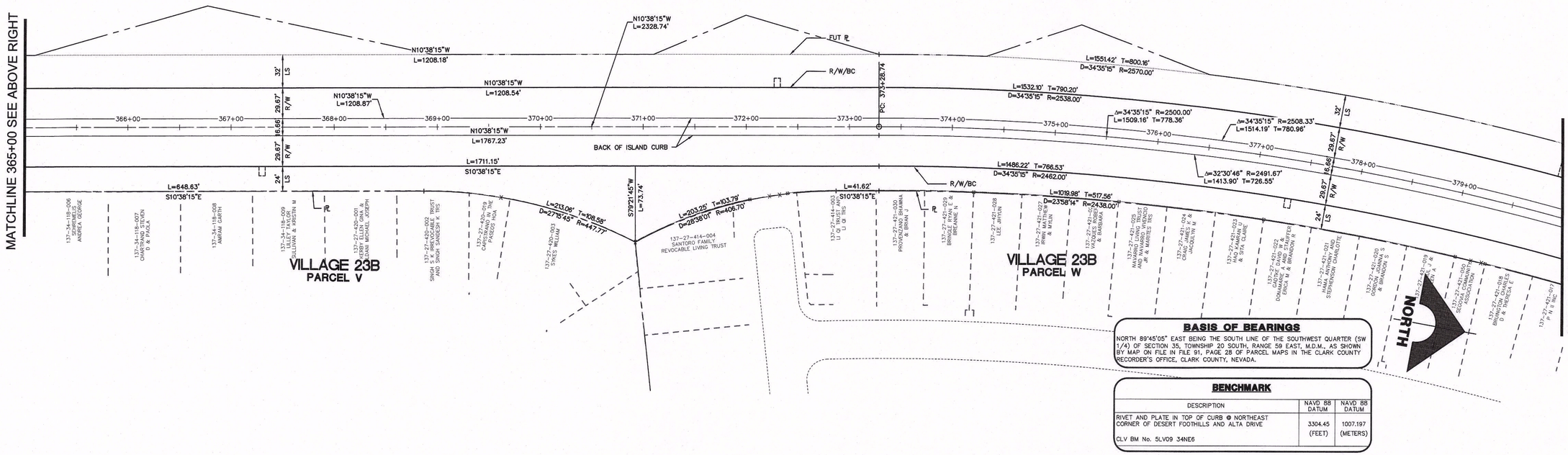
DRAWING 6
6 OF 43 SHTS



SKY VISTA DRIVE (PUBLIC)

SCALE: 1" = 50'

50 0 50 100
SCALE FEET



BASIS OF BEARINGS

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.

BENCHMARK

DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)
CLV BM No. 5LV09 34NE6		

CLV #

STATE OF NEVADA — PROFESSIONAL ENGINEER — MICHAEL KANG — No. 020720 — CIVIL — Exp. 06/30/2019 — DATE: 4/11/18

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

AGENCY REVIEW - NOT FOR CONSTRUCTION

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PLOT TIME: 15:00:43

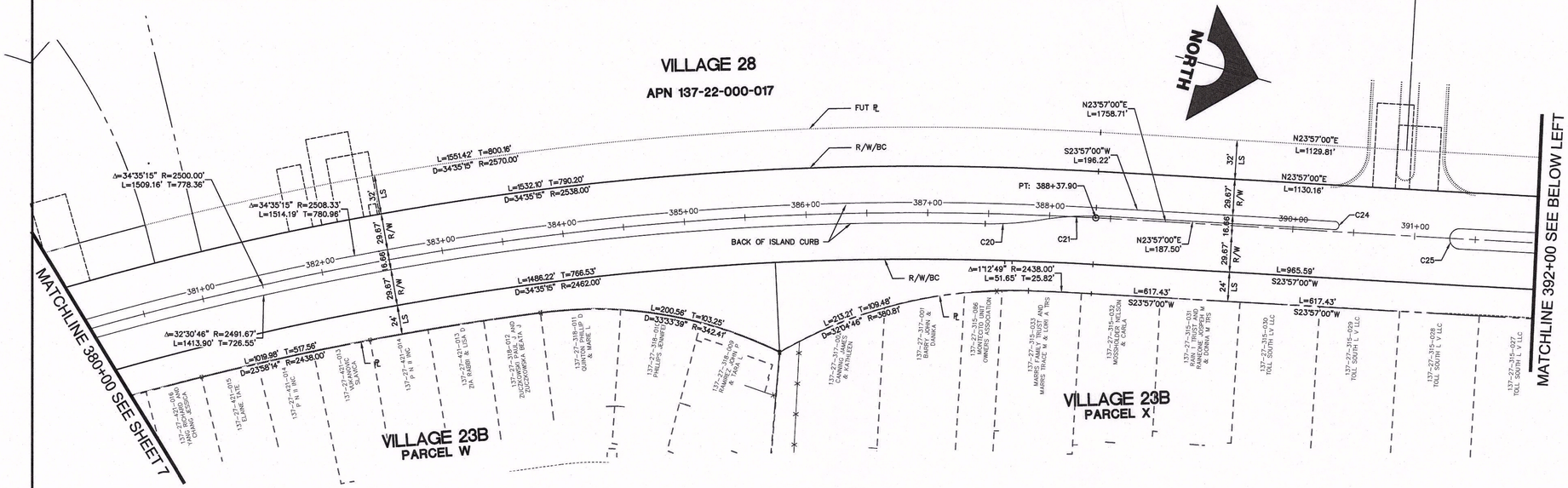
GCV ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcvengineering.com
F:\Projects\620\620238 - 240\DWG\Production\240-HC.dwg
Nicholas DeRosa

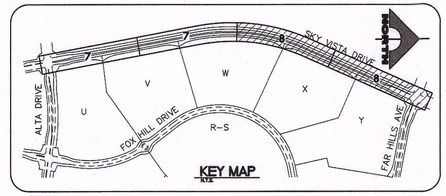
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE,
ALTA DRIVE TO FAR HILLS AVENUE

HORIZONTAL CONTROL 1

DRAWING 7
7 OF 43 SHTS



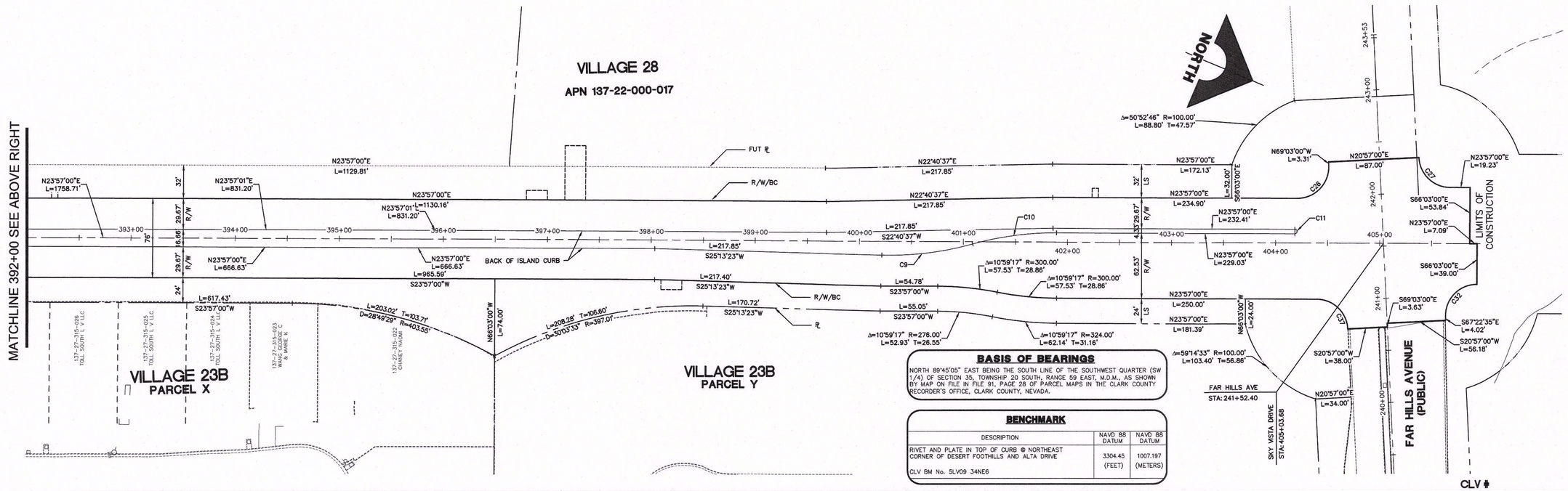


SKY VISTA DRIVE (PUBLIC)

SCALE: 1" = 50'

50 0 50 100
SCALE FEET

CURVE TABLE				
CURVE #	LENGTH	RADIUS	TANGENT	DELTA
C7	57.53'	300.00'	28.86'	N16°07'54"W
C8	64.20'	300.00'	32.22'	N15°29'42"W
C9	88.31'	300.00'	44.48'	N16°47'23"E
C10	81.65'	300.00'	41.08'	S16°09'12"W
C11	6.80'	2.16'	INFINITY'	N66°03'00"W
C16	4.13'	25.00'	2.07'	S5°54'23"E
C17	4.13'	25.00'	2.07'	N5°54'23"W
C18	6.12'	25.00'	3.08'	N17°39'20"W
C19	6.12'	25.00'	3.08'	S17°39'20"E
C20	45.23'	249.33'	22.68'	N16°40'41"E
C21	54.55'	250.66'	27.38'	N17°42'55"E
C24	10.47'	3.33'	INFINITY'	N66°03'00"W
C25	26.18'	8.33'	40833.66'	S66°03'00"E
C26	48.69'	30.00'	31.61'	N22°33'00"W
C27	45.55'	30.00'	28.47'	N67°27'00"E
C32	47.82'	30.00'	30.70'	S21°42'49"E
C37	45.55'	30.00'	28.47'	S67°27'00"W
C39	7.46'	3.00'	8.85'	N9°21'52"W



BASIS OF BEARINGS

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.

BENCHMARK

DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)
CLV BM No. 5LV09 34NE6		

STATE OF NEVADA
PROFESSIONAL ENGINEER
MICHAEL FANG
Exp. 06/30/2019
CIVIL
No. 21464
DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	AGEN APP	DATE	CCW APP

PROJECT NO. 620238-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:00:55

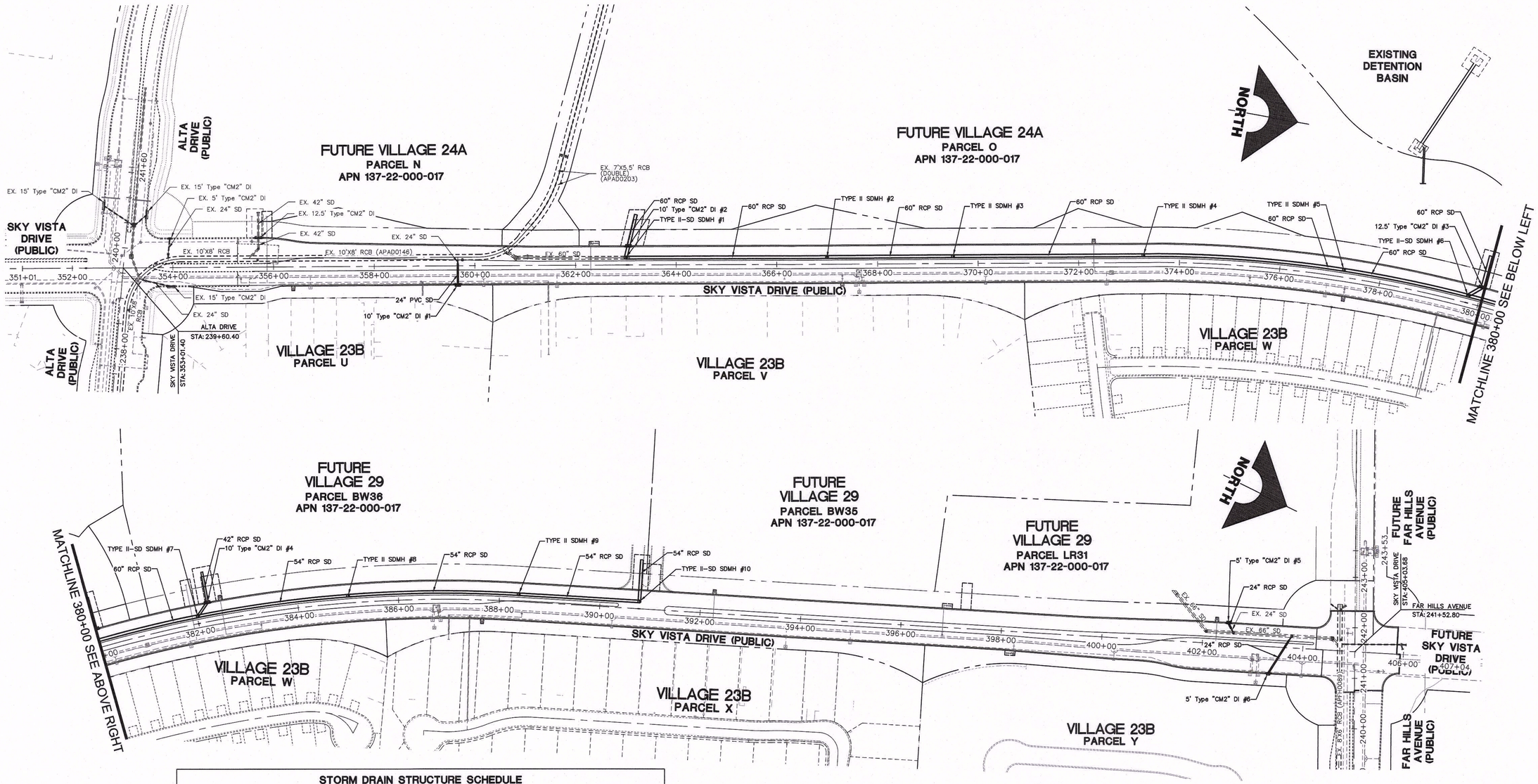
GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\600\620238-240\DWG\Production\240-HC.dwg
Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

HORIZONTAL CONTROL 2

DRAWING 8
8 OF 43 SHTS



STORM DRAIN STRUCTURE SCHEDULE

STRUCT. #	STREET NAME	STATION & OFFSET	RIM	INV IN	INV OUT	NORTHING	EASTING	SIZE
DI #1	SKY VISTA DRIVE	359+66.01, 38.00' R	3470.0±		3464.93	517735.53	563683.91	10'
DI #2	SKY VISTA DRIVE	363+05.60, 38.00' L	3484.7±	3474.70	3474.70	518055.26	563546.53	10'
DI #3	SKY VISTA DRIVE	380+00.00, 37.89' L	3536.2±	3526.30	3526.30	519739.33	563322.86	12.5'
DI #4	SKY VISTA DRIVE	382+24.45, 37.97' L	3542.2±	3532.20	3532.20	519965.26	563351.80	10'
DI #5	SKY VISTA DRIVE	402+48.84, 42.84' L	3560.0±		3553.83	521851.01	564100.90	5'
DI #6	SKY VISTA DRIVE	403+33.69, 53.83' R	3559.1±		3554.11	521889.31	564223.69	5'
SDMH #1	SKY VISTA DRIVE	362+99.85, 14.50' L	3484.5±	3473.12 3473.12		518053.94	563570.68	60"
SDMH #2	SKY VISTA DRIVE	366+99.85, 14.50' L	3501.5±	3487.25	3487.25	518447.07	563496.85	60"
SDMH #3	SKY VISTA DRIVE	369+50.00, 14.50' L	3508.5±	3496.08	3496.08	518692.92	563450.67	60"
SDMH #4	SKY VISTA DRIVE	373+28.73, 14.50' L	3518.5±	3507.07	3507.07	519065.14	563380.76	60"
SDMH #5	SKY VISTA DRIVE	377+26.43, 14.50' L	3529.0±	3518.72	3518.72	519462.47	563338.43	60"
SDMH #6	SKY VISTA DRIVE	379+76.63, 14.50' L	3535.7±	3525.38 3525.38	3525.38	519713.96	563344.33	60"
SDMH #7	SKY VISTA DRIVE	382+01.01, 14.50' L	3541.6±	3528.73 3528.73	3528.73	519937.98	563370.98	60"
SDMH #8	SKY VISTA DRIVE	385+00.00, 14.50' L	3549.4±	3538.49	3538.49	520231.08	563437.46	60"
SDMH #9	SKY VISTA DRIVE	388+37.90, 14.50' L	3556.2±	3544.44	3544.44	520550.04	563554.04	60"
SDMH #10	SKY VISTA DRIVE	390+78.40, 14.50' L	3560.5±	3548.65	3548.65	520769.84	563651.67	60"

STORM DRAIN QUANTITIES (PUBLIC)

60" RCP	2091	LF
54" RCP	964	LF
42" RCP	95	LF
24" RCP	133	LF
TYPE II MANHOLE	6	EA
TYPE II-SD MANHOLE	4	EA
5' TYPE "CM2" DROP INLET	2	EA
10.0' TYPE "CM2" DROP INLET	3	EA
12.5' TYPE "CM2" DROP INLET	1	EA

QUANTITIES ARE ESTIMATED ONLY. CONTRACTOR IS TO VERIFY DURING BIDDING PROCESS.

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

CLV #

STATE OF NEVADA — PROFESSIONAL ENGINEER — MICHAEL FANG — Exp. 06/30/2019 — CIVIL — No. 21487 — DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	AGEN APP	DATE	CCW APP	DATE

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:01:13

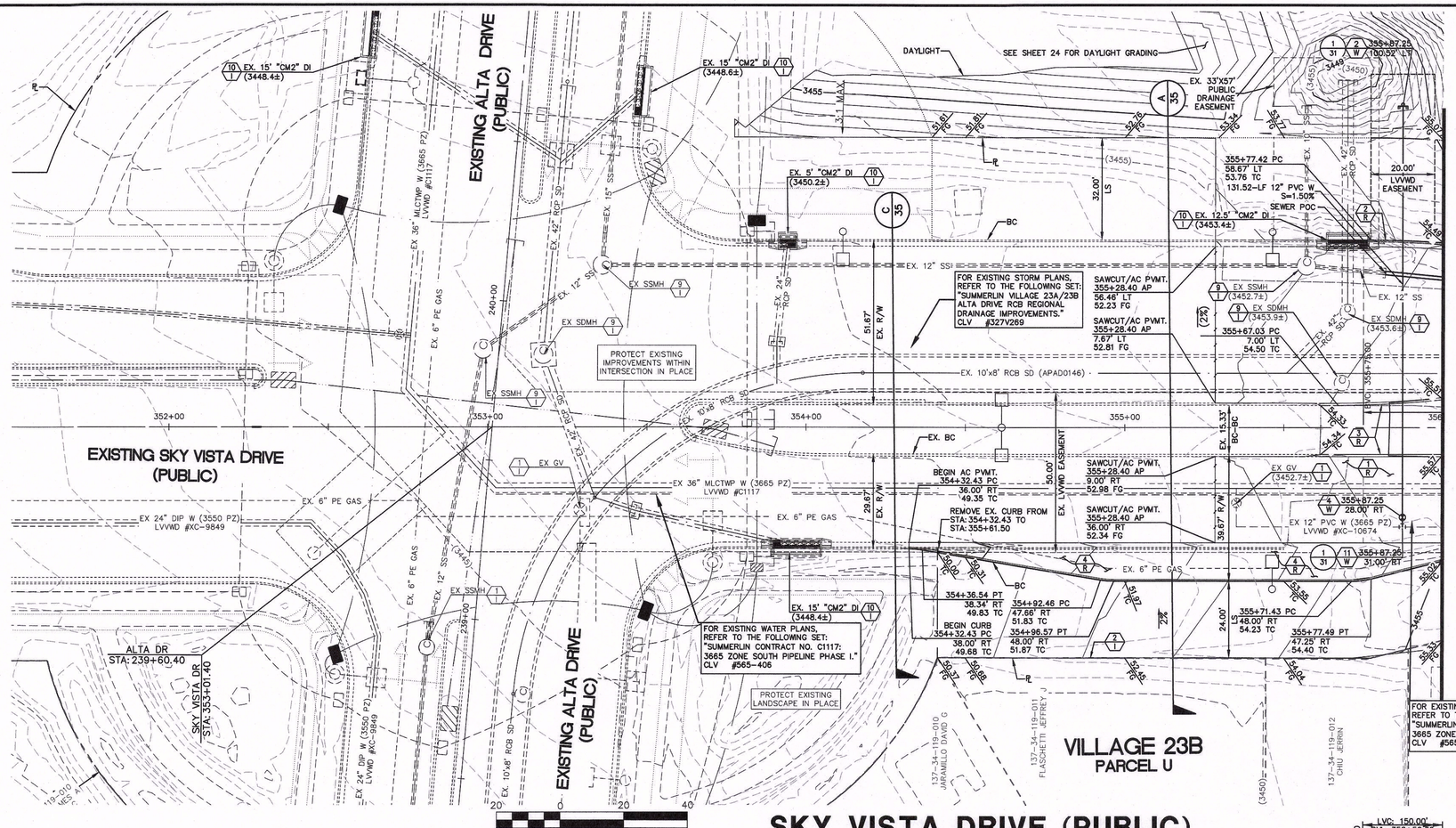
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1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\600\62023B-240\DWG\Production\240-MU2.dwg
Nicholas DelRosa

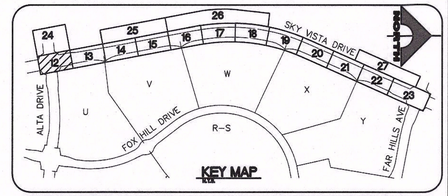
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

MASTER UTILITY PLAN - STORM DRAIN

DRAWING 10
10 OF 43 SHTS





IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
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11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

ROADWAY IMPROVEMENTS NOTES:

1. INSTALL A.C. PAVEMENT PER STREET SECTIONS, SEE SHEET 35
2. INSTALL 6" "L" TYPE CURB & GUTTER, SEE SUMMERLIN STD DWG S-47
3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S-50
4. INSTALL CONCRETE BUS TURNOUT PER USD DWG. NO. 234.1

WATER CONSTRUCTION NOTES:

1. INSTALL 1-½" WATER METER AND 1-½" RPPA PER UDACS PL. NO. 4 AND 8
2. INSTALL CAP W/ 2" BLOW-OFF ASSEMBLY PER UDACS PL. NO. 36
3. INSTALL FIRE HYDRANT PER UDACS PL. NO. 39 AND 40. FOR "DEEP" FIRE HYDRANTS SEE UDACS PL. NO. 41.
4. INSTALL GATE VALVE AND BOX PER UDACS PL. NO. 30 AND 39
5. INSTALL TEE PER UDACS PL. NO. 31
6. INSTALL HORIZONTAL BEND PER UDACS PL. NO. 31
7. REMOVE CAP AND BLOWOFF PER UDACS PL. NO. 36 AND CONNECT TO EX WATER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX WATER PRIOR TO CONSTRUCTION)
8. INSTALL VERTICAL BEND PER UDACS PL. NO. 31 UNLESS OTHERWISE IDENTIFIED. (SEE PLAN FOR ANGLE)
9. INSTALL REDUCER (SEE PLAN FOR SIZE)
10. INSTALL 6"X12" TAPPING SLEEVE AND 6" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.
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SEWER CONSTRUCTION NOTES:

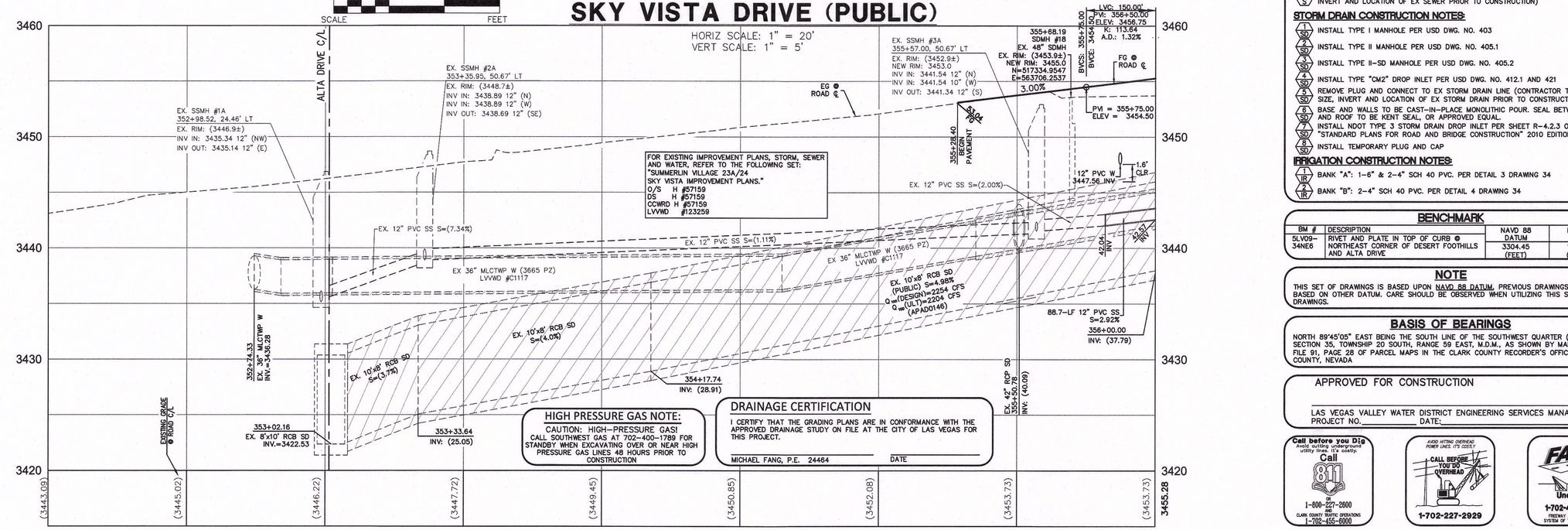
1. INSTALL SEWER MANHOLE PER DCS STD. DWG. 1A AND 1B
2. STUB AND CAP SEWER PIPE PER DETAIL 2, DRAWING 34
3. REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)

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2. INSTALL TYPE II MANHOLE PER USD DWG. NO. 405.1
3. INSTALL TYPE II-SD MANHOLE PER USD DWG. NO. 405.2
4. INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
5. REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
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7. INSTALL NDOT TYPE 3 STORM DRAIN DROP INLET PER SHEET R-4.2.3 OF NDOT "STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" 2010 EDITION
8. INSTALL TEMPORARY PLUG AND CAP

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1. BANK "A": 1-6" & 2-4" SCH 40 PVC. PER DETAIL 3 DRAWING 34
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HIGH PRESSURE GAS NOTE:

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

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 — DATE

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LV09-34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

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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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____

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Call 811 OR 1-800-227-2600
CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-6000

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

CLV #

STATE OF NEVADA — PROFESSIONAL ENGINEER — MICHAEL FANG — No. 24464 — CIVIL — exp. 06/30/2019

DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	CCW. APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:02:48

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

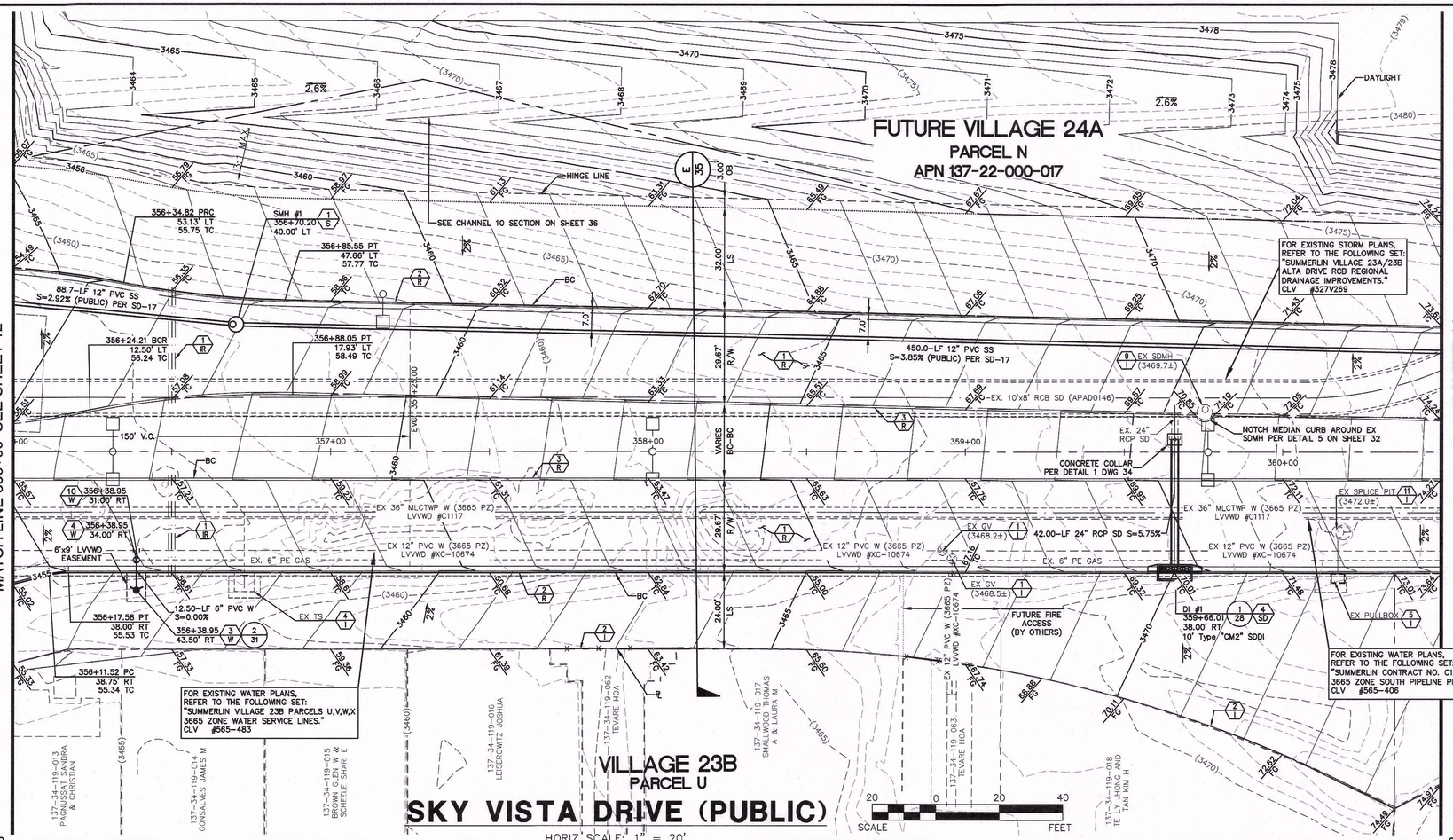
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Nicholas DeRosa

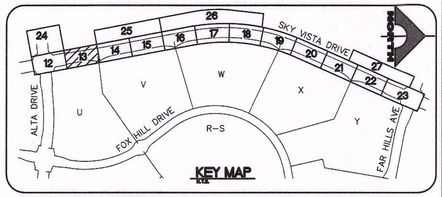
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 1

DRAWING 12
12 OF 43 SHTS





IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
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8. EXISTING WATER AIR-VAC PROTECT IN PLACE. ADJUST TO FINISH GRADE IF REQUIRED.
9. EXISTING MANHOLE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE IF IMPACTED BY PAVEMENT IMPROVEMENTS.
10. EXISTING DROP INLET PROTECT IN PLACE.
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MICHAEL FANG, P.E. 24464 DATE

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STATE OF NEVADA PROFESSIONAL ENGINEER
MICHAEL FANG
No. 24464
Exp. 06/30/2019
CIVIL

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4/11/19	AGENCY REVIEW - NOT FOR CONSTRUCTION		

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:03:28

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
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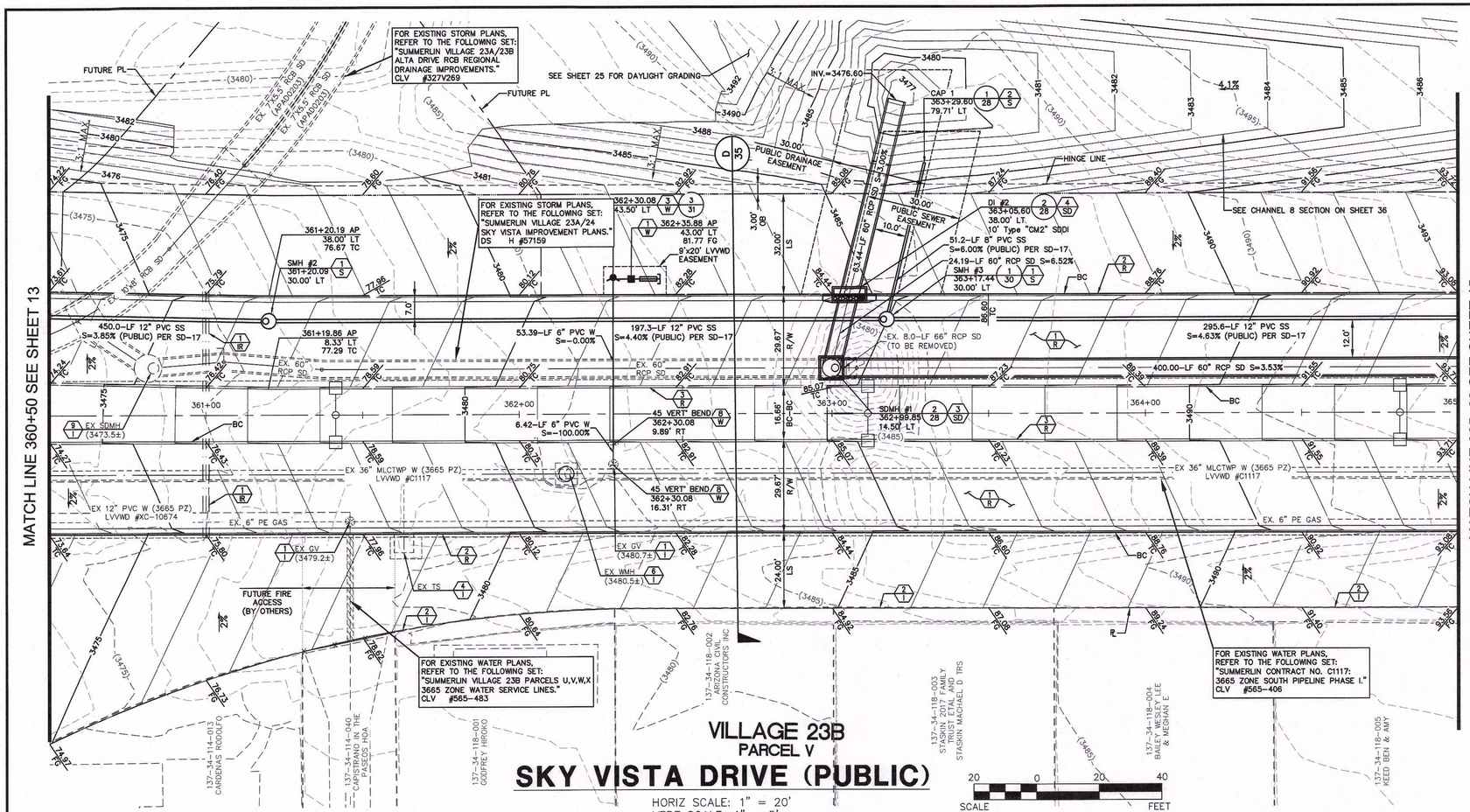
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Nicholas DeRosa

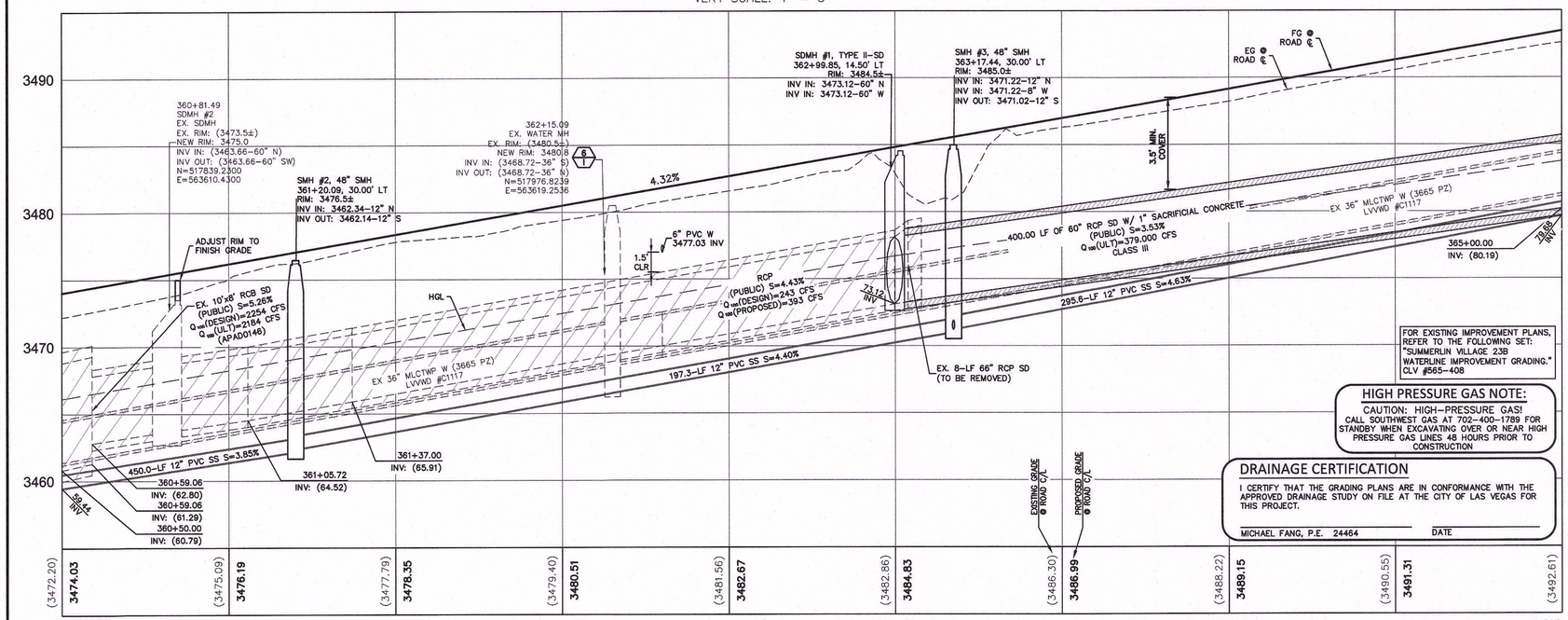
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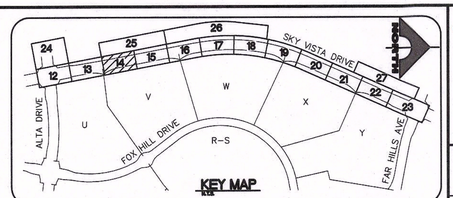
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PLAN AND PROFILE 2

DRAWING 13
13 OF 43 SHTS







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STATE OF NEVADA — PROFESSIONAL ENGINEER — MICHAEL FANG — Exp. 06/30/2019 — CIVIL — No. 24464

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PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
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PLOT DATE: 04-11-18
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GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\600\62023B-240\DWG\Production\240-PP.dwg
Nicholas DeRoso

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 3

DRAWING 14
14 OF 43 SHTS

MATCH LINE 365+00 SEE SHEET 14

MATCH LINE 369+60 SEE SHEET 16

NORTH

SEE SHEET 25 FOR DAYLIGHT GRADING

HINGE LINE

SEE CHANNEL 8 SECTION ON SHEET 36

SEE CHANNEL 7 SECTION ON SHEET 36

SMH #4
365+13.09
30.00' LT

SMH #5
368+78.73
30.00' LT

SDMH #2
366+99.85
14.50' LT

SDMH #3
369+50.00
14.50' LT

295.6–LF 12" PVC SS
S=4.63% (PUBLIC) PER SD–17

265.6–LF 12" PVC SS
S=2.60% (PUBLIC) PER SD–17

450.0–LF 12" PVC SS
S=2.60% (PUBLIC) PER SD–17

400.00–LF 60" RCP SD S=3.53%

250.15–LF 60" RCP SD S=3.53%

150' V.C.

EX 36" MLCTWP W (3665 PZ)
LVVWD #C1117

EX. 6" PE GAS

EX GV (3497.4±)

EX GV (3501.8±)

EX WMH (3503.5±)

EX BO

EX TS

EX AVAR

8" W 45 VERT' BEND
367+30.08
29.00' RT

8" W 45 VERT' BEND
367+30.08
33.25' RT

10.25–LF 6" PVC W
S=0.00%

4.25–LF 6" PVC W
S=–100.00%

6'x9' LVVWD
EASEMENT

367+30.08
43.50' RT

32.00' LS

24.00' LS

29.67' R/W

16.66' BC–BC

FOR EXISTING WATER PLANS, REFER TO THE FOLLOWING SET:
"SUMMERLIN CONTRACT NO. C1117: 3665 ZONE SOUTH PIPELINE PHASE I."
CLV #565–406

137–34–118–006
SEHREMELIS
ANDREA GEORGE

137–34–118–007
CHARTRAND, STEVEN D
& PAOLA

137–34–118–008
AMPAM GARTH

137–34–118–009
LILLEY TAYLOR
SULLIVAN & KRISTIN M

137–27–420–001
KERBY ELLEN GINA &
OLDANI MICHAEL JOSEPH

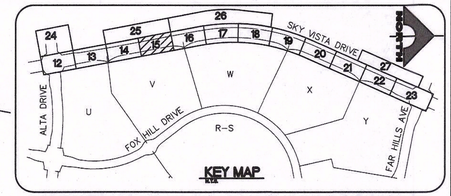
137–27–420–002
SINGH, SURESHWAR
SINGH, ST. ANNE SOCABLE
SANDESH K TRS

137–27–420–010
CAPISTRANO IN THE
PALMS HOA

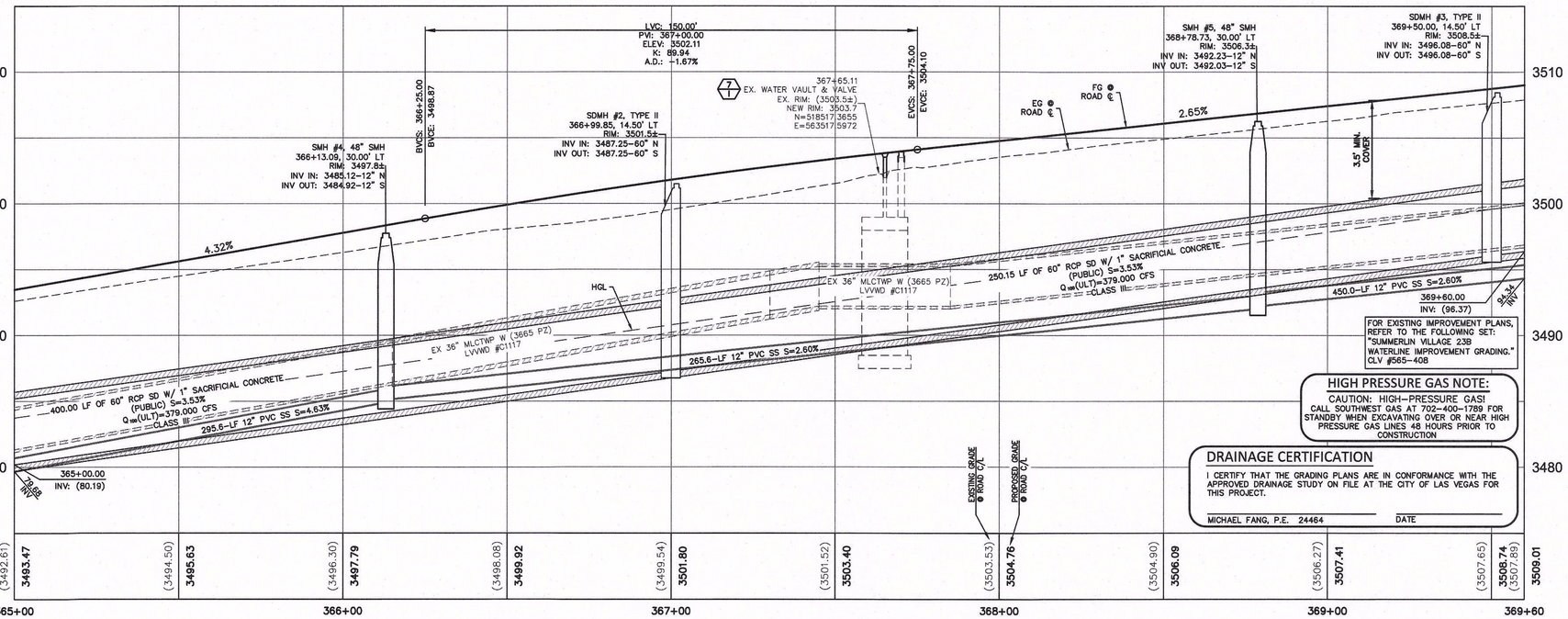
VILLAGE 23B
PARCEL V
SKY VISTA DRIVE (PUBLIC)

HORIZ SCALE: 1" = 20'
VERT SCALE: 1" = 5'

SCALE 20 0 20 40 FEET



KEY MAP
NTS



FOR EXISTING IMPROVEMENT PLANS, REFER TO THE FOLLOWING SET:
"SUMMERLIN VILLAGE 23B WATERLINE IMPROVEMENT GRADING."
CLV #565–408

HIGH PRESSURE GAS NOTE:

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

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 DATE

IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW–OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
4. EXISTING WATER TEST STATION PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
5. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
6. EXISTING WATER ACCESS MANHOLE PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
7. EXISTING WATER VALVE VAULT PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
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9. EXISTING MANHOLE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE IF IMPACTED BY PAVEMENT IMPROVEMENTS.
10. EXISTING DROP INLET PROTECT IN PLACE.
11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

ROADWAY IMPROVEMENTS NOTES:

1. INSTALL A.C. PAVEMENT PER STREET SECTIONS, SEE SHEET 35
2. INSTALL 6" "L" TYPE CURB & GUTTER, SEE SUMMERLIN STD DWG S–47
3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S–50
4. INSTALL CONCRETE BUS TURNOUT PER USD DWG. NO. 234.1

WATER CONSTRUCTION NOTES:

1. INSTALL 1–½" WATER METER AND 1–½" RPPA PER UDACS PL. NO. 4 AND 8
2. INSTALL CAP W/ 2" BLOW–OFF ASSEMBLY PER UDACS PL. NO. 36
3. INSTALL FIRE HYDRANT PER UDACS PL. NO. 39 AND 40. FOR "DEEP" FIRE HYDRANTS SEE UDACS PL. NO. 41.
4. INSTALL GATE VALVE AND BOX PER UDACS PL. NO. 30 AND 39
5. INSTALL TEE PER UDACS PL. NO. 31
6. INSTALL HORIZONTAL BEND PER UDACS PL. NO. 31
7. REMOVE CAP AND BLOWOFF PER UDACS PL. NO. 36 AND CONNECT TO EX WATER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX WATER PRIOR TO CONSTRUCTION)
8. INSTALL VERTICAL BEND PER UDACS PL. NO. 31 UNLESS OTHERWISE IDENTIFIED. (SEE PLAN FOR ANGLE)
9. INSTALL REDUCER (SEE PLAN FOR SIZE)
10. INSTALL 6"X12" TAPPING SLEEVE AND 6" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.
11. INSTALL 12"X12" TAPPING SLEEVE AND 12" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.

SEWER CONSTRUCTION NOTES:

1. INSTALL SEWER MANHOLE PER DCS STD. DWG. 1A AND 1B
2. STUB AND CAP SEWER PIPE PER DETAIL 2, DRAWING 34
3. REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)

STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL TYPE I MANHOLE PER USD DWG. NO. 403
2. INSTALL TYPE II MANHOLE PER USD DWG. NO. 405.1
3. INSTALL TYPE II–SD MANHOLE PER USD DWG. NO. 405.2
4. INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
5. REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
6. BASE AND WALLS TO BE CAST–IN–PLACE MONOLITHIC POUR. SEAL BETWEEN WALLS AND ROOF TO BE KENT SEAL, OR APPROVED EQUAL.
7. INSTALL NDOT TYPE 3 STORM DRAIN DROP INLET PER SHEET R–4.2.3 OF NDOT "STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" 2010 EDITION
8. INSTALL TEMPORARY PLUG AND CAP

IRRIGATION CONSTRUCTION NOTES:

1. BANK "A": 1–6" & 2–4" SCH 40 PVC. PER DETAIL 3 DRAWING 34
2. BANK "B": 2–4" SCH 40 PVC. PER DETAIL 4 DRAWING 34

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM (FEET)	NAVD 88 DATUM (METERS)
SLV09–34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45	1007.197

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

BASIS OF BEARINGS

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____

Call before you Dig
Avoid cutting underground utility lines. It's costly.
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CLARK COUNTY TRAFFIC OPERATIONS 1–702–455–6000

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

CLV #

AGENCY REVIEW - NOT FOR CONSTRUCTION

STATE OF NEVADA
ENGINEER
MICHAEL FANG
No. 24464
CIVIL
PROFESSIONAL
DATE: 4/11/18

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP	DATE

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 12:16:01

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

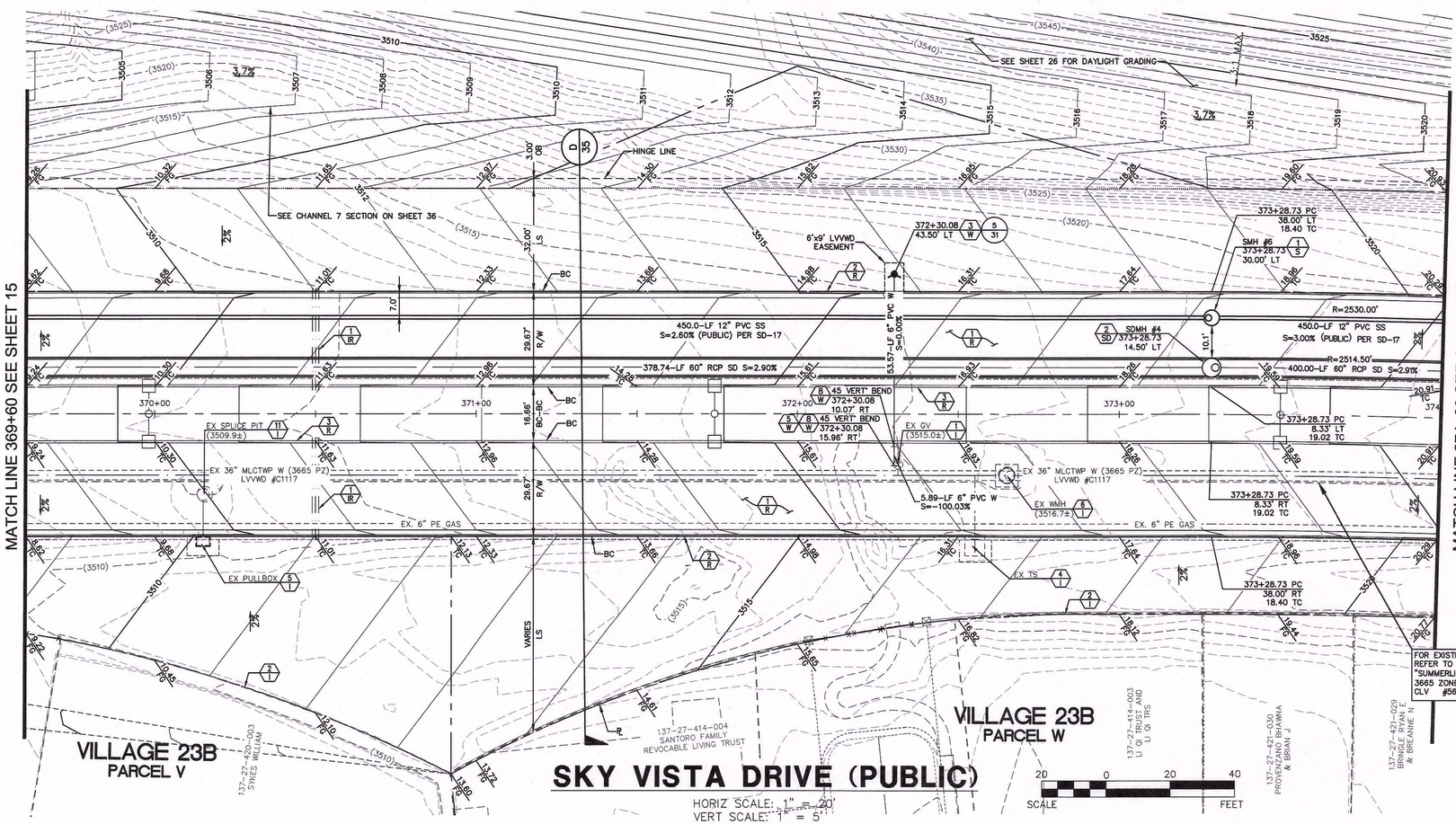
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Nicholas DeRosa

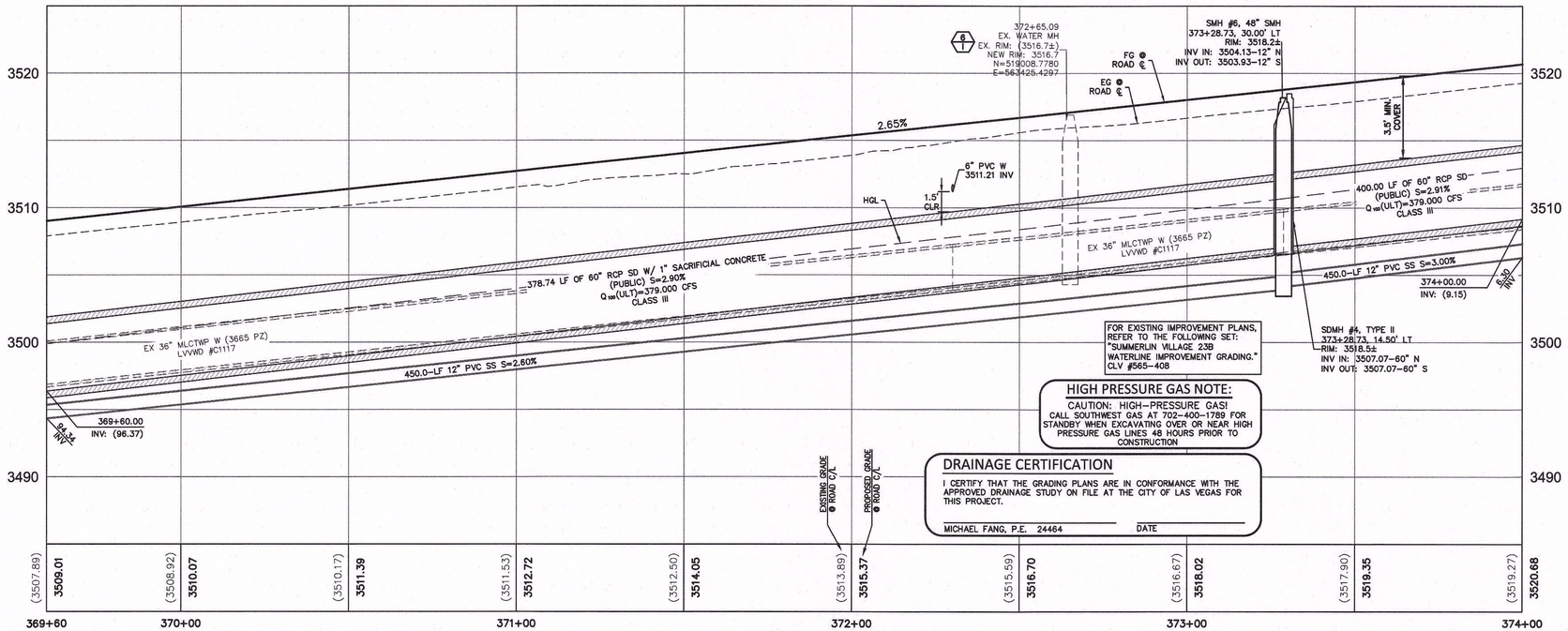
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 4

DRAWING 15
15 OF 43 SHTS





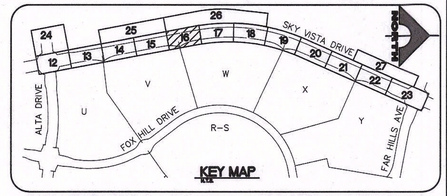
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MICHAEL FANG, P.E. 24464 DATE



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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

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CLV

STATE OF NEVADA — PROFESSIONAL ENGINEER — MICHAEL FANG — No. 24464 — CIVIL — 04/20/2018 — DATE: 4/11/18

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCV APP	DATE

AGENCY REVIEW - NOT FOR CONSTRUCTION

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 12:16:31

GCV ENGINEERS \ SURVEYORS
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T: 702.804.2000
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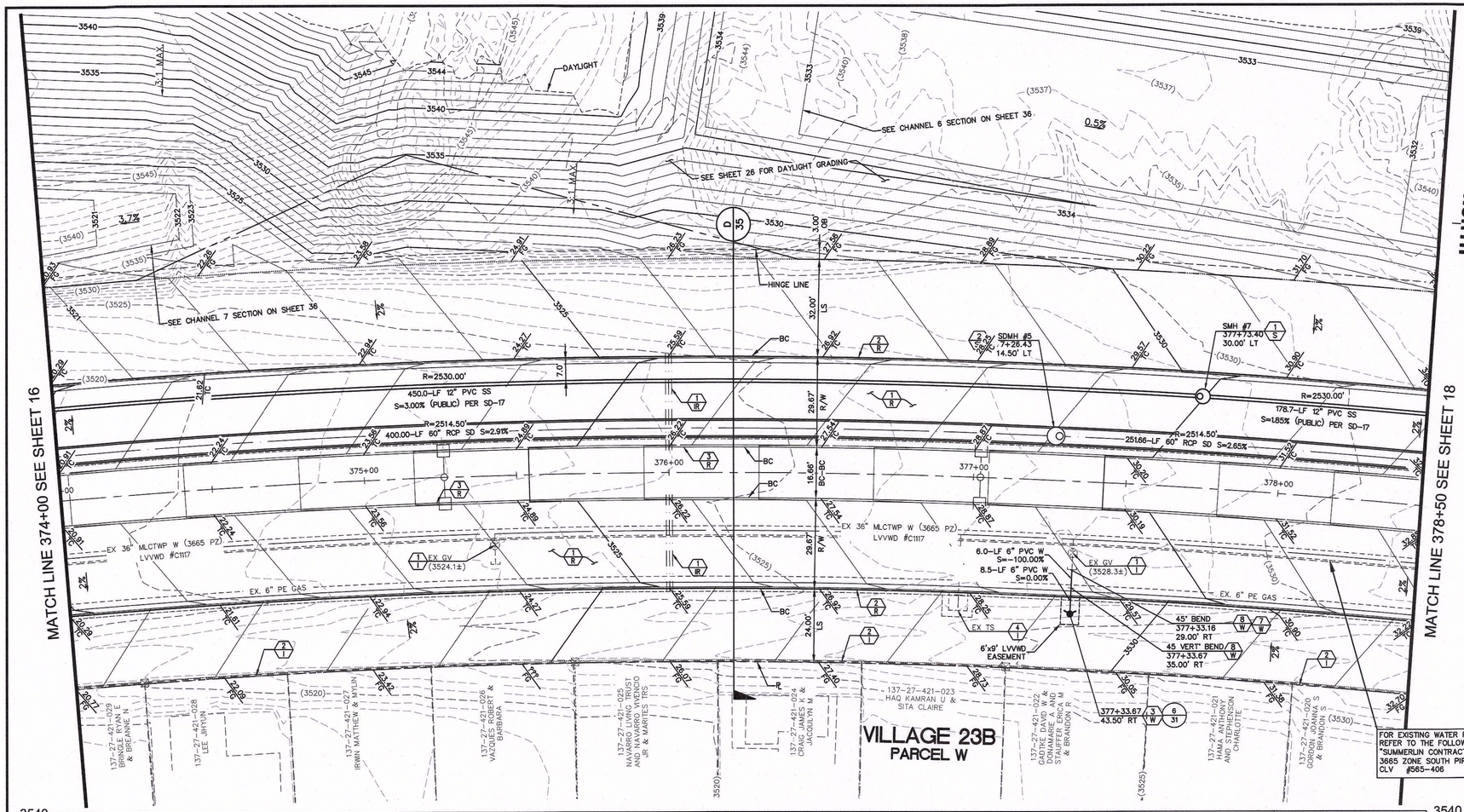
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Nicholas DeRosa

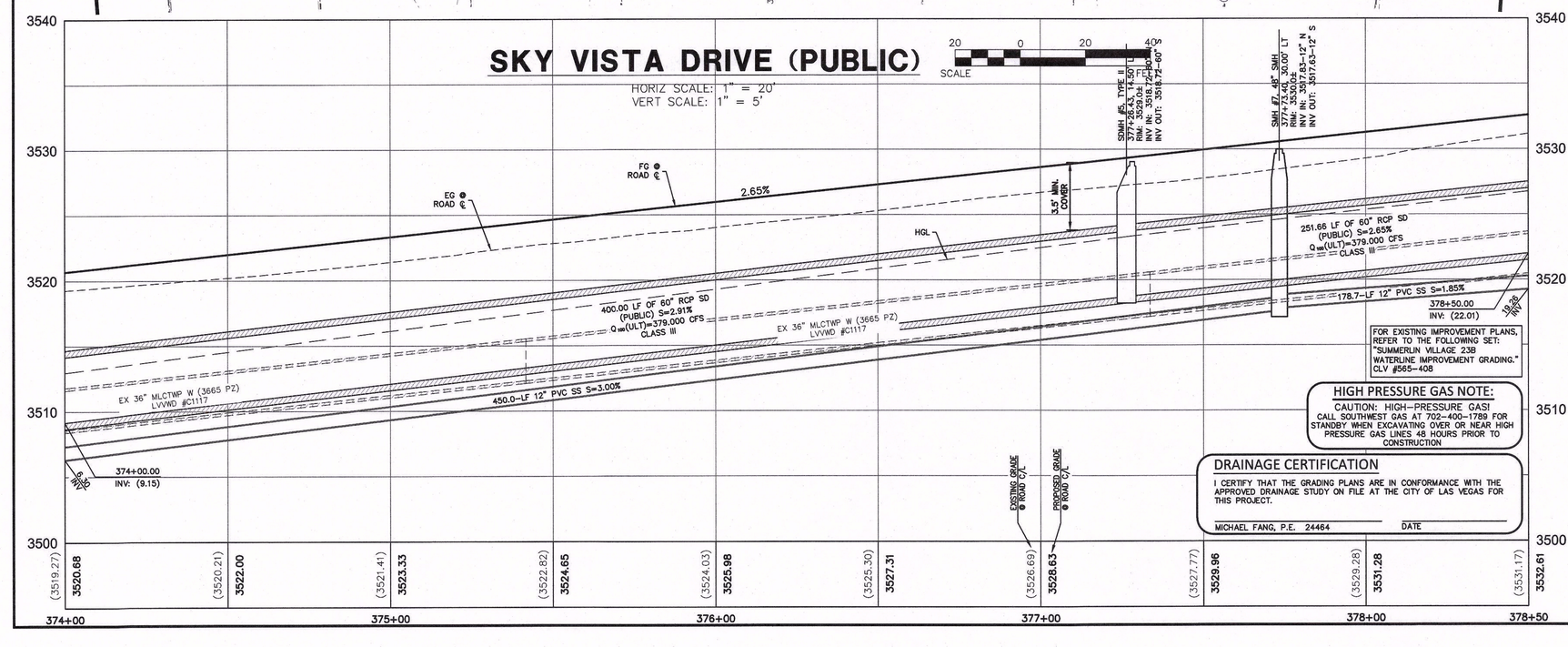
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 5

DRAWING 16
16 OF 43 SHTS





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MICHAEL FANG, P.E. 24464 DATE

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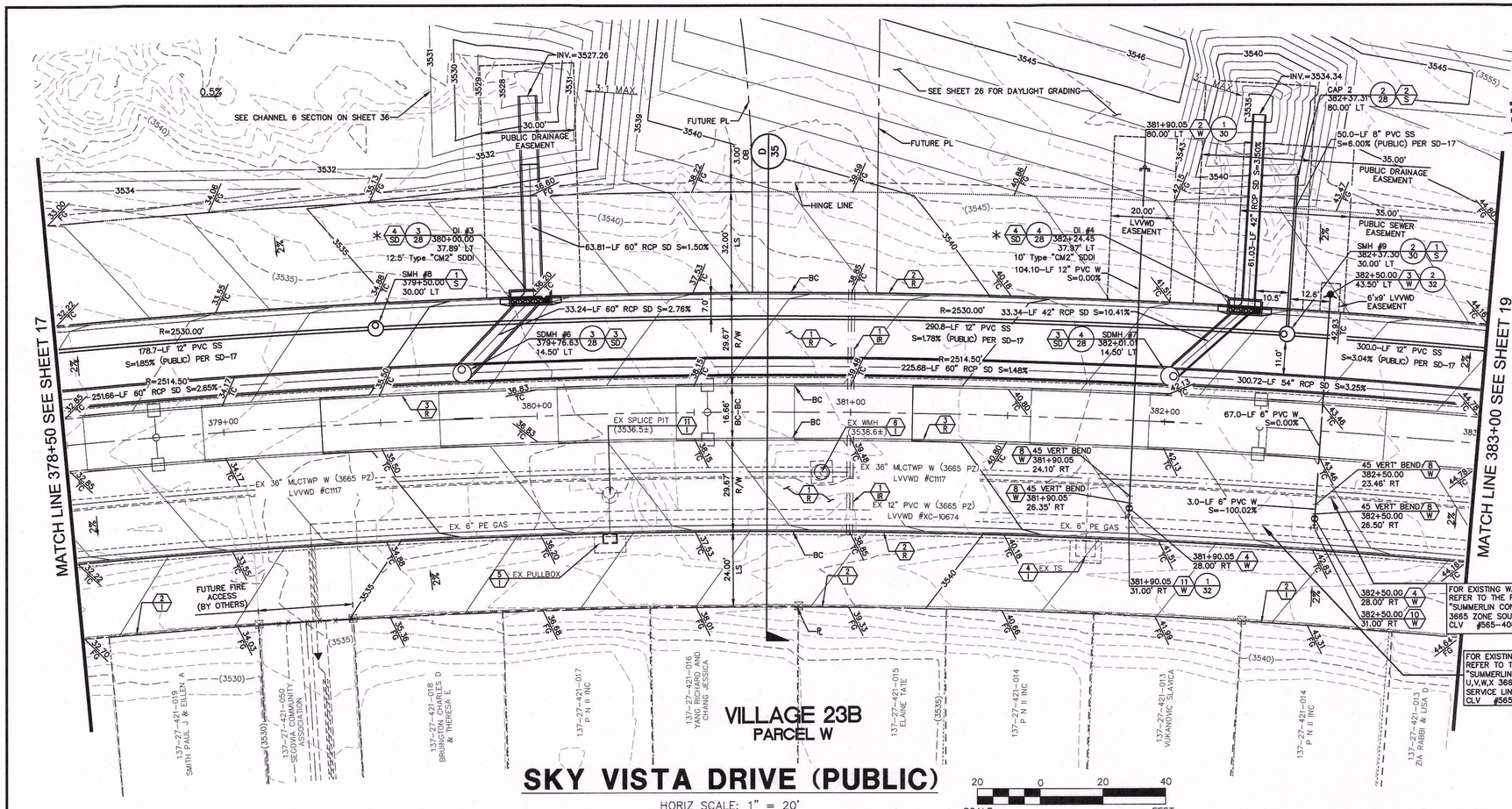
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Nicholas DiRosa

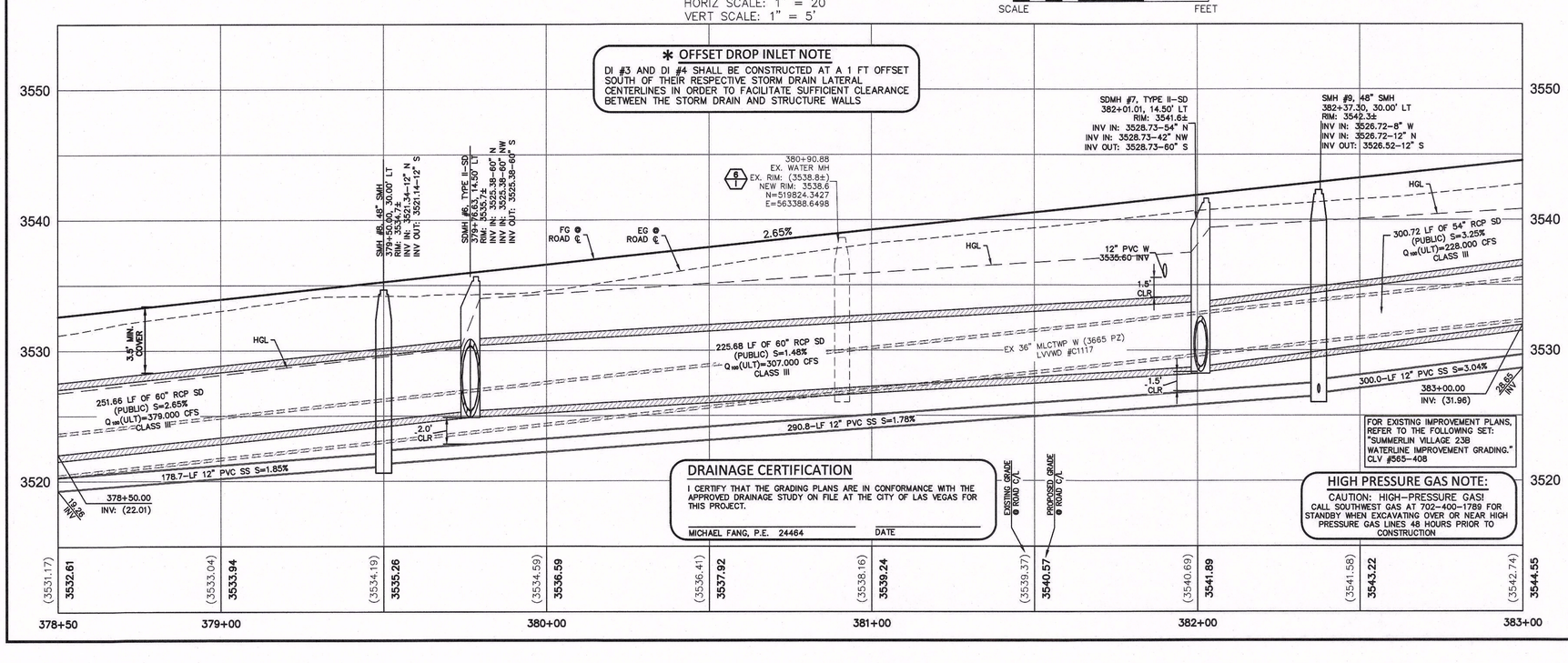
THE HOWARD HUGHES COMPANY, LLC

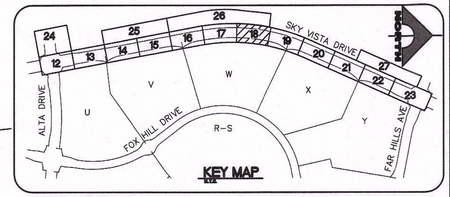
VILLAGE 23B SKY VISTA DRIVE
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PLAN AND PROFILE 6

DRAWING 17
17 OF 43 SHTS







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2. INSTALL CAP W/ 2" BLOW–OFF ASSEMBLY PER UDACS PL. NO. 36
3. INSTALL FIRE HYDRANT PER UDACS PL. NO. 39 AND 40. FOR "DEEP" FIRE HYDRANTS SEE UDACS PL. NO. 41.
4. INSTALL GATE VALVE AND BOX PER UDACS PL. NO. 30 AND 39
5. INSTALL TEE PER UDACS PL. NO. 31
6. INSTALL HORIZONTAL BEND PER UDACS PL. NO. 31
7. REMOVE CAP AND BLOWOFF PER UDACS PL. NO. 36 AND CONNECT TO EX WATER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX WATER PRIOR TO CONSTRUCTION)
8. INSTALL VERTICAL BEND PER UDACS PL. NO. 31 UNLESS OTHERWISE IDENTIFIED. (SEE PLAN FOR ANGLE)
9. INSTALL REDUCER (SEE PLAN FOR SIZE)
10. INSTALL 6"X12" TAPPING SLEEVE AND 6" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.
11. INSTALL 12"X12" TAPPING SLEEVE AND 12" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.

SEWER CONSTRUCTION NOTES:

1. INSTALL SEWER MANHOLE PER DCS STD. DWG. 1A AND 1B
2. STUB AND CAP SEWER PIPE PER DETAIL 2, DRAWING 34
3. REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)

STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL TYPE I MANHOLE PER USD DWG. NO. 403
2. INSTALL TYPE II MANHOLE PER USD DWG. NO. 405.1
3. INSTALL TYPE II–SD MANHOLE PER USD DWG. NO. 405.2
4. INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
5. REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
6. BASE AND WALLS TO BE CAST–IN–PLACE MONOLITHIC POUR. SEAL BETWEEN WALLS AND ROOF TO BE KENT SEAL, OR APPROVED EQUAL.
7. INSTALL NDOT TYPE 3 STORM DRAIN DROP INLET PER SHEET R–4.2.3 OF NDOT "STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" 2010 EDITION
8. INSTALL TEMPORARY PLUG AND CAP

IRRIGATION CONSTRUCTION NOTES:

1. BANK "A": 1–6" & 2–4" SCH 40 PVC. PER DETAIL 3 DRAWING 34
2. BANK "B": 2–4" SCH 40 PVC. PER DETAIL 4 DRAWING 34

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM (FEET)	NAVD 88 DATUM (METERS)
5LV09–34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45	1007.197

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

BASIS OF BEARINGS

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
1–800–227–2600
AND
CLARK COUNTY TRAFFIC OPERATIONS
1–702–455–6000

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

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

CLV #

STATE OF NEVADA
PROFESSIONAL ENGINEER
MICHAEL FANG
No. 24464
CIVIL
DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-240
DESIGN: LC/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04–11–18
PLOT TIME: 12:17:36

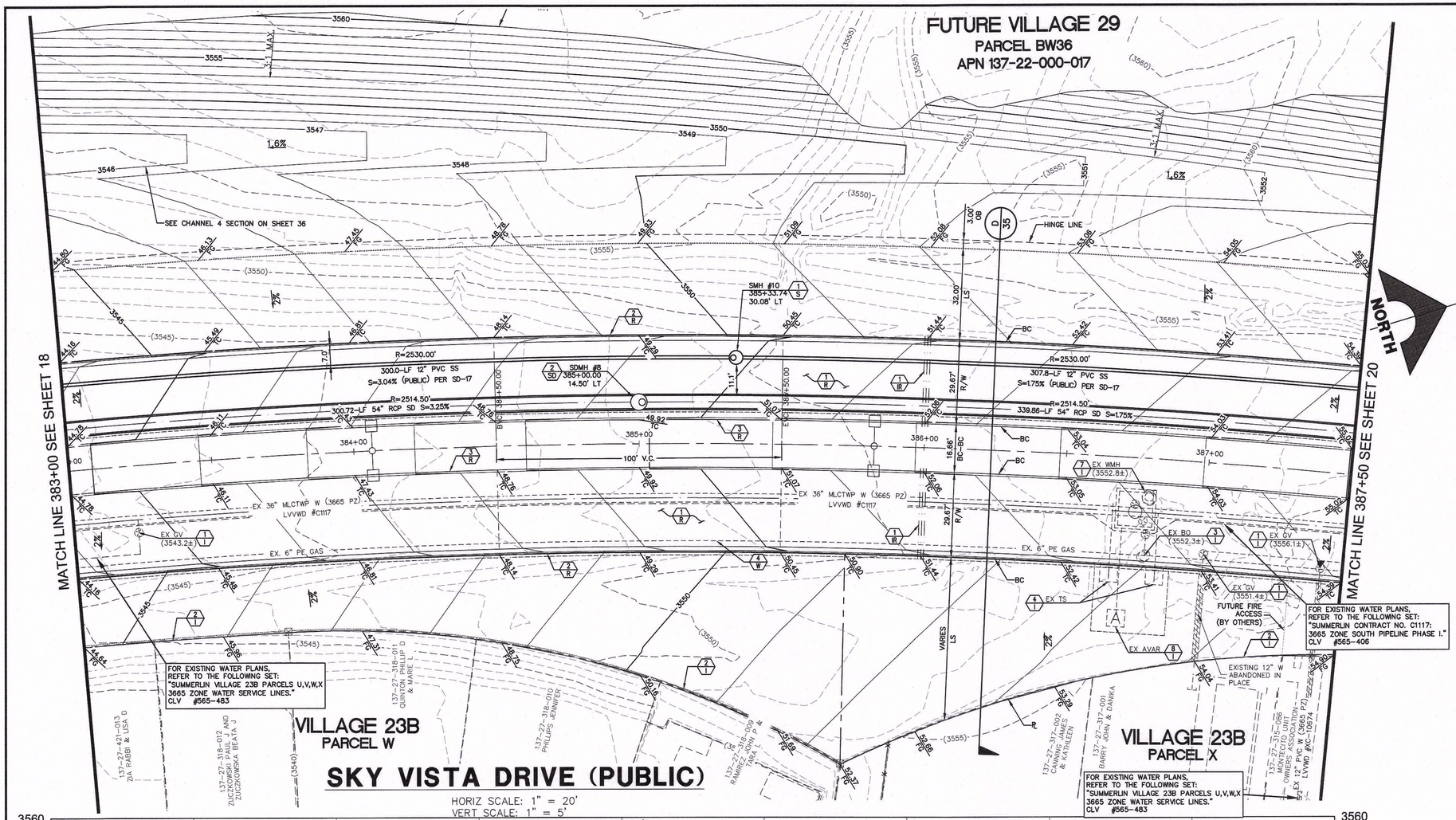
GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\600\620230–240\DWG\Production\240–PP.dwg
Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 7

DRAWING 18
18 OF 43 SHTS



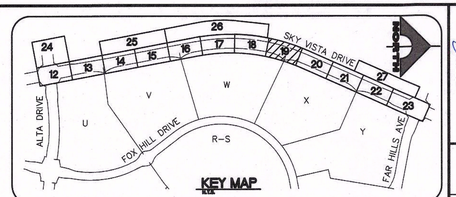
DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 — DATE

HIGH PRESSURE GAS NOTE:

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



KEY MAP

IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
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8. EXISTING WATER AIR-VAC PROTECT IN PLACE. ADJUST TO FINISH GRADE IF REQUIRED.
9. EXISTING MANHOLE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE IF IMPACTED BY PAVEMENT IMPROVEMENTS.
10. EXISTING DROP INLET PROTECT IN PLACE.
11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

ROADWAY IMPROVEMENTS NOTES:

1. INSTALL A.C. PAVEMENT PER STREET SECTIONS, SEE SHEET 35
2. INSTALL 6" "L" TYPE CURB & GUTTER, SEE SUMMERLIN STD DWG S-47
3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S-50
4. INSTALL CONCRETE BUS TURNOUT PER USD DWG. NO. 234.1

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3. REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)

STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL TYPE I MANHOLE PER USD DWG. NO. 403
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BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LVO9-34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____

Call before you Dig
Avoid cutting underground utility lines. It's costly.
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AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-6000

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

CLV #

STATE OF NEVADA — PROFESSIONAL ENGINEER
MICHAEL FANG
Exp. 06/30/2019
CIVIL
No. 24464

DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	GOVT. APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:04:42

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

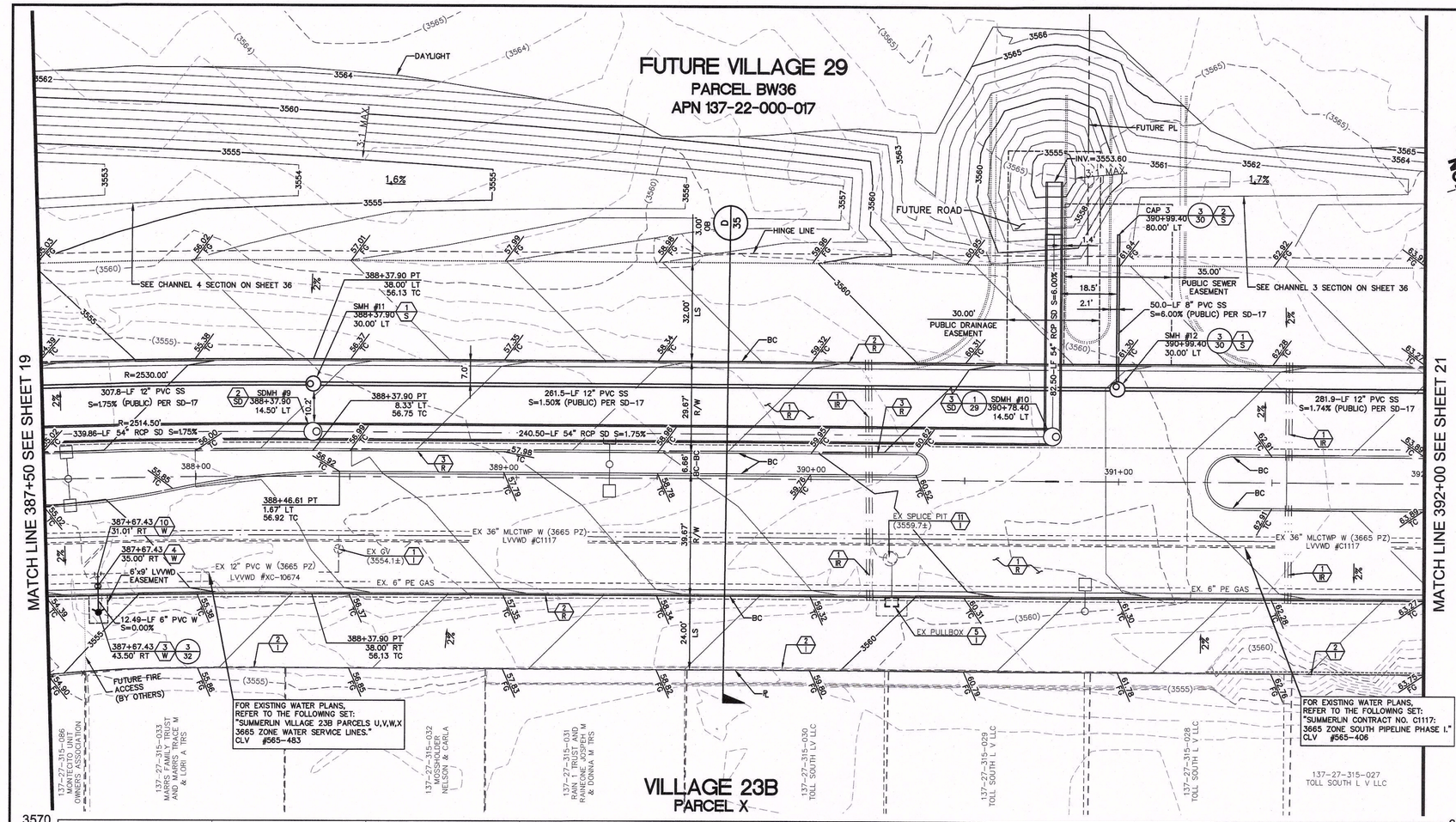
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Nicholas DeRose

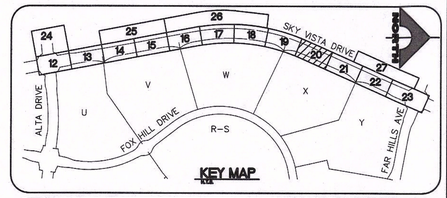
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 8

DRAWING 19
19 OF 43 SHTS





IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
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3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S-50
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BENCHMARK

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

CLV #

STATE OF NEVADA
ENGINEER
MICHAEL FANG
No. 24464
CIVIL
Exp. 06/30/2019
PROFESSIONAL

DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:05:22

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\600\62023B-240\DWG\Production\240-PP.dwg
Nicholas DeRosa

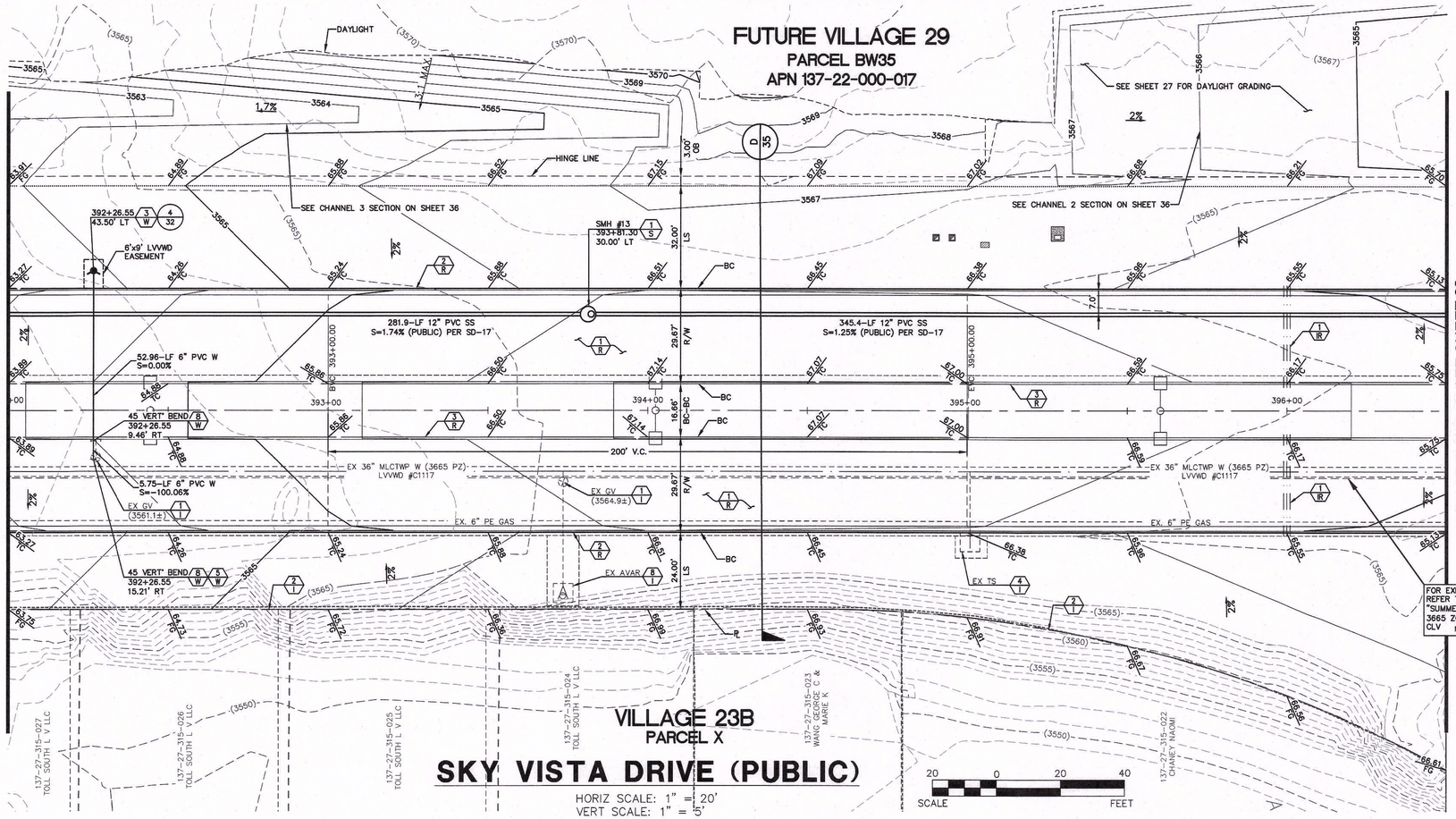
THE HOWARD HUGHES COMPANY, LLC

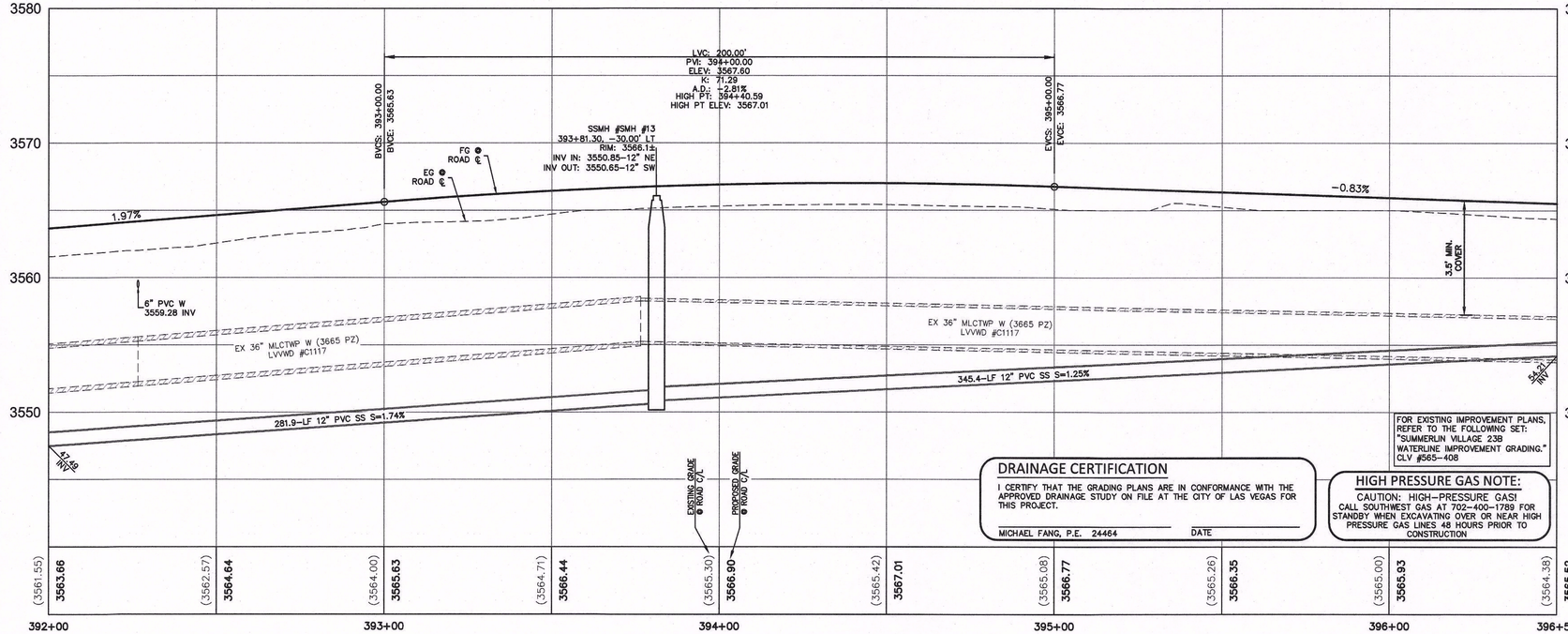
VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 9

DRAWING 20
20 OF 43 SHTS

FUTURE VILLAGE 29
PARCEL BW35
APN 137-22-000-017





DRAINAGE CERTIFICATION

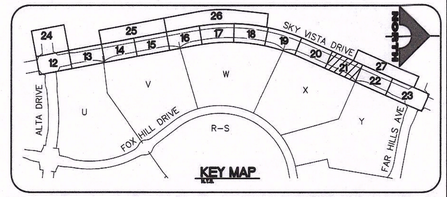
I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 — DATE

HIGH PRESSURE GAS NOTE:

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

FOR EXISTING IMPROVEMENT PLANS, REFER TO THE FOLLOWING SET: "SUMMERLIN VILLAGE 23B WATERLINE IMPROVEMENT GRADING." CLV #565-408



IMPROVEMENT NOTES:

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5SD. REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
6SD. BASE AND WALLS TO BE CAST-IN-PLACE MONOLITHIC POUR. SEAL BETWEEN WALLS AND ROOF TO BE KENT SEAL, OR APPROVED EQUAL.
7SD. INSTALL NDOT TYPE 3 STORM DRAIN DROP INLET PER SHEET R-4.2.3 OF NDOT "STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" 2010 EDITION
8SD. INSTALL TEMPORARY PLUG AND CAP

IRRIGATION CONSTRUCTION NOTES:

1IR. BANK "A": 1-6" & 2-4" SCH 40 PVC. PER DETAIL 3 DRAWING 34
2IR. BANK "B": 2-4" SCH 40 PVC. PER DETAIL 4 DRAWING 34

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LV09-34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

BASIS OF BEARINGS

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 OR 1-800-227-2600
AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-6000

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1-702-227-2929

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

CLV

STATE OF NEVADA — ENGINEER — MICHAEL FANG — No. 24464 — CIVIL — PROFESSIONAL — DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 12:19:10

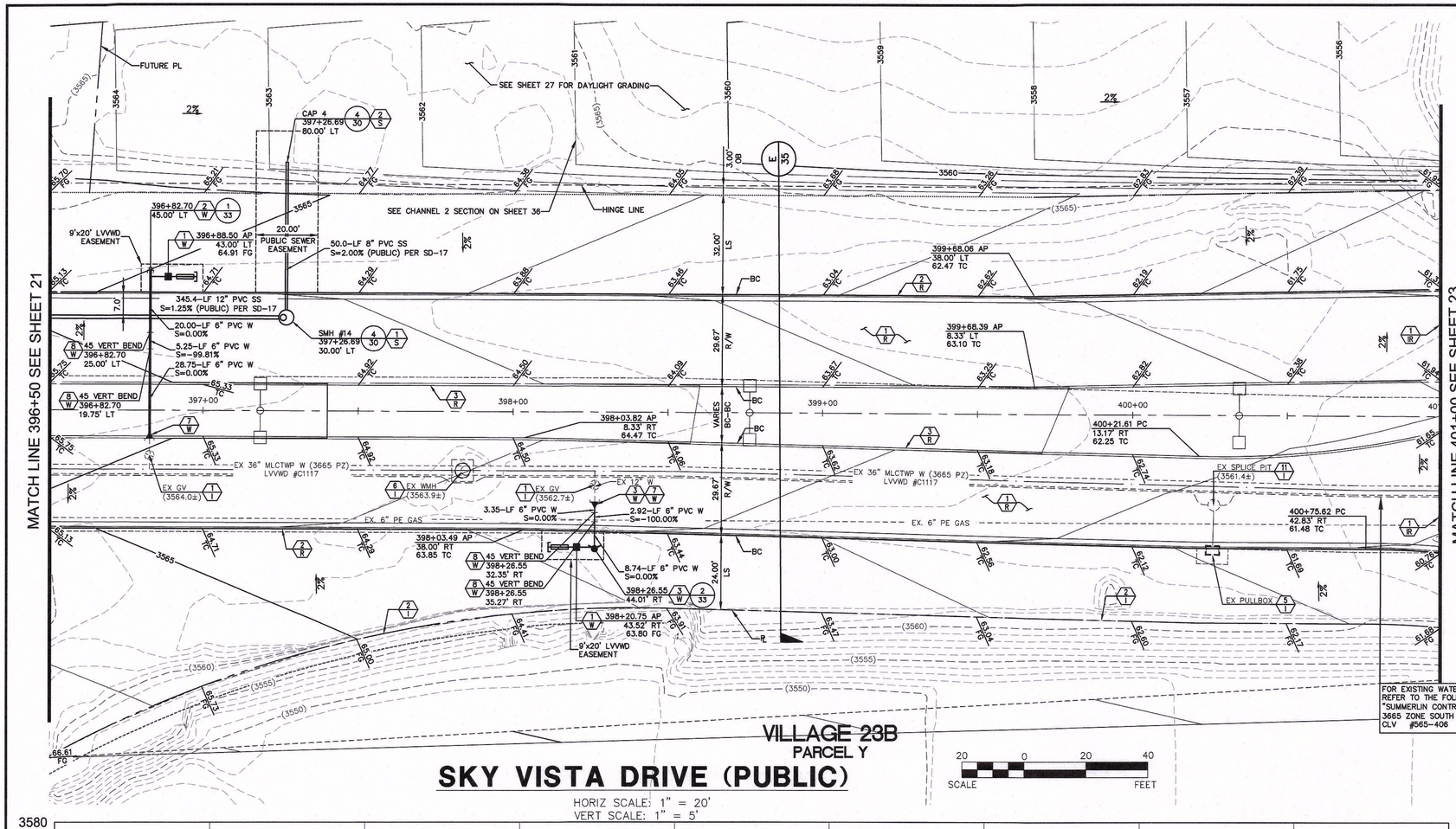
GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\600\62023B-240\DWG\Production\240-PP.dwg
Nicholas DeRosa

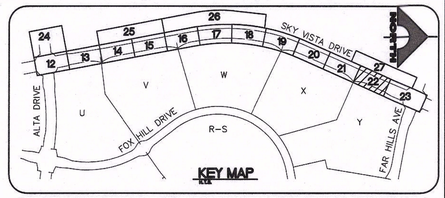
THE HOWARD HUGHES COMPANY. LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 10

DRAWING 21
21 OF 43 SHTS





IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
4. EXISTING WATER TEST STATION PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
5. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL CURB GRADE
6. EXISTING WATER ACCESS MANHOLE PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
7. EXISTING WATER VALVE VAULT PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
8. EXISTING WATER AIR-VAC PROTECT IN PLACE. ADJUST TO FINISH GRADE IF REQUIRED.
9. EXISTING MANHOLE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE IF IMPACTED BY PAVEMENT IMPROVEMENTS.
10. EXISTING DROP INLET PROTECT IN PLACE.
11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

ROADWAY IMPROVEMENTS NOTES:

1. INSTALL A.C. PAVEMENT PER STREET SECTIONS, SEE SHEET 35
2. INSTALL 6" "L" TYPE CURB & GUTTER, SEE SUMMERLIN STD DWG S-47
3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S-50
4. INSTALL CONCRETE BUS TURNOUT PER USD DWG. NO. 234.1

WATER CONSTRUCTION NOTES:

1. INSTALL 1-½" WATER METER AND 1-½" RPPA PER UDACS PL. NO. 4 AND 8
2. INSTALL CAP W/ 2" BLOW-OFF ASSEMBLY PER UDACS PL. NO. 36
3. INSTALL FIRE HYDRANT PER UDACS PL. NO. 39 AND 40. FOR "DEEP" FIRE HYDRANTS SEE UDACS PL. NO. 41.
4. INSTALL GATE VALVE AND BOX PER UDACS PL. NO. 30 AND 39
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6. INSTALL HORIZONTAL BEND PER UDACS PL. NO. 31
7. REMOVE CAP AND BLOWOFF PER UDACS PL. NO. 36 AND CONNECT TO EX WATER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX WATER PRIOR TO CONSTRUCTION)
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9. INSTALL REDUCER (SEE PLAN FOR SIZE)
10. INSTALL 6"X12" TAPPING SLEEVE AND 6" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.
11. INSTALL 12"X12" TAPPING SLEEVE AND 12" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.

SEWER CONSTRUCTION NOTES:

1. INSTALL SEWER MANHOLE PER DCS STD. DWG. 1A AND 1B
2. STUB AND CAP SEWER PIPE PER DETAIL 2, DRAWING 34
3. REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)

STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL TYPE I MANHOLE PER USD DWG. NO. 403
2. INSTALL TYPE II MANHOLE PER USD DWG. NO. 405.1
3. INSTALL TYPE II-SD MANHOLE PER USD DWG. NO. 405.2
4. INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
5. REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
6. BASE AND WALLS TO BE CAST-IN-PLACE MONOLITHIC POUR. SEAL BETWEEN WALLS AND ROOF TO BE KENT SEAL, OR APPROVED EQUAL.
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DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 DATE

APPROVED FOR CONSTRUCTION

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CLV #

ENGINEER: STATE OF NEVADA — MICHAEL FANG — Exp. 06/30/2019 — CIVIL — No. 24464 — PROFESSIONAL ENGINEER
DATE: 4/11/18

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			PLOT DATE: 04-11-18
			CHECK: JLJ
			DRAWN: LG/MB
			DESIGN: LG/MB

PROJECT NO. 62023B-240

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\600\62023B-240\DWG\Production\240-PP.dwg
Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 11

DRAWING 22
22 OF 43 SHTS

VILLAGE 23B
PARCEL Y
SKY VISTA DRIVE (PUBLIC)

HORIZ SCALE: 1" = 20'
VERT SCALE: 1" = 5'

MATCH LINE 401+00 SEE SHEET 22

SEE SHEET 27 FOR DAYLIGHT GRADING

STA: 402+50.00

170.76' WEST CURB TRANSITION
2% TO -3%

STA: 404+20.76

INV.=3548.0±

HINGE LINE

401+85.85 AP
42.84' LT
60.55 TC

6'x9' LVVWD EASEMENT

DI #5
402+48.84
42.84' LT
5' Type "CM2" SDDI

401+86.18 AP
13.17' LT
61.18 TC

12.72-LF 24" RCP SD S=20.00%

55.1-LF 6" PVC W
S=0.00%

7.1-LF 6" PVC W
S=-100.08%

401+08.92 PRC
2.20' RT
61.62 TC

45 VERT BEND
402+26.50
6.76' RT

45 VERT BEND
402+26.50
13.84' RT

402+26.50
48.34' LT

FOR EXISTING WATER PLANS, REFER TO THE FOLLOWING SET: "SUMMERLIN CONTRACT NO. C1117: 3665 ZONE SOUTH PIPELINE PHASE I." CLV #565-406

EX 36" MLCTWP W (3665 PZ) LVVWD #C1117

EX 36" MLCTWP W (3665 PZ) LVVWD #C1092

78.24-LF 24" RCP SD S=3.89%

DI #6
403+33.69
53.83' RT
5' Type "CM2" SDDI

100' V.C.

401+32.80 BCR
48.33' RT
60.88 TC

401+89.98 PT
53.83' RT
60.30 TC

404+39.98 BCR
53.83' RT
59.65 TC

FAR HILLS AVENUE
STA: 241+52.80

SKY VISTA DRIVE
STA: 405+03.68

MATCH EXISTING
404+69.94 BCR
82.26' RT
58.72 TC

64.00' EAST CURB TRANSITION
2% TO 3%

STA: 402+46.00

STA: 403+10.00

FOR EXISTING SKY VISTA DRIVE STORM PLANS, REFER TO THE FOLLOWING SET: "SUMMERLIN VILLAGE 23B FAR HILLS AVENUE IMPROVEMENTS:SKY VISTA DRIVE TO DESERT FOOTHILLS DRIVE." DS H #62A.23.230

404+20.76 BCR
42.84' LT
62.36 TC

404+50.54 BCR
77.72' LT
63.61 TC

405+37.42 BCR
82.27' LT
63.64 TC

405+67.38 BCR
53.84' LT
62.77 TC

405+86.61 BCR
53.84' LT
62.68 TC

405+93.70 BCR
39.00' RT
59.54 TC

LIMITS OF CONSTRUCTION

FUTURE SD
FUTURE DI
FUTURE SSWR
EX SDMH (3561.0±)
EX SDMH (3561.1±)
EX SDMH (3561.3±)
EX SDMH (3560.4±)
EX SDMH (3559.8±)
EX SDMH (3560.5±)
EX GV (3559.7±)
EX WMH (3559.5±)
EX BO (3558.9±)
EX SPLICE PIT (3561.2±)
EX PULLBOX
EX AVAR
EX TS
EX 66" SD
EX 24" SD
EX 24" RCP SD
EX 6" PE GAS
EX 42" MLCTWP W (PZ-3665) LVVWD #C1472
EX 48" MLCTWP W (PZ-3665) LVVWD #C1092
EX. F.O. CABLE
ANCHOR WALL
EX. 8'X6' RCB SD (APFH0089)
MATCH EXISTING 405+63.80 BCR 73.71' RT 58.77 TC
FOR EXISTING SKY VISTA DRIVE WATER PLANS, REFER TO THE FOLLOWING SET: "SUMMERLIN 3665 ZONE RESERVOIR INLET/OUTLET PIPELINE." CLV #565-507

FG ROAD ℄
EG ROAD ℄
-0.83%
0.50%
-0.50%
6" PVC W 3555.71 INV
1.9' CLR
3.5' MIN. COVER
EX. 6" PE GAS (3557.0± INV
EX 66" SD (PUBLIC) S=0.20% Q100(DESIGN)=320 CFS Q100(ULT)=207 CFS
EX 66" SD (PUBLIC) S=0.39% Q100(DESIGN)=320 CFS Q100(ULT)=207 CFS
EX 66" SD (PUBLIC) S=0.39% Q100(DESIGN)=320 CFS Q100(ULT)=207 CFS
EX 66" SD (PUBLIC) S=0.86% Q100(DESIGN)=320 CFS Q100(ULT)=207 CFS
EX 36" MLCTWP W (3665 PZ) LVVWD #C1117
EX 36" MLCTWP W (3665 PZ) LVVWD #C1092
EX 36" MLCTWP W (3665 PZ) LVVWD #C1092
EX. 8'X6' RCB SD (APFH0089) INV (3545.4±)
EX 36" MLCTWP W (3665 PZ) LVVWD #C1092
EX. 12" PVC SS (3535.8±) INV
EX. 48" MLCP W 3538.39 INV
EXISTING GRADE @ ROAD C/L
PROPOSED GRADE @ ROAD C/L
FAR HILLS AVE C/L

403+06.36
EX. WATER VAULT & VALVE
EX. RIM: (3559.5±)
NEW RIM: 3559.6
N=521876.5636
E=564185.0537

402+46.32
EX. 48" SDMH
EX. RIM: (3560.5±)
NEW RIM: 3560.4
INV IN: (3547.81-66" NE)
INV IN: (3547.81-66" W)
N=521804.1659
E=564101.6176

402+60.20
EX. 48" SDMH
EX. RIM: (3559.8±)
NEW RIM: 3560.2
INV IN: (3548.29-24" W)
INV IN: (3547.40-66" NE)
INV OUT (3547.40-66" SW)
N=521853.3999
E=564143.4685

403+76.76
EX. 48" SDMH
EX. RIM: (3560.4±)
NEW RIM: 3560.3
INV IN: (3550.67-24" SE)
INV OUT: (3547.17-66" NE)
INV OUT: (3547.17-66" SW)
N=521907.0152
E=564170.8064

404+58.10
EX. TYPE III SDMH
EX. RIM: (3561.2±)
NEW RIM: 3561.7
INV IN: (3546.63-66" SW)
INV OUT: (3546.63-66" NE)
N=521964.2232
E=564203.8232

	401+00	402+00	403+00	404+00	405+00	405+75
(3560.59)	3561.77	(3560.37)	3561.35	(3560.34)	3560.93	(3559.78)	3560.52	(3559.61)	3560.27	(3559.68)	3560.35	(3560.00)	3560.60	(3560.38)	3560.85	(3560.06)	3561.10	(3560.63)	3560.89	(3560.86)	3560.76

** OFFSET DROP INLET NOTE

DI #5 AND DI #6 SHALL BE CONSTRUCTED AT A 1 FT OFFSET NORTH OF THEIR RESPECTIVE STORM DRAIN LATERAL CENTERLINES IN ORDER TO FACILITATE SUFFICIENT CLEARANCE BETWEEN THE STORM DRAIN AND STRUCTURE WALLS

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

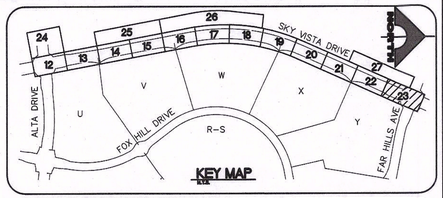
MICHAEL FANG, P.E. 24464 DATE

HIGH PRESSURE GAS NOTE:

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

FOR FAR HILLS AVENUE EXISTING IMPROVEMENT PLANS, STORM, SEWER AND WATER, REFER TO THE FOLLOWING SET: "SUMMERLIN VILLAGE 23B FAR HILLS AVENUE IMPROVEMENTS - PHASE II: FOX HILL DRIVE TO SKY VISTA DRIVE." O/S H #53053 DS H #53053 CCWRD H #53053 LVVWD #122713

FOR EXISTING SKY VISTA DRIVE IMPROVEMENT PLANS, REFER TO THE FOLLOWING SET: "SUMMERLIN VILLAGE 23B WATERLINE IMPROVEMENT GRADING." CLV #565-408



KEY MAP

IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
4. EXISTING WATER TEST STATION PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
5. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
6. EXISTING WATER ACCESS MANHOLE PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
7. EXISTING WATER VALVE VAULT PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
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1. INSTALL A.C. PAVEMENT PER STREET SECTIONS, SEE SHEET 35
2. INSTALL 6" "L" TYPE CURB & GUTTER, SEE SUMMERLIN STD DWG S-47
3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S-50
4. INSTALL CONCRETE BUS TURNOUT PER USD DWG. NO. 234.1

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PROFESSIONAL ENGINEER
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CIVIL
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GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
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F: 702.804.2299
gcwengineering.com

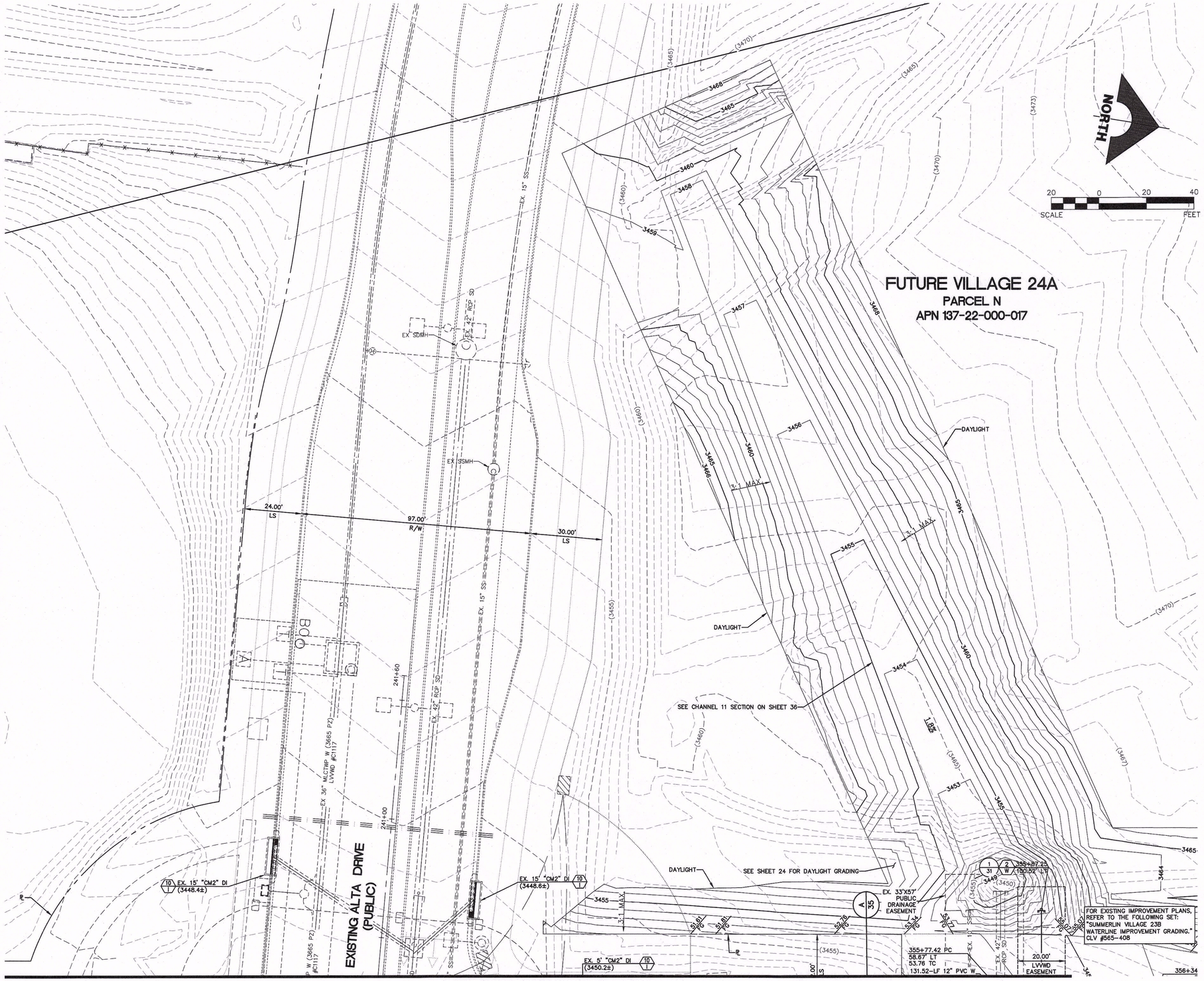
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Nicholas DeRosa

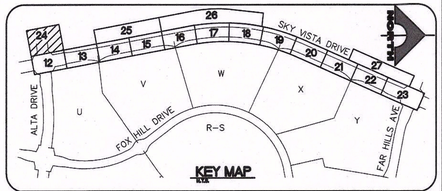
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

PLAN AND PROFILE 12

DRAWING 23
23 OF 43 SHTS





IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
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9. EXISTING MANHOLE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE IF IMPACTED BY PAVEMENT IMPROVEMENTS.
10. EXISTING DROP INLET PROTECT IN PLACE.
11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

ROADWAY IMPROVEMENTS NOTES:

1. INSTALL A.C. PAVEMENT PER STREET SECTIONS, SEE SHEET 35
2. INSTALL 6" "L" TYPE CURB & GUTTER, SEE SUMMERLIN STD DWG S-47
3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S-50
4. INSTALL CONCRETE BUS TURNOUT PER USD DWG. NO. 234.1

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2. INSTALL CAP W/ 2" BLOW-OFF ASSEMBLY PER UDACS PL. NO. 36
3. INSTALL FIRE HYDRANT PER UDACS PL. NO. 39 AND 40. FOR "DEEP" FIRE HYDRANTS SEE UDACS PL. NO. 41.
4. INSTALL GATE VALVE AND BOX PER UDACS PL. NO. 30 AND 39
5. INSTALL TEE PER UDACS PL. NO. 31
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7. REMOVE CAP AND BLOWOFF PER UDACS PL. NO. 36 AND CONNECT TO EX WATER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX WATER PRIOR TO CONSTRUCTION)
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9. INSTALL REDUCER (SEE PLAN FOR SIZE)
10. INSTALL 6"X12" TAPPING SLEEVE AND 6" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.
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SEWER CONSTRUCTION NOTES:

1. INSTALL SEWER MANHOLE PER DCS STD. DWG. 1A AND 1B
2. STUB AND CAP SEWER PIPE PER DETAIL 2, DRAWING 34
3. REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)

STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL TYPE I MANHOLE PER USD DWG. NO. 403
2. INSTALL TYPE II MANHOLE PER USD DWG. NO. 405.1
3. INSTALL TYPE II-SD MANHOLE PER USD DWG. NO. 405.2
4. INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
5. REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
6. BASE AND WALLS TO BE CAST-IN-PLACE MONOLITHIC POUR. SEAL BETWEEN WALLS AND ROOF TO BE KENT SEAL, OR APPROVED EQUAL.
7. INSTALL NDOT TYPE 3 STORM DRAIN DROP INLET PER SHEET R-4.2.3 OF NDOT "STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" 2010 EDITION
8. INSTALL TEMPORARY PLUG AND CAP

IRRIGATION CONSTRUCTION NOTES:

1. BANK "A": 1-6" & 2-4" SCH 40 PVC. PER DETAIL 3 DRAWING 34
2. BANK "B": 2-4" SCH 40 PVC. PER DETAIL 4 DRAWING 34

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
SLV09-34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

BASIS OF BEARINGS

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 _____ DATE

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
or
1-800-227-2600
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-6000

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

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

CLV #

STATE OF NEVADA
PROFESSIONAL ENGINEER
MICHAEL FANG
Exp. 06/30/2019
CIVIL
No. 24464

DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	AGEN. APP	DATE	GCW APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:06:28

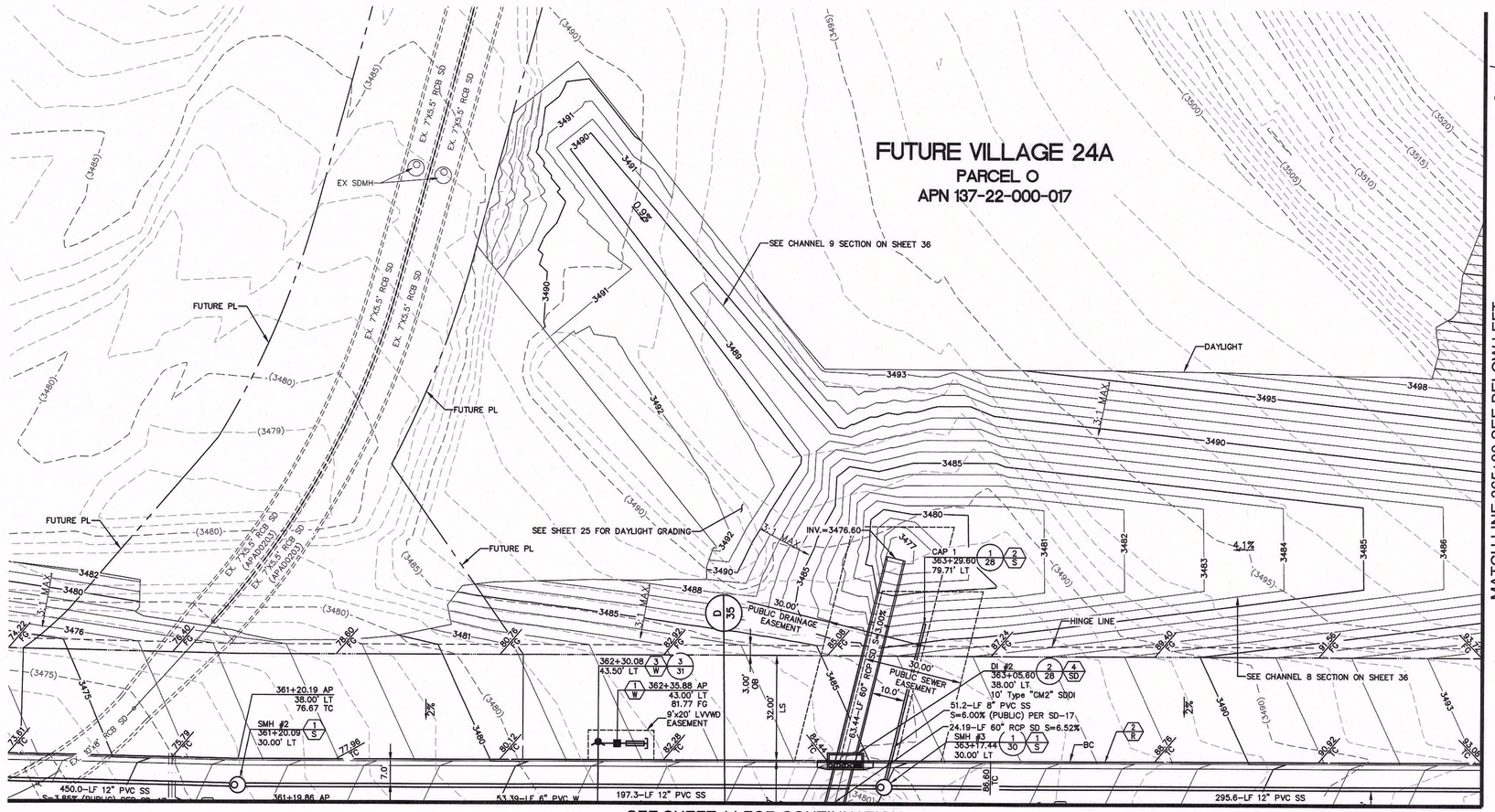
GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\6000\62023B-240\DWG\Production\240-PP.dwg
Nicholas DeRosa

THE HOWARD HUGHES COMPANY. LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

DAYLIGHT GRADING 1

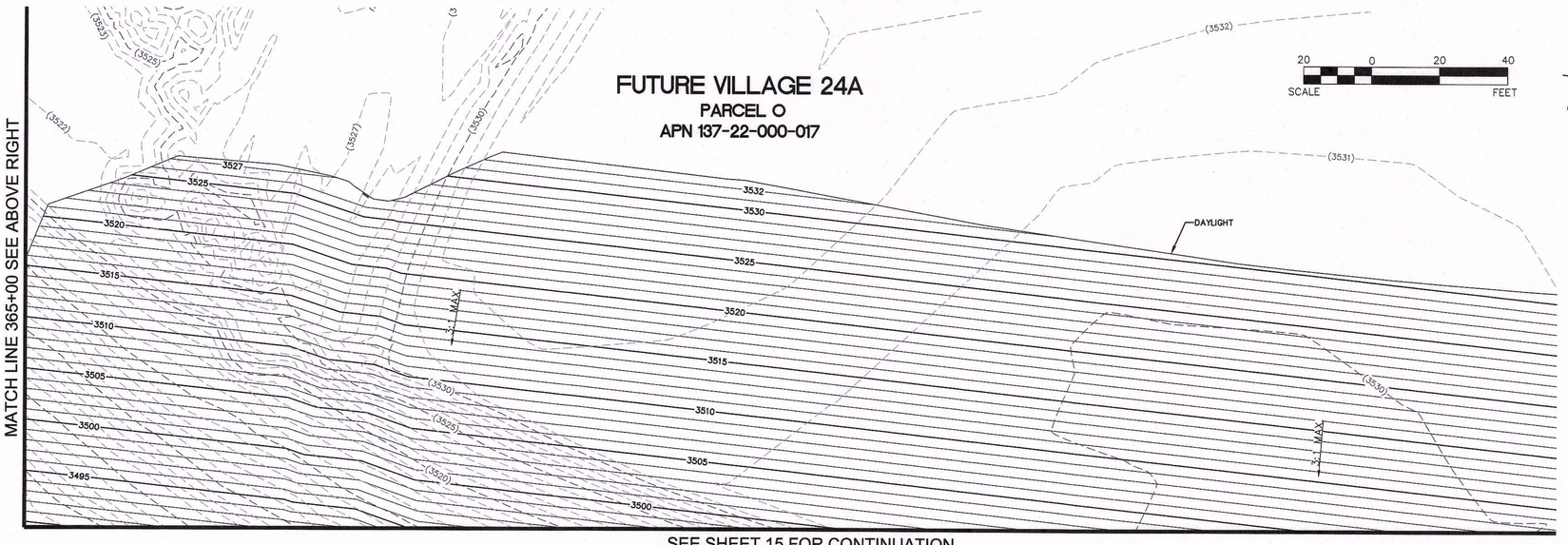
DRAWING 24
24 OF 43 SHTS



MATCH LINE 365+00 SEE BELOW LEFT

NORTH

SEE SHEET 14 FOR CONTINUATION



MATCH LINE 365+00 SEE ABOVE RIGHT

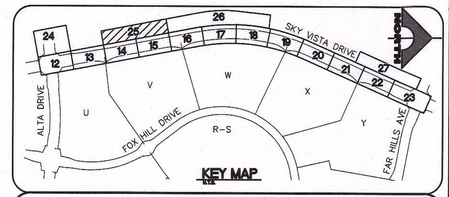
SEE SHEET 15 FOR CONTINUATION

FOR EXISTING IMPROVEMENT PLANS, REFER TO THE FOLLOWING SET:
"SUMMERLIN VILLAGE 23B WATERLINE IMPROVEMENT GRADING."
CLV #565-408

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 DATE



IMPROVEMENT NOTES:

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3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S-50
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BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. DATE:

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-227-2600
AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-6000

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

CLV #

ENGINEER'S STATE OF NEVADA
MICHAEL FANG
No. 24464
CIVIL
Exp. 06/30/2019
PROFESSIONAL ENGINEER
DATE: 4/11/18

REV	DATE	DESCRIPTION	AGEN APP	DATE	GOV APP	DATE

AGENCY REVIEW - NOT FOR CONSTRUCTION

PROJECT NO. 620238-240
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DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:07:09

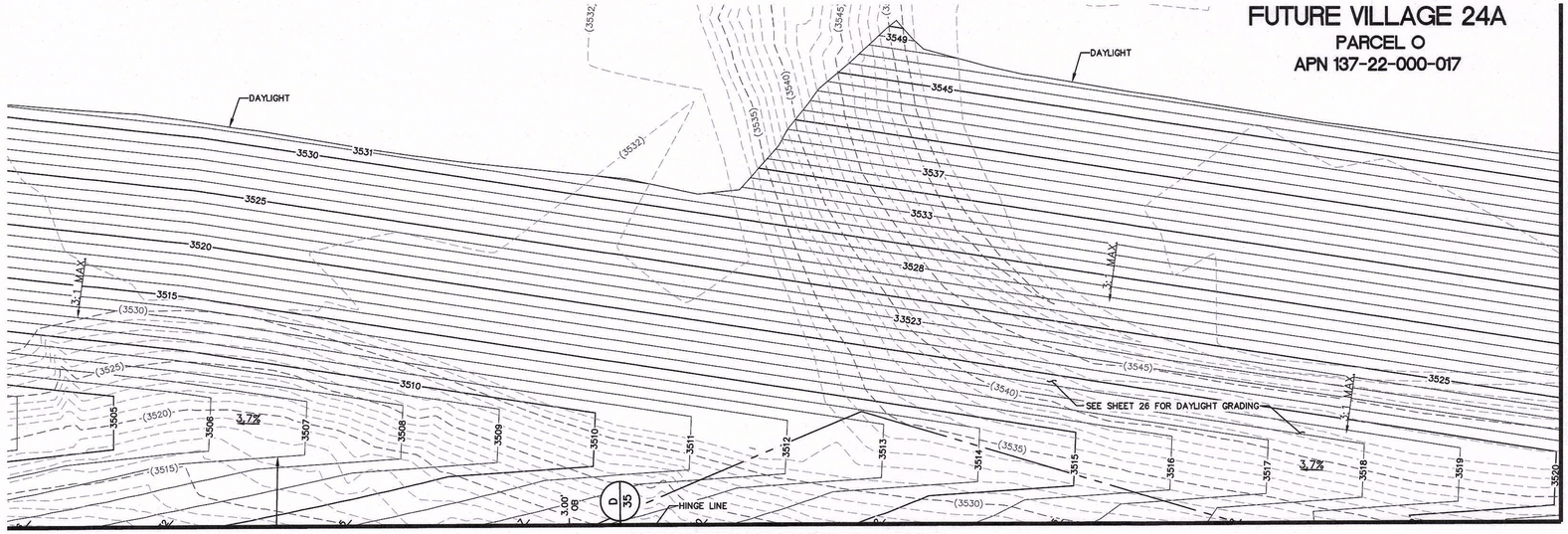
GCW ENGINEERS\SURVEYORS
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VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

DAYLIGHT GRADING 2

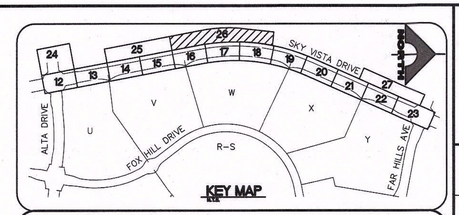
DRAWING
25
25 OF 43 SHTS



SEE SHEET 16 FOR CONTINUATION

MATCH LINE 374+00 SEE BELOW LEFT

NORTH



IMPROVEMENT NOTES:

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BENCHMARK

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APPROVED FOR CONSTRUCTION

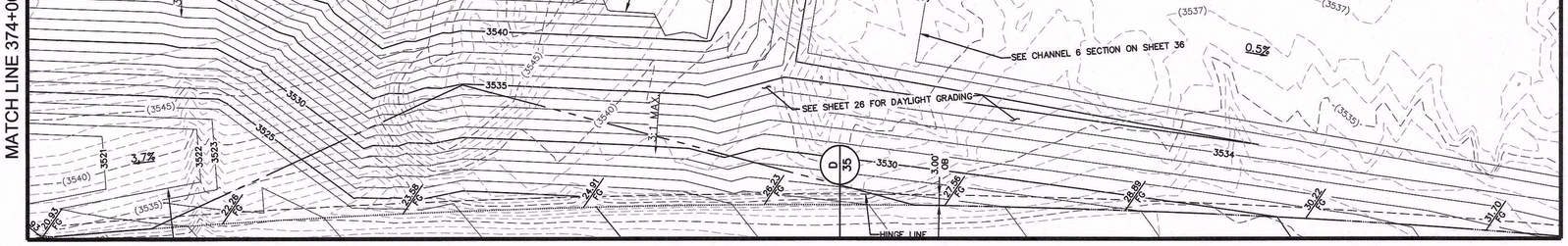
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

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CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-6000

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CLV #

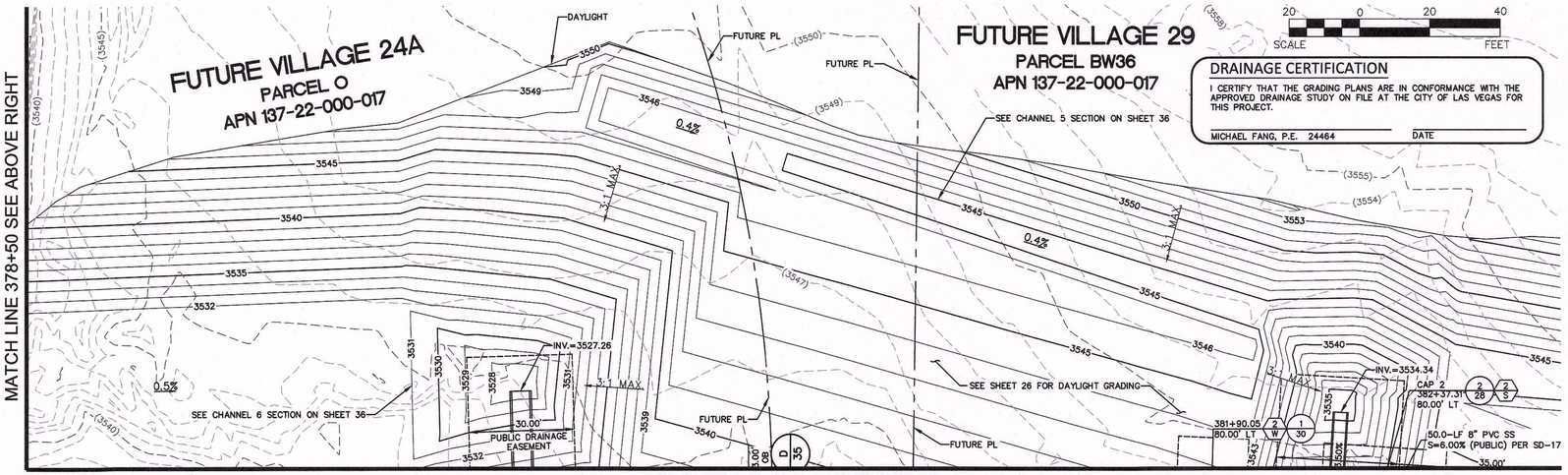


MATCH LINE 374+00 SEE ABOVE RIGHT

MATCH LINE 378+50 SEE BELOW LEFT

NORTH

SEE SHEET 17 FOR CONTINUATION



20 0 20 40
SCALE FEET

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 DATE

NORTH

FOR EXISTING IMPROVEMENT PLANS, REFER TO THE FOLLOWING SET: "SUMMERLIN VILLAGE 23B WATERLINE IMPROVEMENT GRADING." CLV #565-408

SEE SHEET 18 FOR CONTINUATION

STATE OF NEVADA
PROFESSIONAL ENGINEER
MICHAEL FANG
Exp. 06/30/2019
CIVIL
No. 24464

DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	GOV. APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:08:07

GCV
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcvengineering.com

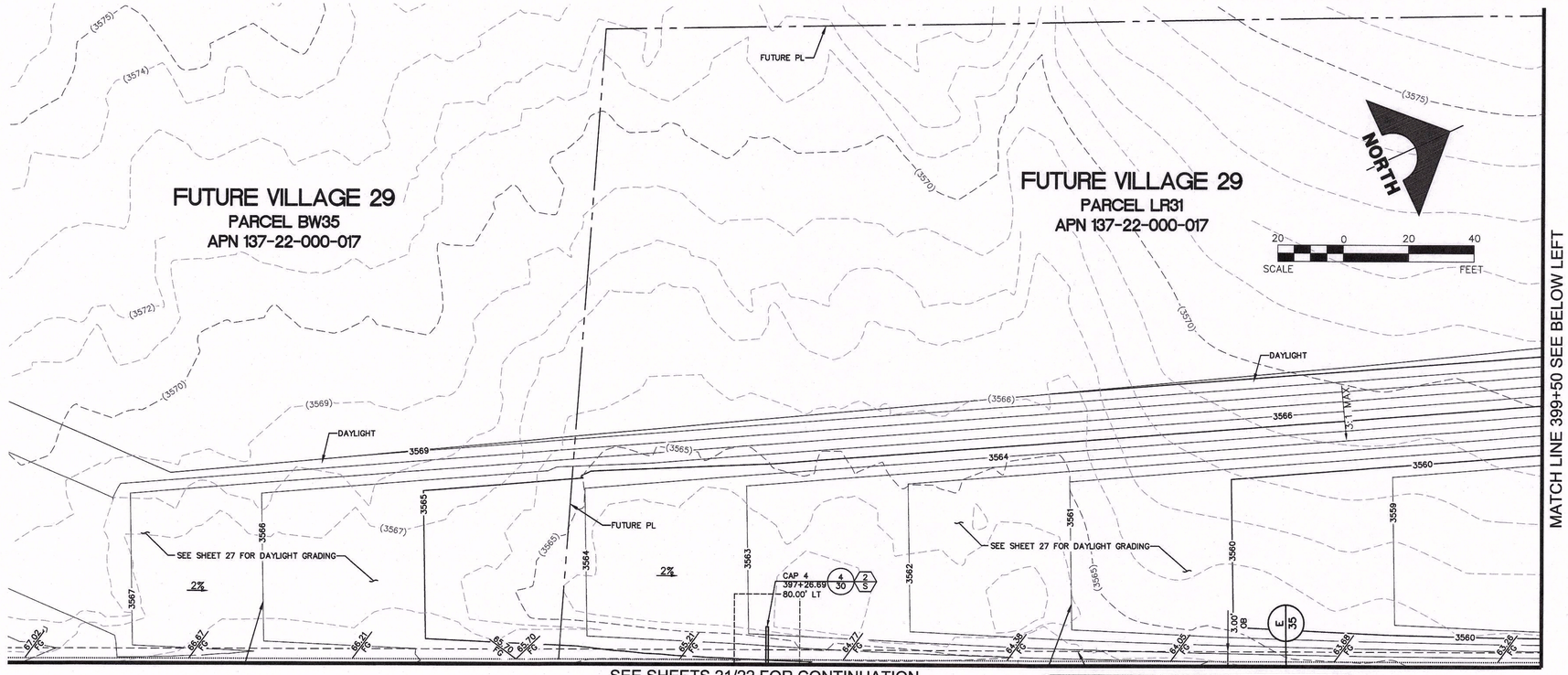
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Nicholas DiRosa

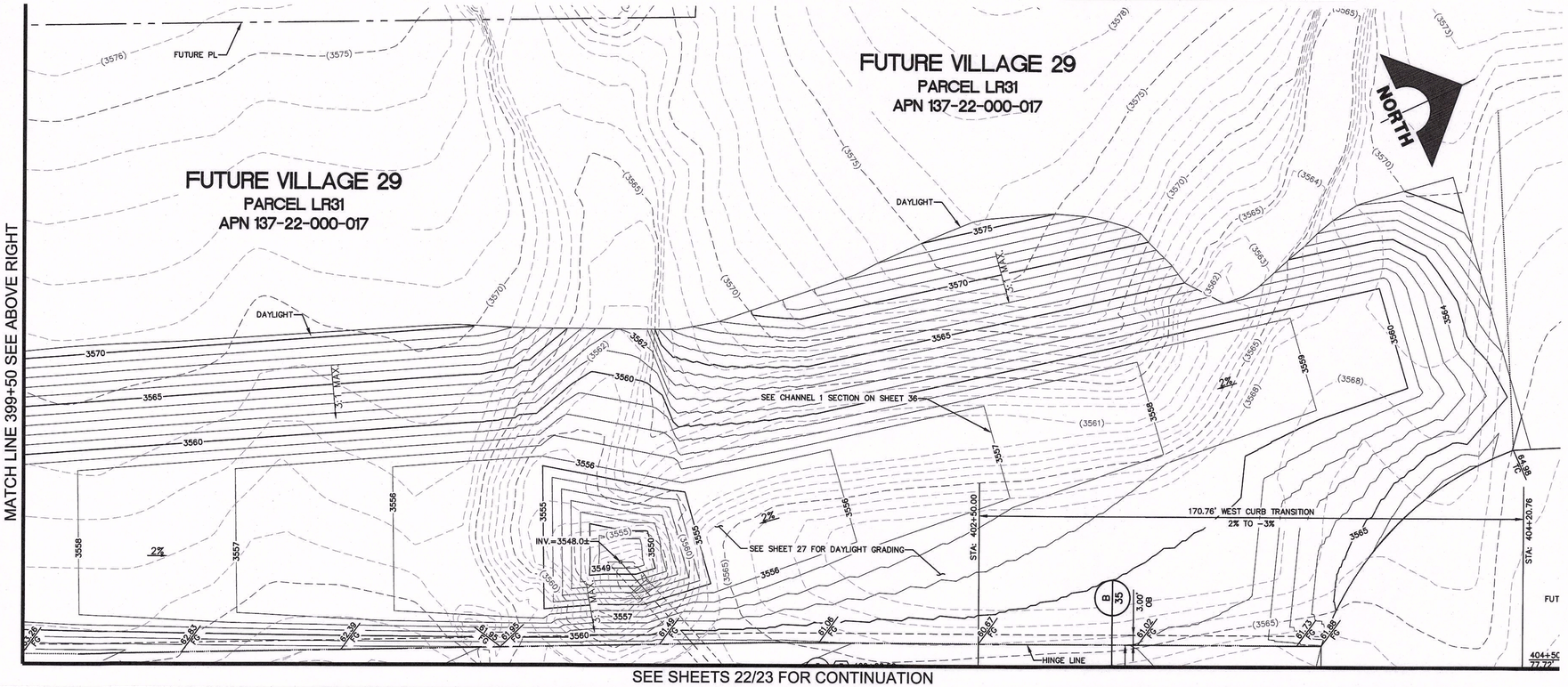
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

DAYLIGHT GRADING 3

DRAWING
26
26 OF 43 SHTS



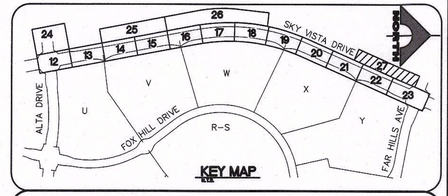


DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

MICHAEL FANG, P.E. 24464 DATE

FOR EXISTING IMPROVEMENT PLANS, REFER TO THE FOLLOWING SET: "SUMMERLIN VILLAGE 23B WATERLINE IMPROVEMENT GRADING." CLV #565-408



IMPROVEMENT NOTES:

1. EXISTING WATER VALVE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE. VALVES TO REMAIN ACCESSIBLE AT ALL TIMES.
2. EXISTING MASONRY WALL AND FENCE BY OTHERS. PROTECT IN PLACE.
3. EXISTING WATER BLOW-OFF PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE.
4. EXISTING WATER TEST STATION PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
5. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL CURB GRADE.
6. EXISTING WATER ACCESS MANHOLE PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
7. EXISTING WATER VALVE VAULT PROTECT IN PLACE. RAISE TO FINAL PAVEMENT GRADE.
8. EXISTING WATER AIR-VAC PROTECT IN PLACE. ADJUST TO FINISH GRADE IF REQUIRED.
9. EXISTING MANHOLE PROTECT IN PLACE. RAISE COVER TO FINAL PAVEMENT GRADE IF IMPACTED BY PAVEMENT IMPROVEMENTS.
10. EXISTING DROP INLET PROTECT IN PLACE.
11. EXISTING WATER FIBER OPTIC SPLICE PIT PROTECT IN PLACE. RAISE TO FINAL GRADE.

ROADWAY IMPROVEMENTS NOTES:

1. INSTALL A.C. PAVEMENT PER STREET SECTIONS, SEE SHEET 35
2. INSTALL 6" "L" TYPE CURB & GUTTER, SEE SUMMERLIN STD DWG S-47
3. INSTALL "A" TYPE ISLAND CURB, SEE SUMMERLIN STD DWG S-50
4. INSTALL CONCRETE BUS TURNOUT PER USD DWG. NO. 234.1

WATER CONSTRUCTION NOTES:

1. INSTALL 1-½" WATER METER AND 1-½" RPPA PER UDACS PL. NO. 4 AND 8
2. INSTALL CAP W/ 2" BLOW-OFF ASSEMBLY PER UDACS PL. NO. 36
3. INSTALL FIRE HYDRANT PER UDACS PL. NO. 39 AND 40. FOR "DEEP" FIRE HYDRANTS SEE UDACS PL. NO. 41.
4. INSTALL GATE VALVE AND BOX PER UDACS PL. NO. 30 AND 39
5. INSTALL TEE PER UDACS PL. NO. 31
6. INSTALL HORIZONTAL BEND PER UDACS PL. NO. 31
7. REMOVE CAP AND BLOWOFF PER UDACS PL. NO. 36 AND CONNECT TO EX WATER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX WATER PRIOR TO CONSTRUCTION)
8. INSTALL VERTICAL BEND PER UDACS PL. NO. 31 UNLESS OTHERWISE IDENTIFIED. (SEE PLAN FOR ANGLE)
9. INSTALL REDUCER (SEE PLAN FOR SIZE)
10. INSTALL 6"X12" TAPPING SLEEVE AND 6" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.
11. INSTALL 12"X12" TAPPING SLEEVE AND 12" TAPPING VALVE PER UDACS PLT No. 30, 31, 34, 39 & SECTION 2.24.01A.

SEWER CONSTRUCTION NOTES:

1. INSTALL SEWER MANHOLE PER DCS STD. DWG. 1A AND 1B
2. STUB AND CAP SEWER PIPE PER DETAIL 2, DRAWING 34
3. REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)

STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL TYPE I MANHOLE PER USD DWG. NO. 403
2. INSTALL TYPE II MANHOLE PER USD DWG. NO. 405.1
3. INSTALL TYPE II-SD MANHOLE PER USD DWG. NO. 405.2
4. INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
5. REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
6. BASE AND WALLS TO BE CAST-IN-PLACE MONOLITHIC POUR. SEAL BETWEEN WALLS AND ROOF TO BE KENT SEAL, OR APPROVED EQUAL.
7. INSTALL NDOT TYPE 3 STORM DRAIN DROP INLET PER SHEET R-4.2.3 OF NDOT "STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" 2010 EDITION
8. INSTALL TEMPORARY PLUG AND CAP

IRRIGATION CONSTRUCTION NOTES:

1. BANK "A": 1-6" & 2-4" SCH 40 PVC. PER DETAIL 3 DRAWING 34
2. BANK "B": 2-4" SCH 40 PVC. PER DETAIL 4 DRAWING 34

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LV09-34NE6	RIVET AND PLATE IN TOP OF CURB ● NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREWOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

BASIS OF BEARINGS

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

Call before you Dig — Avoid cutting underground utility lines. It's costly. Call 811 or 1-800-227-2600 for CLARK COUNTY NEVADA DIGGERS 1-702-455-6000

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

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

CLV #

STATE OF NEVADA — PROFESSIONAL ENGINEER — MICHAEL FANG — No. 24464 — CIVIL — exp. 06/30/2019 — DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 620238-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:08:50

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

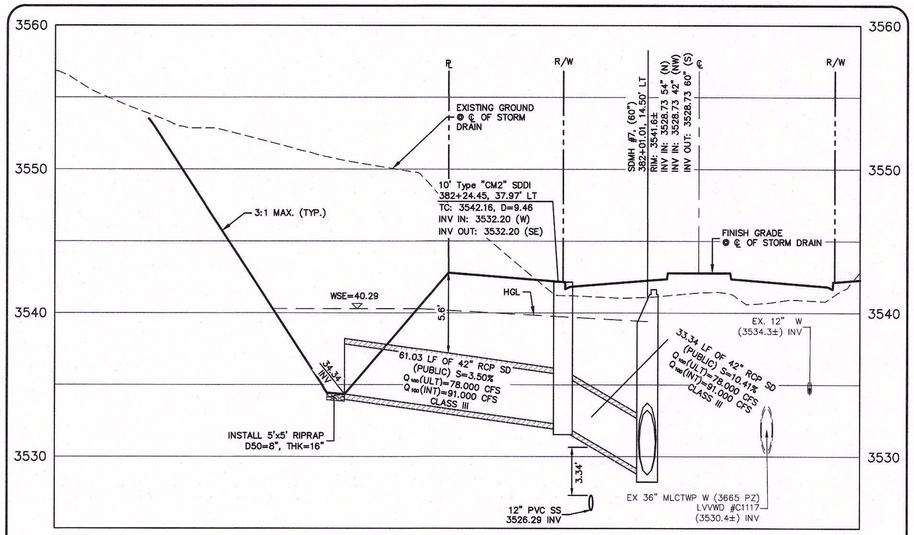
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Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

DAYLIGHT GRADING 4

DRAWING 27
27 OF 43 SHTS

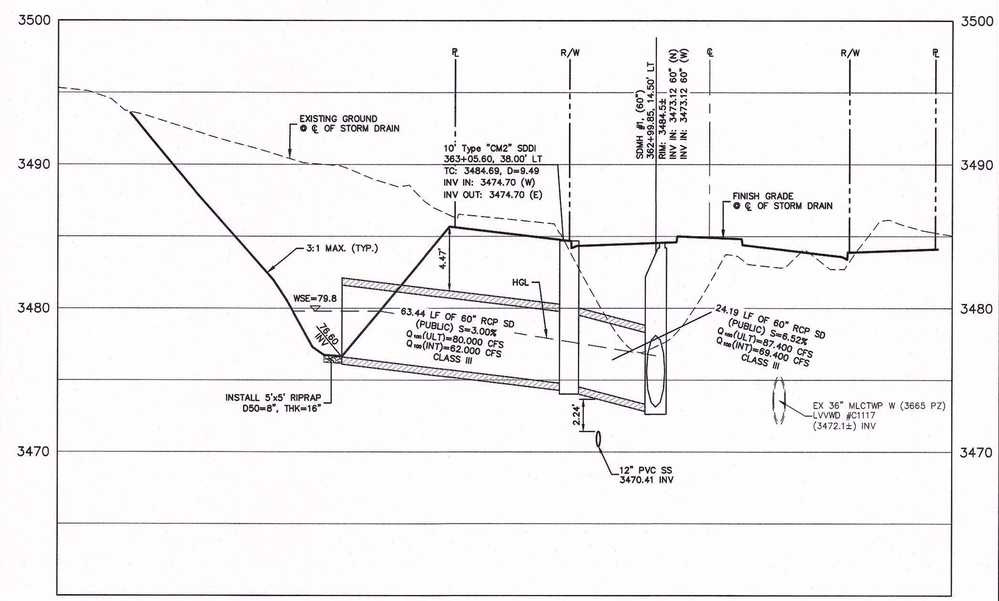


SKY VISTA DRIVE
STORM DRAIN PROFILE @ 382+24.45

SCALE: HORIZ. 1"=20', VERT. 1"=5'

SEE DRAWING 18

4

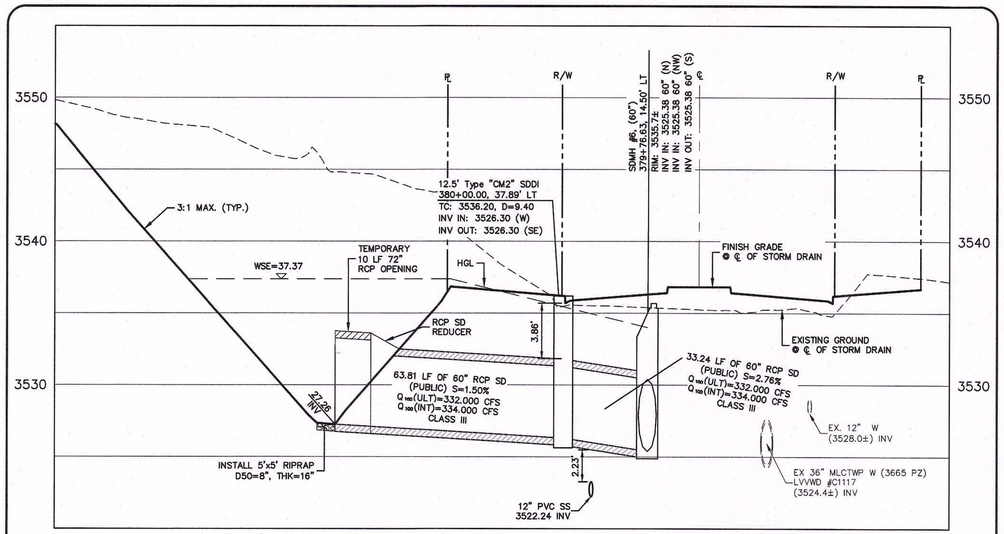


SKY VISTA DRIVE
STORM DRAIN PROFILE @ 362+99.85

SCALE: HORIZ. 1"=20', VERT. 1"=5'

SEE DRAWING 14

2

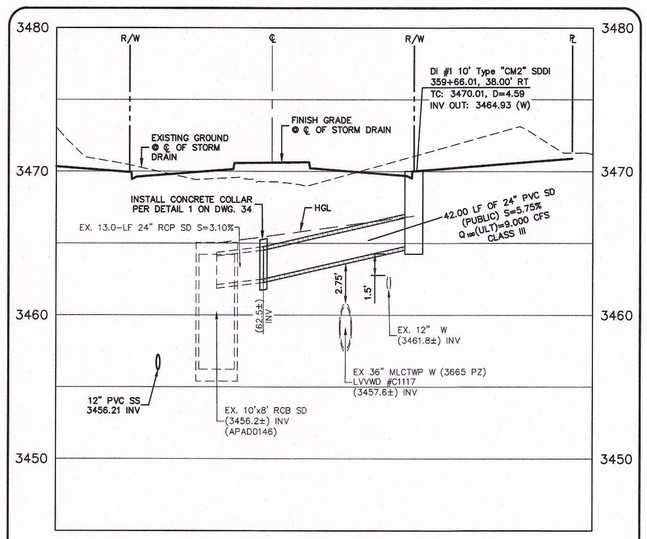


SKY VISTA DRIVE
STORM DRAIN PROFILE @ 380+00.00

SCALE: HORIZ. 1"=20', VERT. 1"=5'

SEE DRAWING 18

3



SKY VISTA DRIVE
STORM DRAIN PROFILE @ 359+66.01

SCALE: HORIZ. 1"=20', VERT. 1"=5'

SEE DRAWING 13

1

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:

CLV #

STATE OF NEVADA
PROFESSIONAL ENGINEER
MICHAEL FANG
Exp. 06/30/2019
CIVIL
No. 24457
DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP	DATE

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 15:09:17

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\600\62023B-240\DWG\Production\240-LAT.dwg
Nicholas DeRosa

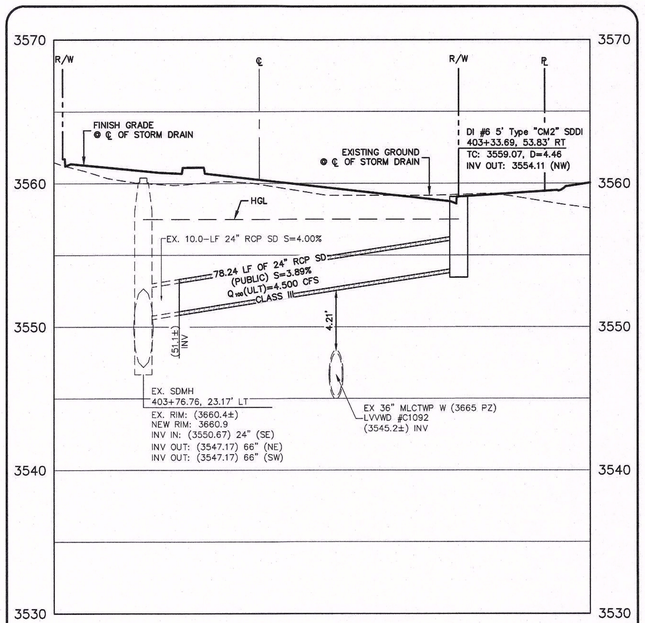
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

LATERAL PROFILES 1

DRAWING
28
28 OF 43 SHTS

H#

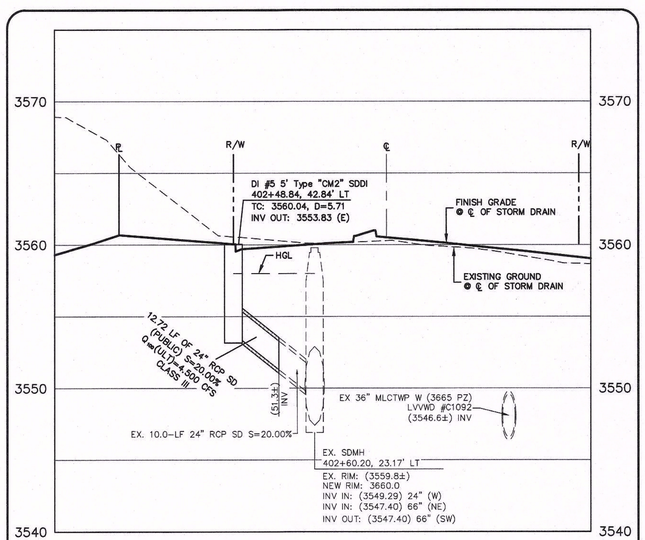


SKY VISTA DRIVE
STORM DRAIN PROFILE @ 403+76.77

3

SCALE: HORIZ. 1"=20', VERT. 1"=5'

SEE DRAWING 23

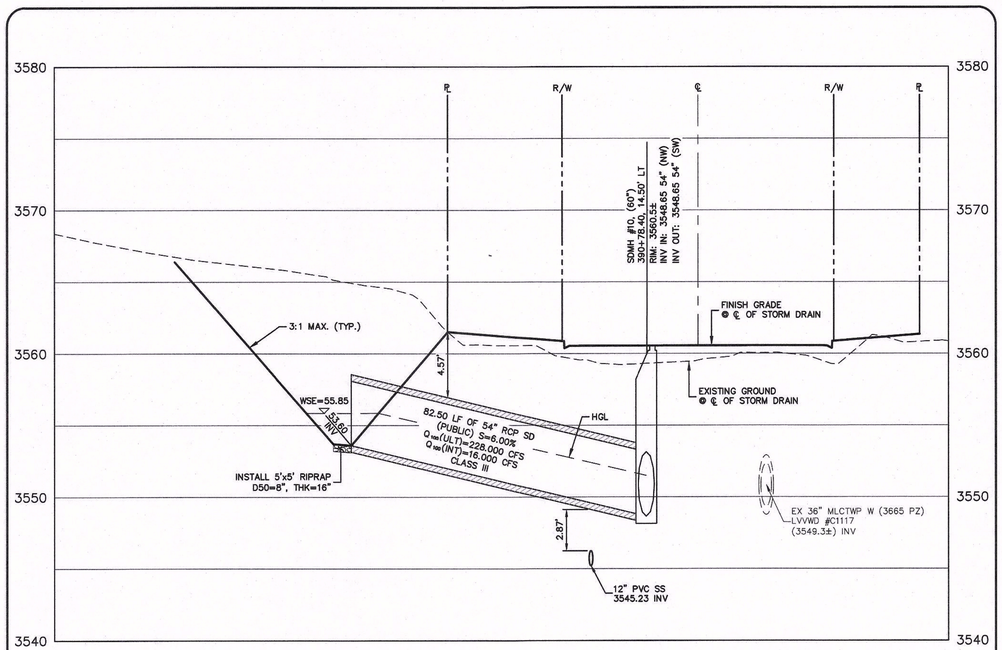


SKY VISTA DRIVE
STORM DRAIN PROFILE @ 402+50.33

2

SCALE: HORIZ. 1"=20', VERT. 1"=5'

SEE DRAWING 23



SKY VISTA DRIVE
STORM DRAIN PROFILE @ 390+78.40

1

SCALE: HORIZ. 1"=20', VERT. 1"=5'

SEE DRAWING 20

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:

CLV #

ENGINEER - STATE OF NEVADA - PROFESSIONAL ENGINEER - MICHAEL FANG - No. 24464 - CIVIL - DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 12:23:21

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
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gcwengineering.com
F:\Projects\600\62023B-240\DWG\Production\240-LAT.dwg
Nicholas DeRosa

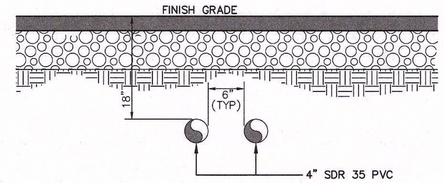
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

LATERAL PROFILES 2

DRAWING
29
29 OF 43 SHTS

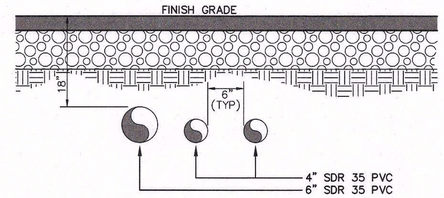
H#



NOTE:

CONTRACTOR TO EXTEND SLEEVES 1' (12") BEHIND BACK OF CURB, TYP.

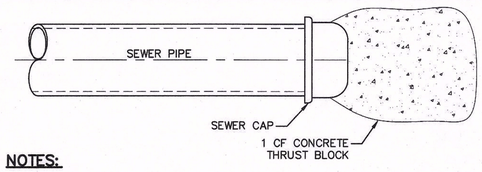
IRRIGATION SLEEVE BANK 'B' 4
SCALE: N.T.S.



NOTE:

CONTRACTOR TO EXTEND SLEEVES 1' (12") BEHIND BACK OF CURB, TYP.

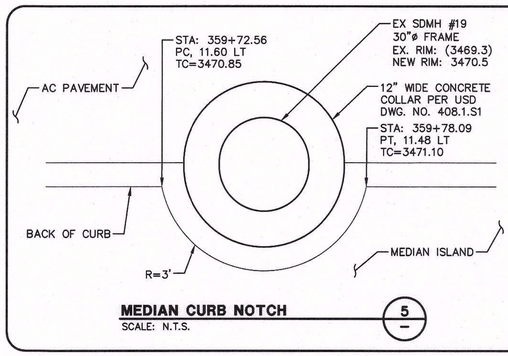
IRRIGATION SLEEVE BANK 'A' 3
SCALE: N.T.S.



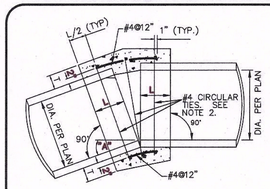
NOTES:

1. CONCRETE TO CONFORM WITH SECTION 4.11.2 OF THE LATEST VERSION OF THE DCS.

SEWER STUB AND CAP WITH THRUST BLOCK 2
SCALE: N.T.S.



MEDIAN CURB NOTCH 5
SCALE: N.T.S.



PLAN

NOTES:

1. WHERE THE SLOPE OF THE UPSTREAM PIPE IS GREATER THAN THE SLOPE OF THE DOWNSTREAM PIPE, JOIN SOFFITS. WHERE THE SLOPE OF THE UPSTREAM PIPE IS LESS THAN THE SLOPE OF THE DOWNSTREAM PIPE, JOIN INVERTS.

2. WHERE THE SPACE BETWEEN THE PIPE EXTREMITIES EXCEEDS 2 1/2 INCHES, THE NUMBER OF CIRCULAR TIES SHALL BE INCREASED TO MAINTAIN A MAXIMUM SPACING OF 6 INCHES CENTER TO CENTER. CIRCULAR TIES SHALL HAVE A DIAMETER 5 INCHES GREATER THAN THE OUTSIDE DIAMETER OF THE LARGER PIPE.

CIRCULAR TIES:

PIPE DIAMETER	SPACE BETWEEN PIPE EXTREMITIES	NO. OF CIRCULAR TIES	L	T
18" OR LESS	2 1/2"	3	12"	5"
24" OR LESS	2 1/2"	3	12"	6"
30" OR LESS	2 1/2"	3	12"	7"
36" OR LESS	2 1/2" OR LESS	4	18"	9"
60" OR LESS	2 1/2" OR LESS	5	21"	11"
78" OR LESS	2 1/2" OR LESS	7	24"	12"

CONCRETE COLLAR DETAIL 1
SCALE: N.T.S.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE: _____

CLV

ENGINEER - STATE OF NEVADA - PROFESSIONAL
MICHAEL FARIS
Exp. 06/30/2019
CIVIL
No. 21468
DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP

PROJECT NO. 620238-240
DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 12:24:07

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
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gcwengineering.com

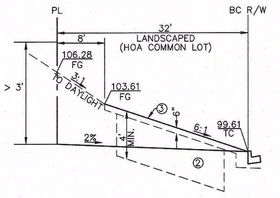
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Nicholas DeRosa

THE HOWARD HUGHES COMPANY. LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

UTILITY DETAILS

DRAWING
34
34 OF 43 SHTS



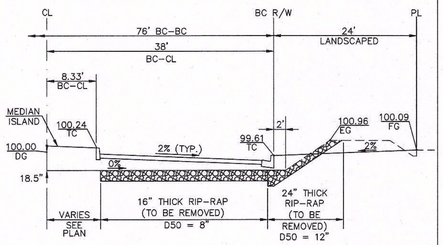
① – SCARIFY NATIVE 6" AND RECOMPACT TO 95%

② – LANDSCAPE AREA – EXCAVATE AND RECOMPACT TO 85% OR RIP ENTIRE AREA TO DEPTH INDICATED

③ – ROUGH GRADE (RG) TO BE 6" BELOW FINISHED GRADE (FG) FOR FUTURE LANDSCAPE PURPOSES

LANDSCAPE GRADING FOR CUTS > 3' AT PL (1)

SEE PLAN/PROFILE SHEETS FOR LOCATION

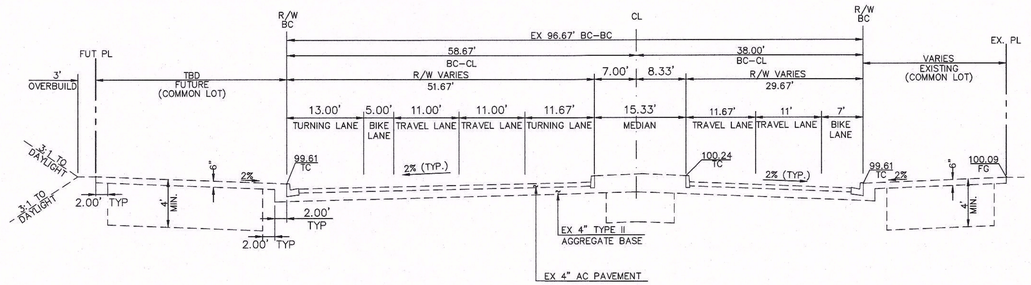


SID #810 PROJECTS 8A, 8B & 8C

SKY VISTA DRIVE- EXISTING RIPRAP REMOVAL (F)

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

NOT TO SCALE



SID #810 PROJECTS 8A, 8B & 8C

SKY VISTA DRIVE- BICYCLE LANE WITH LEFT POCKETS & EXCLUSIVE RIGHT TURN LANE (C)

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

NOT TO SCALE

① – SCARIFY NATIVE 6" AND RECOMPACT TO 95%

② – LANDSCAPE AREA – EXCAVATE AND RECOMPACT TO 85% OR RIP ENTIRE AREA TO DEPTH INDICATED

③ – ROUGH GRADE (RG) TO BE 6" BELOW FINISHED GRADE (FG) FOR FUTURE LANDSCAPE PURPOSES

④ – FOR LANDSCAPE WHERE GRADING FOR CUT > 3' AT PL, SEE DETAIL 1, THIS SHEET

SID #810 PROJECTS 8A, 8B & 8C

SKY VISTA DRIVE- TYPICAL ARTERIAL WITH BIKE LANE (E)

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

NOT TO SCALE

① – SCARIFY NATIVE 6" AND RECOMPACT TO 95%

② – LANDSCAPE AREA – EXCAVATE AND RECOMPACT TO 85% OR RIP ENTIRE AREA TO DEPTH INDICATED

③ – ROUGH GRADE (RG) TO BE 6" BELOW FINISHED GRADE (FG) FOR FUTURE LANDSCAPE PURPOSES

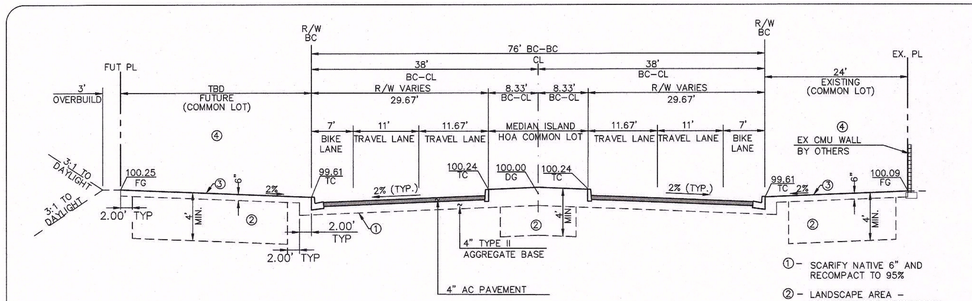
④ – FOR LANDSCAPE WHERE GRADING FOR CUT > 3' AT PL, SEE DETAIL 1, THIS SHEET

SID #810 PROJECTS 8A, 8B & 8C

SKY VISTA DRIVE- BICYCLE LANE WITH LEFT POCKETS & EXCLUSIVE RIGHT TURN LANE (B)

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

NOT TO SCALE



① – SCARIFY NATIVE 6" AND RECOMPACT TO 95%

② – LANDSCAPE AREA – EXCAVATE AND RECOMPACT TO 85% OR RIP ENTIRE AREA TO DEPTH INDICATED

③ – ROUGH GRADE (RG) TO BE 6" BELOW FINISHED GRADE (FG) FOR FUTURE LANDSCAPE PURPOSES

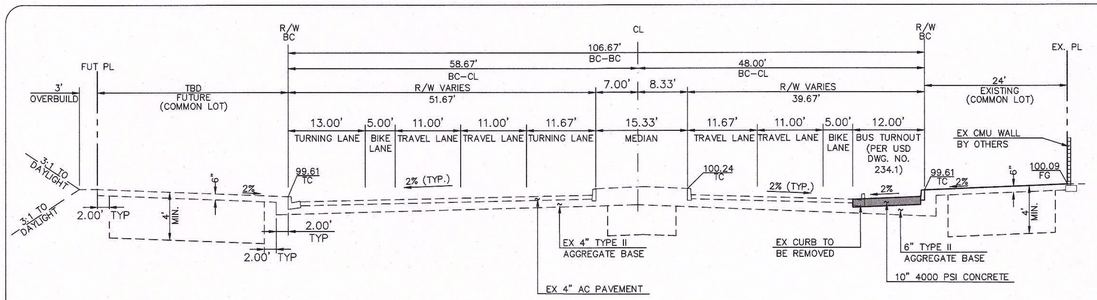
④ – FOR LANDSCAPE WHERE GRADING FOR CUT > 3' AT PL, SEE DETAIL 1, THIS SHEET

SID #810 PROJECTS 8A, 8B & 8C

SKY VISTA DRIVE- TYPICAL CROWED SECTION (D)

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

NOT TO SCALE



SID #810 PROJECTS 8A, 8B & 8C

SKY VISTA DRIVE- TYPICAL BUS TURN-OUT (A)

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

NOT TO SCALE

CLV

STATE OF NEVADA — PROFESSIONAL ENGINEER — MICHAEL FANG — No. 22464 — CIVIL — Exp. 06/30/2019 — DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-240

DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 12:24:12

GCV ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
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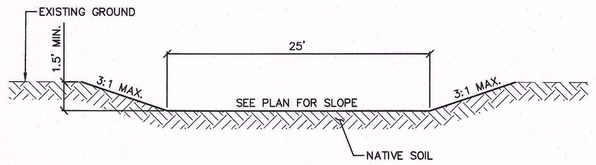
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Nicholas DeRosa

THE HOWARD HUGHES COMPANY. LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

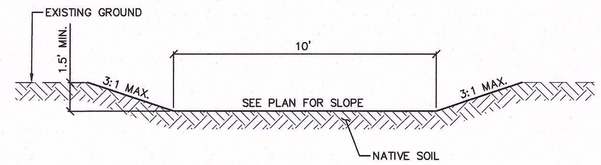
ROADWAY TYPICAL SECTIONS

DRAWING 35
35 OF 43 SHTS



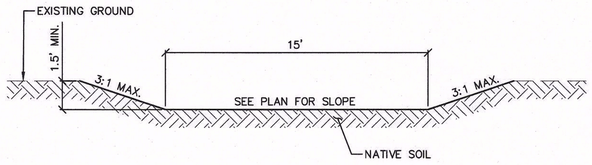
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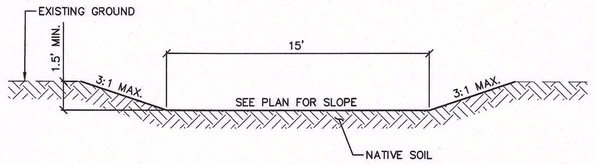
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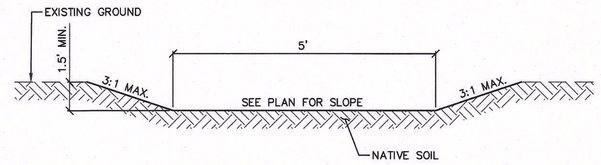
CHANNEL 11 CROSS SECTION 11

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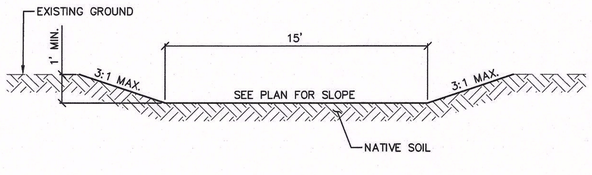
CHANNEL 7 CROSS SECTION 7

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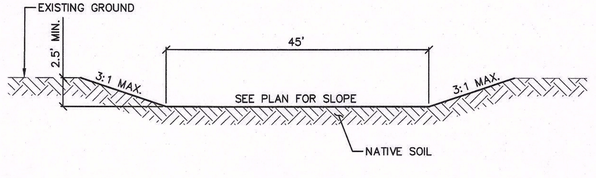
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SCALE: N.T.S.



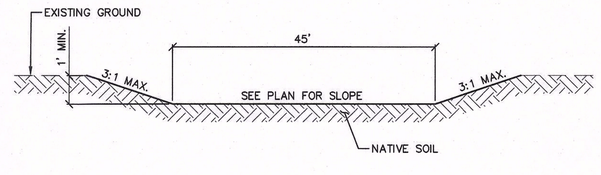
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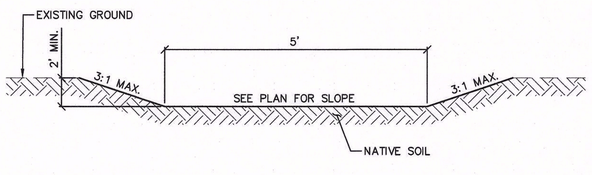
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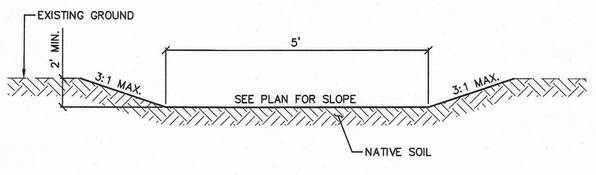
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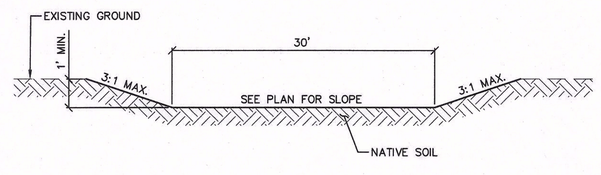
CHANNEL 9 CROSS SECTION 9

SCALE: N.T.S.



CHANNEL 5 CROSS SECTION 5

SCALE: N.T.S.



CHANNEL 1 CROSS SECTION 1

SCALE: N.T.S.

CLV

ENGINEER'S STATE OF NEVADA MICHAEL FANG No. 24487 CIVIL Exp. 06/30/2019 PROFESSIONAL

DATE: 4/11/18

AGENCY REVIEW - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-240

DESIGN: LG/MB
DRAWN: LG/MB
CHECK: JLJ
PLOT DATE: 04-11-18
PLOT TIME: 12:24:14

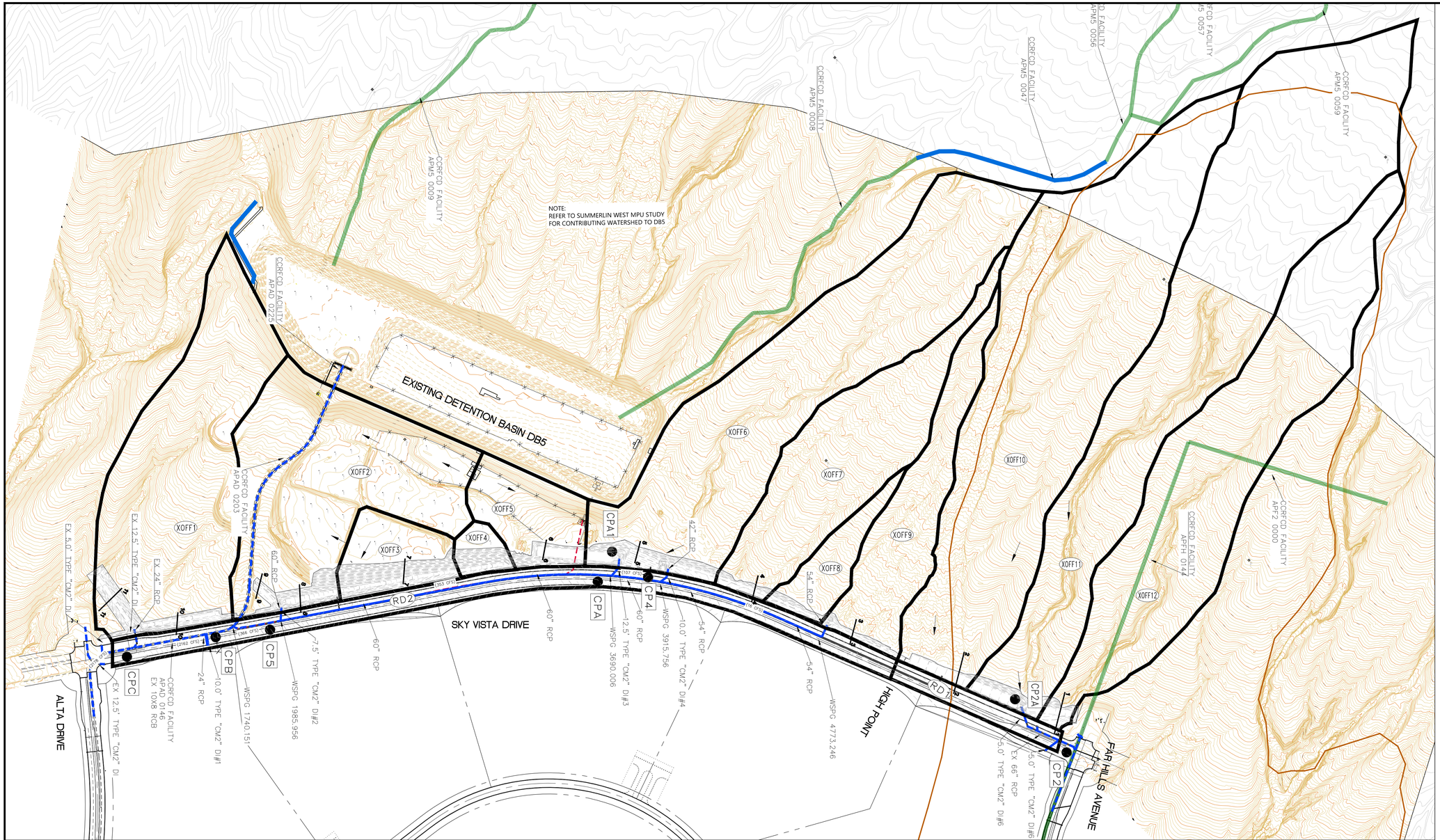
GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
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gcwengineering.com
F:\Projects\600\62023B-240\DWG\Production\240-RD1.dwg
Nicholas DeRosa

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

CHANNEL TYPICAL SECTIONS

DRAWING
36
36 OF 43 SHTS



INTERIM CONDITIONS 100-YEAR DITCH CHARACTERISTICS

Ditch	Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Freeboard (ft)	Total Depth (ft)	Velocity (ft/s)	Bottom Width (ft)
1	2.0	76	0.48	0.52	1.0	5.00	30
2	2.0	100	0.45	0.55	1.0	4.82	45
3	1.7	16	0.55	0.95	1.5	4.38	5
4	1.6	33	0.59	0.91	1.5	4.76	10
5	0.4	13.5	0.74	1.26	2.0	2.53	5
6	0.5	344	1.41	1.09	2.5	4.97	45
7	3.7	10	0.18	1.32	1.5	3.56	15
8	4.1	20.4	0.2	1.30	1.5	4.03	25
9	0.9	27.3	0.87	1.13	2	4.14	5
10	2.6	32.7	0.41	0.59	1	4.98	15
11	1.8	42.6	0.53	0.97	1.5	4.82	15

INTERIM CONDITION
CONCENTRATION POINT SUMMARY

Point ID	Tributary Sources	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
CP2A	XOFF10, XOFF11, XOFF12	0.18	279	105
CP2	RD1, CP2A	0.18	285	108
CP4	XOFF6, XOFF7, XOFF8, XOFF9	0.09	107	29
CPA1	XOFF5, 60RCP	6.73	334	167
CPA	CP4, CPA1	3.68	355	172
CP5	CPA, XOFF2, XOFF3, XOFF4	6.87	366	174
CPB	CP5, 7X5	6.87	2162	1507
CPC	CPB, XOFF1, RD2	6.92	2178	1511

INTERIM CONDITION
SUBBASIN FLOW RATE SUMMARY

Subbasin ID	Area (acres)	Q_{100} (cfs)	Q_{10} (cfs)
XOFF1	23.4	61	23
XOFF2	21.6	52	18
XOFF3	4.3	8	2
XOFF4	1.1	2	0
XOFF5	5.6	12	3
XOFF6	31.2	65	21
XOFF7	15.1	21	4
XOFF8	3.4	5	1
XOFF9	9.9	16	3
XOFF10	41.9	97	34
XOFF11	43.1	107	41
XOFF12	28.3	75	30
RD1	2.1	9	5
RD2	10.1	36	19
60RRCP	-	332	-
7X5	-	1797	-

LEGEND

- ST2 — SUBBASIN NAME
- SUBBASIN BOUNDARY
- CP1 — CONCENTRATION POINT
- FLOW DIRECTION
- 12 — 12 — CROSS SECTION
- PROP MPU FACILITY
- EX MPU FACILITY
- (XX CFS) — STORM DRAIN FLOW RATE

NORTH

GRAPHIC SCALE
250 0 125 250
(IN FEET)
1 inch = 250 ft.

% COMPLETE

DATE:

DESCRIPTION	DATE	AGEN. APP.	DATE	CCW. APP.

REV.	DATE

PROJECT NO.
620238-240

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-11-18
PLOT TIME: 14:32:15

GCW
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Masih Edalat

THE HOWARD HUGHES PROPERTIES, LLC

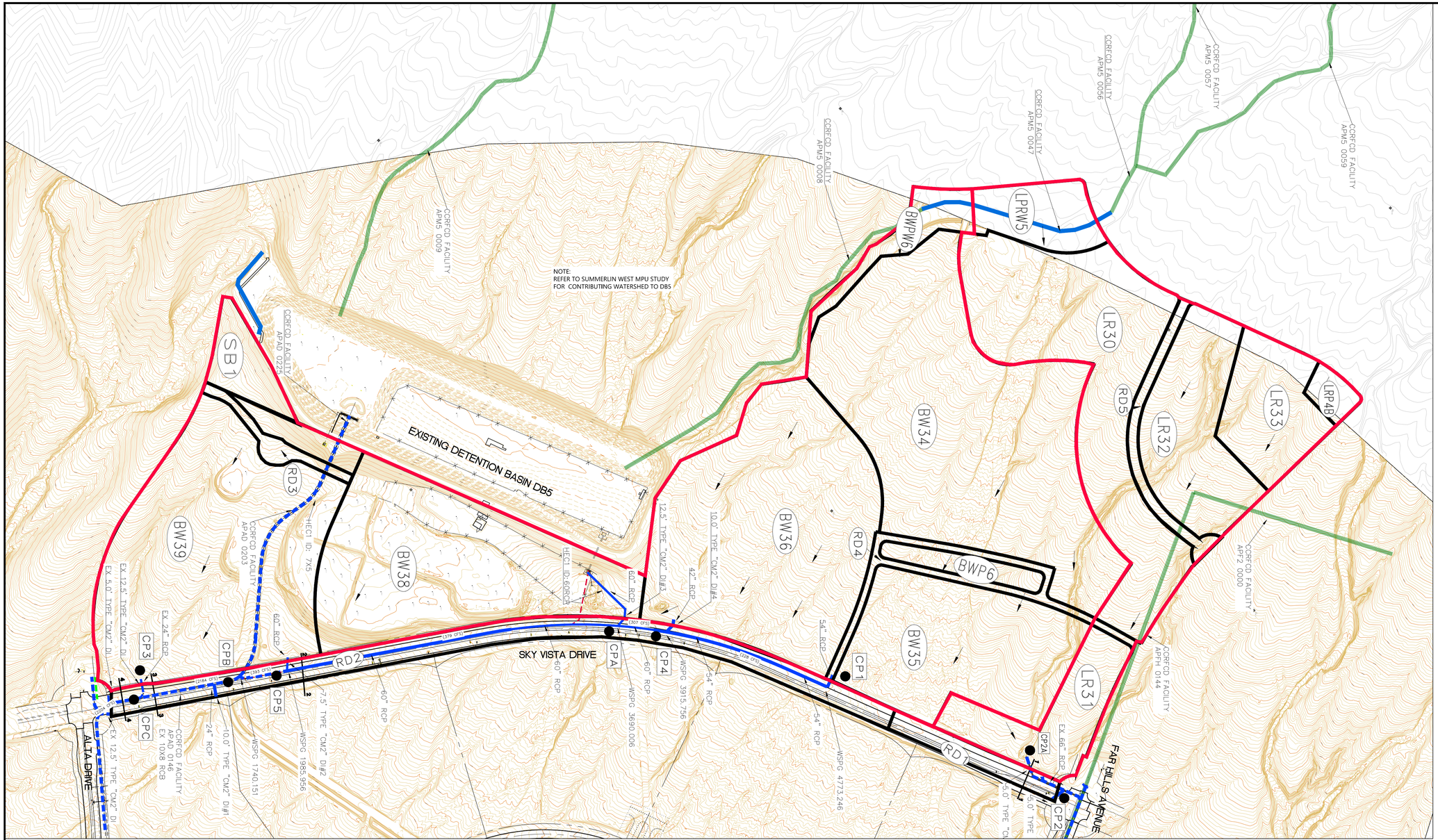
VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

FIGURE 5
INTERIM CONDITION DRAINAGE MAP

DRAWING
FIG5
1 OF 1 SHTS

LOT#

HTE: 00-00000



NOTE:
OFFSITE SUBBASIN DELINEATIONS AND LAND USES ARE BASED ON SUMMERLIN WEST MPU.

100-YEAR FLOW CHARACTERISTICS
ULTIMATE CONDITIONS

Location	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (ft/s)	D*V	Tributary
1-1 Half	0.83	4.50	0.39	2.60	1.01	RD1
2-2	4.32	36.00	0.46	6.52	3.00	RD2
3-3 West Half	3.00	10.60	0.42	5.10	2.14	DI#2 Bypass
4-4 East Half	3.00	9.00	0.40	4.95	1.98	DI#1 Bypass
4-4 West Half	3.00	2.00	0.28	3.2	0.9	EX 12.5' CM2 DI Bypass

ULTIMATE CONDITION
CONCENTRATION POINT SUMMARY

Point ID	Tributary Sources	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
CP1	BWPW6, BW35, BWP6, BW34, & RD4	0.09	228	110
CP2A	LR31, LR30, LR32, LR33, LRP4B, RD5 & LPRW5	0.09	199	93
CP2	CP2A & RD1	0.09	207	97
CP3	SB1, RD3, & BW39	0.04	100	49
CP4	CP1 & BW36	0.14	307	140
CP5	CPA & BW38	6.89	393	195
CPA	CP4 & DB5 60RCP	6.86	379	188
CPB	CP5 & DB 7X5 RCBC	6.89	2184	1520
CPC	CP3, RD2, & CPB	6.95	2204	1531

ULTIMATE CONDITION
SUBBASIN FLOW RATE SUMMARY

Subbasin ID	Area (acres)	Q_{100} (cfs)	Q_{10} (cfs)
BW34	35.8	139	67
BW35	15.8	61	30
BWP6	1.9	6	2
BWPW6	2.9	10	4
BW36	28.4	78	31
BW38	22.2	80	38
BW39	22.0	84	42
LR30	25.0	80	37
LR31	6.6	25	12
LR32	10.3	39	19
LR33	6.7	26	13
LRP4B	1.1	4	2
LPRW5	4.2	16	7
RD1	2.1	9	5
RD2	10.1	36	19
RD3	1.3	6	3
RD4	2.8	12	6
RD5	2.0	9	5
SB1	2.9	10	4
60RCP	-	332	-
7X5	-	1797	-

LEGEND

- (ST2) SUBBASIN NAME
- SUMMERLIN WEST MPU LARGE BASIN BOUNDARY
- SUBBASIN BOUNDARY
- CP1 CONCENTRATION POINT
- FLOW DIRECTION
- 12 — 12 CROSS SECTION
- PROP SD FACILITY
- EX SD FACILITY
- (XX CFS) STORM DRAIN FLOW RATE

NORTH

GRAPHIC SCALE
250 0 125 250
(IN FEET)
1 inch = 250 ft.

% COMPLETE

DATE:

REV.	DATE	DESCRIPTION	AGEN. APP.	DATE	CCW. APP.	DATE

PROJECT NO. 620238-240
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-11-18
PLOT TIME: 14:46:49

GCW ENGINEERS \ SURVEYORS
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Masih Edalat

THE HOWARD HUGHES PROPERTIES, LLC

VILLAGE 23B SKY VISTA DRIVE
ALTA DRIVE TO FAR HILLS AVENUE

FIGURE 6
ULTIMATE CONDITION DRAINAGE MAP

DRAWING
FIG6
1 OF 1 SHTS

LD#
HTE: 00-00000