DS #: 4546

APN: 137-34-212-001

PROJECT: Summerlin Village 23A Unit 2 - Parcel "O"

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: January 31, 2012
TO: **Land Development Services** Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Summerlin Village 23A Unit 2 – Parcel "O"**			**COPIES TO:** Slater Hanifan Group
Cross Streets:	SWC of Alta Drive & Fox Hill Drive			Woodside Homes
File Number:	F:\Depot\DSMemos\DS4546.doc			Bart Anderson, P.E., DevCo
Parcel Number:	137-34-212-001			CCRFCD
Zoning Action:	TMP-43967			
FEMA Flood Zone	YES	NO	**X**	
Proposed Storm Drain	YES	NO	**X**	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	1/18/2012	1/31/2012	See Comments Below	$400.00	271744: $400
			TOTAL FEES (LDDRS):		----

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.

1. **Note to Land Development**: The development of the subject Parcel "O" is based on the flood protection provided by an *Interim Channel* aligned adjacent to the north of *Alta Drive*. However, this *Interim Channel* has not been constructed yet. No permit of any kind shall be issued related to Parcel "O" prior to the complete construction of the *Interim Channel*.
2. Provide a copy of the zoning/planning conditions associated with this site (**TMP-43967**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
3. Sites with a grade difference of 2 feet above or below existing grades are required to have approval from the *City of Las Vegas Planning and Development Department.* The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide *Planning* approval with the next submittal.
4. The developer/engineer proposed rough grading in the future *Phase II* area. Consult with *City of Las Vegas Planning Department* for approval of the proposed rough grading prior to the final approval of the drainage study.

5. 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.

6. It appears that the southernmost portion of the project has grading construction encroaching into the adjacent *Parcel N.* Obtain a notarized letter of permission from the adjacent parcel owner for offsite grading activities prior to the final approval of the drainage study.

7. Provide dimensions of proposed riprap pads at the drainage accepting points of *Saw Mill Avenue*, *City Creek Court* and *Mount Holly Street*. Revise the pertinent construction notes accordingly.

8. At the cul-de-sac end of *Yankee Meadow Street*, clearly identify a public drainage easement (privately maintained) to include the proposed drop inlets and the associated storm drain laterals and manholes.

9. Between the two cul-de-sac of *Elk Meadow Court* and *City Creek Court*, provide a minimum 10'-wide public drainage easement (privately maintained).

10. **Sheet D-1: Details 3, 4, 5, 6, 7**: Clearly indicate that the proposed solid grouted wall portion is constructed with "8"-CMU" thickness.

    Details 18 and 19: Indicate that the depth in the proposed swale is 6"-minimum.

11. **Sheet D-2: Detail 26:** Add "8"-CMU" to the description of the solid grouted wall.

    Details 31, 33, 34, 35, 36: Indicate that the depth in the proposed swale is 6"-minimum.

    Detail 38: Provide a 10'-minimum public drainage easement (privately maintained) for drainage to convey between *Elk Meadow Court* and *City Creek Court*.

12. It appears that the interior streets are public streets. Provide plan & profile for all interior streets in the next submittal.

13. The *Regional Flood Control District Manual* requires 1% minimum slope around the bulb of a cul-de-sac where storm water is drained through in Section 1602. Provide the required slope in *Yankee Meadow Street* cul-de-sac.

14. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

15. All drainage easements must be public drainage easements to be privately maintained and common lots to be labeled on the grading plans and to be dedicated as such in the final map.

16. The subject drainage study addresses *Interim improvements (Phase I only)* as well as the *Final Improvements (Phase I and Phase II)*. However, if *Phase II Improvement* commences more than one year after the final approval of this study, a drainage study update will be required to address the future *Phase II Improvement*.

17. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

In an effort to increase administrative efficiency, the City of Las Vegas Public Works Department requires all soil reports, drainage studies and traffic impact analysis submittals to be accompanied by an electronic copy of the submittal. Electronic documents must be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output replicating your submittal to be used for archival or display purposes. This may be more than one file if necessary. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats, but provided it is a high quality digitized replication of the submittal, other formats may be acceptable. If figures are in color, they must be scanned in color and saved as a separate file. The new submittal requirement is effective on **July 1, 2011**. If there are any questions regarding these new requirements, please contact Albert Sung in the Flood Section at (702) 229-2001 or Rick Schroder in Traffic Engineering at (702) 229-6327.

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

END OF REMARKS
ays

T/R/S: T20S/R59E/34
AREA K-34

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

WSH1105-001

February 14, 2012

Mrs. Linda Hartman-Maynard
City of Las Vegas Development Services Center
Current Planning Division
333 N. Rancho Dr. 2nd Floor
Las Vegas, NV 89106

Subject: Summerlin Village 23A – Parcel "O"
Perimeter Grade Difference Request

Mrs. Hartman-Maynard:

On behalf of our client, Woodside Homes (WSH), this letter describes the justification for allowing WSH to design the site along the perimeter of the development to have proposed grades greater than 2-feet higher or lower than existing grade. This information is provided as requested in Comment #3 of the review of the Technical Drainage Study for this site completed by Albert Sung on January 31, 2012.

The subject project Tentative Map was approved by the City of Las Vegas Planning Commission on January 10, 2012 with 107 single family residences on approximately 21 acres. There is a large vertical difference from the high side of the parcel the low side as it falls at over 5% across the site. As a condition of the purchase of the property from The Howard Hughes Company, WSH is required to design their perimeter wall to be in compliance with The Paseos – A Summerlin Village Residential Design Criteria and the proposed adjacent perimeter street designs for Sky Vista Dr., Alta Dr. and Fox Hill Dr. These designs are, in several areas, greater than 2-feet higher or lower than the existing grade. However, Summerlin as a master planned community is designing the entire area with the best interest of each parcel in mind and will require each parcel to be in compliance with their design criteria.

We appreciate your assistance with this matter, if you need more information or have any questions, do not hesitate to contact me.

Very truly yours,

SLATER HANIFAN GROUP, INC.

Corey Lieber, P.E.
Project Manager

CC: Eddie Duenas, Woodside Homes
Chelsea Peltier, SHG

APPROVED
BY _____
CURRENT PLANNING DIVISION
CITY OF LAS VEGAS

Albert Sung

From: Linda Hartman-Maynard
Sent: Tuesday, February 21, 2012 2:50 PM
To: clieber@shg-inc.com
Cc: Albert Sung
Subject: FW: Attached Image
Attachments: 3173_001.pdf

Approved two foot grade perimeter difference for Summerlin Village 23A – Parcel "O".

Linda Hartman-Maynard
City of Las Vegas
Department of Building and Safety
W: (702)229-6899
F: (702)382-1240
lmaynard@lasvegasnevada.gov

From: MFD-155@LasVegasNevada.gov [mailto:MFD-155@LasVegasNevada.gov]
Sent: Tuesday, February 21, 2012 2:56 PM
To: Linda Hartman-Maynard
Subject: Attached Image

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

TRANSMITTAL

To: Albert Sung, P.E. **Date:** January 18, 2012

City of Las Vegas **Project No.:** WSH1105.000
333 N. Rancho Drive
Las Vegas, NV 89106

From: Kylie Rowbury, P.E.

Subject: Summerlin Village 23A Unit 2 Parcel O

CC: Mark Failla, SHG **CC:**
CC: Corey Lieber, SHG **CC:**
CC: **CC:**

Transmitting Via:
☐ Mail
☒ Messenger / MDS
☐ Federal Express
☐ Pickup

For:
☒ Review & Comment
☐ Per your Request
☐ Information/File

Acknowledgement of Receipt:
☐ Not Required
☒ Acknowledgement Required
Received By:_____
Date:_____ Time:_____

Copies	Description
1	$400 Submittal Fee
1	Technical Drainage Study
1	Grading Plans & Details (bound)
1	Stamped and Signed Standard Form 1 (bound)
1	CLV Drainage Study Checklist (bound)
1	CD containing PDF of submittal documents (bound)

Comments:

Enclosed please find the above listed items in support of our application of the *Technical Drainage Study for Summerlin Village 23A Unit 2 Parcel O*. Please contact us if there are any questions at 702-284-5300. Thanks.

Signed: _____
Kylie Rowbury, P.E.

G:\SHG\Office Forms\Transmittal.doc

Please, notify us at (702) 284-5300 if there are any problems receiving this transmission.

5740 S. Arville Street #216, Las Vegas, NV 89118 ph (702) 284-5300 fax (702) 284-5399

TECHNICAL DRAINAGE STUDY
Summerlin Village 23A Unit 2
Parcel O

City of Las Vegas, Nevada

Job No.: WSH1105.000
Date: January 2012

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

Prepared For:
Woodside Homes
5888 W. Sunset Road, Suite 200
Las Vegas, Nevada 89118
Phone: 702-889-7800 ▪ Fax: 702-889-0801

Kylie C. Rowbury, P.E.
NV Professional Engineer No. 21172

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 06/06/01)

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 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 Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (Design Manual).

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

I. GENERAL REQUIREMENT		
Yes	No	
X		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.) (FROM SUMMERLIN FOR GRADING ON PARCEL N)
X		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions. (SUMMERLIN APPROVAL - SEE APPENDIX K)

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.)
X		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
X		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
X		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
X		Back of lot elevations and lot drainage pattern for all lots including common lots.
X		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. (APPROVED BY SUMMERLIN - SEE APPENDIX K. CLV PLANNING APPROVAL NOT REQUIRED)
X		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
	N/A	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
X		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
X		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.
X		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.
	N/A	Lots with "B and C Type Drainage" shall be required to install an underground nuisance drainage system or a 2-foot valley gutter through the lot. 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.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

- An appointment must be made to preview this checklist in conjunction with Clark County Regional Flood Control District Manual Standard Form 2 prior to the City accepting a new Drainage Study for review. The engineer may contact the Flood Control Section at 229-6541.

- Following the acceptance of the Drainage Study (meeting the minimum acceptable information above), there will be a charge of $250 for each Drainage Study review submittal. These fees are payable at the time the Grading Permit is obtained.

- The Drainage Study must be accepted prior to submitting grading plans to the Land Development Section 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.

F:\Depot\DOCS\Memos\jbCHKLIST7.doc
6-Jun-01

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Summerlin Village 23A Unit 2 Parcel O Date: January 2012

Location of Development: a) Descriptive (Cross Streets): North/South: Fox Hill Drive
East/West: Alta Drive

b) Section: 34 Township: 20 S Range: 59 E

c) APN: 137-34-212-001

Name of Owner: Woodside Homes

Telephone No.: (702) 889-7800 Fax No.: (702) 889-0801 E-mail Address: EdwardD@woodside-homes.com

Address: 5888 W. Sunset Road, Suite 200, Las Vegas, NV 89118

Contact Person – Name: Kylie Rowbury, P.E. Telephone No.: (702) 284-5300

*E-mail Address: krowbury@shg-inc.com Fax No.: (702) 284-5399

Firm: Slater Hanifan Group

Address: 5740 S. Arville Street, Suite 216, Las Vegas, NV 89131

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 21.08 ± Acres Being Developed/Disturbed: All

2. Is a portion or all of the subject property located in a FEMA Flood Hazard Area? ☐ Yes** ☒ No

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No

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

5. Approximate upstream land area which drains to the subject site: 0 ± Acres

6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation:

Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements (CLV DS3402)
Technical Drainage Study for Summerlin Village 23A Rough Grading (CLV DS3077C)
Conceptual Drainage Study for Summerlin Village 23A (CLV DS3077A)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:

South in Fox Hill Drive storm drain

8. Briefly describe your proposed schedule for the subject project: Phase 1 followed by Phase 2

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

*Newly Required Field

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

Revision	Date

Engineer's Seal

Local Entity File No.

REFERENCE: STANDARD FORM 1

Updated 05/01/2008

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- Exhibit B – FEMA FIRM Map
- Exhibit C – CCRFCD 2008 MPU Facilities Map
- Exhibit D – CCRFCD 2008 MPU Hydrologic Map
- Exhibit E – Soils Map
- Exhibit F – Interim Condition (Phase 1) Drainage Map
- Exhibit G – Proposed Condition (Phase 2) Drainage Map
- Exhibit H – Flood Control Facilities Map

Appendix B Precipitation, Curve Number & Lag Time Data

Appendix C HEC-1 Analyses
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- Street Flow
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Appendix E Drop Inlet and Storm Drain Hydraulic Computations
- Drop Inlets
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Appendix G Reference Material
Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements
CLV DS3402, RFCD No. 03-5424, by G.C. Wallace
- Approval Letters
- Referenced Drainage Exhibits
- Report Excerpt
- Ultimate Condition HEC-1 Analysis
- Fox Hill Drive Hydraulic Street Section Computation
- Fox Hill Drive Drop Inlet and Storm Drain Computations

Appendix H Reference Material
Technical Drainage Study for Summerlin Village 23A Rough Grading
CLV DS3077C, by G.C. Wallace
- Approval Letters
- Report Excerpt
- Collector Channel (Sky Vista Drive) Hydraulic Computations
- Relevant Plan, Profile and Detail Sheets

Appendix I Reference Material
Conceptual Drainage Study for Summerlin Village 23A
CLV DS3077A, by G.C. Wallace
- Approval Letters

- Referenced Drainage Exhibits
- Existing Condition HEC-1 Analysis

Appendix J Reference Material
Technical Drainage Study for Summerlin Village 23A/23B Alta Drive Street Improvements, CLV DS4050, RFCD No. 06-7028, by G.C. Wallace
- Approval Letters
- Referenced Drainage Exhibits
- Alta Drive Hydraulic Street Section Computation
- Relevant Plan, Profile and Detail Sheets

Appendix K Summerlin Coordination
- SDRC Technical Drainage Study Approval with Conditions
- Response to Comments Letter

Appendix L Plan, Profile and Detail Sheets

1 INTRODUCTION

1.1 Project Overview & Study Purpose

Woodside Homes is proposing to develop a 21.08-acre parcel within Village 23A (hereafter referred to V23A) of the Summerlin master planned community located in the City of Las Vegas, Nevada. The proposed project is identified as *Summerlin Village 23A Parcel O* (formerly a portion of Summerlin V23A Parcel N) and will consist of single family residential development. Note that Summerlin Parcel O will be developed in two (2) phases as follows:

- **Phase 1** – Residential development of Phase 1, including Lots 1 thru 19, 38 thru 64, and 87 thru 106, as well as mass grading of the Phase 2 portion of the site
- **Phase 2** – Residential development of Phase 2, including Lots 20 thru 37 and 65 thru 86

This study, along with the improvement plans included in Appendix L, addresses the development of both phases. No perimeter street improvements are proposed as part of this project. The Summerlin development agreement designates that perimeter roadways will be completed, as necessary, by the Master Developer (Summerlin). Previously approved drainage studies and improvement plans (by others) have been completed for the design/construction of the perimeter roadways of Fox Hill Drive, Alta Drive and Sky Vista Drive. Please see Section 3.1 for a detailed discussion of the existing condition of the perimeter roadways.

The purpose of this study is to provide a detailed hydrologic and hydraulic analysis for the project site in order to protect the property from onsite and offsite runoff in accordance with local stormwater criteria. This study will also provide an inventory of existing and master planned stormwater facilities in the vicinity, as well as provide recommendations for site specific facilities necessary to control runoff impacting the project site and adjacent downstream properties.

Note that this study has been reviewed and conditionally approved by the Summerlin Design Review Committee (SDRC). The SDRC Technical Drainage Study Approval with Conditions has been provided in Appendix K. A copy of the response to comments, prepared by Slater Hanifan Group, addressing the Summerlin conditions of approval has also been provided in Appendix K for reference.

1.2 Site Description

The Summerlin Parcel O project site is located with APN 137-34-212-001. The existing site condition is undeveloped desert land with sparse desert shrub generally sloping from northwest to southeast. The project site is bound by future Alta Drive to the north, existing Fox Hill Drive to the east, future Sky Vista Drive to the west, and an undeveloped portion of Summerlin Village 23A to the south (future Parcel N). A vicinity map, identified as Exhibit A, is included in Appendix A for reference.

1.3 FEMA Flood Zone Designation

The project site is located within a FEMA designated Zone X as depicted on Flood Insurance Rate Map (FIRM) Panel 32003C2150E, dated September 27, 2002. A Zone X is described as an area determined to be outside the 0.2% annual chance flood. Exhibit B, identifying the project site on the FIRM, has been included in Appendix A for reference.

1.4 CCRFCD Facility Information

The project site is identified on Figure F-29 of the current 2008 Clark County Regional Flood Control District (CCRFCD) Master Plan Update (MPU, Reference 1) included as Exhibit C in Appendix A for reference. Per the 2008 CCRFCD MPU, the project site is adjacent to regional facility APAD 0146, an existing 10-foot by 8-foot RCB located in Alta Drive. This project does not discharge to the Regional Facility in Alta Drive; however, since it is adjacent to the facility, the study will be submitted to CCRFCD for concurrence upon conditional approval from the City of Las Vegas.

1.5 Reference Studies

Four (4) approved drainage studies have been utilized for reference in the preparation of the subject study. The following studies have been reviewed and determined acceptable for reference.

1. The *Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements (*Unit 2 Study, Reference 2), prepared by G.C. Wallace (CLV DS3402, RFCD No. 03-5424) was utilized to determine the allowable flows and existing storm drain facilities in adjacent Fox Hill Drive. This includes the Standard Form 6 analysis for the storm drain in Fox Hill Drive which was utilized to determine a starting HGL for storm drain analysis performed for the proposed Parcel O storm drain. The Unit 2 Study was also utilized to illustrate the existing onsite berm located along the east boundary of the Parcel O site, adjacent to Fox Hill Drive, which directs flow from the existing condition site to the exposed 42-inch RCP lateral at the southeast corner of the site. In addition, the Unit 2 Study updated the ultimate condition HEC-1 analysis from the V23A Conceptual Study. Therefore, the ultimate condition hydrology for the Parcel O site has been referenced from the Unit 2 Study. Relevant reference material from the Unit 2 Study is included in Appendix G for reference.

2. The *Technical Drainage Study for Summerlin Village 23A Rough Grading* (Rough Grade Study, Reference 3), prepared by G.C. Wallace (CLV DS3077C) was utilized to determine the flow characteristics in the existing Collector Channel along the Sky Vista Drive alignment, adjacent to the Parcel O site to the west. Relevant reference material from the Unit 2 Study is included in Appendix H for reference.

3. The *Conceptual Drainage Study for Summerlin Village 23A* (V23A Conceptual Study, Reference 4), prepared by G.C. Wallace (CLV DS3077A) was utilized to determine the historical existing condition drainage patterns for the project site. Relevant reference material from the V23A Conceptual Study is included in Appendix I for reference.

4. The *Technical Drainage Study for Summerlin Village 23A/23B Alta Drive Street Improvements* (Alta Study, Reference 5), prepared by G.C. Wallace (CLV DS4050, RFCD No. 06-7028) was utilized to determine the ultimate condition street flow in Alta Drive adjacent to the Parcel O site. Furthermore, the Alta Study improvement plans were utilized to illustrate the interim channel parallel to Alta Drive to the north which will protect the Parcel O site from interim condition flows from the north. The Alta Study was utilized to reference the interim condition flow reaching the interim channel, as well as the hydraulic flow computation for the interim channel. Relevant reference material from the Alta Study is included in Appendix J for reference.

2 METHODOLOGY

2.1 Compliance

The methodologies utilized in the preparation of this study are in compliance with the Clark County Regional Flood Control District's Hydrologic and Drainage Design Manual (CCRFCD Manual, Reference 4).

2.2 Hydrologic Modeling

Modeling: The SCS Unit Hydrograph Method (SCS Method) was utilized to determine peak flow rates. The SCS Method utilizes precipitation, drainage area, curve number and lag time parameters to determine peak flow rates. The HEC-1 Flood Hydrograph Package Version 4.1 by the U.S. Army Corps of Engineers was utilized to model the drainage subbasins analyzed by this study.

Precipitation: The site is located outside the McCarran Rainfall Area. Therefore the point precipitation values were obtained from Figures 503 (10-year) and 506 (100-year) from the CCRFCD Manual. Utilizing Table 501 from the CCRFCD Manual to adjust the point precipitation values from Figures 503 and 506, the 10-year and 100-year adjusted point precipitation values are 1.86 inches and 3.29 inches respectively. These precipitation values match those used in previously approved studies for the project site. Additionally, since the drainage area of the contributing watershed is less than 8 square miles, the SDN 3 design storm distribution from Table 503 in the CCRFCD Manual was used. Reference tables and figures from the CCRFCD Manual are included in Appendix B.

Curve Number: The SCS curve number loss rate methodology was utilized to approximate infiltration for the subbasins. The soils information within the watershed was obtained from the SCS Soil Survey of the Las Vegas Valley Area (Soil Survey, Reference 5). Exhibit E, depicting the project site on the soils map, has been included in Appendix A. Per the Soil Survey, the project site lies within Soil Type 155 (Cave gravelly fin sandy loam, 4 to 15 percent slopes) and Soil Type 502 (Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes). Soil Type 155 is comprised of 5% hydrologic soil group (HSG) 'A', 5% HSG 'B' and 90% HSG 'D'. Soil Type 502 is comprised of 5% hydrologic soil group (HSG) 'A', 55% HSG 'B' and 40% HSG 'D'.

Inspection of the grading plans shows that the average lot size proposed for the project is approximately 6,400 square feet. Per Table 602A, curve numbers were determined for the 6,400 square foot lots by interpolating between the 6,000 square foot and 7,000 square foot curve number values. Per Table 602 (1of 4), a 'newly graded' designation was used for rough graded areas in the interim condition. The proposed linear park was analyzed based on a 'natural desert landscaping' curve number. Weighted curve numbers have been calculated utilizing an in-house spreadsheet, incorporating HSG percentages within each soil type. Refer to the Soil and Curve Number Computation found in Appendix B for details regarding curve numbers.

Lag Time: The lag time is defined as the time measured from the center of mass of effective rainfall to the time to peak of the outflow hydrograph. The lag time is related to the time of concentration as 0.6 times the time of concentration. The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a subbasin to the outlet point of the subbasin. Standard Form 4, as included in the CCRFCD Manual, was utilized to determine the lag times for subbasins modeled. A copy of the lag time computations is included in Appendix B.

2.3 Hydraulic Modeling

Storm Drain & Drop Inlets: The hydraulic gradient for the onsite storm drain system was determined utilizing the Water Surface and Pressure Gradient (WSPG) Hydraulic Analysis System software by the Los Angeles County Department of Public Works. Drop inlets were modeled using an in-house computation sheet which incorporates methodologies from Section 805 of the Manual.

Street Flow: Street flow was analyzed utilizing the Flowmaster Version 7.0 software by Haestad Methods. In accordance with the CCRFCD Manual, the velocity times depth factor (v x d) for street flow for the 10-year storm event must be less than or equal to 6 with a maximum depth of 1 foot. The velocity times depth factor (v x d) for street flow for the 100-year storm event must be less than or equal to 8 with a maximum depth of 2 feet. For streets with a right-of-way greater than 80-feet, a 12-foot dry lane must be maintained for the 10-year storm event.

Channel Sections: Channel sections were analyzed utilizing the Flowmaster Version 7.0 software by Haestad Methods.

Emergency Overflow: Emergency overflow weir computations were performed utilizing the Flowmaster Version 7.0 software by Haestad Methods. In accordance with the CCRFCD Manual, finished floors adjacent to the emergency overflow weir have been elevated above the headwater depth over weir crest.

3 EXISTING DRAINAGE CONDITION

3.1 Discussion of Existing Drainage Condition

The historical existing drainage condition for the site was analyzed with the V23A Conceptual Study. The historical drainage condition considered the site undeveloped with sparse desert brush, draining southeast at approximately 4 percent. In the historical drainage condition, Parcel O drained to the Charleston Boulevard/Desert Foothills Drive intersection as part of referenced Basin EX6. Please see Appendix I for referenced Figure 5, as well as the existing condition HEC-1 analysis from the V23A Study.

However, subsequent to the V23A Conceptual Study, the V23A Rough Grade Study proposed rough grading of the Village 23 roadways including Alta Drive. The Sky Vista Drive alignment adjacent to Parcel O to the west consists of an 80-foot wide channel (Collector Channel) which was also constructed with the Rough Grade Study. The channel acts as a cut-off for flows from the west and directs flow south to the existing Red Rock Detention Basin. Please see the report excerpt from the Rough Grade Study located in Appendix H for discussion concerning the Collector Channel. Referenced hydraulic flow computations for the existing Collector Channel have also been included in Appendix H.

In addition to the Rough Grade Study improvements, the Unit 2 Study proposed and constructed storm drain improvements within the V23A rough graded roadways, including adjacent Fox Hill Drive and Alta Drive, as well as a series of interim berms and channels to direct flows to the storm drain in order to mimic ultimate condition flow patterns. Therefore, an existing berm along the east boundary of the project site directs flow from the existing Parcel O site south to the existing 42-inch stub from Fox Hill Drive constructed with the Unit 2 Study. Please see referenced Figure 7 from the Rough Grade Study located in Appendix G for an illustration of the existing berm along the east boundary of the project site.

Per a recent site visit, it is determined that Fox Hill Drive is complete with full street improvements from back-of-curb to back-of-curb. The Alta Drive alignment has been cleared, but minimal grading has been performed. Note that Summerlin will not construct Alta Drive at this time as it is not needed to provide access to the Parcel O site. However, in order to protect the Parcel O site from interim condition flows from the north, the interim channel proposed with the Alta Study will be constructed. Please see the referenced Alta Drive improvement plans located in Appendix J. Per coordination with Summerlin, it is agreed that the interim channel along Alta Drive to the north is a necessary perimeter improvement prior to development of Parcel O; therefore, it is assumed to be in place prior to development of the Parcel O site. Per the site visit, the Collector Channel along Sky Vista Drive appears to be constructed in accordance with the Rough Grade Study.

4 INTERIM DRAINAGE CONDITION

4.1 Definition of Interim Condition

The interim condition considers Phase 1 of the Parcel O site residentially developed. Phase 1 consists of development of the southeastern portion of the site, specifically Lots 1 thru 19, 38 thru 64, and 87 thru 106. Full street improvements Fox Hill Drive are considered complete. Storm drain facilities within the perimeter roadways are considered complete per the Unit 2 Study and the Alta Study. The interim channel that runs parallel to the Alta Drive alignment to the north is considered complete per the Master Developer; however, street improvements to Alta Drive are not complete. The Collector Channel is considered existing within the Sky Vista Drive alignment. Future Phase 2, located in the northwestern portion of the site, is considered mass graded. No offsite flows contribute directly to the project site in the interim condition.

4.2 Discussion of Interim Condition

Please see Exhibit F located in Appendix A for an illustration of the Interim Condition drainage patterns.

Offsite: As discussed, the interim channel north of Alta Drive and the existing Collector Channel within Sky Vista Drive act as a cutoff for offsite flows from the north and west, respectively. Therefore, no offsite flow drains thru the proposed project site.

Onsite: The proposed onsite drainage patterns are in accordance with those determined in the V23A Conceptual Study, as well as the Unit 2 Study and the Rough Grade Study. The proposed project site drains south and east and is collected via drop inlets and storm drain at two (2) interior locations prior to discharging into the existing Fox Hill Drive storm drain system. Flow from mass graded Phase 2 will surface drain southeast to the west boundary of the Phase 1 improvements. Proposed interim condition flow lines and berming will be utilized to direct Phase 2 flow onto Phase 1 streets. Flow will then be conveyed thru the proposed Phase 1 improvements to the drop inlet collection points. The majority of the flow generated by the site drains thru Yankee Meadow Way to a low point at Concentration Point CP2. The remaining flow will drain south in Big Meadow Street to Concentration Point CP3. At Concentration Points CP2 and CP3, storm flows are collected and conveyed via existing and proposed storm drain infrastructure and combine in storm drain at Concentration Point CP4 prior to discharging south in Fox Hill Drive.

4.3 Summary of Interim Condition Flows

The interim condition onsite HEC-1 analysis is located in Appendix C, and is summarized in Table 1 below.

Table 1: Summary of Interim Condition HEC-1 Analysis

Subbasin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
PH1-1	9.60	30	14

Table 1: Summary of Interim Condition HEC-1 Analysis			
Subbasin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
PH1-2	0.38	1	1
PH1-3	4.01	13	6
RG1	1.39	5	3
RG2	5.32	20	10
RG3	0.51	2	1
CP2 (RG2 + RG1 + PH1-1+ PH1-2)	N/A	57	27
CP3 (RG3 + PH1-3)	N/A	15	7
CP4 (CP2 + CP3)	N/A	72	34

Prorated flow computations have been performed for utilization in hydraulic flow computations. Prorated basin boundaries are illustrated on Exhibit F located in Appendix A and results are summarized in Table 2 below.

TABLE 2: Prorated Flow Computations			
Subbasin	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/ac)**
PH1-1	30	9.60	3.1
Prorated Subbasin	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/ac)**
1A	5	1.68	3.1
1B	6	1.90	3.1
1C	8	2.46	3.1
1D	11	3.56	3.1
TOTAL	**30.0**	**9.60**	

The total interim condition flow established with this study has been compared against the allowable discharge established in the Unit 2 Study. Please see Table 3 below for a comparison of the flow rates from the Unit 2 Study versus interim condition flow rates determined herein.

Table 3: Interim Condition Comparison of Flows for Parcel O			
Unit 2 Study Basin	$Q_{100/10}$ (cfs)	Interim Condition Parcel O Basin	$Q_{100/10}$ (cfs)
N	75/33	CP4	72/34

Please note that the 100-year interim condition flow determined in this study is less than that determined with the Unit 2 Study. It is noted that the 10-year flow is slightly higher, but the increase is considered minor (1 cfs). Also note that this is an interim condition and that it will be remedied when Phase 2 is developed. Therefore, the development of the site does not negatively impact downstream facilities and/or property and the development is considered acceptable.

4.4 Summary of Interim Condition Street Flows

Perimeter: Note that per the Unit 2 Study, the storm drain design within Village 23A is intended such that flow generated by each of the individual parcels will be collected in storm drain prior to discharging to perimeter roadways. Therefore, flow in the perimeter streets of Alta Drive and Fox Hill Drive is limited to the amount of flow generated by the roadways only. Flow in Fox Hill Drive has been referenced from the Unit 2 Study and referenced hydraulic flow computations are included in Appendix G. Flow in Alta Drive has been referenced from the Alta Study and referenced hydraulic flow computations are included in Appendix J. Note that the referenced ultimate condition flow and resulting depth in Alta Drive has been checked against interim condition grades within the Alta Drive alignment. This is a conservative approach given that interim condition Alta Drive is cleared/rough graded resulting in a lower curve number and lower flow than the ultimate condition. Note that the walls and finished floors adjacent to Alta Drive have been adequately flood protected for both the interim and ultimate drainage condition. In the interim condition, Sky Vista Drive is not complete, but rather consists of an 80-foot-wide Collector Channel that acts as a cutoff for flow from the west. Flow in the Collector Channel has been referenced from the Rough Grade Study and referenced hydraulic flow computations are included in Appendix H. Referenced perimeter street flows are summarized in Table 4 below.

Interior: Street flows for the interior streets have been analyzed based on interim condition flows. Please see Exhibit F located in Appendix A for section locations. Hydraulic flow computations are included in Appendix D and results are summarized in Table 4 below.

TABLE 4: Interim Condition Street Flow Summary

Section	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (fps)	VxD	EGL (ft)
SECTION 1 *(Q = CP2)*	3.00	57.0	0.56	6.22	3.5	1.16
SECTION 2 *(Q = PH1-2 + 1C)*	4.00	9.0	0.33	4.29	1.4	0.62
SECTION 3 *(Q = RG2 + 1B)*	4.00	26.0	0.43	5.95	2.6	0.98
SECTION 4 *(Q = RG1 + 1A)*	4.80	10.0	0.33	4.72	1.6	0.68
SECTION 5W *(Q = ½CP3)*	2.85	7.5	0.38	4.72	1.8	N/A
SECTION 5E *(Q = ½CP3)*	3.25	7.5	0.37	4.99	1.8	N/A

TABLE 4: Interim Condition Street Flow Summary						
Section	**Slope (%)**	**Q_{100} (cfs)**	**Depth (ft)**	**Velocity (fps)**	**VxD**	**EGL (ft)**
ALT[4] *(Q = Referenced)*	3.00	14.0	0.39	4.14	1.6	N/A
FOX[1] *(Q = Referenced)*	5.30	13.0	0.35	5.10	1.8	N/A
SKY[2] *(Q = Referenced)*	2.59	430.0	0.68	6.51	N/A	N/A

1 - Referenced from the Unit 2 Study
2 - Referenced from the Rough Grade Study
3 - Referenced from the Conceptual Study
4 - Referenced from the Alta Study

Upon review of Table 4 above, it is noted that 100-year street criteria as set forth in the CCRFCD Manual are met in the proposed interior streets. Since 100-year flows meet 10-year criteria, 10-year flows have not been reported. However, it is noted that the velocity in Section 1 is greater than 5 fps and is, therefore, considered erosive. However, the depth of flow in the roadway does not exceed the back of walk elevation. Therefore, erosion protection within the landscape area adjacent to the roadway is deemed unnecessary.

4.5 Summary of Interim Condition Facilities

Storm Drain & Drop Inlets: An existing 42-inch RCP lateral designed and constructed with the Unit 2 Study extends onto the Parcel O site and is intended to pick up the entire flow generated by the site. Table 5 below summarizes the facilities proposed with Phase 1 of the Parcel O development. See Exhibit G located in Appendix A for an illustration of the proposed flood control facilities.

TABLE 5: Flood Control Facility Summary Interim Condition					
ID	**Facility**	**Description of Flow**	**$Q_{FACILITY}$ (cfs)**	**Q_{BYPASS} (cfs)**	**Comment**
1	Proposed Sump Inlet	Q = CP2	57	0	15.0-ft Mod. Type C Drop Inlet
2A	Proposed CG Inlet	Q = ½CP3	7.5	0	20.0-ft Mod. Type C Drop Inlet, 18-inch RCP Lateral
2B	Proposed CG Inlet	Q = ½CP3	7.5	0	20.0-ft Mod. Type C Drop Inlet, 18-inch RCP Lateral

Drop inlet computations are included in Appendix E. WSPG analyses for the existing and proposed storm drain are also included in Appendix E. Note that the starting WSE for the WSPG analysis has been taken from the referenced Standard Form 6 from the

Unit 2 Study. Please see relevant reference material included in Appendix G. Per the CCRFCD Manual, the resulting HGL is at minimum 1-foot below finished grade and has been labeled on the profile sheets included in Appendix L.

Emergency Overflow: In the case that the proposed drop inlets become entirely clogged, an emergency overflow path has been established. At Concentration Point CP2, flow will weir over the curb to the south and ultimately into Fox Hill Drive. A weir calculation has been performed for the emergency overflow to ensure that adjacent finished floors are elevated above the headwater depth over the weir in the emergency situation. Please see Appendix D for reference to the weir computation as summarized in Table 6 below.

TABLE 6: Emergency Overflow Weir

Section	Q_{100} (cfs)	Weir Crest (ft)	Weir Depth (ft)	Headwater Elevation (fps)
Section E1 *(Q = CP2)*	57	75.10	0.61	75.71

Drainage Easements: A public drainage easement is proposed over the proposed storm drain improvements extending from the low point at Concentration Point CP2 south thru the common lot to the existing Paseo Breeze Drive ROW. The drainage easement is irregular in shape due to the configuration of the storm drain in that area. No drainage easement computations have been performed since the easement is not designed to convey surface flow. Note that the storm drain was placed I the common lot due versus the roadway due to utility conflicts. Access will be granted within the common lot to allow for maintenance of the proposed facilities.

Common Lot: A park (Common Lot C) is centrally located within the proposed site. The only flow convey thru the park from north to south is what is generated by Basin PH1-2 which is approximately 1 cfs. A flowline has been provided along the east boundary of the park wall; however, due to the insignificance of the flow, hydraulic calculations have not been performed. Note that a sidewalk underdrain has been provided where the park discharges onto Sandy Peak Avenue.

Utility Easements: Proposed utility easements from Sky Vista Drive and Alta Drive are sloped from the perimeter roadways into the site. Therefore, in order to prevent offsite flows from entering the site, the upstream sides of the easements have been elevated to twice the depth of flow in the roadway. Note that the depth of flow in completed Sky Vista Drive is unknown. Therefore, it was assumed that the flow depth would not be greater than curb height and the high side of the utility easement was set a minimum of 1-foot above the flowline.

Interim Swales/Berms: A series of interim swales and berms have been provided along the perimeter of the Phase 1 improvements to direct flows from mass graded Phase 2 to proposed Phase 1 roadways. These swales and berms are temporary and will be removed with development of Phase 2. Therefore, hydraulic computations for the interim swales and berms have not been included. If erosion occurs, it will be the

developer's responsibility to re-grade as necessary to maintain interim condition flow patterns.

Riprap Pads: Riprap pads have been provided where rough grading meets and/or discharges onto developed roadways to allow for sedimentation and to minimize the potential for undercutting of the pavement. Please see the grading plans located in Appendix L for riprap locations.

Solid Grouting: Solid grouting has been provided where necessary to protect finished floors from flows in adjacent roadways. Two (2) courses of solid grouting is provided on the interior walls for Lots 54 and 97 and one (1) course is provided for Lot 91. Furthermore, two (2) courses of solid grouting above future FG has been provided along Alta Drive and Sky Vista Drive to protect the finished floors up to a depth of 18-inches above the water surface elevation in the street. Please see the grading plans located in Appendix L for proposed solid grouting.

4.6 Summary of Interim Condition Finished Floors

In some locations, the interim condition flows are higher than the proposed condition flows in the Phase 1 interior roadways and vice versa. Therefore, street section hydraulic computations have been performed for all street sections for both interim and proposed condition flows and finished floors have been checked against the higher flow depths. Please see Section 5.6 for further discussion on proposed finished floors.

5 PROPOSED DRAINAGE CONDITION

5.1 Definition of Proposed Condition

The proposed condition considers Phase 2 residentially developed, including Lots 20 thru 37 and 65 thru 86, completing development of the entire Parcel O site. The adjacent perimeter streets of existing Fox Hill Drive and future Alta Drive, as well as the adjacent Collector Channel within the Sky Vista Drive alignment, are the same as discussed in the interim condition.

5.2 Discussion of Proposed Condition

Please see Exhibit G located in Appendix A for an illustration of the proposed condition drainage patterns.

Offsite: Offsite flow patterns are the same as discussed in the interim condition. See Section 4.2 for further discussion.

Onsite: In the proposed condition, Phase 2 of Parcel O will be residentially developed, completing development of the entire Parcel O site. Similar to the interim condition, developed Phase 2 will drain east and south thru developed Phase 1 interior roadways to one of two collection locations. Flow will be collected via storm drain facilities constructed with Phase 1 and will discharge into existing storm drain within Fox Hill Drive.

5.3 Summary of Proposed Condition Flows

The proposed condition HEC-1 analysis is located in Appendix C, and is summarized in Table 7 below.

Table 7: Summary of Proposed Condition HEC-1 Flows

Subbasin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
PH1-1	9.60	30	14
PH1-2	0.38	1	1
PH1-3	4.01	12	6
PH2-1	3.29	11	5
PH2-2	1.30	4	2
PH2-3	1.95	7	3
PH2-4	0.19	1	0
PH2-5	0.49	2	1
CP1 (PH2-4 + PH2-3)	N/A	8	4
CP2 (CP1 + PH2-1 + PH1-1 + PH2-5 + PH1-2)	N/A	52	24
CP3 (PH2-2 + PH1-3)	N/A	18	8
CP4 (CP2 + CP3)	N/A	70	32

The total proposed condition flow established with this study has been compared against the allowable discharge established in the Unit 2 Study. Please see Table 8 below for a comparison of the flow rates from the Unit 2 Study versus proposed condition flow rates determined herein.

Table 8: Proposed Condition Comparison of Flows for Parcel O

Unit 2 Study Basin	$Q_{100/10}$ (cfs)	Proposed Condition Parcel O Basin	$Q_{100/10}$ (cfs)
N	75/33	CP4	70/32

Please note that the proposed condition flows determined in this study are less than those determined with the Unit 2 Study. Note that the proposed condition flows determined herein are slightly less than the interim condition flows due to the fact that the rough graded curve number is higher than the developed condition curve number. Therefore, the development of the site does not negatively impact downstream facilities and/or property and the development is considered acceptable.

5.4 Summary of Proposed Condition Street Flows

Perimeter: The flows in the perimeter streets existing Fox Hill Drive and future Alta Drive, as well as the adjacent Collector Channel within the Sky Vista Drive alignment,

are the same as presented in the interim condition. See Section 4.4 for further discussion.

Interior: Street flows for the interior streets have been analyzed based on proposed condition flows. Please see Exhibit G located in Appendix A for section locations. Hydraulic flow computations are included in Appendix D and results are summarized in Table 8 below.

TABLE 9: Proposed Condition Street Flow Summary

Section	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (fps)	VxD	EGL (ft)
SECTION 1 *(Q = CP2)*	3.00	52.0	0.55	6.03	3.3	1.11
SECTION 2 *(Q = PH2-5 + PH1-2 + 1C)*	4.00	11.0	0.35	4.48	1.6	0.66
SECTION 3 *(Q = CP1 + 1B)*	4.00	14.0	0.36	5.40	1.9	0.81
SECTION 4 *(Q = PH2-1 + 1A)*	4.80	16.0	0.36	5.95	2.1	0.91
SECTION 5W *(Q = ½CP3)*	2.85	9.0	0.40	4.86	1.9	N/A
SECTION 5E *(Q = ½CP3)*	3.25	9.0	0.39	5.13	2.0	N/A

Upon review of Table 9 above, it is noted that 100-year depth and VxD criteria as set forth in the CCRFCD Manual are met in the proposed interior streets. Since 100-year flows meet 10-year criteria, 10-year flows have not been reported. However, it is noted that the velocity in Section 1 is greater than 5 fps and is, therefore, considered erosive. However, the depth of flow in the roadway does not exceed the back of walk elevation. Therefore, erosion protection within the landscape area adjacent to the roadway is deemed unnecessary.

5.5 Summary of Proposed Recommended Facilities

Storm Drain & Drop Inlets: No additional storm drain and/or drop inlets are proposed with Phase 2. However, the Phase 1 facilities have been analyzed utilizing the proposed condition flows. See calculations included in Appendix E. See Exhibit H located in Appendix A for an illustration of the flood control facilities. Hydraulic flow characteristics for the facilities in the proposed condition are summarized in Table 10 below.

TABLE 10: Flood Control Facility Summary

Proposed Condition

ID	Facility	Description of Flow	$Q_{FACILITY}$ (cfs)	Q_{BYPASS} (cfs)	Comment
1	Proposed Sump Inlet	Q = CP2	52	0	15.0-ft Mod. Type C Drop Inlet

TABLE 10: Flood Control Facility Summary Proposed Condition					
ID	**Facility**	**Description of Flow**	**$Q_{FACILITY}$ (cfs)**	**Q_{BYPASS} (cfs)**	**Comment**
2A	Proposed CG Inlet	Q = ½CP3	8.0	1.0	20.0-ft Mod. Type C Drop Inlet, 18-inch RCP Lateral
2B	Proposed CG Inlet	Q = ½CP3	7.9	1.1	20.0-ft Mod. Type C Drop Inlet, 18-inch RCP Lateral

Note that in the proposed condition, the continuous grade Drop Inlets No. 2A and No. 2B allow ± 1 cfs of bypass flow. This is due to the inefficiency of continuous grade inlets to collect 100% of flow. Bypass from Drop Inlet No. 2B will turn the corner and convey east in Paseo Breeze Drive to Fox Hill Drive. The flow will likely be collected in an existing nuisance inlet within Fox Hill Drive. The bypass flow from Drop Inlet No. 2A will continue south onto the adjacent property. This is an insignificant amount of flow and when the adjacent parcel gets developed and the roadway gets extended, additional drop inlets will likely be designed and the flow will get collected.

Emergency Overflow: The emergency overflow weir was analyzed using the worst case interim condition flow. See Section 4.5 for further discussion.

Common Lot: A 2-foot wide concrete flume is proposed across Common Lot C from Elk Meadow Court to City Creek Court to convey flow from west of the common lot to the east. Flowmaster computations for the flume are included in Appendix D and results are summarized in Table 11 below. Note that a sidewalk underdrain is provided at the sidewalk crossing. The underdrain is mainly provided for nuisance flow, but can convey the entire 100-year flow of 8 cfs.

TABLE 11: Hydraulic Flow Summary						
Section	**Slope (%)**	**Q_{100} (cfs)**	**Velocity (fps)**	**Normal Depth (ft)**	**Facility Depth (ft)**	**Description**
Section A *(Q = CP1)*	3.1	8	9.12	0.44	0.50	Concrete Flume 2 ft BW, Rectangular

Solid Grouting: Solid grouting has been provided where necessary to protect finished floors from flows in adjacent roadways. Two (2) courses of solid grouting is provided along Alta Drive and Sky Vista Drive to protect the finished floors up to a depth of 18-inches above the water surface elevation in the street. Please see the grading plans located in Appendix L for proposed solid grouting.

5.6 Summary of Proposed Finished Floor

All proposed finished floor elevations have been determined to be a vertical distance above the gutter flowline of twice the depth of flow in the street and 6-inches above the top of curb on the high side of the lot in accordance with the Manual. Finished floor elevations are based on either interim or proposed condition street flows, whichever are higher, based on which street section is being referenced. All finished floor elevations are in compliance with the CCRFCD Manual criteria. A finished floor analysis has been provided in Appendix F. Per CLV requirements, the finish floor elevation for lots adjacent to emergency overflow weirs must be higher than the headwater elevation over the weir. The finished floor elevation for Lot 1 adjacent to the emergency overflow weir has been checked and meets CLV criteria

6 ULTIMATE DRAINAGE CONDITION

6.1 Discussion of Ultimate Condition

The ultimate condition for the proposed project site has been referenced from the Unit 2 Study. The Unit 2 Study analyzed Parcel O as Subbasin N. See Figure 6 – Ultimate Drainage Patterns located in Appendix G for an illustration of the Ultimate Condition drainage patterns. The referenced HEC-1 analysis is also included in Appendix G. The only difference between the proposed condition herein and the ultimate condition for the project site is that full street improvements to Alta Drive and Sky Vista Drive adjacent to the site will be complete. Note that the more conservative ultimate condition flow in Alta Drive has been considered in the interim and proposed condition designs. Furthermore, once Sky Vista Drive is completed, the surface flow in the street will be much less than the 430 cfs that is currently in the Collector Channel. Therefore, the proposed condition presented herein controls the design and the perimeter walls adjacent to Alta Drive and Sky Vista Drive alignment acceptable.

7 CONCLUSIONS & RECOMMENDATIONS

1. The project site is located within a FEMA designated Zone X, areas determined to be outside the 0.2% annual chance floodplain.

2. The project is adjacent to proposed APAD 0146, an existing 10-foot by 8-foot RCB located in Alta Drive; therefore, CCRFCD concurrence is required.

3. Three (3) drop inlets and associated storm drain facilities are proposed to collect and convey flow from the developed Parcel O site to the existing storm drain facilities within Fox Hill Drive.

4. Finished floor elevations for entire site have been elevated to at least a height of two times the depth of flow in the adjacent street and 6-inches above the top of curb measured from the high side of the lot. For lots adjacent to the drainage easement, the finish floor elevations have been elevated to a height of 18-inches above the water surface elevation over the weir or twice the depth of channel flow, whichever is higher.

5. This proposed development is in conformance with the concept set forth in the V23A Conceptual Study, as well as the Rough Grade Study and Unit 2 Study. Note that the site discharge is approximately equal to the allowable discharges set forth in the Unit 2 Study. Therefore, development of the proposed site does not negatively impact downstream properties and/or facilities and the design is considered acceptable.

8 REFERENCES

1. *Las Vegas Valley Flood Control Master Plan Update*, PBS&J, Inc. and G.C. Wallace, Inc, November 2002.

2. *Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements,* G.C. Wallace, October 2003.

3. *Technical Drainage Study for Summerlin Village 23A Rough Grading,* G.C. Wallace, April 2002.

4. *Conceptual Drainage Study for Summerlin Village 23A,* G.C. Wallace, February 2002.

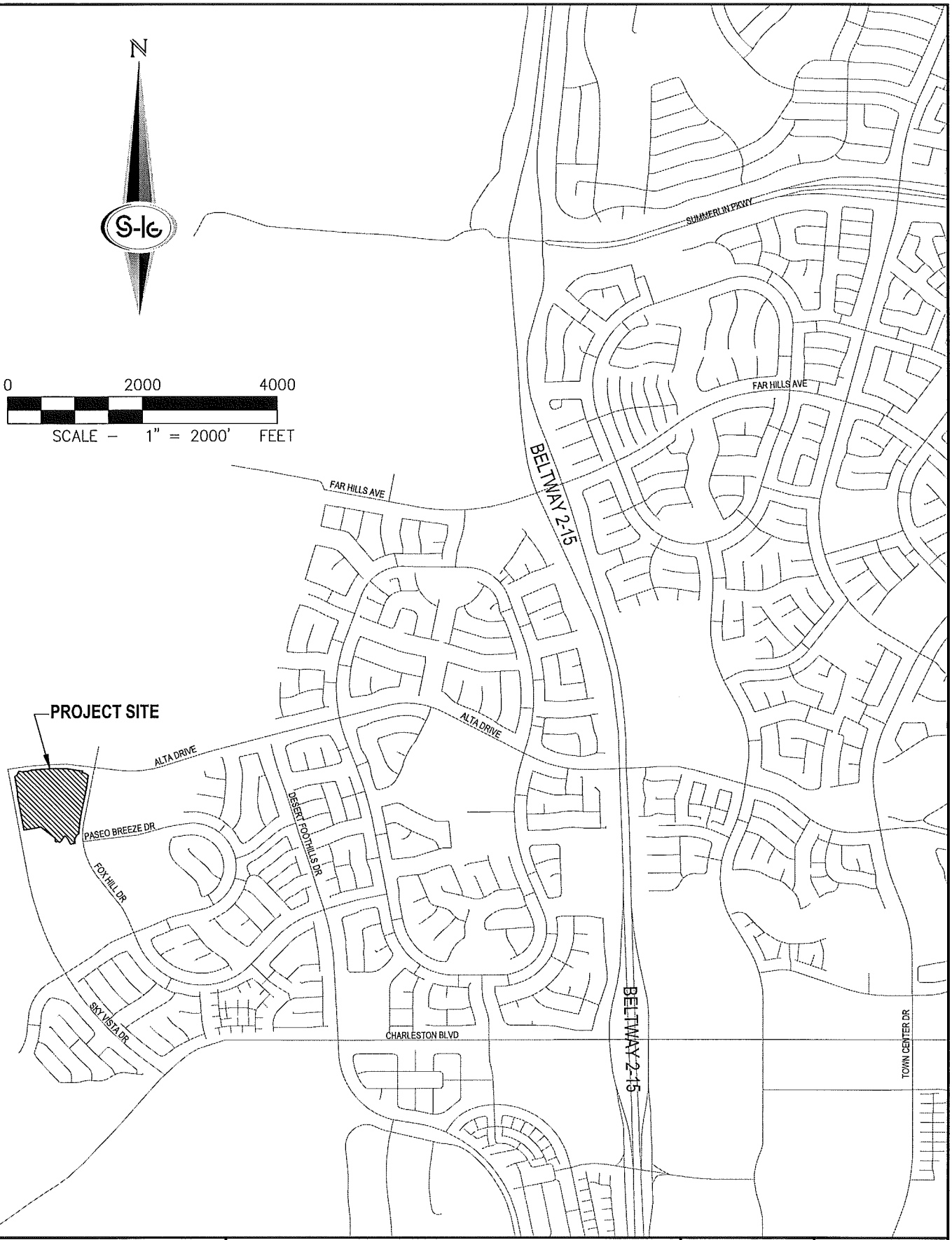
5. *Technical Drainage Study for Summerlin Village 23A/23B Alta Drive Street Improvements,* G.C. Wallace, January 2007.

6. *Hydrologic Criteria and Drainage Design Manual*, Clark County Regional Flood Control District, 1990.

7. *Soil Survey of Las Vegas Valley Area, Nevada*, U.S. Department of Agriculture, Soil Conservation Service, July 1985.

APPENDIX A

Drainage Exhibits



j:\wsh1105-000 v23 parcel o\drainage\technical study\figures\wsh1104-000 exhibit a – vicinity map.dwg 12/19/2011 10:51 AM Kylie Rowbury

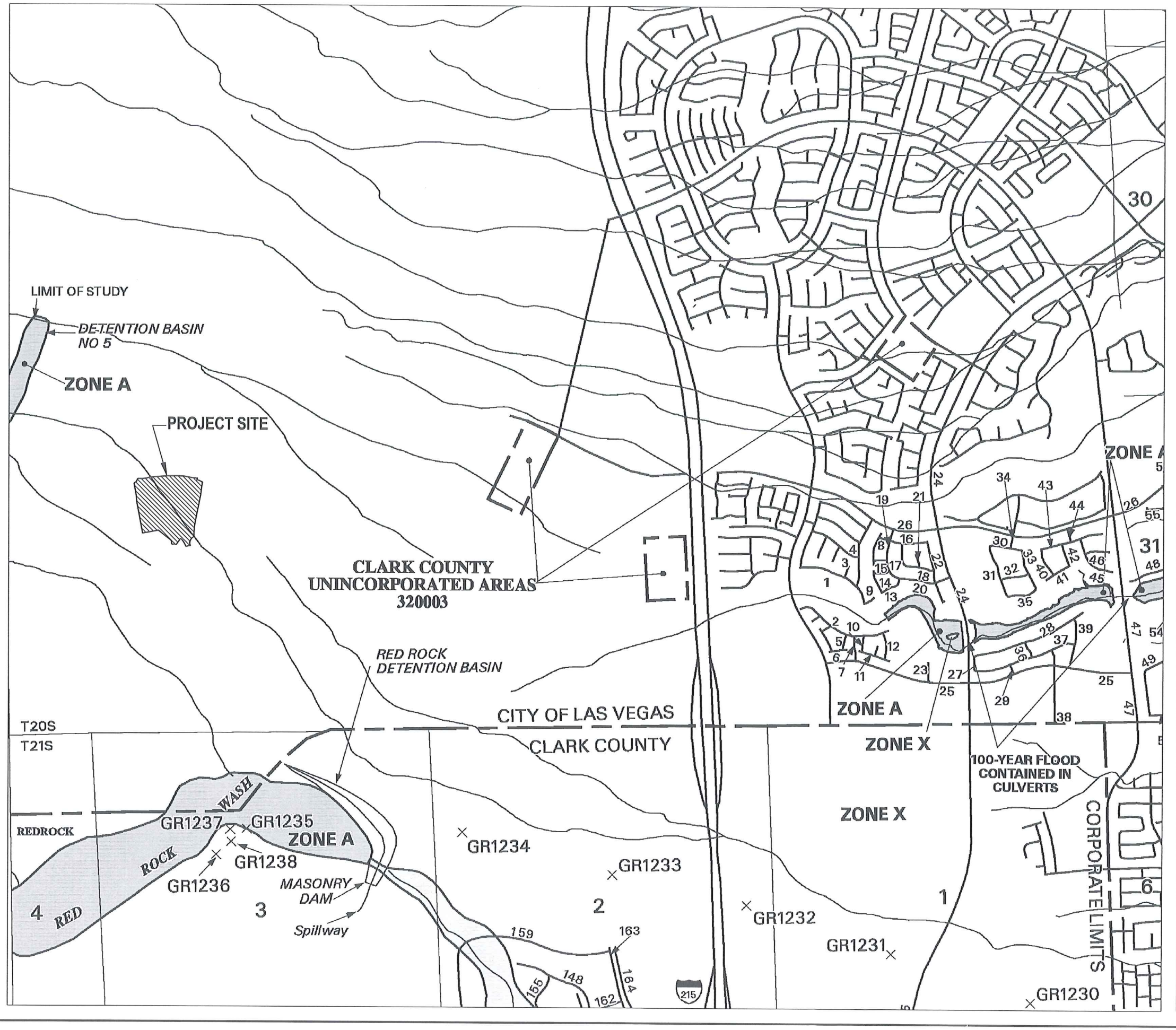
SLATER HANIFAN GROUP
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PHONE (702) 284-5300 FAX (702) 284-5399

WOODSIDE HOMES

SUMMERLIN VILLAGE 23A PARCEL O

VICINITY MAP

DATE: DEC 2011	PROJECT NO. WSH1105.000
DRAFTER: KCR	
DESIGNER: KCR	**EXHIBIT A**
CHECKED: SMJ	SHEET 1 OF 1



N

N.T.S.

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2150 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 2150 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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

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

MAP NUMBER
32003C2150 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

SLATER HANIFAN GROUP
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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

WOODSIDE HOMES

SUMMERLIN VILLAGE 23A PARCEL O

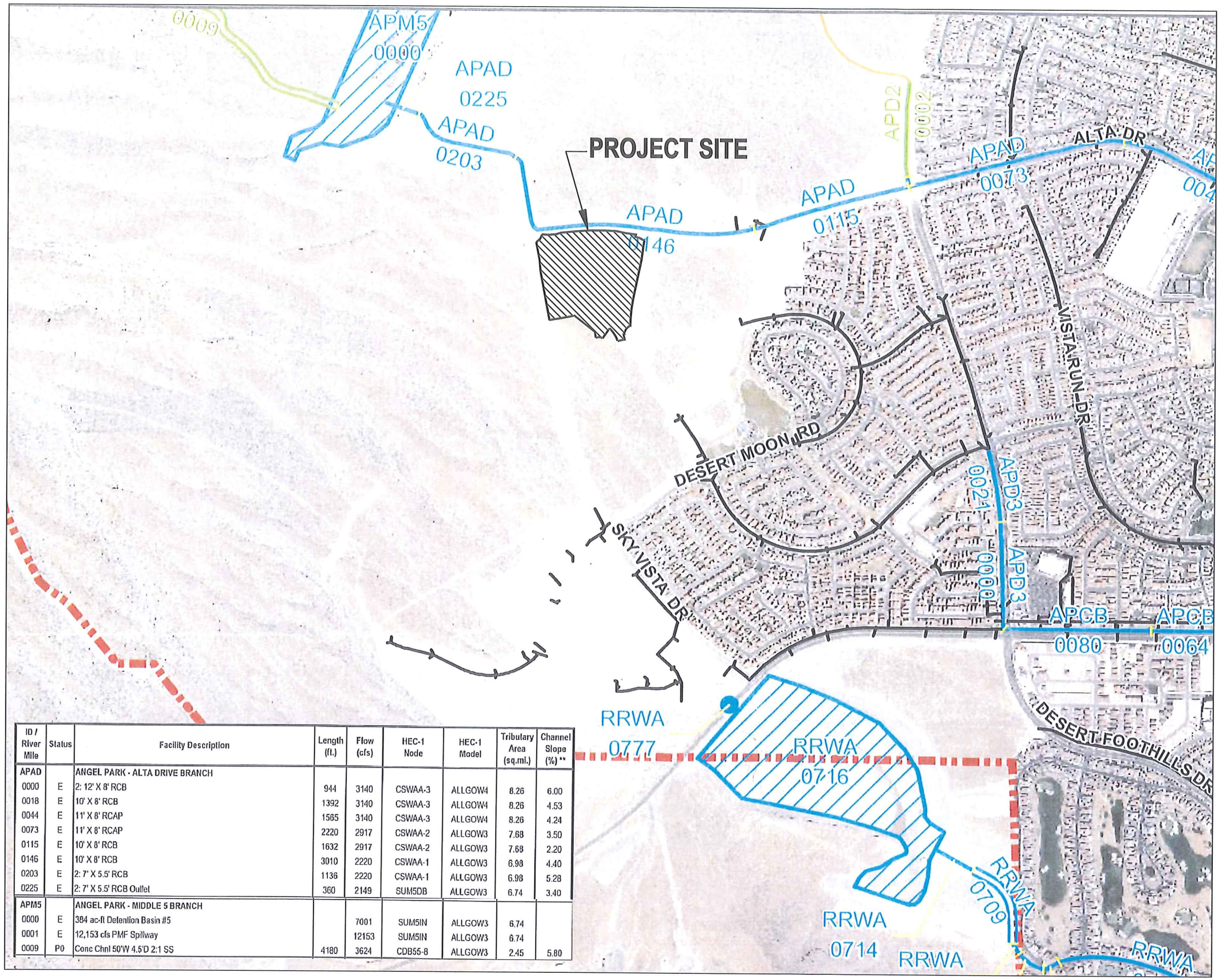
FEMA FIRM MAP

DATE: DEC 2011
DRAFTER: KCR
DESIGNER: KCR
CHECKED: SMJ
PROJECT NO.
WSH1105.000

EXHIBIT B
SHEET 1 OF 1

12/19/2011 11:29 AM Kylie Rowbury

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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						
0000	E	2: 12' X 8' RCB	944	3140	CSWAA-3	ALLGOW4	8.26	6.00
0018	E	10' X 8' RCB	1392	3140	CSWAA-3	ALLGOW4	8.26	4.53
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
0115	E	10' X 8' RCB	1632	2917	CSWAA-2	ALLGOW3	7.68	2.20
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
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	
0009	P0	Conc Chnl 50'W 4.5'D 2:1 SS	4180	3624	CDB55-8	ALLGOW3	2.45	5.80

N

0 1000 2000

SCALE – 1"=1000' FEET

REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F-29
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
- Culvert or Bridge Crossing
- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain
Crossing	Crossing

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WOODSIDE HOMES

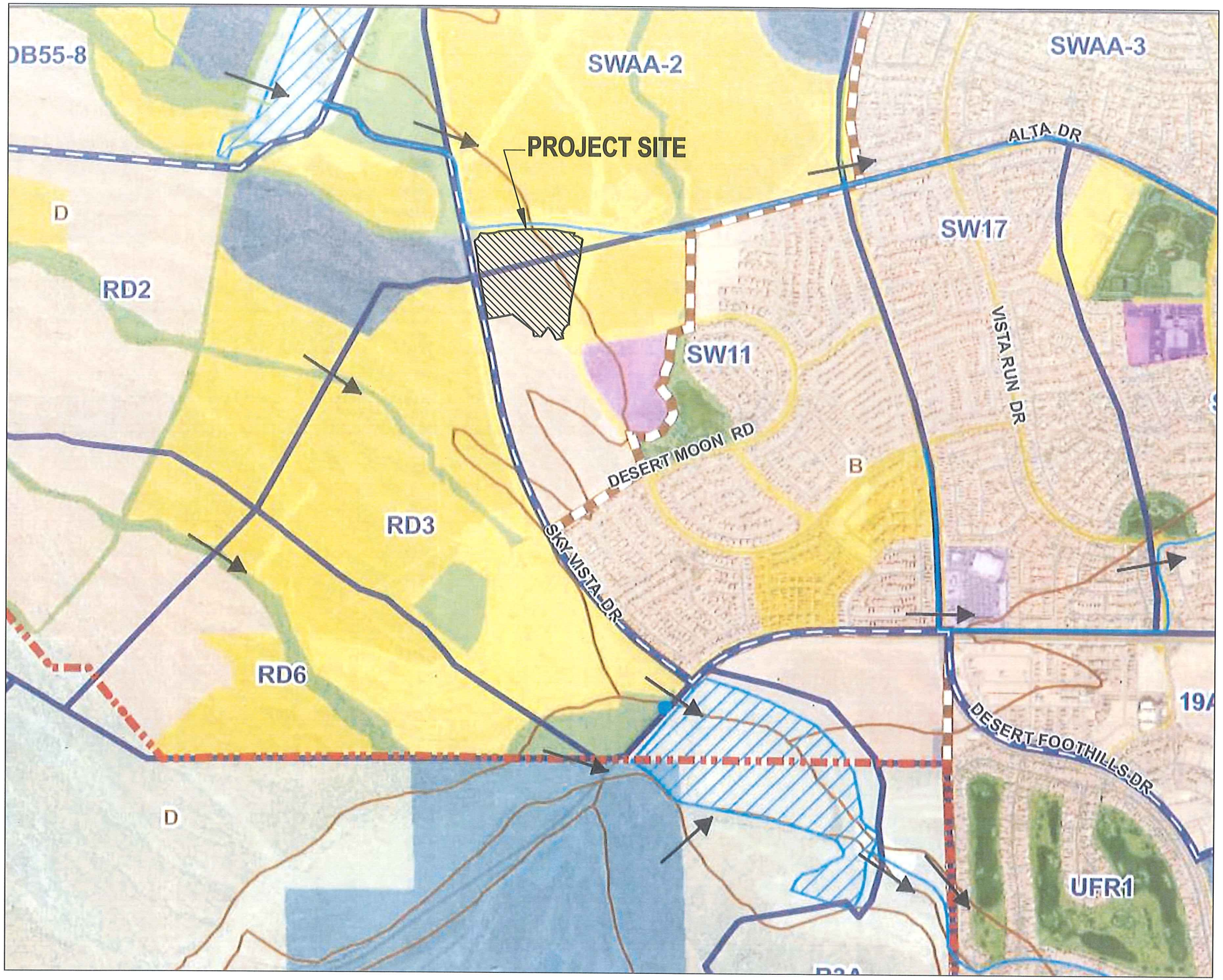
SUMMERLIN VILLAGE 23A PARCEL O
CCRFCD 2008 MPU FACILITIES MAP

DATE: DEC 2011
DRAFTER: KCR
DESIGNER: KCR
CHECKED: SMJ
PROJECT NO. WSH1105.000

EXHIBIT C
SHEET 1 OF 1

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J:\Flow\WSH\WSH1105.000\v23 Reports\Drainage\Exhibits\Figures\WSH_Hydrologic Map.dwg 12/19/2011 11:44 AM Kylie Rowbur



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0 1000 2000

SCALE – 1"=1000' FEET

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H-29
HYDROLOGIC SUMMARY

LEGEND

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

Flood Control Facilities

- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Category A Remove & Replace/ Parallel Facilities
- Category B Remove & Replace/ Parallel Facilities
- Type Hydrologic Soil Groups
- A Low Runoff Potential
- B Moderately Low Runoff Potential
- C Moderately High Runoff Potential
- D High Runoff Potential/Rock Outcrops

Typical Land Use

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

* Drought Ordinance Applied

N

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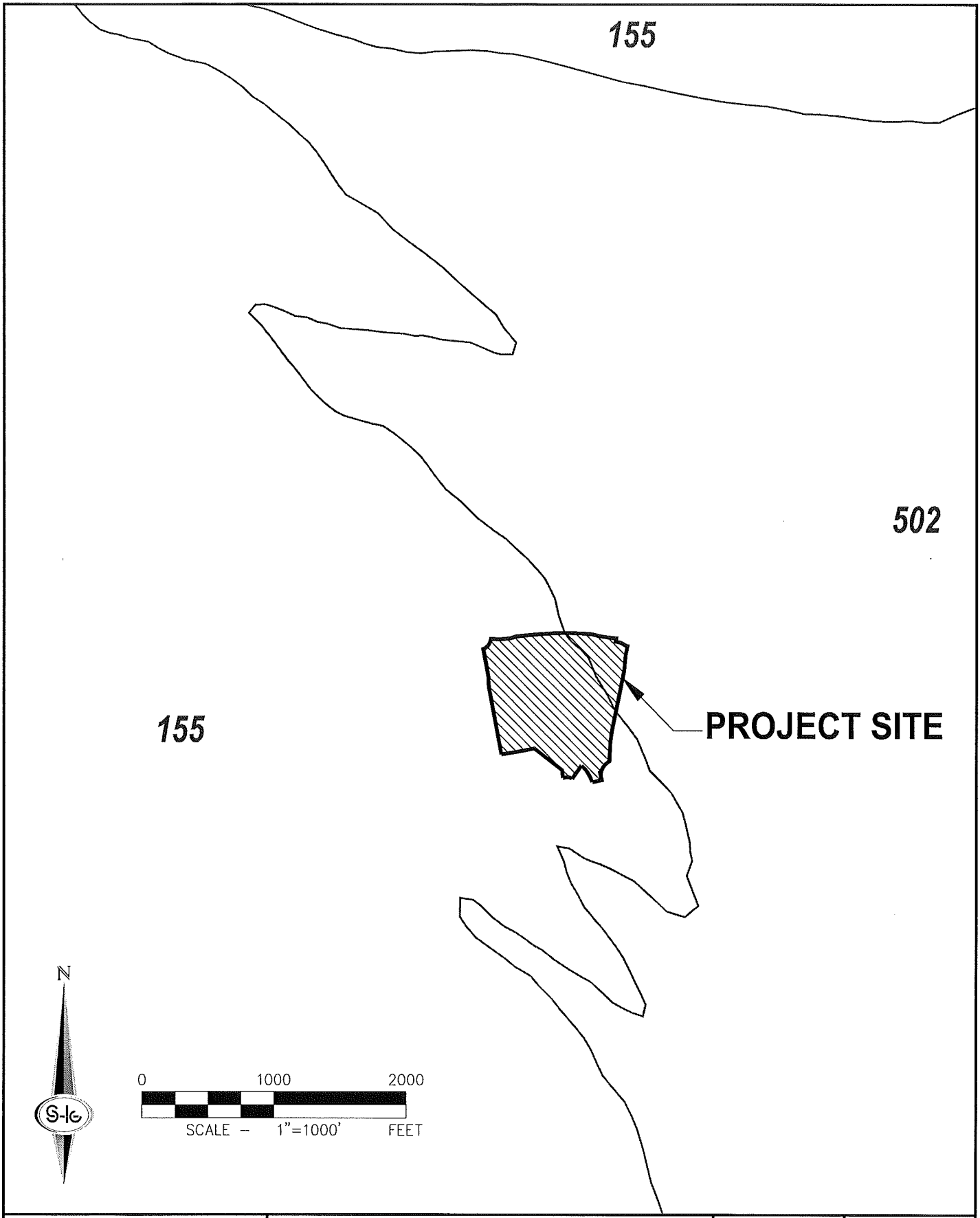
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WOODSIDE HOMES

SUMMERLIN VILLAGE 23A PARCEL O
CCRFCD 2008 MPU HYDROLOGIC MAP

DATE:	DEC 2011
DRAFTER:	KCR
DESIGNER:	KCR
CHECKED:	SMJ
PROJECT NO.	WSH1105.000

EXHIBIT D
SHEET 1 OF 1



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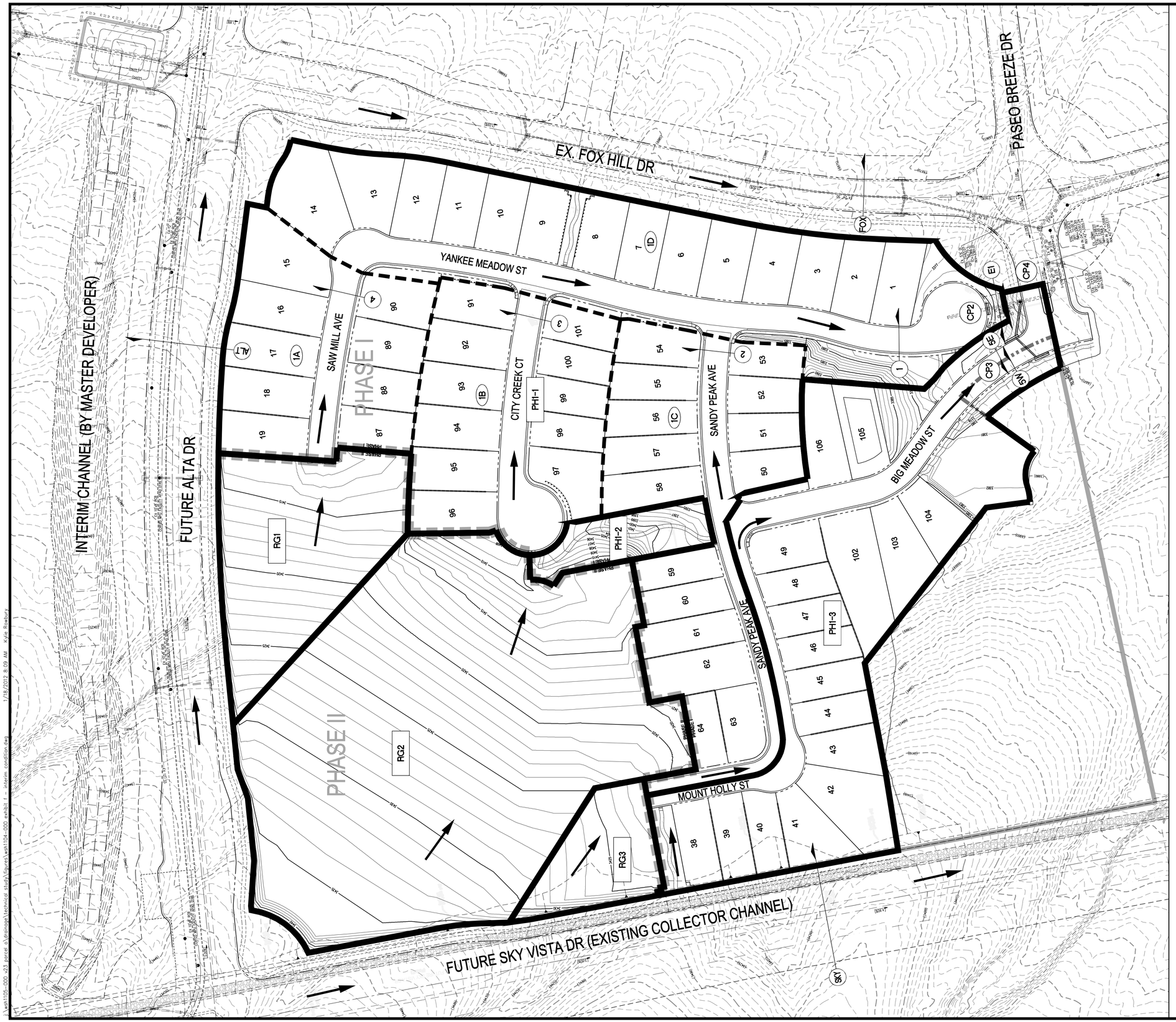
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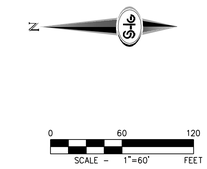
WOODSIDE HOMES

SUMMERLIN VILLAGE 23A PARCEL O

SOILS MAP

DATE: DEC 2011	PROJECT NO. WSH1105.000
DRAFTER: KCR	
DESIGNER: KCR	**EXHIBIT E**
CHECKED: SMJ	SHEET 1 OF 1





LEGEND

- BASIN BOUNDARY
- ON-D1 — BASIN ID
- FLOW DIRECTION
- PT1 — CONCENTRATION POINT
- 000 — FLOWMASTER SECTION
- PT1 — FACILITY ID
- 1D — PRORATED BASIN ID
- PRORATED BASIN BOUNDARY

Flow Summary
Interim Condition

Subbasin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
PH1-1	9.60	30	14
PH1-2	0.38	1	1
PH1-3	4.01	13	6
RG1	1.39	5	3
RG2	5.32	20	10
RG3	0.51	2	1
CP2 (RG2 + RG1 + PH1-1 + PH1-2)	N/A	57	27
CP3 (RG3 + PH1-3)	N/A	15	7
CP4 (CP2 + CP3)	N/A	72	34

Prorated Flow Computations
Interim/Proposed Condition

Subbasin	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/ac)
PH1-1	30	9.60	3.1
Prorated Subbasin	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/ac)**
1A	5	1.68	3.1
1B	6	1.90	3.1
1C	8	2.46	3.1
1D	11	3.56	3.1
TOTAL	30.0	9.60	

Street Flow Summary
Interim Condition

Section	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (fps)	VxD	EGL (ft)
SECTION 1 (Q = CP2)	3.00	57.0	0.56	6.22	3.5	1.16
SECTION 2 (Q = PH1-2 + 1C)	4.00	9.0	0.33	4.29	1.4	0.62
SECTION 3 (Q = RG2 + 1B)	4.00	26.0	0.43	5.95	2.6	0.98
SECTION 4 (Q = RG1 + 1A)	4.80	10.0	0.33	4.72	1.6	0.68
SECTION 5W (Q = ½CP3)	2.85	7.5	0.38	4.72	1.8	N/A
SECTION 5E (Q = ½CP3)	3.25	7.5	0.37	4.99	1.8	N/A
ALT[4] (Q = Referenced)	3.00	14.0	0.39	4.14	1.6	N/A
FOX[1] (Q = Referenced)	5.30	13.0	0.35	5.10	1.8	N/A
SKY[2] (Q = Referenced)	2.59	430.0	0.68	6.51	4.4	N/A

1 - Referenced from the Unit 2 Study
2 - Referenced from the Rough Grade Study
3 - Referenced from the Conceptual Study
4 - Referenced from the Alta Study

Emergency Overflow Weir

Section	Q_{100} (cfs)	Weir Crest (ft)	Weir Depth (ft)	Headwater Elevation (fps)
Section E1 (Q = CP2)	57	75.10	0.61	75.71

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

LAS VEGAS, NV

WOODSIDE HOMES

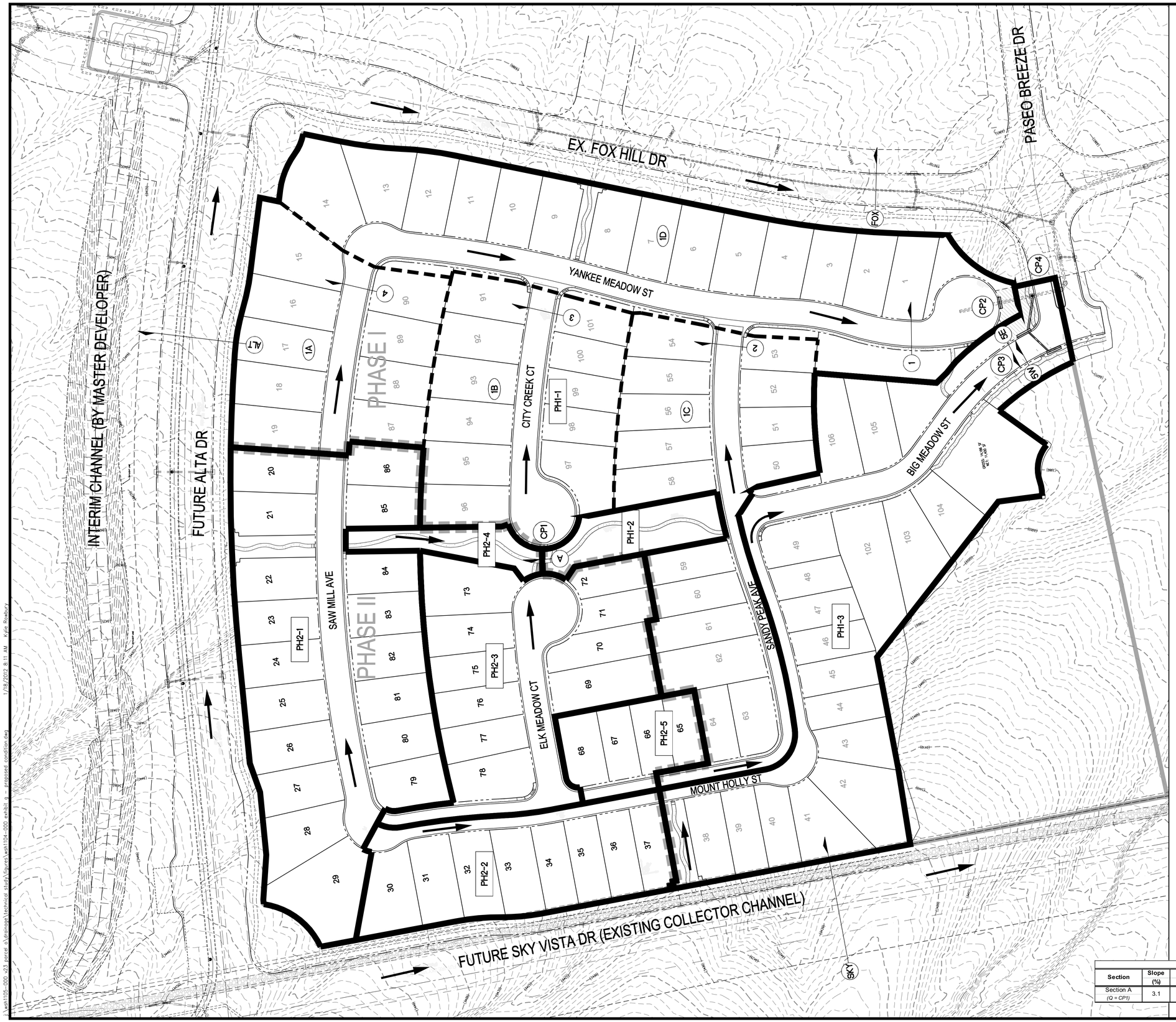
SUMMERLIN VILLAGE 23A PARCEL O
INTERIM CONDITION DRAINAGE MAP (PHASE 1)

24 20 S 59 E

DATE: JAN 2012
DRAFTER: KCR
DESIGNER: KCR
CHECKED: SMJ
PROJECT NO. WSH1105.000

EXHIBIT F
SHEET 1 OF 1

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SCALE – 1"=60' (0, 60, 120 FEET)

LEGEND

- BASIN BOUNDARY
- ON-D1 — BASIN ID
- FLOW DIRECTION
- PT1 — CONCENTRATION POINT
- 000 — FLOWMASTER SECTION
- PT1 — FACILITY ID
- 1D — PRORATED BASIN ID
- PRORATED BASIN BOUNDARY

Flow Summary
Proposed Condition

Subbasin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
PH1-1	9.60	30	14
PH1-2	0.38	1	1
PH1-3	4.01	12	6
PH2-1	3.29	11	5
PH2-2	1.30	4	2
PH2-3	1.95	7	3
PH2-4	0.19	1	0
PH2-5	0.49	2	1
CP1 (PH2-4 + PH2-3)	N/A	8	4
CP2 (CP1+PH2-1+PH1-1+PH2-5+PH1-2)	N/A	52	24
CP3 (PH2-2 +PH1-3)	N/A	18	8
CP4 (CP2 + CP3)	N/A	70	32

Prorated Flow Computations
Interim/Proposed Condition

Subbasin	Q_{100} (cfs)	Area (acres)	100-yr Unit Flow (cfs/ac)
PH1-1	30	9.60	3.1
Prorated Subbasin	**Q_{100} (cfs)**	**Area (acres)**	**100-yr Unit Flow (cfs/ac)**
1A	5	1.68	3.1
1B	6	1.90	3.1
1C	8	2.46	3.1
1D	11	3.56	3.1
TOTAL	**30.0**	**9.60**	

Street Flow Summary
Proposed Condition

Section	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (fps)	VxD	EGL (ft)
SECTION 1 (Q = CP2)	3.00	52.0	0.55	6.03	3.3	1.11
SECTION 2 (Q = PH2-5 + PH1-2 + 1C)	4.00	11.0	0.35	4.48	1.6	0.66
SECTION 3 (Q = CP1 + 1B)	4.00	14.0	0.36	5.40	1.9	0.81
SECTION 4 (Q = PH2-1 + 1A)	4.80	16.0	0.36	5.95	2.1	0.91
SECTION SW (Q = ½CP3)	2.85	9.0	0.40	4.86	1.9	N/A
SECTION 5E (Q = ½CP3)	3.25	9.0	0.39	5.13	2.0	N/A
ALT[4] (Q = Referenced)	3.00	14.0	0.39	4.14	1.6	N/A
FOX[1] (Q = Referenced)	5.30	13.0	0.35	5.10	1.8	N/A
SKY[2] (Q = Referenced)	2.59	430.0	0.68	6.51	4.4	N/A

1 - Referenced from the Unit 2 Study
2 - Referenced from the Rough Grade Study
3 - Referenced from the Conceptual Study
4 - Referenced from the Alta Study

Hydraulic Flow Summary

Section	Slope (%)	Q_{100} (cfs)	Velocity (fps)	Normal Depth (ft)	Facility Depth (ft)	Description
Section A (Q = CP1)	3.1	8	9.12	0.44	0.50	Concrete Flume 2 ft BW, Rectangular

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

LAS VEGAS, NV

WOODSIDE HOMES

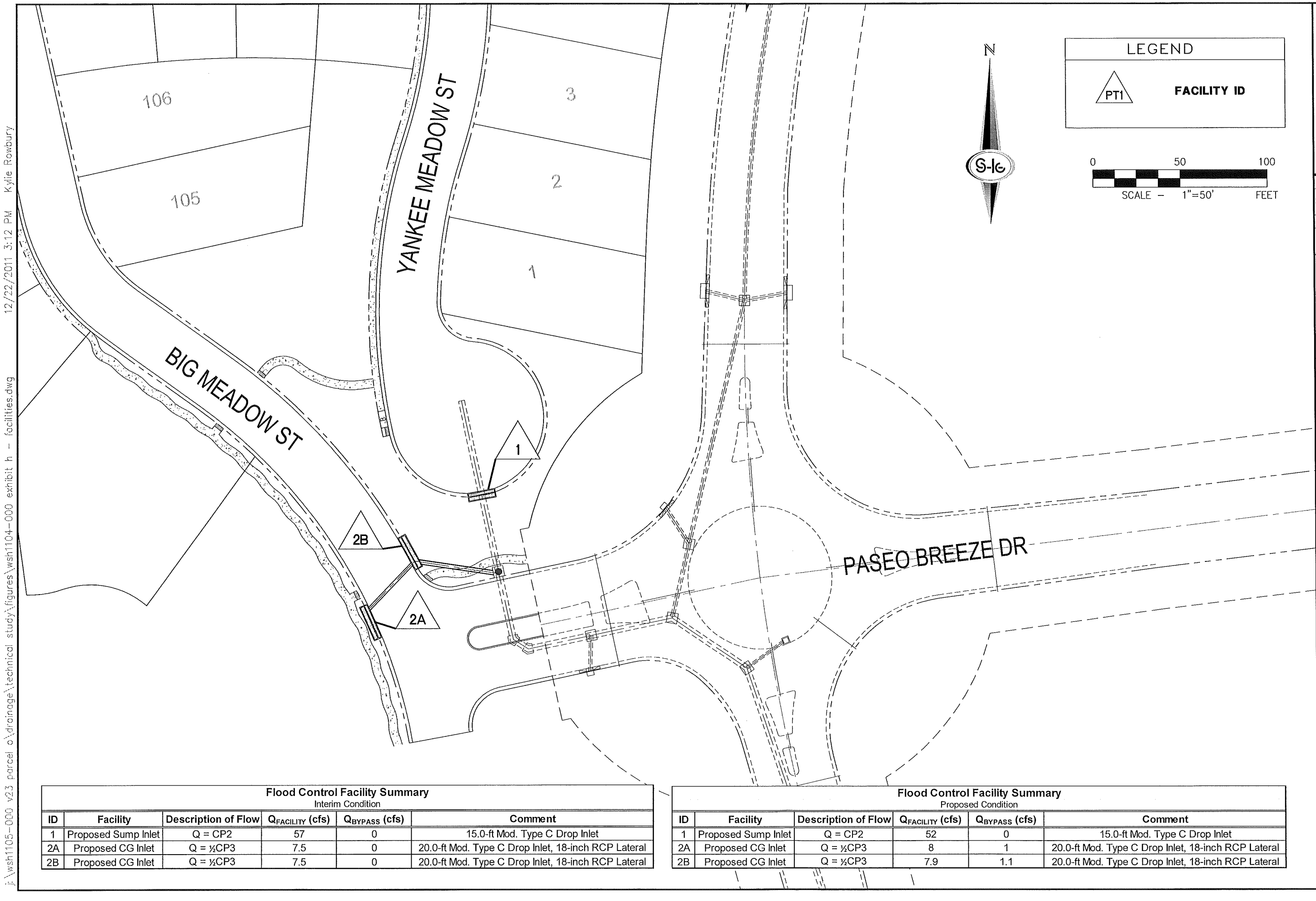
SUMMERLIN VILLAGE 23A PARCEL O
PROPOSED CONDITION DRAINAGE MAP (PHASE 2)

34
20 S
59 E

DATE: JAN 2011
DRAFTER: KCR
DESIGNER: KCR
CHECKED: SMJ
PROJECT NO.
WSH1105.000

EXHIBIT G
SHEET 1 OF 1

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Flood Control Facility Summary
Interim Condition

ID	Facility	Description of Flow	$Q_{FACILITY}$ (cfs)	Q_{BYPASS} (cfs)	Comment
1	Proposed Sump Inlet	Q = CP2	57	0	15.0-ft Mod. Type C Drop Inlet
2A	Proposed CG Inlet	Q = ½CP3	7.5	0	20.0-ft Mod. Type C Drop Inlet, 18-inch RCP Lateral
2B	Proposed CG Inlet	Q = ½CP3	7.5	0	20.0-ft Mod. Type C Drop Inlet, 18-inch RCP Lateral

Flood Control Facility Summary
Proposed Condition

ID	Facility	Description of Flow	$Q_{FACILITY}$ (cfs)	Q_{BYPASS} (cfs)	Comment
1	Proposed Sump Inlet	Q = CP2	52	0	15.0-ft Mod. Type C Drop Inlet
2A	Proposed CG Inlet	Q = ½CP3	8	1	20.0-ft Mod. Type C Drop Inlet, 18-inch RCP Lateral
2B	Proposed CG Inlet	Q = ½CP3	7.9	1.1	20.0-ft Mod. Type C Drop Inlet, 18-inch RCP Lateral

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

WOODSIDE HOMES

SUMMERLIN VILLAGE 23A PARCEL O

FLOOD CONTROL FACILITIES MAP

DATE: 12/22/11
DRAFTER: KCR
DESIGNER: KCR
CHECKED: SMJ
PROJECT NO. WSH1105.000

EXHIBIT H
SHEET 1 OF 1

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APPENDIX B

Precipitation, Curve Number and Lag Time Data

Precipitation Data

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Rainfall and Precipitation Computation

Project Name: Summerlin Village 23A Parcel O
Date: December 2011
File Name: WSH1105 H&H Forms.xls
By: KCR

Data:

Reference:

Project is located in: Township: 20 S. Range: 59 E. Section: 34 — APN Map

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

Rainfall Depth-Duration-Frequency 10-Year, 6-Hour: 1.5 inches — Figure 503*

Rainfall Depth-Duration-Frequency 100-Year, 6-Hour 2.3 inches — Figure 506*

Precipitation Adjustment Ratios:

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

Six Hour Depth Area Reduction Factors (DARF):
Area (gross acres): 21.1 = 0.0329 square miles — Table 502*
DARF = 1.00

Calculations:

P_{10} = 1.86 10-Year Precipitation (in)
P_{100} = 3.29 100-Year Precipitation (in)

P10/P100= 0.57 HEC-1 Multiple Ratio Value

Equations:

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

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

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

NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data deliniated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0 100 200 400 600 800

MAP LEGEND

PARCEL BOUNDARY
SUB BOUNDARY
PM/LD BOUNDARY
ROAD EASEMENT
MATCH / LEADER LINE
HISTORIC LOT LINE
HISTORIC SUB BOUNDARY
HISTORIC PM/LD BOUNDARY
SECTION LINE

CONDOMINIUM UNIT
AIR SPACE PCL
RIGHT OF WAY PCL
SUB-SURFACE PCL

001 ROAD PARCEL NUMBER
001 PARCEL NUMER
1.00 ACREAGE
202 PARCEL SUB/SEQ NUMBER
PB 24-45 PLAT RECORDING NUMBER
5 BLOCK NUMBER
5 LOT NUMBER
GL5 GOV. LOT NUMBER

ASSESSOR'S PARCELS - CLARK CO., NV.
Michele W. Shafe - Assessor

BOOK T20S R59E | SEC. 34 | MAP S 2 NW 4 | 137-34-2

Scale: 1" = 200' | Rev: 07/13/2011

CLARK COUNTY NEVADA

PROJECT SITE

PM 112-94

PT 137-22-000-015

SUMMERLIN VILLAGE 23A UNIT NO.2 AMD
PB 143-47

SUMMERLIN VILLAGE 23A PARCEL L

SUMMERLIN VILLAGE 23A UNIT NO.2
PB 143-47

ANDALUSIA

ALTA DR

FOX HILL DR

HIGH COUNTY LN

HIGHLAND VISTA WY

HIGHLAND BLUFF WY

DESERT SUNSET PL

GREEN SAGE WY

KITE HILL LN

LARGE POD LOT 1

PT LARGE POD LOT 2

PT 137-34-211-091

PT 137-22-000-015

PT 137-34-517-001

PT 137-34-313-001

PT 137-34-312-002

PT 4

PT N

PT 3

PTA

PTB

PTD

PTM

212

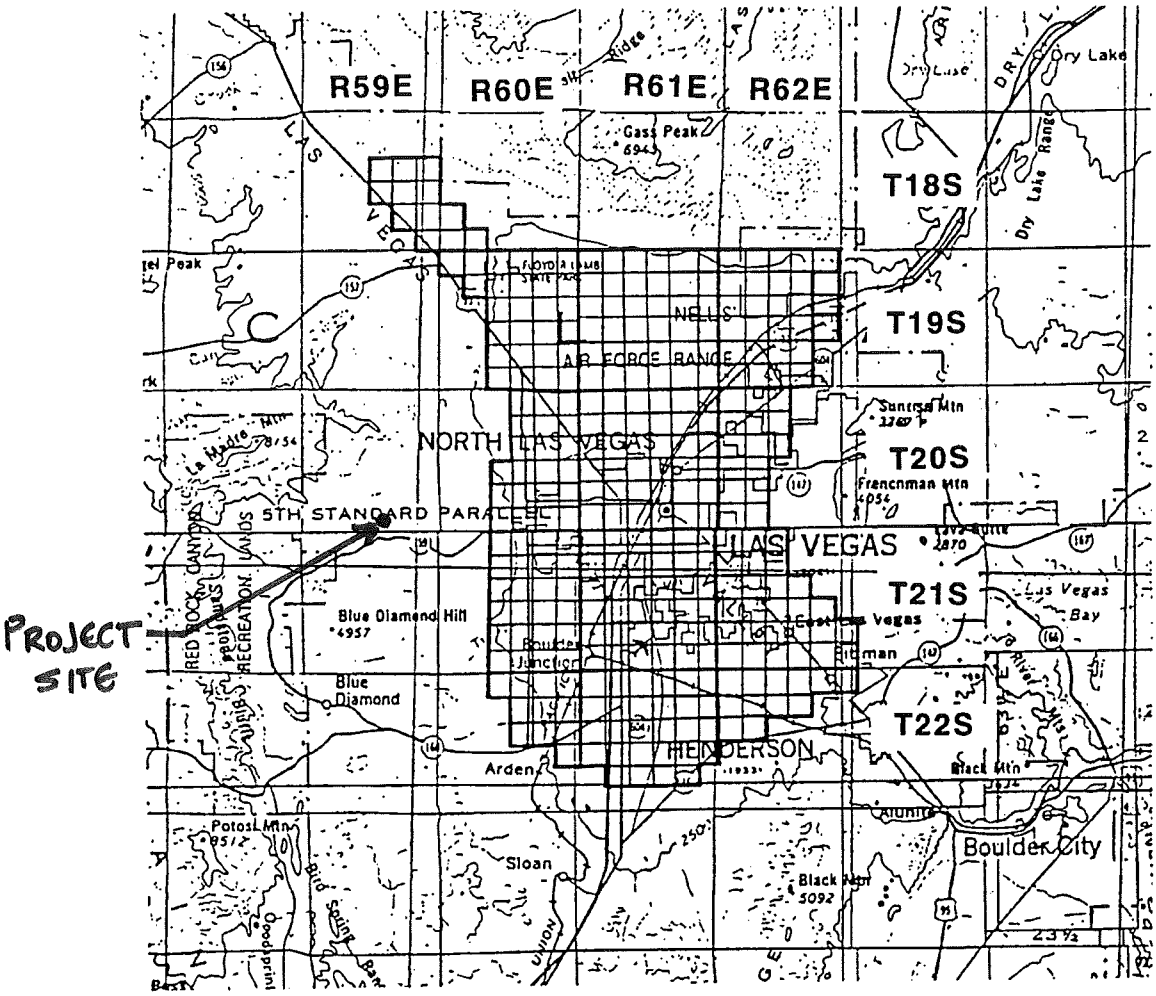
211

621

95-001

TAX DIST 200

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP	RANGE	SECTIONS	TOWNSHIP	RANGE	SECTIONS
18 South	59 East	13-15,22-26,36	20 South	62 East	4-9,16-20,29-32
18 South	60 East	30-32	21 South	60 East	1-4,9-16,21-28,33-36
19 South	60 East	1-6,8-16,21-28,33-36	21 South	61 East	ALL SECTIONS
19 South	61 East	ALL SECTIONS	21 South	62 East	4-9,15-23, 25-36
19 South	62 East	2-11,14-23,27-34	22 South	60 East	1-4,10-15,24
20 South	60 East	1-3,10-15,21-28,33-36	22 South	61 East	1-24,26-29
20 South	61 East	ALL SECTIONS	22 South	62 East	1-10,17-18

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

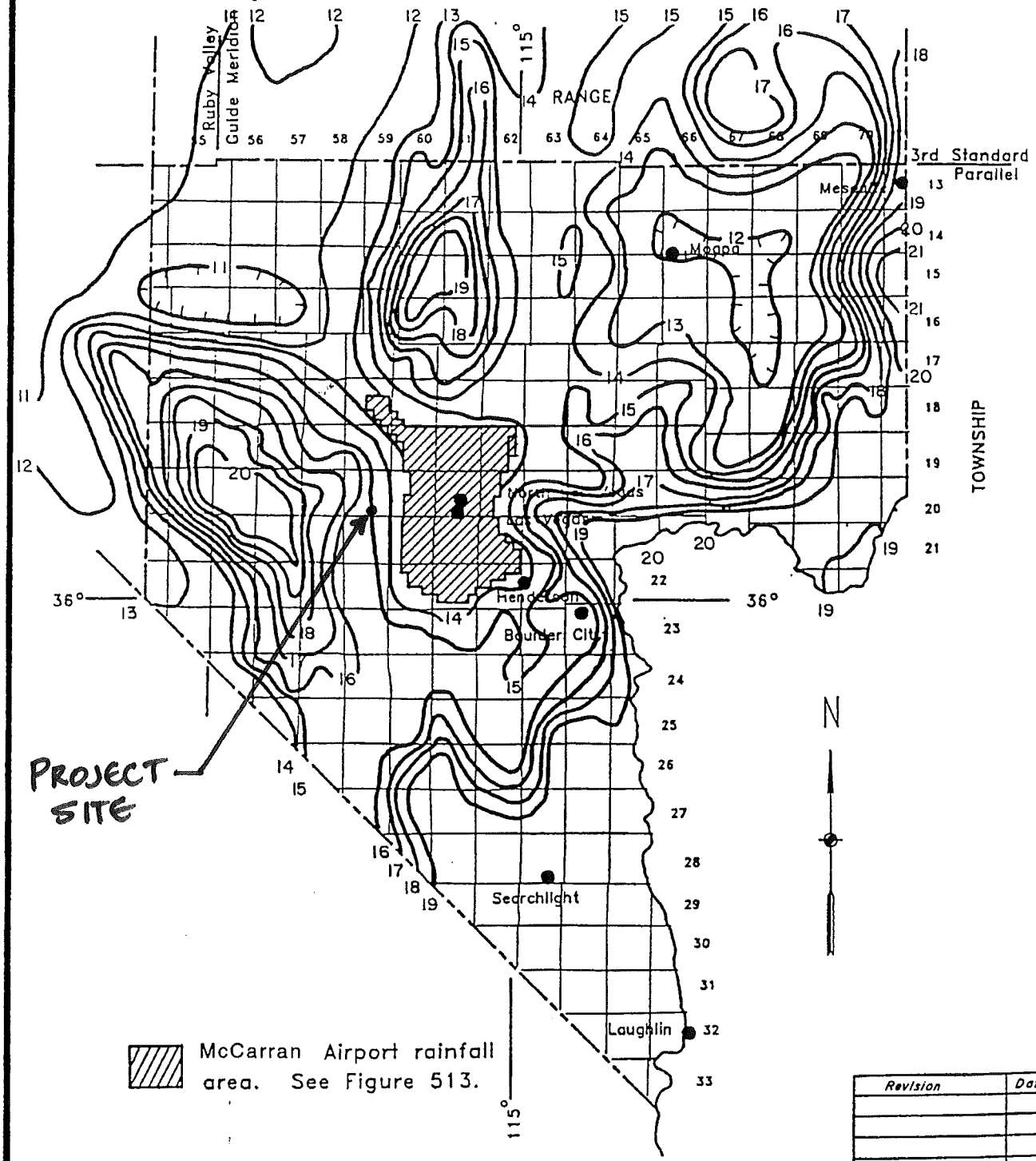
Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

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



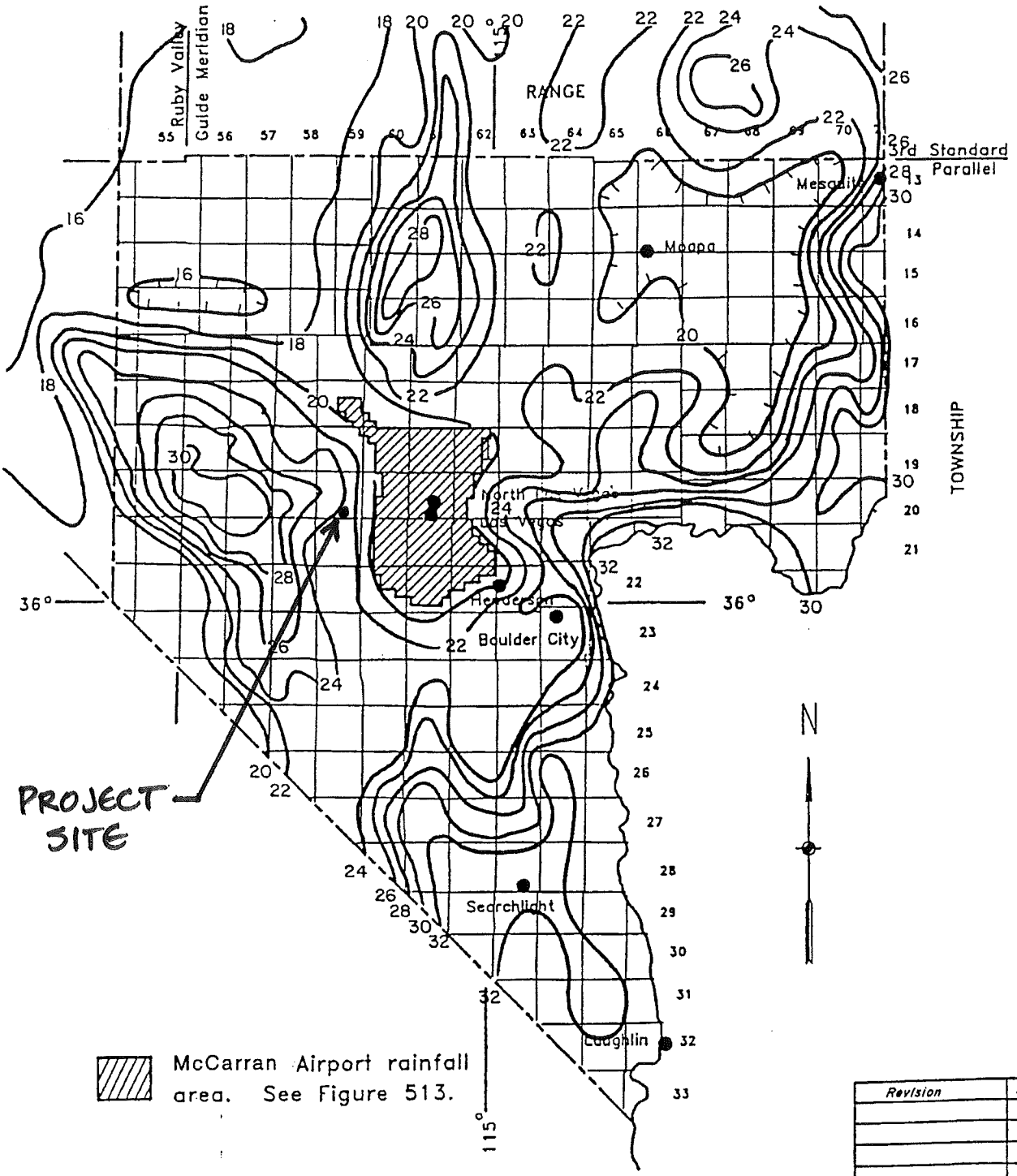
Revision	Date

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	←
25-year	1.33	
50-year	1.39	
100-year	1.43	←

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

SIX HOUR DEPTH-AREA REDUCTION FACTORS

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

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

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

Revision	Date

SIX-HOUR STORM DISTRIBUTIONS

Storm Time (In Minutes)	Percent of Total Storm Depth SDN3	SDN4	SDN5
0	0.0	0.0	0.0
5	2.0	2.0	2.0
10	5.7	5.8	5.9
15	7.0	7.5	8.0
20	8.7	9.9	11.0
25	10.8	12.6	14.4
30	12.4	13.7	15.0
35	13.0	14.5	16.0
40	13.0	14.9	16.8
45	13.0	15.1	17.1
50	13.0	15.5	18.0
55	13.0	15.6	18.2
60	13.0	15.9	18.7
65	13.3	16.2	19.0
70	14.0	16.9	19.7
75	14.2	17.2	20.2
80	14.8	17.9	21.0
85	15.8	18.9	22.0
90	17.2	20.1	23.0
95	18.1	21.1	24.1
100	19.0	22.0	25.0
105	19.7	22.8	25.9
110	19.9	23.2	26.5
115	20.0	24.0	28.0
120	20.1	24.6	29.0
125	20.4	25.2	30.0
130	21.4	26.0	30.5
135	22.9	26.9	30.9
140	24.1	27.6	31.0
145	24.9	28.3	31.7
150	25.1	28.6	32.1
155	25.6	29.2	32.7
160	27.0	30.2	33.3
165	27.8	31.2	34.6
170	28.1	32.1	36.1
175	28.3	33.2	38.1
180	29.5	35.2	40.8
185	32.2	37.6	43.0
190	35.2	41.5	47.7
195	40.9	46.2	51.4
200	49.9	53.0	56.1
205	59.0	61.0	63.0
210	71.0	71.0	71.0
215	74.4	73.2	72.0
220	78.1	75.6	73.1
225	81.2	78.2	75.2
230	81.9	79.9	77.9
235	83.5	81.3	79.0
240	85.1	82.3	79.5
245	85.6	83.0	80.4
250	86.0	83.5	81.0
255	86.8	84.4	82.0
260	87.6	85.1	82.6
265	88.8	86.4	84.0
270	91.0	88.5	85.9
275	92.6	90.8	88.9
280	93.7	92.4	91.0
285	95.0	94.4	93.8
290	97.0	96.8	96.6
295	97.6	97.3	97.0
300	98.2	97.8	97.4
305	98.5	98.2	97.9
310	98.7	98.4	98.1
315	98.9	98.6	98.3
320	99.0	98.8	98.5
325	99.3	99.1	98.9
330	99.3	99.2	99.0
335	99.4	99.3	99.2
340	99.5	99.4	99.3
345	99.8	99.7	99.6
350	99.8	99.8	99.7
355	99.9	99.9	99.9
360	100.0	100.0	100.0

Notes:
1. For drainage areas less than 8 square miles in size, use SDN 3.
2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
4. A graphical representation of these values is presented on **Figure 515**.

Revision	Date

REFERENCE:

TABLE 503

Curve Number Data

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Soil & Curve Number Computation

Project Name: Summerlin Village 23A Parcel O
Date: December 2011
File Name: WSH1105 Composite_CN_Calculation.xlsx
By: KCR

Data:

Reference:

Soil Type & Description		A	B	C	D
155	Cave gravelly fine sandy loam, 4 to 15 percent slopes	5%	5%	0%	90%
502	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	5%	55%	0%	40%

Exhibit G
SCS Soil Data

Land Use	A	B	C	D
Newly Graded	77.0	86.0	91.0	94.0
Residential (6,400 sf)	78.4	85.8	89.6	91.6
Natural Desert Landscaping	63.0	77.0	85.0	88.0

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
RG1	155	97.1%	Newly Graded	5%	5%	0%	90%	77.0	86.0	91.0	94.0	1.35	90.1
	502	2.9%	Newly Graded	5%	55%	0%	40%	77.0	86.0	91.0	94.0	0.04	2.6
TOTAL PERCENT		100.0%									TOTAL AREA	1.39	**92.6**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
RG2	155	100.0%	Newly Graded	5%	5%	0%	90%	77.0	86.0	91.0	94.0	5.32	92.8
TOTAL PERCENT		100.0%									TOTAL AREA	5.32	**92.8**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
RG3	155	100.0%	Newly Graded	5%	5%	0%	90%	77.0	86.0	91.0	94.0	0.51	92.8
TOTAL PERCENT		100.0%									TOTAL AREA	0.51	**92.8**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
PH1-1	155	71.8%	Residential (6,400 sf)	5%	5%	0%	90%	78.4	85.8	89.6	91.6	6.89	65.1
	502	28.2%	Residential (6,400 sf)	5%	55%	0%	40%	78.4	85.8	89.6	91.6	2.71	24.8
TOTAL PERCENT		100.0%									TOTAL AREA	9.60	**89.8**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
PH1-2	155	100.0%	Natural Desert Landscaping	5%	5%	0%	90%	63.0	77.0	85.0	88.0	0.38	86.2
TOTAL PERCENT		100.0%									TOTAL AREA	0.38	**86.2**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
PH1-3	155	100.0%	Residential (6,400 sf)	5%	5%	0%	90%	78.4	85.8	89.6	91.6	4.01	90.7
TOTAL PERCENT		100.0%									TOTAL AREA	4.01	**90.7**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
PH2-1	155	98.8%	Residential (6,400 sf)	5%	5%	0%	90%	78.4	85.8	89.6	91.6	3.25	89.5
	502	1.2%	Residential (6,400 sf)	5%	55%	0%	40%	78.4	85.8	89.6	91.6	0.04	1.1
TOTAL PERCENT		100.0%									TOTAL AREA	3.29	**90.6**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
PH2-2	155	100.0%	Residential (6,400 sf)	5%	5%	0%	90%	78.4	85.8	89.6	91.6	1.30	90.7
TOTAL PERCENT		100.0%									TOTAL AREA	1.30	**90.7**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
PH2-3	155	100.0%	Residential (6,400 sf)	5%	5%	0%	90%	78.4	85.8	89.6	91.6	1.95	90.7
TOTAL PERCENT		100.0%									TOTAL AREA	1.95	**90.7**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
PH2-4	155	100.0%	Natural Desert Landscaping	5%	5%	0%	90%	63.0	77.0	85.0	88.0	0.19	86.2
TOTAL PERCENT		100.0%									TOTAL AREA	0.19	**86.2**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
PH2-5	155	100.0%	Residential (6,400 sf)	5%	5%	0%	90%	78.4	85.8	89.6	91.6	0.49	90.7
TOTAL PERCENT		100.0%									TOTAL AREA	0.49	**90.7**

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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 - 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
6,400 sq ft LOTS		78.4	85.8	89.6	91.6
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.

AVERAGE LOT SIZE = 6,400 SF => INTERPOLATE BETWEEN 6000 & 7000 SF LOTS

Revision	Date

REFERENCE:

TABLE 602A

Lag Time Data

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Project Name: Summerlin Village 23A Parcel O
Description: Hydrologic Conditions
File Name: WSH1105 H&H Forms.xls
By: KCR
Date: December 2011

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check Urbanized Basins		Tlag
DESIG:	DEV./EX. (D or E)	CN	K [1]	AREA Ac	AREA Mi^2 [2]	INITIAL LENGTH Feet	SLOPE %	Ti Min [3]	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS [4]	V2 VELOCITY FPS [5]	Tt Min [6]	Tc Calc. [7]	Total Length Feet [8]	Tc Check [9]	Tlag Hours [10]
RG1	D	92.6	0.832	1.39	0.0022	100	1.00	4.82	370	6.00	4.95	7.50	1.25	6.06	470	12.611	0.061
RG2	D	92.8	0.835	5.32	0.0083	100	1.00	4.77	580	6.00	4.95	7.50	1.86	6.63	680	13.778	0.066
RG3	D	92.8	0.835	0.51	0.0008	100	1.00	4.77	270	6.00	4.95	7.50	0.91	5.68	370	12.056	0.057
PH1-1	D	89.8	0.795	9.60	0.0150	100	1.00	5.48	1055	3.00	3.50	5.30	4.13	9.61	1155	16.417	0.096
PH1-2	D	86.2	0.748	0.38	0.0006	60	4.90	2.89	270	5.00	4.52	6.84	1.00	3.89	330	11.833	0.050
PH1-3	D	90.7	0.807	4.01	0.0063	100	1.00	5.27	1110	4.50	4.29	6.49	3.51	8.78	1210	16.722	0.088
PH2-1	D	90.6	0.806	3.29	0.0051	100	1.00	5.29	510	4.80	4.43	6.70	1.91	7.20	610	13.389	0.072
PH2-2	D	90.7	0.808	1.30	0.0020	100	1.00	5.26	390	3.00	3.50	5.30	1.86	7.12	490	12.722	0.071
PH2-3	D	90.7	0.807	1.95	0.0030	100	1.00	5.27	315	5.00	4.52	6.84	1.16	6.43	415	12.306	0.064
PH2-4	D	86.2	0.748	0.19	0.0003	30	4.90	2.04	210	2.50	3.19	4.84	1.10	3.14	240	11.333	0.050
PH2-5	D	90.7	0.807	0.49	0.0008	100	1.00	5.27	105	1.10	2.12	3.21	0.83	6.10	205	11.139	0.061

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

REFERENCE :

STANDARD FORM 4

APPENDIX C

HEC-1 Analyses

Interim Condition

```
1****************************************
****************************************
 *                                      *                                      *
 *                                      *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                      *    U.S. ARMY CORPS OF ENGINEERS
 *                                      *                                      *
 *              JUN   1998              *                                      *    HYDROLOGIC ENGINEERING CENTER
 *                                      *                                      *
 *           VERSION 4.1                *                                      *         609 SECOND STREET
 *                                      *                                      *
 *                                      *                                      *        DAVIS, CALIFORNIA 95616
 *                                      *                                      *
 *  RUN DATE   21DEC11  TIME  10:36:26  *                                      *           (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


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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     SUMMERLIN VILLAGE 23A PARCEL O
    3         ID     INTERIM DRAINAGE CONDITION
    4         ID
    5         ID     RETURN PERIOD ------- 100 AND 10-YEAR
    6         ID     DISTRIBUTION -------- 6-HOUR SDN3
    7         ID     PROJECT NO. ---------- WSH1105.000
    8         ID     FILENAME ------------ PO_RG.H1
    9         ID     DATE ---------------- 12/21/2011
   10         ID     MODELED BY ---------- KCR
   11         ID
   12         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   13         ID        DRAINAGE AREA (MI^2)    DARF
   14         ID        100-YEAR                1.00
   15         ID         10-YEAR                0.57
   16         ID
   17         IT       5       0       0     300
   18         IO       5       0       0
   19         IN       5       0       0
   20         JR    PREC    1.00    0.57
              *

   21         KK     RG2
   22         KM   ONSITE ROUGH GRADED BASIN RG2
   23         BA   .0083
   24         PB    3.29
   25         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   26         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   27         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   28         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   29         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   30         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   31         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   32         PC   0.998   0.999   1.000
   33         LS       0    92.8
   34         UD   0.066
              *

   35         KK     RG1
   36         KM   ONSITE ROUGH GRADED BASIN RG1
   37         BA   .0022
   38         LS       0    92.6
   39         UD   0.061
              *

   40         KK   PH1-1
   41         KM   ONSITE PROPOSED PHASE 1 BASIN PH1-1
```

```
          42           BA   .0150
          43           LS      0    89.8
          44           UD   0.096
                       *
1                                                HEC-1 INPUT                                                PAGE  2

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

          45           KK   PH1-2
          46           KM   ONSITE PROPOSED PHASE 1 BASIN PH1-2
          47           BA   .0006
          48           LS      0    86.2
          49           UD   0.050
                       *

          50           KK     CP2
          51           KM   COMBINE RG2, RG1, PH1-1 & PH1-2
          52           KM   FLOW TO LOW POINT AT SOUTHEAST CORNER OF SITE
          53           HC      4
                       *

          54           KK     RG3
          55           KM   ONSITE ROUGH GRADED BASIN RG3
          56           BA   .0008
          57           LS      0    92.8
          58           UD   0.057
                       *

          59           KK   PH1-3
          60           KM   ONSITE PROPOSED PHASE 1 BASIN PH1-3
          61           BA   .0063
          62           LS      0    90.7
          63           UD   0.088
                       *

          64           KK     CP3
          65           KM   COMBINE RG3 & PH1-3
          66           KM   SURFACE FLOW IN ENTRY ROAD
          67           HC      2
                       *

          68           KK     CP4
          69           KM   COMBINE CP2 & CP3
          70           KM   TOTAL FLOW GENERATED BY SITE
          71           HC      2
                       *
          72           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    21          RG2
                  .
                  .
    35            .          RG1
                  .            .
                  .            .
    40            .            .       PH1-1
                  .            .            .
                  .            .            .
    45            .            .            .       PH1-2
                  .            .            .            .
                  .            .            .            .
    50          CP2.....................................
                  .
                  .
    54            .          RG3
                  .            .
                  .            .
    59            .            .       PH1-3
                  .            .            .
                  .            .            .
    64            .          CP3.............
                  .            .
                  .            .
    68          CP4.............

  (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
**************************************
 *                                    *                                        *
 *                                    *                                        *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                     *    U.S. ARMY CORPS OF ENGINEERS
 *                                    *                                        *
 *               JUN   1998           *                                        *    HYDROLOGIC ENGINEERING CENTER
 *                                    *                                        *
 *            VERSION 4.1             *                                        *         609 SECOND STREET
 *                                    *                                        *
 *                                    *                                        *      DAVIS, CALIFORNIA 95616
 *
```

```
 *  RUN DATE   21DEC11  TIME  10:36:26   *                                    *          (916) 756-1104
*                                                                             *
 *                                       *                                    *
*
 ****************************************
****************************************
```

SLATER HANIFAN GROUP
SUMMERLIN VILLAGE 23A PARCEL O
INTERIM DRAINAGE CONDITION

RETURN PERIOD ------- 100 AND 10-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. ---------- WSH1105.000
FILENAME ------------ PO_RG.H1
DATE ---------------- 12/21/2011
MODELED BY ---------- KCR

SIX HOUR DEPTH-AREA REDUCTION FACTORS

DRAINAGE AREA (MI^2)	DARF
100-YEAR	1.00
10-YEAR	0.57

18 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .57

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .57
HYDROGRAPH AT						
+	RG2	.01	1	FLOW	20.	10.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	RG1	.00	1	FLOW	5.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	PH1-1	.01	1	FLOW	30.	14.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	PH1-2	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP2	.03	1	FLOW	57.	27.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	RG3	.00	1	FLOW	2.	1.
				TIME	3.50	3.50

HYDROGRAPH AT						
+	PH1-3	.01	1	FLOW	13.	6.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP3	.01	1	FLOW	15.	7.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP4	.03	1	FLOW	72.	34.
				TIME	3.50	3.50

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

Proposed Condition

```
1****************************************
****************************************
 *                                      *                                      *
 *                                      *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                      *    U.S. ARMY CORPS OF ENGINEERS
 *                                      *                                      *
 *               JUN   1998             *                                      *    HYDROLOGIC ENGINEERING CENTER
 *                                      *                                      *
 *            VERSION 4.1               *                                      *         609 SECOND STREET
 *                                      *                                      *
 *                                      *                                      *       DAVIS, CALIFORNIA 95616
 *                                      *                                      *
 *  RUN DATE   21DEC11  TIME  10:36:18  *                                      *           (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


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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     SUMMERLIN VILLAGE 23A PARCEL O
    3         ID     PROPOSED DRAINAGE CONDITION
    4         ID
    5         ID     RETURN PERIOD ------- 100 AND 10-YEAR
    6         ID     DISTRIBUTION -------- 6-HOUR SDN3
    7         ID     PROJECT NO. ---------- WSH1105.000
    8         ID     FILENAME ------------ PO_PR.H1
    9         ID     DATE ---------------- 12/02/2011
   10         ID     MODELED BY ---------- KCR
   11         ID
   12         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   13         ID        DRAINAGE AREA (MI^2)     DARF
   14         ID        100-YEAR                 1.00
   15         ID         10-YEAR                 0.57
   16         ID
   17         IT       5       0       0     300
   18         IO       5       0       0
   19         IN       5       0       0
   20         JR    PREC    1.00    0.57
              *
   21         KK   PH2-4
   22         KM   ONSITE PROPOSED PHASE 2 BASIN PH2-4
   23         BA   .0003
   24         PB    3.29
   25         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   26         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   27         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   28         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   29         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   30         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   31         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   32         PC   0.998   0.999   1.000
   33         LS       0    86.2
   34         UD   0.050
              *
   35         KK   PH2-3
   36         KM   ONSITE PROPOSED PHASE 2 BASIN PH2-3
   37         BA   .0030
   38         LS       0    90.7
   39         UD   0.064
              *
   40         KK     CP1
   41         KM   COMBINE PH2-4 & PH2-3
```

```
          42          KM   FLOW FROM WEST CULDESAC & NORTH LINEAR PARK TO EAST CULDESAC
          43          HC       2
                      *
1                                                  HEC-1 INPUT                                                  PAGE  2

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

          44          KK   PH2-1
          45          KM   ONSITE PROPOSED PHASE 2 BASIN PH2-1
          46          BA   .0051
          47          LS       0    90.6
          48          UD   0.072
                      *

          49          KK   PH1-1
          50          KM   ONSITE PROPOSED PHASE 1 BASIN PH1-1
          51          BA   .0150
          52          LS       0    89.8
          53          UD   0.096
                      *

          54          KK   PH2-5
          55          KM   ONSITE PROPOSED PHASE 2 BASIN PH2-5
          56          BA   .0008
          57          LS       0    90.7
          58          UD   0.061
                      *

          59          KK   PH1-2
          60          KM   ONSITE PROPOSED PHASE 1 BASIN PH1-2
          61          BA   .0006
          62          LS       0    86.2
          63          UD   0.050
                      *

          64          KK     CP2
          65          KM   COMBINE CP1, PH2-1, PH1-1, PH2-5 & PH1-2
          66          KM   FLOW TO LOW POINT AT SOUTHEAST CORNER OF SITE
          67          HC       5
                      *

          68          KK   PH2-2
          69          KM   ONSITE PROPOSED PHASE 2 BASIN PH2-2
          70          BA   .0020
          71          LS       0    90.7
          72          UD   0.071
                      *

          73          KK   PH1-3
          74          KM   ONSITE PROPOSED PHASE 1 BASIN PH1-3
          75          BA   .0063
          76          LS       0    90.7
          77          UD   0.088
                      *

          78          KK     CP3
          79          KM   COMBINE PH2-2 & PH1-3
          80          KM   SURFACE FLOW IN ENTRY ROAD
          81          HC       2
                      *
1                                                  HEC-1 INPUT                                                  PAGE  3

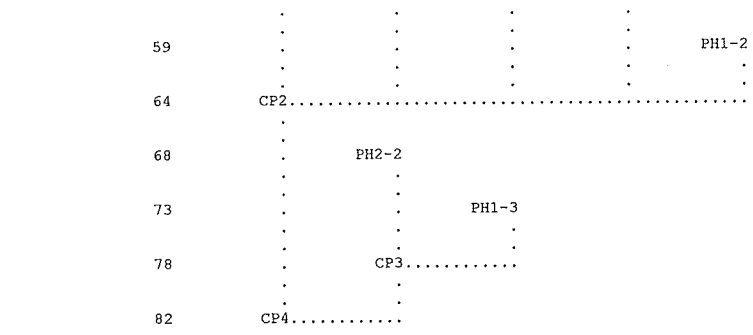
        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          82          KK     CP4
          83          KM   COMBINE CP2 & CP3
          84          KM   TOTAL FLOW GENERATED BY SITE
          85          HC       2
                      *
          86          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    21       PH2-4
                 .
                 .
    35           .       PH2-3
                 .           .
                 .           .
    40         CP1............
                 .
                 .
    44           .       PH2-1
                 .           .
                 .           .
    49           .           .       PH1-1
                 .           .           .
                 .           .           .
    54           .           .           .       PH2-5
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
**************************************
 *                                    *                                    *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                    *    U.S. ARMY CORPS OF ENGINEERS
*
 *               JUN   1998             *                                    *    HYDROLOGIC ENGINEERING CENTER
*
 *            VERSION 4.1               *                                    *         609 SECOND STREET
*
 *                                      *                                    *       DAVIS, CALIFORNIA 95616
*
 *  RUN DATE   21DEC11  TIME  10:36:18  *                                    *           (916) 756-1104
*
 *                                      *                                    *
*
 ****************************************
**************************************
```

SLATER HANIFAN GROUP
SUMMERLIN VILLAGE 23A PARCEL O
PROPOSED DRAINAGE CONDITION

RETURN PERIOD ------- 100 AND 10-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- WSH1105.000
FILENAME ------------ PO_PR.H1
DATE ---------------- 12/02/2011
MODELED BY ---------- KCR

SIX HOUR DEPTH-AREA REDUCTION FACTORS

DRAINAGE AREA (MI^2)	DARF
100-YEAR	1.00
10-YEAR	0.57

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

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

                    COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE   24.92 HOURS

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

      JP           MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

      JR           MULTI-RATIO OPTION
                       RATIOS OF PRECIPITATION
                     1.00       .57
1
                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
```

FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .57
HYDROGRAPH AT	PH2-4	.00	1	FLOW	1.	0.
+				TIME	3.50	3.50
HYDROGRAPH AT	PH2-3	.00	1	FLOW	7.	3.
+				TIME	3.50	3.50
2 COMBINED AT	CP1	.00	1	FLOW	8.	4.
+				TIME	3.50	3.50
HYDROGRAPH AT	PH2-1	.01	1	FLOW	11.	5.
+				TIME	3.50	3.50
HYDROGRAPH AT	PH1-1	.01	1	FLOW	30.	14.
+				TIME	3.50	3.50
HYDROGRAPH AT	PH2-5	.00	1	FLOW	2.	1.
+				TIME	3.50	3.50
HYDROGRAPH AT	PH1-2	.00	1	FLOW	1.	1.
+				TIME	3.50	3.50
5 COMBINED AT	CP2	.02	1	FLOW	52.	24.
+				TIME	3.50	3.50
HYDROGRAPH AT	PH2-2	.00	1	FLOW	4.	2.
+				TIME	3.50	3.50
HYDROGRAPH AT	PH1-3	.01	1	FLOW	13.	6.
+				TIME	3.50	3.50
2 COMBINED AT	CP3	.01	1	FLOW	18.	8.
+				TIME	3.50	3.50
2 COMBINED AT	CP4	.03	1	FLOW	70.	32.
+				TIME	3.50	3.50

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

APPENDIX D

Flowmaster Hydraulic Computations

Street Flow

SECTION 1 (Interim)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 1 (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	3.00	%
Discharge	57	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.56	ft
Elevation Range	0.00 to 0.58	
Flow Area	9.2	ft²
Wetted Perimeter	41.24	ft
Top Width	40.12	ft
Actual Depth	0.56	ft
Critical Elevation	0.73	ft
Critical Slope	0.48	%
Velocity	6.22	ft/s
Velocity Head	0.60	ft
Specific Energy	1.16	ft
Froude Number	2.29	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.62449715e-1 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+39.00	0.016
0+39.00	0+41.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50
0+39.00	0.17

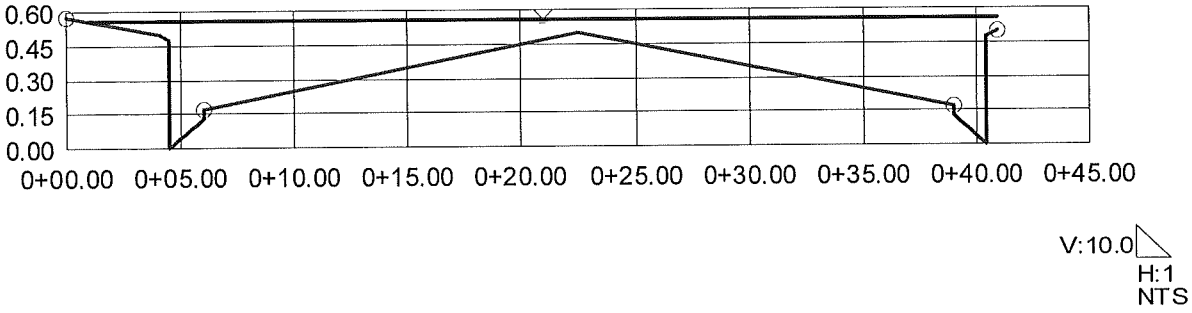
SECTION 1 (Interim)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

SECTION 1 (Interim)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 1 (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	3.00	%
Water Surface Elevation	0.56	ft
Elevation Range	0.00 to 0.58	
Discharge	57	cfs



SECTION 2 (Interim)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 2 (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	4.00	%
Discharge	9	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.33	ft
Elevation Range	0.00 to 0.58	
Flow Area	2.1	ft²
Wetted Perimeter	19.87	ft
Top Width	19.11	ft
Actual Depth	0.33	ft
Critical Elevation	0.42	ft
Critical Slope	0.69	%
Velocity	4.29	ft/s
Velocity Head	0.29	ft
Specific Energy	0.62	ft
Froude Number	2.29	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+39.00	0.016
0+39.00	0+41.00	0.013

Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50
0+39.00	0.17

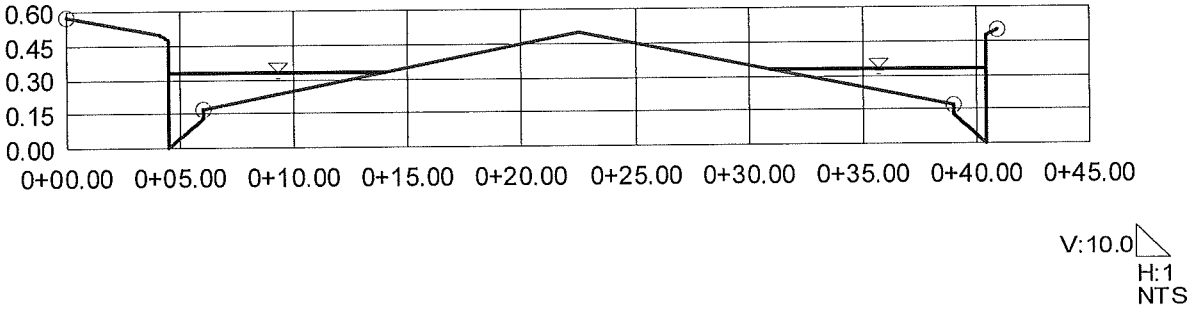
SECTION 2 (Interim)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

SECTION 2 (Interim)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 2 (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	4.00	%
Water Surface Elevation	0.33	ft
Elevation Range	0.00 to 0.58	
Discharge	9	cfs



SECTION 3 (Interim)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 3 (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	4.00	%
Discharge	26	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.014	
Water Surface Elevation	0.43	ft
Elevation Range	0.00 to 0.58	
Flow Area	4.4	ft²
Wetted Perimeter	29.59	ft
Top Width	28.64	ft
Actual Depth	0.43	ft
Critical Elevation	0.57	ft
Critical Slope	0.48	%
Velocity	5.95	ft/s
Velocity Head	0.55	ft
Specific Energy	0.98	ft
Froude Number	2.68	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+39.00	0.016
0+39.00	0+41.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50
0+39.00	0.17

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Slater Hanifan Group
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

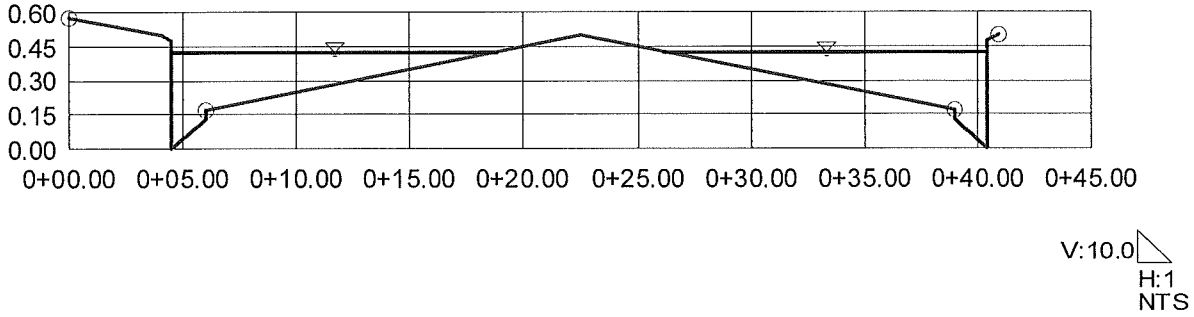
SECTION 3 (Interim)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

SECTION 3 (Interim)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 3 (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.014	
Channel Slope	4.00	%
Water Surface Elevation	0.43	ft
Elevation Range	0.00 to 0.58	
Discharge	26	cfs



SECTION 4 (Interim)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 4 (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	4.80	%
Discharge	10	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.33	ft
Elevation Range	0.00 to 0.58	
Flow Area	2.1	ft²
Wetted Perimeter	19.99	ft
Top Width	19.23	ft
Actual Depth	0.33	ft
Critical Elevation	0.43	ft
Critical Slope	0.68	%
Velocity	4.72	ft/s
Velocity Head	0.35	ft
Specific Energy	0.68	ft
Froude Number	2.51	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+39.00	0.016
0+39.00	0+41.00	0.013

Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50
0+39.00	0.17

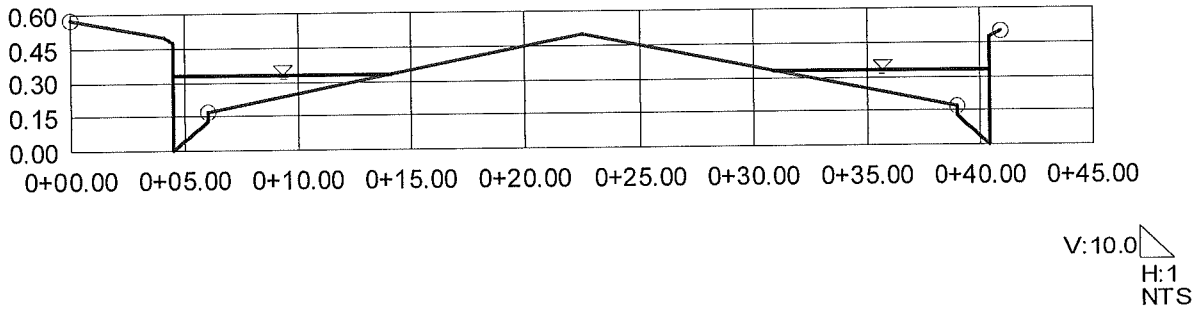
SECTION 4 (Interim)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

SECTION 4 (Interim)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 4 (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	4.80	%
Water Surface Elevation	0.33	ft
Elevation Range	0.00 to 0.58	
Discharge	10	cfs



SECTION 5W (Interim)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 5W (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.85	%
Discharge	8	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	0.38	ft
Elevation Range	0.00 to 0.58	
Flow Area	1.6	ft²
Wetted Perimeter	12.49	ft
Top Width	12.06	ft
Actual Depth	0.38	ft
Critical Elevation	0.49	ft
Critical Slope	0.49	%
Velocity	4.72	ft/s
Velocity Head	0.35	ft
Specific Energy	0.73	ft
Froude Number	2.29	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+22.50	0.016

Natural Channel Points

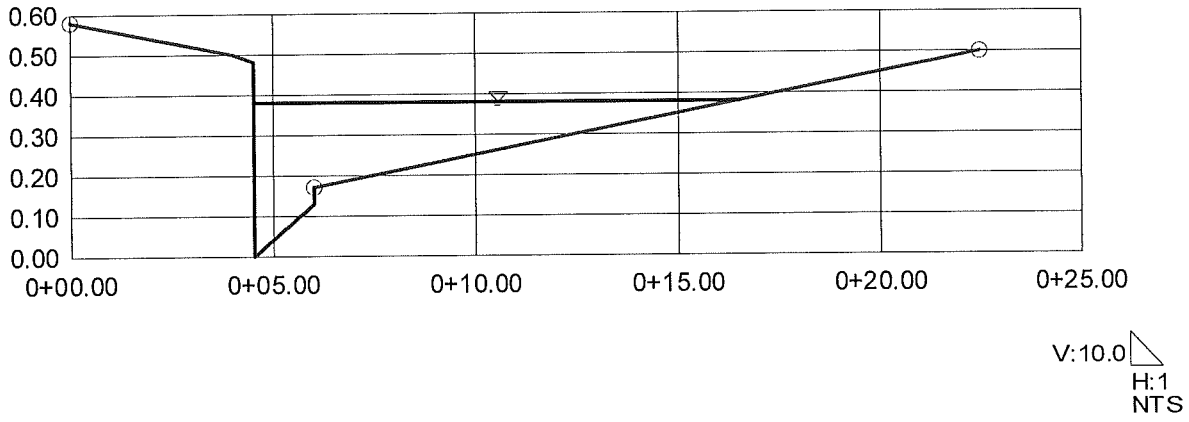
Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50

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SECTION 5W (Interim)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 5W (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	2.85 %
Water Surface Elevation	0.38 ft
Elevation Range	0.00 to 0.58
Discharge	8 cfs



SECTION 5E (Interim)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 5E (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	3.25	%
Discharge	8	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	0.37	ft
Elevation Range	0.00 to 0.58	
Flow Area	1.5	ft²
Wetted Perimeter	12.12	ft
Top Width	11.70	ft
Actual Depth	0.37	ft
Critical Elevation	0.49	ft
Critical Slope	0.48	%
Velocity	4.99	ft/s
Velocity Head	0.39	ft
Specific Energy	0.76	ft
Froude Number	2.45	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+22.50	0.016

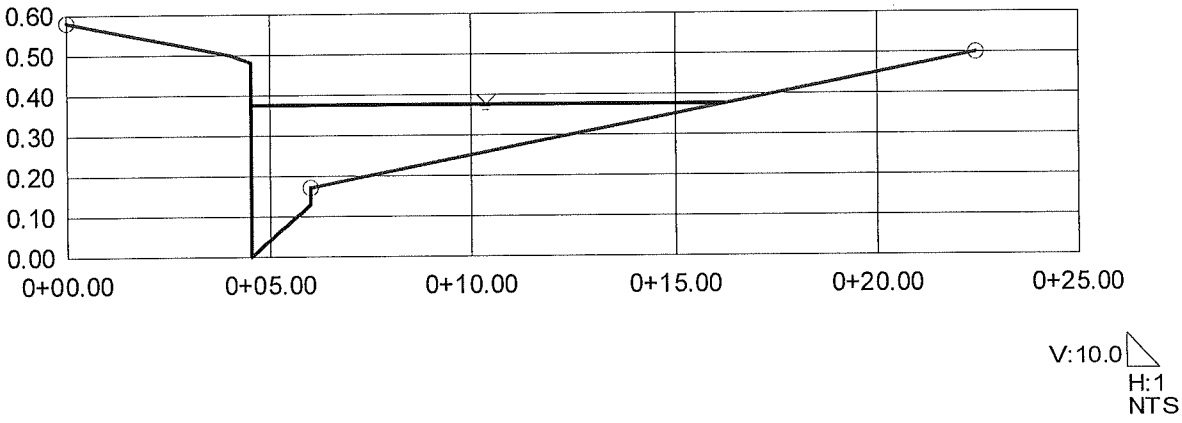
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50

SECTION 5E (Interim)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 5E (Interim)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	3.25	%
Water Surface Elevation	0.37	ft
Elevation Range	0.00 to 0.58	
Discharge	8	cfs



SECTION 1 (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 1 (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	3.00	%
Discharge	52	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.55	ft
Elevation Range	0.00 to 0.58	
Flow Area	8.6	ft²
Wetted Perimeter	40.55	ft
Top Width	39.44	ft
Actual Depth	0.55	ft
Critical Elevation	0.71	ft
Critical Slope	0.49	%
Velocity	6.03	ft/s
Velocity Head	0.56	ft
Specific Energy	1.11	ft
Froude Number	2.27	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.04878770 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+39.00	0.016
0+39.00	0+41.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50
0+39.00	0.17

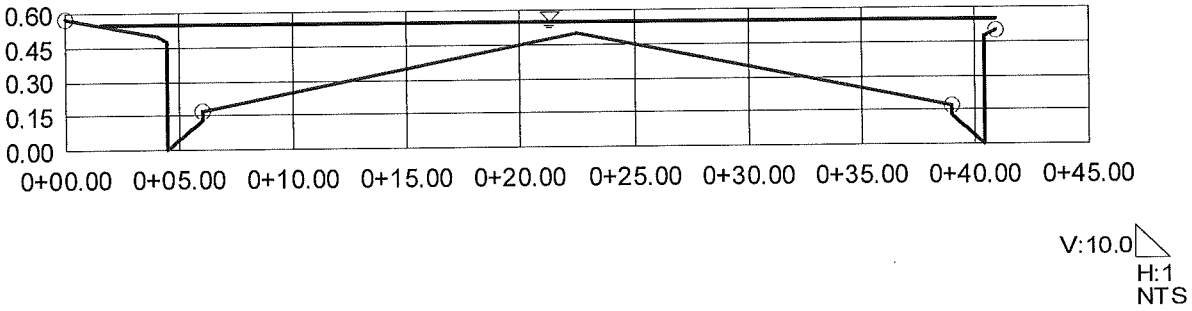
SECTION 1 (Proposed)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

SECTION 1 (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 1 (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	3.00 %
Water Surface Elevation	0.55 ft
Elevation Range	0.00 to 0.58
Discharge	52 cfs



SECTION 2 (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 2 (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	4.00	%
Discharge	11	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.35	ft
Elevation Range	0.00 to 0.58	
Flow Area	2.5	ft²
Wetted Perimeter	21.69	ft
Top Width	20.89	ft
Actual Depth	0.35	ft
Critical Elevation	0.44	ft
Critical Slope	0.67	%
Velocity	4.48	ft/s
Velocity Head	0.31	ft
Specific Energy	0.66	ft
Froude Number	2.31	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+39.00	0.016
0+39.00	0+41.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50
0+39.00	0.17

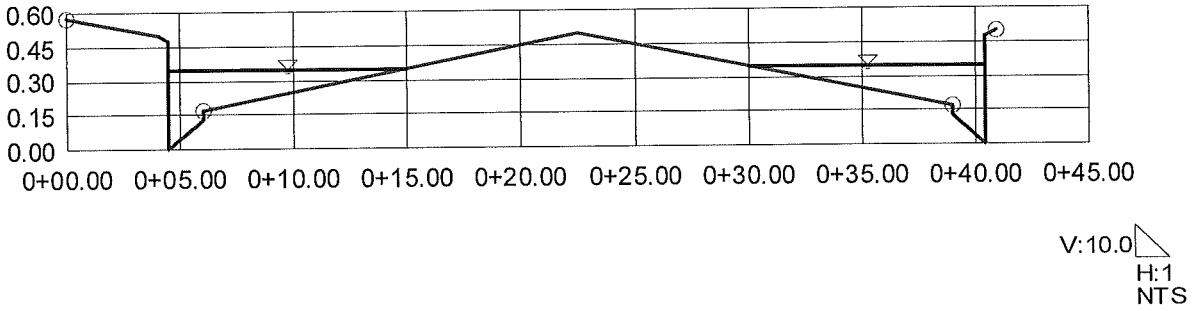
SECTION 2 (Proposed)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

SECTION 2 (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 2 (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	4.00 %
Water Surface Elevation	0.35 ft
Elevation Range	0.00 to 0.58
Discharge	11 cfs



SECTION 3 (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 3 (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	4.00	%
Discharge	14	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	0.36	ft
Elevation Range	0.00 to 0.58	
Flow Area	2.6	ft²
Wetted Perimeter	22.35	ft
Top Width	21.54	ft
Actual Depth	0.36	ft
Critical Elevation	0.48	ft
Critical Slope	0.46	%
Velocity	5.40	ft/s
Velocity Head	0.45	ft
Specific Energy	0.81	ft
Froude Number	2.75	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+39.00	0.016
0+39.00	0+41.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50
0+39.00	0.17

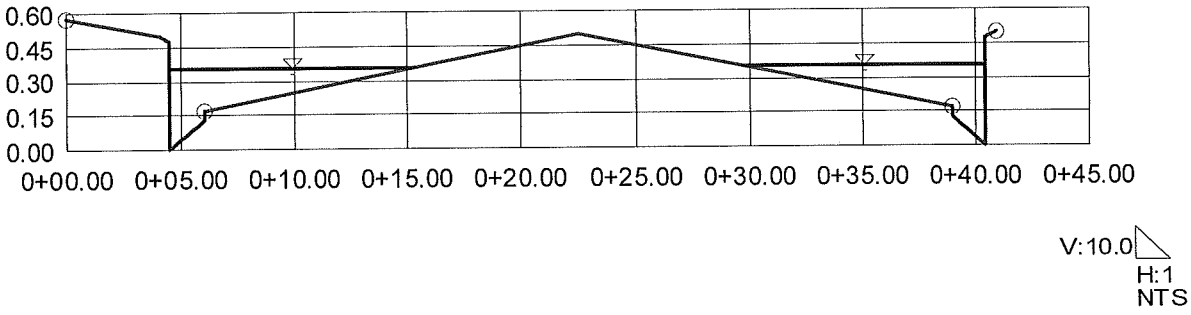
SECTION 3 (Proposed)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

SECTION 3 (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 3 (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	4.00	%
Water Surface Elevation	0.36	ft
Elevation Range	0.00 to 0.58	
Discharge	14	cfs



SECTION 4 (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 4 (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	4.80	%
Discharge	16	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	0.36	ft
Elevation Range	0.00 to 0.58	
Flow Area	2.7	ft²
Wetted Perimeter	22.80	ft
Top Width	21.99	ft
Actual Depth	0.36	ft
Critical Elevation	0.50	ft
Critical Slope	0.46	%
Velocity	5.95	ft/s
Velocity Head	0.55	ft
Specific Energy	0.91	ft
Froude Number	3.00	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+39.00	0.016
0+39.00	0+41.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50
0+39.00	0.17

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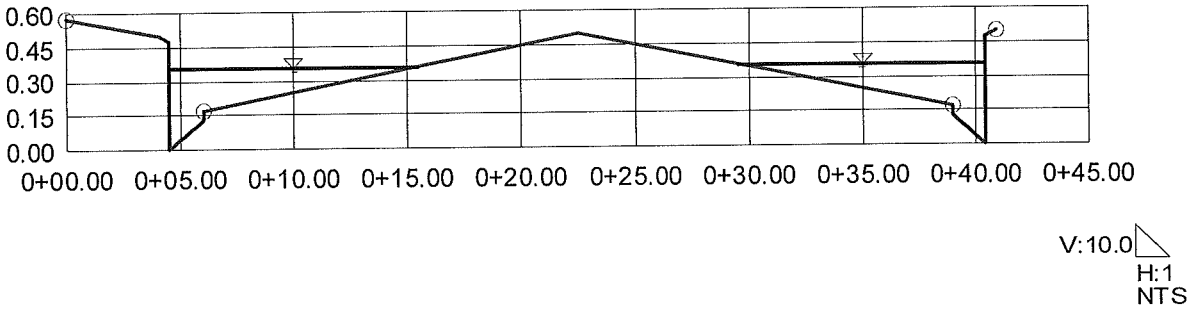
SECTION 4 (Proposed)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.00	0.13
0+40.50	0.00
0+40.50	0.48
0+41.00	0.50

SECTION 4 (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 4 (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	4.80	%
Water Surface Elevation	0.36	ft
Elevation Range	0.00 to 0.58	
Discharge	16	cfs



SECTION 5W (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 5W (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.85	%
Discharge	9	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.014	
Water Surface Elevation	0.40	ft
Elevation Range	0.00 to 0.58	
Flow Area	1.9	ft²
Wetted Perimeter	13.56	ft
Top Width	13.11	ft
Actual Depth	0.40	ft
Critical Elevation	0.51	ft
Critical Slope	0.49	%
Velocity	4.86	ft/s
Velocity Head	0.37	ft
Specific Energy	0.77	ft
Froude Number	2.28	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+22.50	0.016

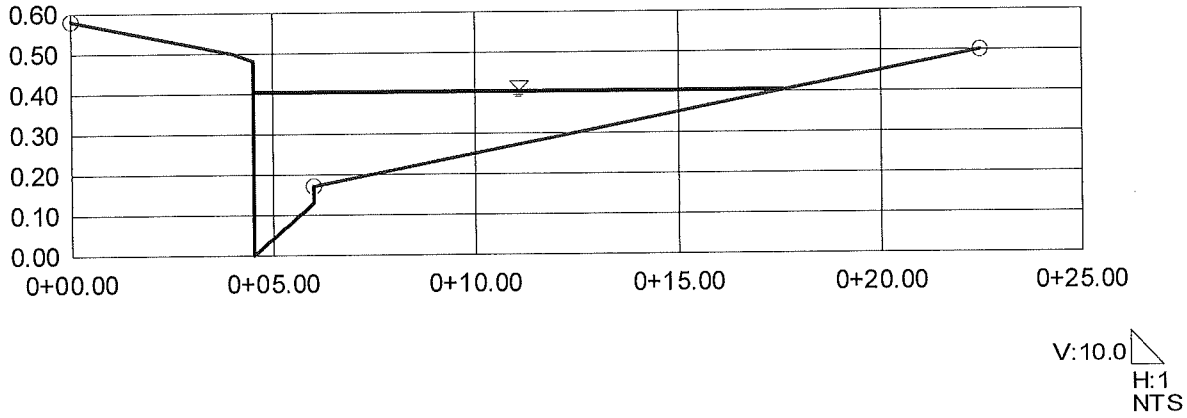
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50

SECTION 5W (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 5W (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.014	
Channel Slope	2.85	%
Water Surface Elevation	0.40	ft
Elevation Range	0.00 to 0.58	
Discharge	9	cfs



SECTION 5E (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 5E (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	3.25	%
Discharge	9	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.014	
Water Surface Elevation	0.39	ft
Elevation Range	0.00 to 0.58	
Flow Area	1.8	ft²
Wetted Perimeter	13.17	ft
Top Width	12.72	ft
Actual Depth	0.39	ft
Critical Elevation	0.51	ft
Critical Slope	0.49	%
Velocity	5.13	ft/s
Velocity Head	0.41	ft
Specific Energy	0.80	ft
Froude Number	2.44	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+22.50	0.016

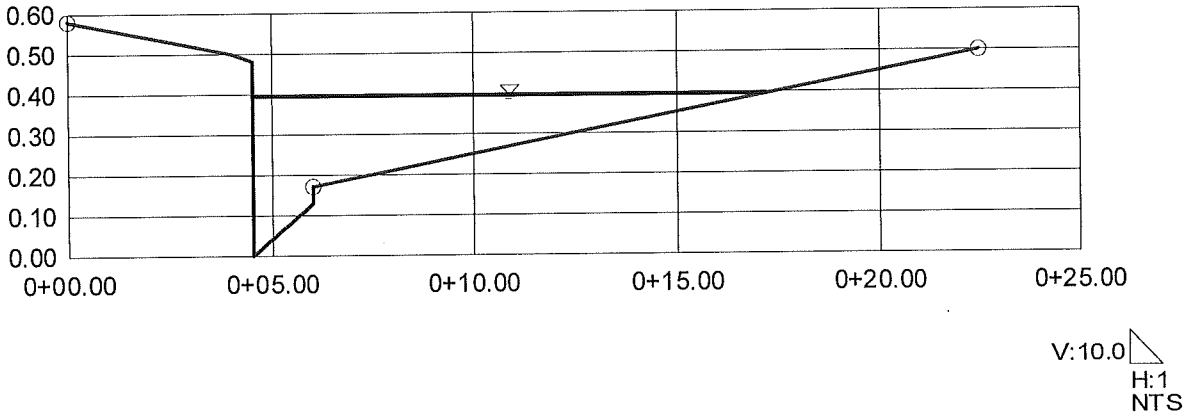
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50

SECTION 5E (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 5E (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	3.25 %
Water Surface Elevation	0.39 ft
Elevation Range	0.00 to 0.58
Discharge	9 cfs



Half Street Capacity
Worksheet for Irregular Channel

Project Description	
Worksheet	Half Street Capacity
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Channel Slope	4.50 %
Water Surface Elevation	0.50 ft

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.015
Elevation Range	0.00 to 0.58
Discharge	23 cfs
Flow Area	3.4 ft²
Wetted Perimeter	19.03 ft
Top Width	18.50 ft
Actual Depth	0.50 ft
Critical Elevation	0.67 ft
Critical Slope	0.50 %
Velocity	6.70 ft/s
Velocity Head	0.70 ft
Specific Energy	1.20 ft
Froude Number	2.76
Flow Type	Supercritical

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+06.00	0.013
0+06.00	0+22.50	0.016

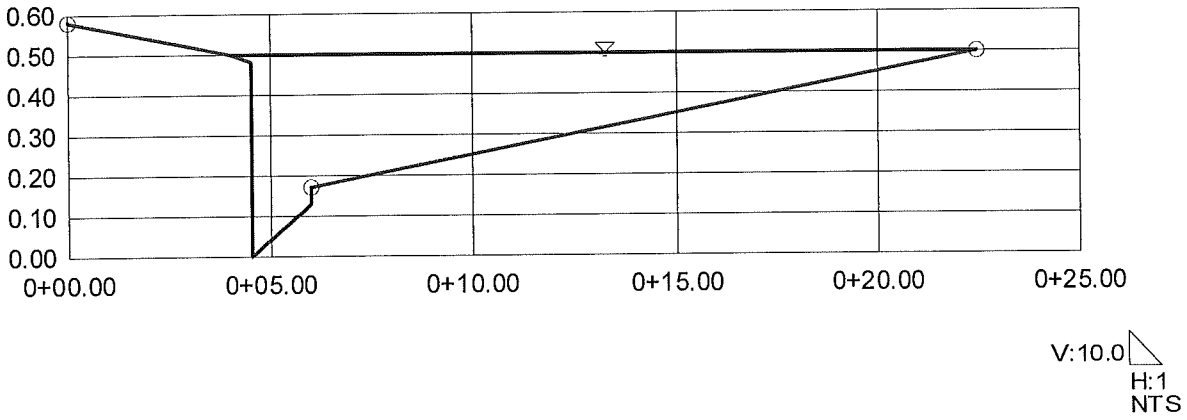
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.58
0+04.00	0.50
0+04.50	0.48
0+04.50	0.00
0+06.00	0.13
0+06.00	0.17
0+22.50	0.50

Half Street Capacity
Cross Section for Irregular Channel

Project Description	
Worksheet	Half Street Capacity
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.015	
Channel Slope	4.50	%
Water Surface Elevation	0.50	ft
Elevation Range	0.00 to 0.58	
Discharge	23	cfs



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Hydraulic Sections

SECTION A (Proposed)
Worksheet for Rectangular Channel

Project Description	
Worksheet	SECTION A (Proposed)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.013
Channel Slope	3.10 %
Bottom Width	2.00 ft
Discharge	8 cfs

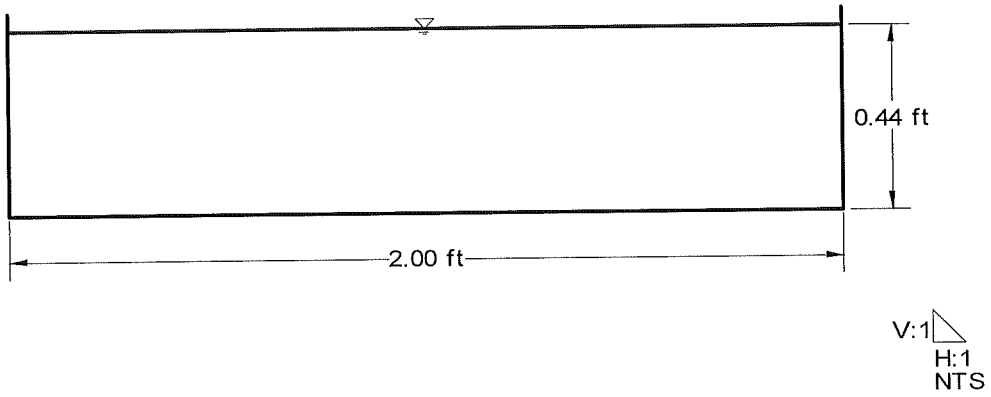
Results	
Depth	0.44 ft
Flow Area	0.9 ft²
Wetted Perimeter	2.88 ft
Top Width	2.00 ft
Critical Depth	0.79 ft
Critical Slope	0.58 %
Velocity	9.12 ft/s
Velocity Head	1.29 ft
Specific Energy	1.73 ft
Froude Number	2.43
Flow Type	Supercritical

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SECTION A (Proposed)
Cross Section for Rectangular Channel

Project Description	
Worksheet	SECTION A (Proposed)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	3.10	%
Depth	0.44	ft
Bottom Width	2.00	ft
Discharge	8	cfs



Emergency Overflow

SECTION E1 (Emergency Overflow Weir)
Worksheet for Generic Weir

Project Description	
Worksheet	SECTION E1 (Weir Calculation)
Type	Generic Weir
Solve For	Headwater Elevation

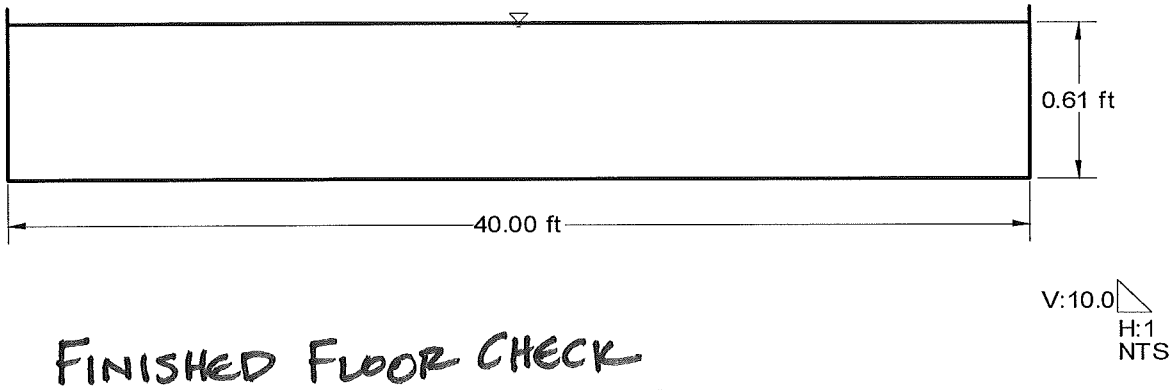
Input Data		
Discharge	57	cfs
Crest Elevation	75.10	ft
Discharge Coefficient	3.00	US
Crest Length	40.00	ft

Results		
Headwater Elevation	75.71	ft
Headwater Height Above Crest	0.61	ft
Flow Area	24.4	ft^2
Velocity	2.34	ft/s
Wetted Perimeter	41.22	ft
Top Width	40.00	ft

SECTION E1 (Emergency Overflow Weir)
Cross Section for Generic Weir

Project Description	
Worksheet	SECTION E1 (Weir Calculation)
Type	Generic Weir
Solve For	Headwater Elevation

Section Data		
Discharge	57	cfs
Headwater Elevation	75.71	ft
Crest Elevation	75.10	ft
Discharge Coefficient	3.00	US
Crest Length	40.00	ft



FINISHED FLOOR CHECK

LOT 1 FF = 79.2' > 75.71' OK

APPENDIX E

Drop Inlet and Storm Drain Hydraulic Computations

Drop Inlets

Project:	**Summerlin Village 23A Parcel O**
Title:	**Mod. Type 'C' Drop Inlet (SUMP)**
Subtitle:	**15-ft Drop Inlet**
By:	**KCR**
Date:	**12/21/2011**

Input:	**Variable:**	**Input:**
Depth at Inlet (ft)	D	1.22
Grate Width (ft)	W	1.50
Length of Grate (ft)	L_g	15.00
Length of Curb Opening (ft)	L_c	15.00
Height of Curb Opening (ft)	H	0.547
Weir Coef. - Curb Opening	W_c	2.3
Weir Coef. - Grate	W_g	3.0
Orifice Coef.	O_c	0.67
Grate Coef.	G_c	0.60
Clogging Factor - Grate (%)	CF_g	50
Clogging Factor - Curb (%)	CF_c	50
Output (Grate):	**Equation:**	**Output (Grate):**
Effective Weir Length (ft)	$2*W+L_g$	18.00
Adjusted Effective Weir Length (ft)	$2*(1-CF_g/100)*W+(1-CF_g/100)*L_g$	9.00
Grate Open Area (sf)	$W*L_g$	22.50
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1-CF_g/100)$	6.75
Controlling Flow Type (weir/orifice)	If $D<1.792*$(Adj. Grate Open Area/Adj. Eff. Length) use weir, else orifice	weir
Intercepted Flow (cfs)	weir: W_g*(Adj. Eff. Weir Length)$*D^{1.5}$	36.4
	orifice: O_c*(Adj. Grate Open Area)$*(64.4*D)^{0.5}$	
Output (Curb):	**Equation:**	**Output (Curb):**
Effective Weir Length (ft)	$L+1.8*W$	17.70
Adjusted Effective Weir Length (ft)	$L+1.8(1-CF_c/100)*W$	16.41
Curb Open Area (sf)	$L*H$	8.21
Adjusted Curb Open Area (sf)	Curb Open Area * $(1-CF_c/100)$	4.10
Controlling Flow Type (weir/orifice)	If D<H, weir, else orifice	orifice
Intercepted Flow (cfs)	weir: W_c*(Adj. Eff. Weir Length)$*D^{1.5}$	24.32
	orifice: O_c*(Adj. Curb Open Area)$*(64.4*(D-H/2))^{0.5}$	
Output (Combination):		**Output (Combination):**
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**60.7**

INTERIM: $Q_{COLLECT}$ = 57 CFS, Q_{BYPASS} = 0 CFS

PROPOSED: $Q_{COLLECT}$ = 52 CFS, Q_{BYPASS} = 0 CFS

Project:	**Summerlin Village 23A Parcel O**
Title:	**Mod. Type C Drop Inlet (Continuous Grade)**
Subtitle:	**20-ft Drop Inlet**
By:	**KCR**
Date:	**12/21/2011**

	Input:	**Variable:**	**Input:**
	Street Flow (cfs)	Q	9.0
	Longitudinal Slope (ft/ft)	S_o	0.0285
	Manning's Coefficient	n	0.016
	Street Flow Velocity (fps)	V	4.86
	Street Flow Depth (ft)	D	0.40
	Street Cross Slope (ft/ft)	S_x	0.02
	Grate Width (ft)	W	1.5
	Grate Depression (in)	D_g	2.0
	Length of Grate (ft)	L_g	17.5
	Length of Curb Opening (ft)	L_c	20.00
	Clogging Factor - Grate (%)	CF_g	50%
	Clogging Factor - Curb (%)	CF_c	50%
	Effective Grate Length (ft)	L_{ge}	8.8
	Effective Curb Opening Length (ft)	L_{ce}	10.00
	Output (Grate):	**Equation:**	**Output (Grate):**
[1]	R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2]	V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	42.93
[1]	E - Grate Flow Ratio	Frontal Flow/Side Flow	0.31
[2]	Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	2.77
[1]	Q_s - Side Flow (cfs)	Q_s = Q-Qw	6.2
	T - Side Flow Spread (ft)	$(D-D_g)/S_x$	11.67
[1]	R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.53
[1]	Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	6.1
	Output (Curb):	**Equation:**	**Output (Curb):**
[1]	S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.054
	Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	2.917
	S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1]	L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	22.24
[1]	Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	1.9
		or Q_{sx} if L_t is less than L_{ce}	
	Output (Combination):		**Output (Combination):**
	Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**8.0**

[1] Formula referenced from the CCRFCD Manual

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

INTERIM: $Q_{COLLECT}$ = 7.5 CFS, Q_{BYPASS} = 0 CFS

PROPOSED: $Q_{COLLECT}$ = 8 CFS, Q_{BYPASS} = 1 CFS

Project:	**Summerlin Village 23A Parcel O**	
Title:	**Mod. Type C Drop Inlet (Continuous Grade)**	
Subtitle:	**20-ft Drop Inlet**	
By:	**KCR**	
Date:	**12/21/2011**	
Input:	**Variable:**	**Input:**
Street Flow (cfs)	Q	9.0
Longitudinal Slope (ft/ft)	S_o	0.0325
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	5.13
Street Flow Depth (ft)	D	0.39
Street Cross Slope (ft/ft)	S_x	0.02
Grate Width (ft)	W	1.5
Grate Depression (in)	D_g	2.0
Length of Grate (ft)	L_g	17.5
Length of Curb Opening (ft)	L_c	20.00
Clogging Factor - Grate (%)	CF_g	50%
Clogging Factor - Curb (%)	CF_c	50%
Effective Grate Length (ft)	L_{ge}	8.8
Effective Curb Opening Length (ft)	L_{ce}	10.00
Output (Grate):	**Equation:**	**Output (Grate):**
[1] R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2] V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	42.93
[1] E - Grate Flow Ratio	Frontal Flow/Side Flow	0.32
[2] Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	2.88
[1] Q_s - Side Flow (cfs)	Q_s = Q-Qw	6.1
T - Side Flow Spread (ft)	$(D-D_g)/S_x$	11.17
[1] R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.51
[1] Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	6.0
Output (Curb):	**Equation:**	**Output (Curb):**
[1] S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.056
Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	3.015
S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1] L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	23.11
[1] Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	1.9
	or Q_{sx} if L_t is less than L_{ce}	
Output (Combination):		**Output (Combination):**
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**7.9**

[1] Formula referenced from the CCRFCD Manual

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

INTERIM: $Q_{COLLECT}$ = 7.5 CFS, Q_{BYPASS} = 0 CFS

PROPOSED: $Q_{COLLECT}$ = 7.9 CFS, Q_{BYPASS} = 1.1 CFS

WSPG Analysis

```
0
T1 SUMMERLIN VILLAGE 23A PARCEL O
T2 STORM DRAIN LATERAL TO PARCEL O
T3 42-INCH RCP TO SUMP INLET - INTERIM CONDITION
SO     100.003359.21 42                              3362.71                                  1
R      137.433362.63 42       .013
JX     142.433363.11 42 24    .013     15.0         3364.37        69.
R      184.533367.87 42       .013
SH     184.533367.87 42
CD   18  4               1.5
CD   24  4               2.
CD   30  4               2.5
CD   36  4               3.
CD   42  4               3.5
CD   48  4               4.
```

0
Q 57.0

DATE: 12/22/2011
TIME: 8: 3

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4			1.50														
CD	24	4			2.00														
CD	30	4			2.50														
CD	36	4			3.00														
CD	42	4			3.50														
CD	48	4			4.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SUMMERLIN VILLAGE 23A PARCEL O

HEADING LINE NO 2 IS -

STORM DRAIN LATERAL TO PARCEL O

HEADING LINE NO 3 IS -

42-INCH RCP TO SUMP INLET - INTERIM CONDITION

F 0 5 1 5 P 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
	100.00	3359.21	42	3362.71

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	137.43	3362.63	42	0.013	0.00	0.00	0.00	1

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

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	142.43	3363.11	42	24	0	0.013	15.0	0.0	3364.37	0.00	69.00	0.00

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	184.53	3367.87	42	0.013	0.00	0.00	0.00	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	184.53	3367.87	42	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: SLATER HANIFAN GROUP F0515P PAGE 1

WATER SURFACE PROFILE LISTING
SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
42-INCH RCP TO SUMP INLET - INTERIM CONDITION

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
100.00	3359.21	1.422	3360.632	72.0	19.62	5.980	3366.612	0.00	2.658		3.50	0.00	0.00	0	0.00
8.69	0.09137					.040269	0.35			1.160			0.00		
108.69	3360.00	1.468	3361.472	72.0	18.80	5.490	3366.962	0.00	2.658		3.50	0.00	0.00	0	0.00
7.98	0.09137					.035618	0.28			1.160			0.00		
116.67	3360.73	1.522	3362.255	72.0	17.93	4.991	3367.246	0.00	2.658		3.50	0.00	0.00	0	0.00
6.62	0.09137					.031291	0.21			1.160			0.00		
123.29	3361.34	1.578	3362.916	72.0	17.09	4.537	3367.453	0.00	2.658		3.50	0.00	0.00	0	0.00
5.54	0.09137					.027505	0.15			1.160			0.00		
128.83	3361.84	1.637	3363.481	72.0	16.30	4.126	3367.607	0.00	2.658		3.50	0.00	0.00	0	0.00
4.66	0.09137					.024195	0.11			1.160			0.00		
133.49	3362.27	1.699	3363.969	72.0	15.54	3.750	3367.719	0.00	2.658		3.50	0.00	0.00	0	0.00
3.94	0.09137	STARTING WSE LAT_INT				.021298	0.08			1.160			0.00		
137.43	3362.63	1.764	3364.394	72.0	14.82	3.409	3367.803	0.00	2.658		3.50	0.00	0.00	0	0.00
JUNCT STR	0.09600					.034054	0.17						0.00		
142.43	3363.11	1.213	3364.323	57.0	19.25	5.754	3370.077	0.00	2.365		3.50	0.00	0.00	0	0.00
5.73	0.11306					.045768	0.26			0.971			0.00		
148.16	3363.76	1.247	3365.005	57.0	18.53	5.332	3370.337	0.00	2.365		3.50	0.00	0.00	0	0.00
6.09	0.11306					.040695	0.25			0.971			0.00		
154.25	3364.45	1.291	3365.737	57.0	17.67	4.848	3370.585	0.00	2.365		3.50	0.00	0.00	0	0.00
5.09	0.11306					.035684	0.18			0.971			0.00		
159.34	3365.02	1.338	3366.360	57.0	16.85	4.408	3370.768	0.00	2.365		3.50	0.00	0.00	0	0.00
4.31	0.11306					.031305	0.13			0.971			0.00		

WATER SURFACE PROFILE LISTING

SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
42-INCH RCP TO SUMP INLET - INTERIM CONDITION

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		

163.65	3365.51	1.386	3366.895	57.0	16.07	4.008	3370.903	0.00	2.365		3.50	0.00	0.00	0	0.00
3.66	0.11306					.027473	0.10			0.971			0.00		
167.31	3365.92	1.437	3367.360	57.0	15.32	3.644	3371.004	0.00	2.365		3.50	0.00	0.00	0	0.00
3.14	0.11306					.024120	0.08			0.971			0.00		
170.45	3366.28	1.489	3367.767	57.0	14.60	3.312	3371.079	0.00	2.365		3.50	0.00	0.00	0	0.00
2.68	0.11306					.021182	0.06			0.971			0.00		
173.13	3366.58	1.544	3368.125	57.0	13.92	3.010	3371.135	0.00	2.365		3.50	0.00	0.00	0	0.00
2.28	0.11306					.018618	0.04			0.971			0.00		
175.41	3366.84	1.602	3368.441	57.0	13.28	2.737	3371.178	0.00	2.365		3.50	0.00	0.00	0	0.00
1.96	0.11306					.016372	0.03			0.971			0.00		
177.37	3367.06	1.662	3368.722	57.0	12.66	2.488	3371.210	0.00	2.365		3.50	0.00	0.00	0	0.00
1.66	0.11306					.014402	0.02			0.971			0.00		
179.03	3367.25	1.724	3368.972	57.0	12.07	2.262	3371.234	0.00	2.365		3.50	0.00	0.00	0	0.00
1.39	0.11306					.012677	0.02			0.971			0.00		
180.42	3367.41	1.790	3369.195	57.0	11.51	2.056	3371.251	0.00	2.365		3.50	0.00	0.00	0	0.00
1.16	0.11306					.011170	0.01			0.971			0.00		
181.58	3367.54	1.859	3369.395	57.0	10.97	1.869	3371.264	0.00	2.365		3.50	0.00	0.00	0	0.00
0.94	0.11306					.009850	0.01			0.971			0.00		
182.52	3367.64	1.932	3369.574	57.0	10.46	1.699	3371.273	0.00	2.365		3.50	0.00	0.00	0	0.00
0.74	0.11306					.008696	0.01			0.971			0.00		
183.26	3367.73	2.009	3369.735	57.0	9.97	1.545	3371.280	0.00	2.365		3.50	0.00	0.00	0	0.00
0.56	0.11306					.007686	0.00			0.971			0.00		

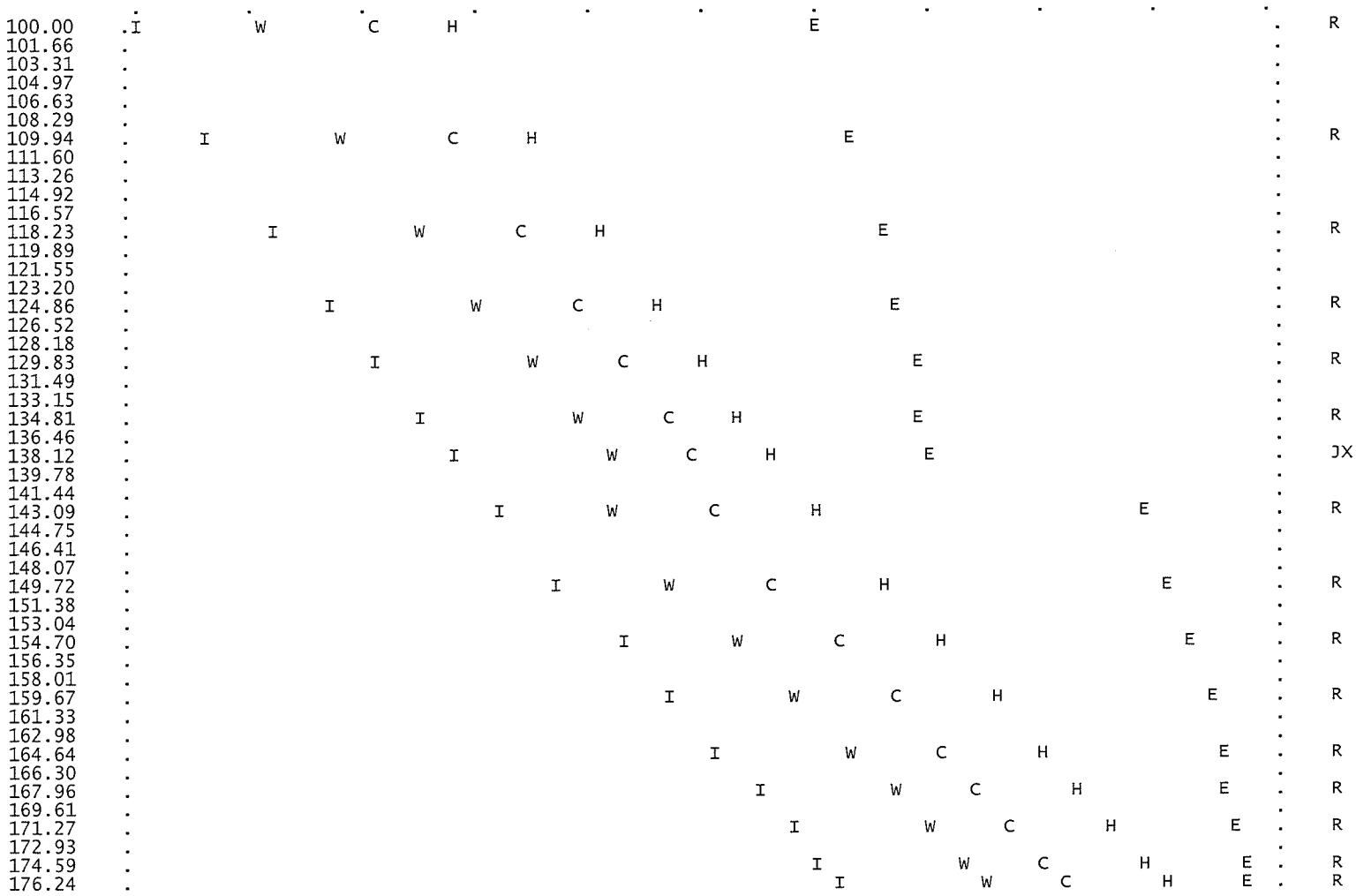
WATER SURFACE PROFILE LISTING

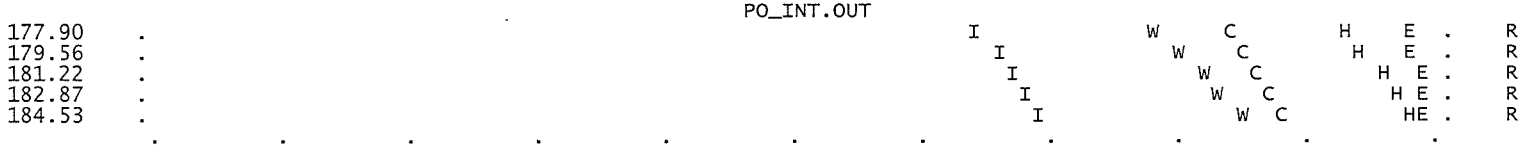
SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
42-INCH RCP TO SUMP INLET - INTERIM CONDITION

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
183.82	3367.79	2.090	3369.880	57.0	9.51	1.405	3371.285	0.00	2.365		3.50	0.00	0.00	0	0.00
0.41	0.11306					.006801	0.00			0.971			0.00		
184.23	3367.84	2.175	3370.011	57.0	9.07	1.277	3371.288	0.00	2.365		3.50	0.00	0.00	0	0.00

0.23	0.11306					.006027	0.00			0.971			0.00		
184.46	3367.86	2.266	3370.128	57.0	8.65	1.161	3371.289	0.00	2.365		3.50	0.00	0.00	0	0.00
0.07	0.11306					.005350	0.00			0.971			0.00		
184.53	3367.87	2.365	3370.235	57.0	8.24	1.054	3371.289	0.00	2.365		3.50	0.00	0.00	0	0.00♀

SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
42-INCH RCP TO SUMP INLET - INTERIM CONDITION





N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY♀

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0
T1 SUMMERLIN VILLAGE 23A PARCEL O
T2 STORM DRAIN LATERAL TO PARCEL O
T3 18-INCH RCP TO CG INLETS - INTERIM CONDITION
SO     100.003364.87 18                          3364.39                                  1
R      144.153365.45 18       .013
JX     148.153365.45 18 18    .013      7.5       3365.45        90.
R      182.313366.35 18       .013
SH     182.313366.35 18
CD  18  4                1.5
CD  24  4                2.
CD  30  4                2.5
CD  36  4                3.
CD  42  4                3.5
CD  48  4                4.
```

0
Q 7.5

DATE: 12/22/2011
TIME: 9:26

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4			1.50														
CD	24	4			2.00														
CD	30	4			2.50														
CD	36	4			3.00														
CD	42	4			3.50														
CD	48	4			4.00														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SUMMERLIN VILLAGE 23A PARCEL O

HEADING LINE NO 2 IS -

STORM DRAIN LATERAL TO PARCEL O

HEADING LINE NO 3 IS -

18-INCH RCP TO CG INLETS - INTERIM CONDITION

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.00	3364.87	18	3364.39

ELEMENT NO 2 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	144.15	3365.45	18	0.013	0.00	0.00	0.00	1

ELEMENT NO 3 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	148.15	3365.45	18	18	0	0.013	7.5	0.0	3365.45	0.00	90.00	0.00

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

ELEMENT NO 4 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	182.31	3366.35	18	0.013	0.00	0.00	0.00	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS

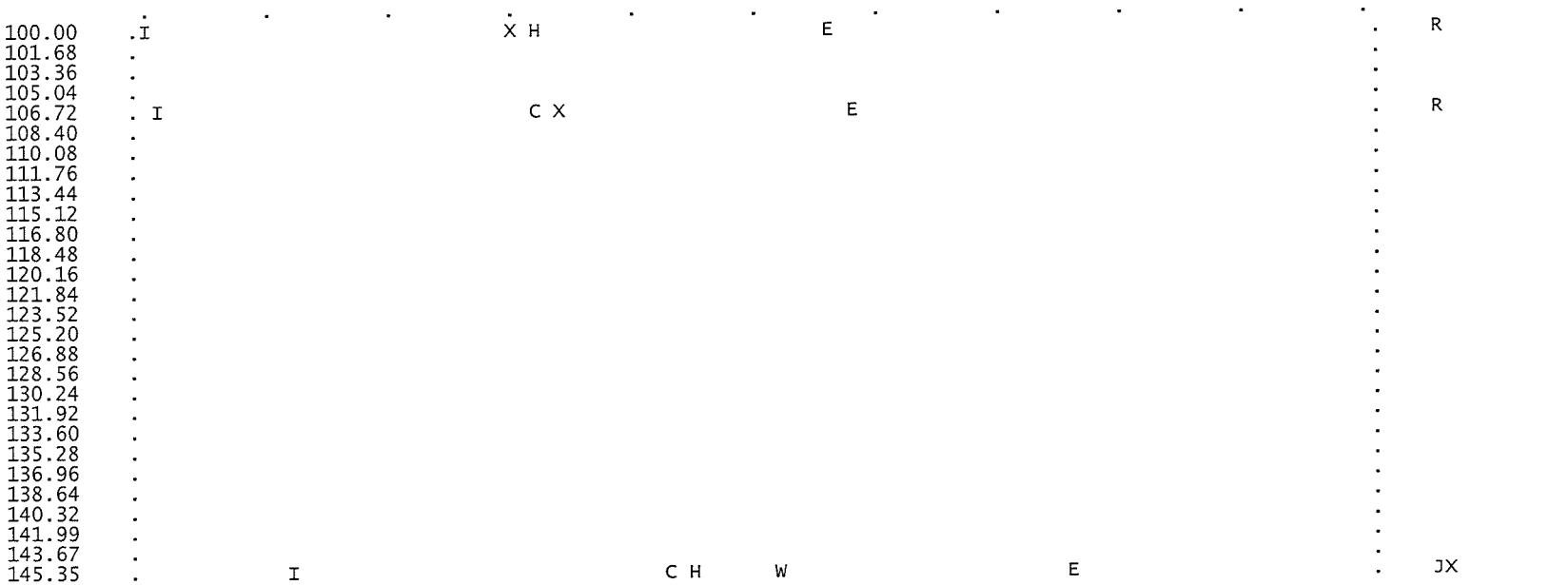
U/S DATA	STATION	INVERT	SECT	W S ELEV
	182.31	3366.35	18	0.00

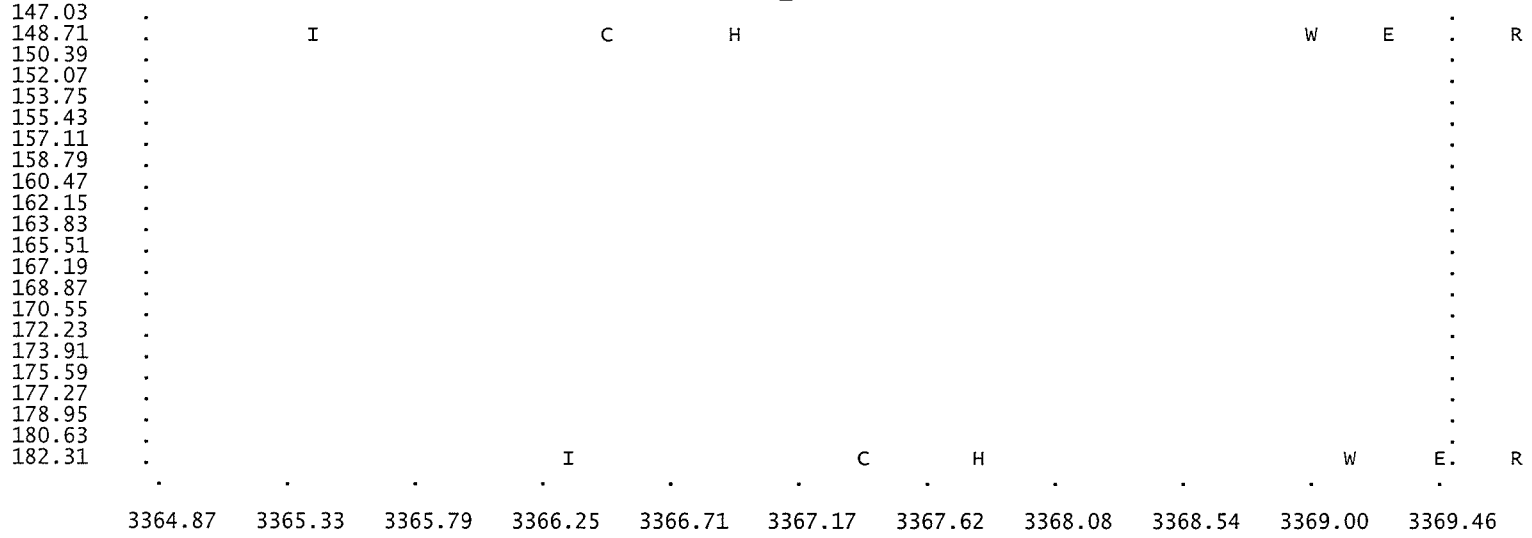
NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
ERROR MESSAGE NO. 2 - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN OTLTUS, W.S.ELEV = INV + DC

STORM DRAIN LATERAL TO PARCEL O
18-INCH RCP TO CG INLETS - INTERIM CONDITION

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
100.00	3364.87	1.406	3366.276	15.0	8.72	1.180	3367.456	0.00	1.406		1.50	0.00	0.00	0	0.00
5.87	0.01314					.018784	0.11			1.500			0.00		
105.87	3364.95	1.500	3366.447	15.0	8.49	1.119	3367.566	0.00	1.406		1.50	0.00	0.00	0	0.00
38.28	0.01314					.020168	0.77			1.500			0.00		
144.15	3365.45	1.826	3367.276	15.0	8.49	1.119	3368.395	0.00	1.406		1.50	0.00	0.00	0	0.00
JUNCT STR	0.00000					.012744	0.05						0.00		
148.15	3365.45	3.555	3369.005	7.5	4.24	0.280	3369.285	0.00	1.061		1.50	0.00	0.00	0	0.00
34.16	0.02635					.005098	0.17			0.700			0.00		
182.31	3366.35	2.829	3369.179	7.5	4.24	0.280	3369.459	0.00	1.061		1.50	0.00	0.00	0	0.00♀

SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
18-INCH RCP TO CG INLETS - INTERIM CONDITION





N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY♀

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0
T1 SUMMERLIN VILLAGE 23A PARCEL O
T2 STORM DRAIN LATERAL TO PARCEL O
T3 42-INCH RCP TO SUMP INLET - PROPOSED CONDITION
SO     100.003359.21 42                          3362.71                                  1
R      137.433362.63 42        .013
JX     142.433363.11 42 24     .013     15.9         3364.37         69.
R      184.533367.87 42        .013
SH     184.533367.87 42
CD  18  4                1.5
CD  24  4                2.
CD  30  4                2.5
CD  36  4                3.
CD  42  4                3.5
CD  48  4                4.
+
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0
Q 52.0

DATE: 12/22/2011
TIME: 8: 3

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4			1.50														
CD	24	4			2.00														
CD	30	4			2.50														
CD	36	4			3.00														
CD	42	4			3.50														
CD	48	4			4.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SUMMERLIN VILLAGE 23A PARCEL O

HEADING LINE NO 2 IS -

STORM DRAIN LATERAL TO PARCEL O

HEADING LINE NO 3 IS -

42-INCH RCP TO SUMP INLET - PROPOSED CONDITION

F 0 5 1 5 P 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
	100.00	3359.21	42	3362.71

ELEMENT NO 2 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	137.43	3362.63	42	0.013	0.00	0.00	0.00	1

ELEMENT NO 3 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	142.43	3363.11	42	24	0	0.013	15.9	0.0	3364.37	0.00	69.00	0.00

ELEMENT NO 4 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	184.53	3367.87	42	0.013	0.00	0.00	0.00	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS

U/S DATA	STATION	INVERT	SECT	W S ELEV
	184.53	3367.87	42	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
42-INCH RCP TO SUMP INLET - PROPOSED CONDITION

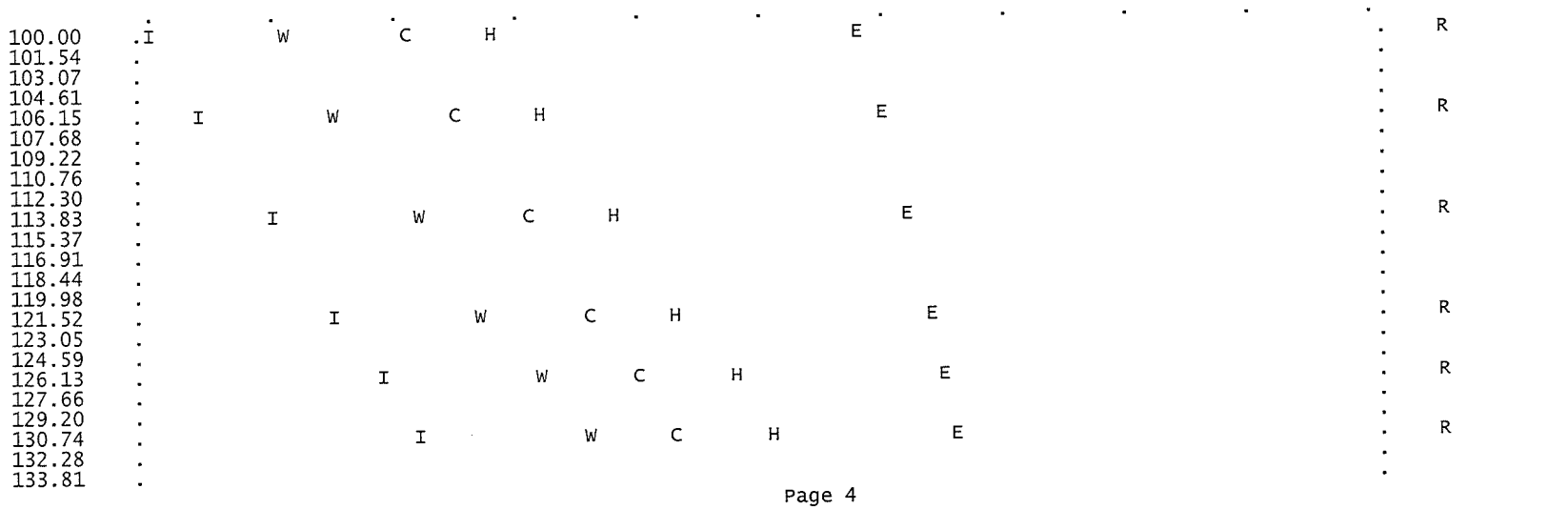
STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
100.00	3359.21	1.385	3360.595	67.9	19.17	5.706	3366.301	0.00	2.583		3.50	0.00	0.00	0	0.00
5.46	0.09137					.040197	0.22			1.123			0.00		
105.46	3359.71	1.414	3361.123	67.9	18.64	5.397	3366.520	0.00	2.583		3.50	0.00	0.00	0	0.00
7.99	0.09137					.036305	0.29			1.123			0.00		
113.45	3360.44	1.465	3361.904	67.9	17.77	4.906	3366.810	0.00	2.583		3.50	0.00	0.00	0	0.00
6.59	0.09137					.031877	0.21			1.123			0.00		
120.04	3361.04	1.519	3362.560	67.9	16.95	4.461	3367.021	0.00	2.583		3.50	0.00	0.00	0	0.00
5.51	0.09137					.028006	0.15			1.123			0.00		
125.55	3361.55	1.575	3363.120	67.9	16.16	4.055	3367.175	0.00	2.583		3.50	0.00	0.00	0	0.00
4.64	0.09137					.024618	0.11			1.123			0.00		
130.19	3361.97	1.634	3363.603	67.9	15.41	3.686	3367.289	0.00	2.583		3.50	0.00	0.00	0	0.00
3.92	0.09137					.021657	0.08			1.123			0.00		
134.11	3362.33	1.696	3364.022	67.9	14.69	3.351	3367.373	0.00	2.583		3.50	0.00	0.00	0	0.00
3.32	0.09137	STARTING WSE LAT_PR				.019063	0.06			1.123			0.00		
137.43	3362.63	1.761	3364.391	67.9	14.01	3.046	3367.437	0.00	2.583		3.50	0.00	0.00	0	0.00
JUNCT STR	0.09600					.033881	0.17						0.00		
142.43	3363.11	1.145	3364.255	52.0	19.01	5.609	3369.864	0.00	2.255		3.50	0.00	0.00	0	0.00
2.29	0.11306					.048880	0.11			0.926			0.00		
144.72	3363.37	1.157	3364.526	52.0	18.72	5.441	3369.967	0.00	2.255		3.50	0.00	0.00	0	0.00
6.65	0.11306					.044887	0.30			0.926			0.00		
151.37	3364.12	1.198	3365.319	52.0	17.85	4.948	3370.267	0.00	2.255		3.50	0.00	0.00	0	0.00
5.52	0.11306					.039341	0.22			0.926			0.00		

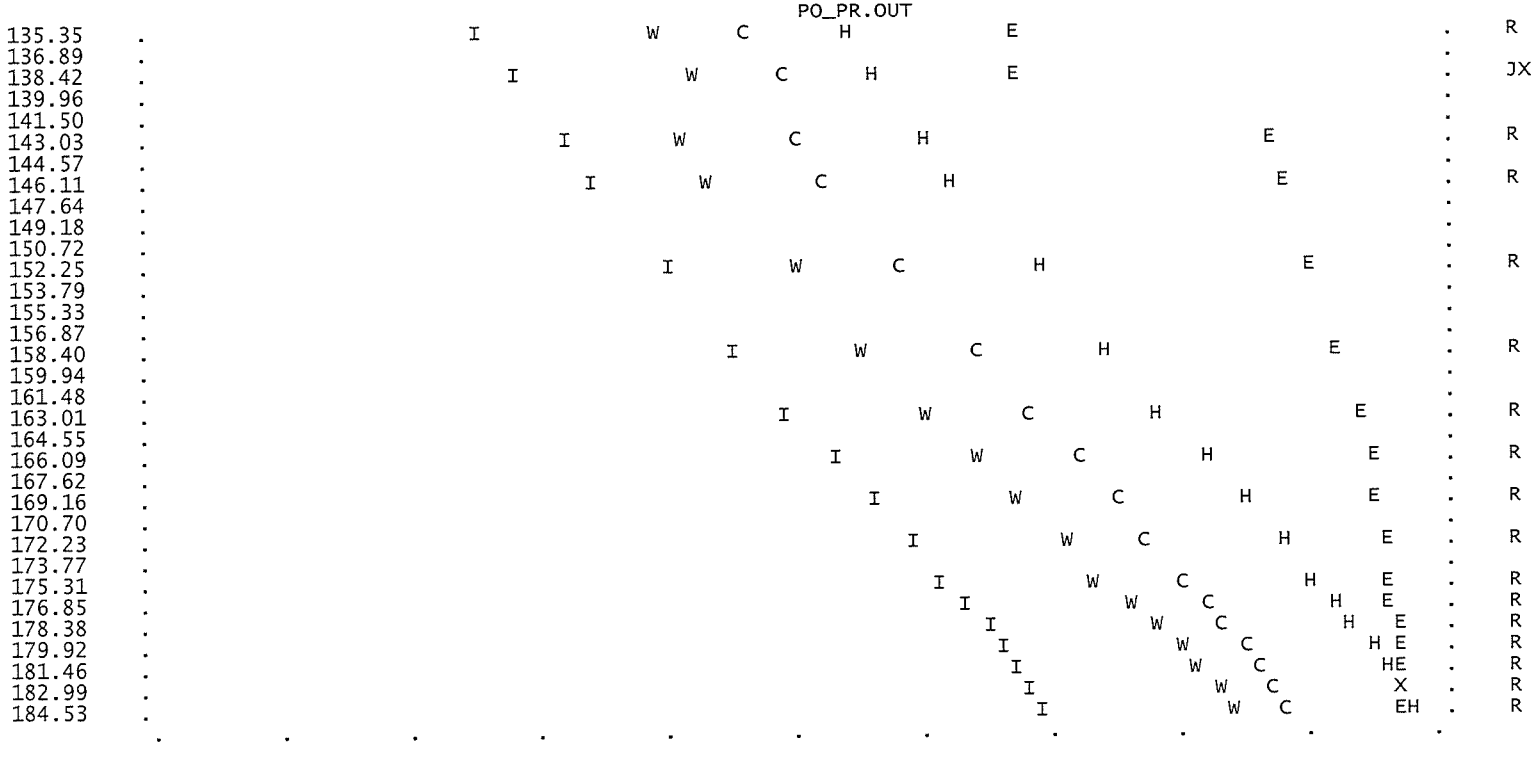
STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
156.89	3364.74	1.241	3365.986	52.0	17.02	4.496	3370.482	0.00	2.255		3.50	0.00	0.00	0	0.00
4.64	0.11306					.034487	0.16			0.926			0.00		
161.53	3365.27	1.285	3366.555	52.0	16.22	4.088	3370.643	0.00	2.255		3.50	0.00	0.00	0	0.00
3.94	0.11306					.030235	0.12			0.926			0.00		
165.47	3365.72	1.331	3367.046	52.0	15.47	3.717	3370.763	0.00	2.255		3.50	0.00	0.00	0	0.00
3.35	0.11306					.026520	0.09			0.926			0.00		
168.82	3366.09	1.379	3367.472	52.0	14.75	3.379	3370.851	0.00	2.255		3.50	0.00	0.00	0	0.00
2.85	0.11306					.023276	0.07			0.926			0.00		
171.67	3366.42	1.430	3367.846	52.0	14.07	3.072	3370.918	0.00	2.255		3.50	0.00	0.00	0	0.00
2.45	0.11306					.020438	0.05			0.926			0.00		
174.12	3366.69	1.482	3368.175	52.0	13.41	2.792	3370.967	0.00	2.255		3.50	0.00	0.00	0	0.00
2.09	0.11306					.017950	0.04			0.926			0.00		
176.21	3366.93	1.537	3368.467	52.0	12.79	2.538	3371.005	0.00	2.255		3.50	0.00	0.00	0	0.00
1.79	0.11306					.015775	0.03			0.926			0.00		
178.00	3367.13	1.594	3368.726	52.0	12.19	2.308	3371.034	0.00	2.255		3.50	0.00	0.00	0	0.00
1.52	0.11306					.013867	0.02			0.926			0.00		
179.52	3367.30	1.653	3368.956	52.0	11.62	2.098	3371.054	0.00	2.255		3.50	0.00	0.00	0	0.00
1.26	0.11306					.012199	0.02			0.926			0.00		
180.78	3367.45	1.716	3369.163	52.0	11.08	1.907	3371.070	0.00	2.255		3.50	0.00	0.00	0	0.00
1.06	0.11306					.010739	0.01			0.926			0.00		
181.84	3367.57	1.781	3369.347	52.0	10.57	1.734	3371.081	0.00	2.255		3.50	0.00	0.00	0	0.00
0.86	0.11306					.009461	0.01			0.926			0.00		

PO_PR.OUT

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
182.70	3367.66	1.850	3369.513	52.0	10.08	1.576	3371.089	0.00	2.255		3.50	0.00	0.00	0	0.00
0.68	0.11306					.008342	0.01			0.926			0.00		
183.38	3367.74	1.922	3369.662	52.0	9.61	1.433	3371.095	0.00	2.255		3.50	0.00	0.00	0	0.00
0.51	0.11306					.007362	0.00			0.926			0.00		
183.89	3367.80	1.998	3369.796	52.0	9.16	1.303	3371.099	0.00	2.255		3.50	0.00	0.00	0	0.00
0.36	0.11306					.006504	0.00			0.926			0.00		
184.25	3367.84	2.078	3369.917	52.0	8.73	1.184	3371.101	0.00	2.255		3.50	0.00	0.00	0	0.00
0.22	0.11306					.005755	0.00			0.926			0.00		
184.47	3367.86	2.163	3370.026	52.0	8.33	1.077	3371.103	0.00	2.255		3.50	0.00	0.00	0	0.00
0.06	0.11306					.005097	0.00			0.926			0.00		
184.53	3367.87	2.255	3370.125	52.0	7.94	0.978	3371.103	0.00	2.255		3.50	0.00	0.00	0	0.00♀

SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
42-INCH RCP TO SUMP INLET - PROPOSED CONDITION





N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY♀

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T1 SUMMERLIN VILLAGE 23A PARCEL O
T2 STORM DRAIN LATERAL TO PARCEL O
T3 18-INCH RCP TO CG INLETS - PROPOSED CONDITION
SO     100.003364.87 18                          3364.39                                  1
R      144.153365.45 18       .013
JX     148.153365.45 18 18    .013      7.9         3365.45         90.
R      182.313366.35 18       .013
SH     182.313366.35 18
CD  18  4               1.5
CD  24  4               2.
CD  30  4               2.5
CD  36  4               3.
CD  42  4               3.5
CD  48  4               4.
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0
Q 8.0

DATE: 12/22/2011
TIME: 8:29

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4			1.50														
CD	24	4			2.00														
CD	30	4			2.50														
CD	36	4			3.00														
CD	42	4			3.50														
CD	48	4			4.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SUMMERLIN VILLAGE 23A PARCEL O

HEADING LINE NO 2 IS -

STORM DRAIN LATERAL TO PARCEL O

HEADING LINE NO 3 IS -

18-INCH RCP TO CG INLETS - PROPOSED CONDITION

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	100.00	3364.37	18	3364.39

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	144.15	3365.45	18	0.013	0.00	0.00	0.00	1

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

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	148.15	3365.45	18	18	0	0.013	7.9	0.0	3365.45	0.00	90.00	0.00

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

ELEMENT NO 4 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	182.31	3366.35	18	0.013	0.00	0.00	0.00	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	182.31	3366.35	18	0.00

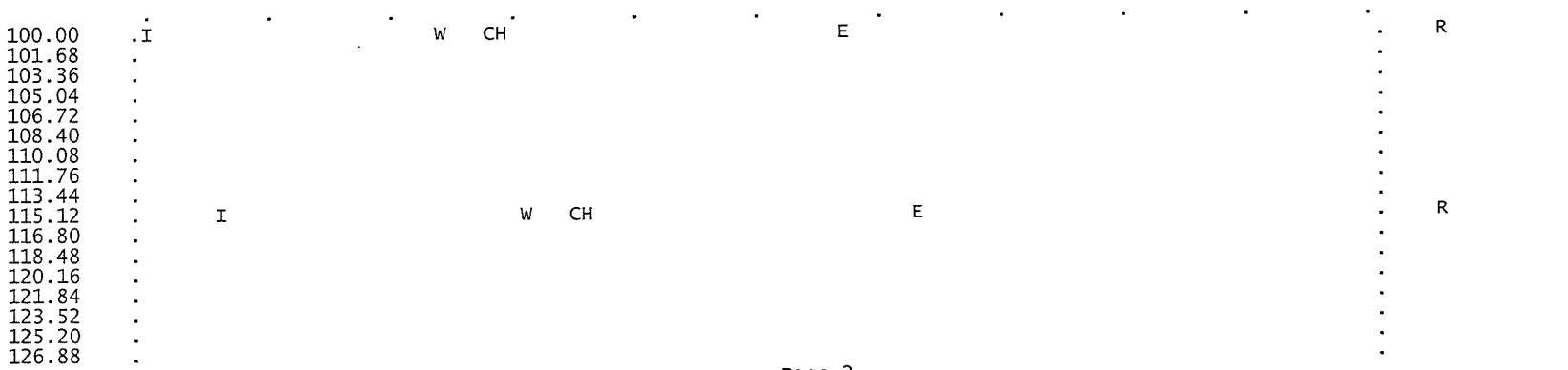
NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

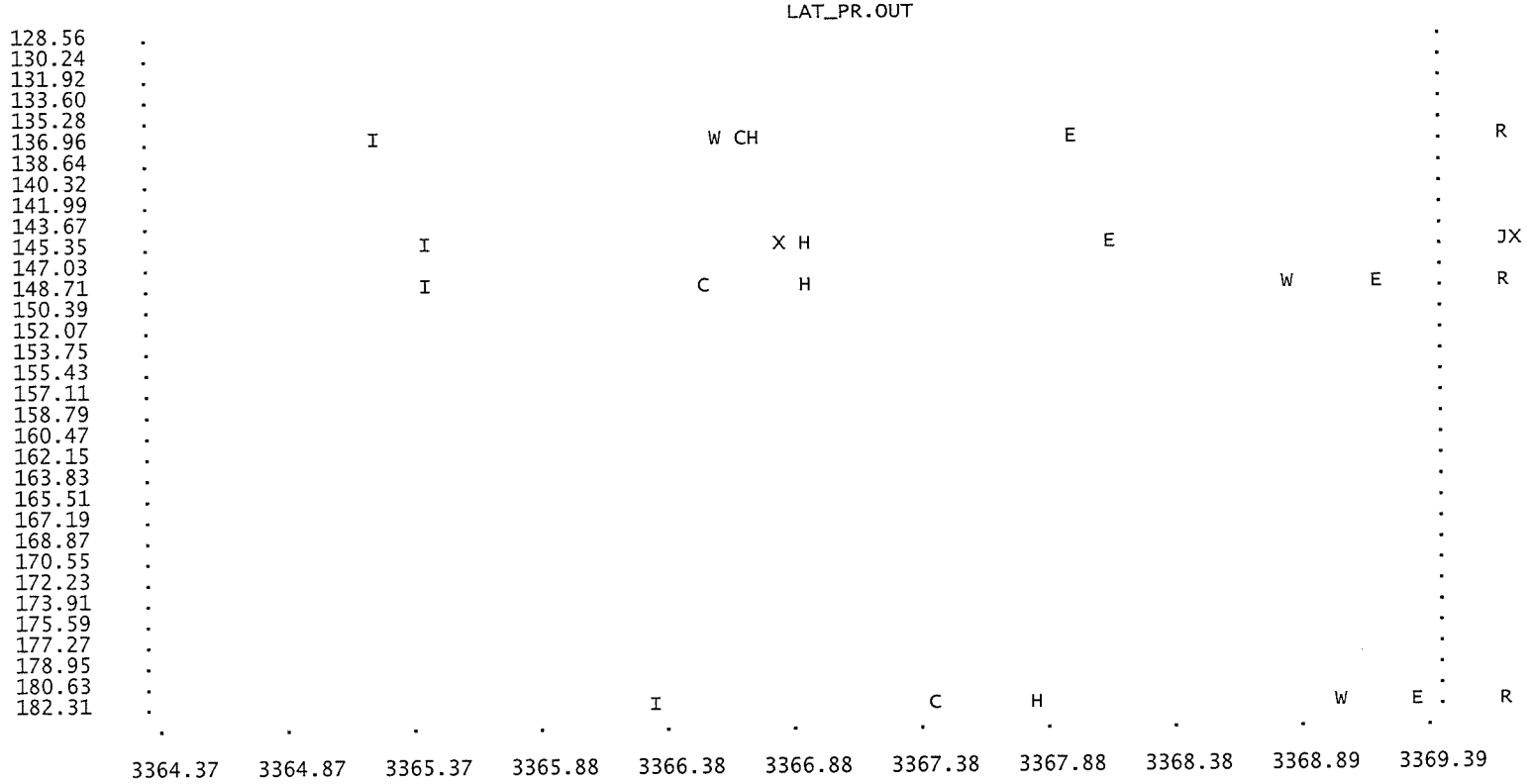
WATER SURFACE PROFILE LISTING

SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
18-INCH RCP TO CG INLETS - PROPOSED CONDITION

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
100.00	3364.37	1.231	3365.601	15.9	10.24	1.630	3367.231	0.00	1.423		1.50	0.00	0.00	0	0.00
13.85	0.02446					.022539	0.31			1.190			0.00		
113.85	3364.71	1.250	3365.959	15.9	10.10	1.583	3367.542	0.00	1.423		1.50	0.00	0.00	0	0.00
22.61	0.02446					.021369	0.48			1.190			0.00		
136.46	3365.26	1.324	3366.586	15.9	9.62	1.438	3368.024	0.00	1.423		1.50	0.00	0.00	0	0.00
7.69	0.02446					.020180	0.16			1.190			0.00		
144.15	3365.45	1.423	3366.873	15.9	9.17	1.307	3368.180	0.00	1.423		1.50	0.00	0.00	0	0.00
JUNCT STR	0.00000					.012817	0.05						0.00		
148.15	3365.45	3.421	3368.871	8.0	4.53	0.318	3369.189	0.00	1.096		1.50	0.00	0.00	0	0.00
34.16	0.02635					.005800	0.20			0.720			0.00		
182.31	3366.35	2.719	3369.069	8.0	4.53	0.318	3369.387	0.00	1.096		1.50	0.00	0.00	0	0.00♀

SUMMERLIN VILLAGE 23A PARCEL O
STORM DRAIN LATERAL TO PARCEL O
18-INCH RCP TO CG INLETS - PROPOSED CONDITION





N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY?

APPENDIX F

Finished Floor Analysis

SUMMERLIN VILLAGE 23A PARCEL O
FINISH FLOOR ANALYSIS - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline F.F.$_{-min}$[3] (ft)	T/C + 6" F.F.$_{-min}$[4] (ft)	F.F.$_{-Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
1	1	3377.58	3377.08	0.56	3378.20	3378.08	3379.2	OK	OK	
2	1	3379.14	3378.64	0.56	3379.76	3379.64	3380.7	OK	OK	
3	1	3381.18	3380.68	0.56	3381.80	3381.68	3382.8	OK	OK	
4	1	3383.62	3383.12	0.56	3384.24	3384.12	3385.2	OK	OK	
5	1	3386.07	3385.57	0.56	3386.69	3386.57	3387.7	OK	OK	
6	1	3388.36	3387.86	0.56	3388.98	3388.86	3390.0	OK	OK	
7	1	3389.82	3389.32	0.56	3390.44	3390.32	3391.4	OK	OK	
8	1	3391.00	3390.50	0.56	3391.62	3391.50	3392.6	OK	OK	
9	1	3392.53	3392.03	0.56	3393.15	3393.03	3394.1	OK	OK	
10	1	3393.67	3393.17	0.56	3394.29	3394.17	3395.3	OK	OK	
11	1	3394.80	3394.30	0.56	3395.42	3395.30	3396.4	OK	OK	
12	1	3395.94	3395.44	0.56	3396.56	3396.44	3397.5	OK	OK	
13	1	3397.33	3396.83	0.56	3397.95	3397.83	3398.9	OK	OK	
14	1	3398.65	3398.15	0.56	3399.27	3399.15	3400.3	OK	OK	
15	4	3400.44	3399.94	0.36	3400.66	3400.94	3402.0	OK	OK	
16	4	3403.05	3402.55	0.36	3403.27	3403.55	3404.7	OK	OK	
17	4	3405.66	3405.16	0.36	3405.88	3406.16	3407.3	OK	OK	
18	4	3408.27	3407.77	0.36	3408.49	3408.77	3409.9	OK	OK	
19	4	3410.88	3410.38	0.36	3411.10	3411.38	3412.5	OK	OK	
20	4	3413.49	3412.99	0.36	3413.71	3413.99	3415.1	OK	OK	
21	4	3416.10	3415.60	0.36	3416.32	3416.60	3417.7	OK	OK	
22	4	3420.13	3419.63	0.36	3420.35	3420.63	3421.7	OK	OK	
23	4	3422.74	3422.24	0.36	3422.96	3423.24	3424.3	OK	OK	
24	4	3425.35	3424.85	0.36	3425.57	3425.85	3427.0	OK	OK	
25	4	3427.96	3427.46	0.36	3428.18	3428.46	3429.6	OK	OK	
26	4	3430.57	3430.07	0.36	3430.79	3431.07	3432.2	OK	OK	
27	4	3432.98	3432.48	0.36	3433.20	3433.48	3434.6	OK	OK	
28	4	3434.14	3433.64	0.36	3434.36	3434.64	3435.7	OK	OK	
29	4	3434.77	3434.27	0.36	3434.99	3435.27	3436.4	OK	OK	
30	5W	3434.47	3433.97	0.39	3434.75	3434.97	3436.1	OK	OK	
31	5W	3433.48	3432.98	0.39	3433.76	3433.98	3435.1	OK	OK	
32	5W	3430.92	3430.42	0.39	3431.20	3431.42	3432.5	OK	OK	
33	5W	3428.44	3427.94	0.39	3428.72	3428.94	3430.0	OK	OK	

SUMMERLIN VILLAGE 23A PARCEL O
FINISH FLOOR ANALYSIS - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline F.F.$_{min}$[3] (ft)	T/C + 6" F.F.$_{min}$[4] (ft)	F.F.$_{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
34	5W	3426.05	3425.55	0.39	3426.33	3426.55	3427.7	OK	OK	
35	5W	3424.52	3424.02	0.39	3424.80	3425.02	3426.1	OK	OK	
36	5W	3423.60	3423.10	0.39	3423.88	3424.10	3425.2	OK	OK	
37	5W	3423.10	3422.60	0.39	3423.38	3423.60	3424.7	OK	OK	
38	5W	3420.35	3419.85	0.39	3420.63	3420.85	3422.0	OK	OK	
39	5W	3416.05	3415.55	0.39	3416.33	3416.55	3418.0	OK	OK	
40	5W	3412.99	3412.49	0.39	3413.27	3413.49	3414.6	OK	OK	
41	5W	3411.51	3411.01	0.39	3411.79	3412.01	3413.1	OK	OK	
42	5W	3410.63	3410.13	0.39	3410.91	3411.13	3412.2	OK	OK	
43	5W	3409.74	3409.24	0.39	3410.02	3410.24	3411.3	OK	OK	
44	5W	3408.63	3408.13	0.39	3408.91	3409.13	3410.2	OK	OK	
45	5W	3406.91	3406.41	0.39	3407.19	3407.41	3408.5	OK	OK	
46	5W	3404.93	3404.43	0.39	3405.21	3405.43	3406.5	OK	OK	
47	5W	3402.94	3402.44	0.39	3403.22	3403.44	3404.5	OK	OK	
48	5W	3400.94	3400.44	0.39	3401.22	3401.44	3402.5	OK	OK	
49	5W	3398.89	3398.39	0.39	3399.17	3399.39	3400.5	OK	OK	
50	2	3393.40	3392.90	0.35	3393.60	3393.90	3394.8	OK	OK	
51	2	3391.06	3390.56	0.35	3391.26	3391.56	3392.7	OK	OK	
52	2	3388.75	3388.25	0.35	3388.95	3389.25	3390.4	OK	OK	
53	2	3386.60	3386.10	0.35	3386.80	3387.10	3388.2	OK	OK	
54	2	3386.34	3385.84	0.35	3386.54	3386.84	3387.9	OK	OK	6
55	2	3388.04	3387.54	0.35	3388.24	3388.54	3389.6	OK	OK	
56	2	3389.75	3389.25	0.35	3389.95	3390.25	3391.4	OK	OK	
57	2	3391.67	3391.17	0.35	3391.87	3392.17	3393.4	OK	OK	
58	2	3393.59	3393.09	0.35	3393.79	3394.09	3395.2	OK	OK	
59	2	3398.36	3397.86	0.35	3398.56	3398.86	3400.0	OK	OK	
60	2	3400.38	3399.88	0.35	3400.58	3400.88	3402.0	OK	OK	
61	2	3402.48	3401.98	0.35	3402.68	3402.98	3404.1	OK	OK	
62	2	3405.19	3404.69	0.35	3405.39	3405.69	3406.8	OK	OK	
63	2	3413.56	3413.06	0.35	3413.76	3414.06	3415.2	OK	OK	
64	2	3416.76	3416.26	0.35	3416.96	3417.26	3418.4	OK	OK	
65	2	3420.63	3420.13	0.35	3420.83	3421.13	3422.2	OK	OK	
66	2	3422.76	3422.26	0.35	3422.96	3423.26	3424.4	OK	OK	

SUMMERLIN VILLAGE 23A PARCEL O
FINISH FLOOR ANALYSIS - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline $F.F._{min}$[3] (ft)	T/C + 6" $F.F._{min}$[4] (ft)	$F.F._{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
67	2	3423.31	3422.81	0.35	3423.51	3423.81	3424.9	OK	OK	
68	2	3423.82	3423.32	0.35	3424.02	3424.32	3425.4	OK	OK	
69	3	3419.10	3418.60	0.43	3419.46	3419.60	3420.3	OK	OK	
70	3	3416.12	3415.62	0.43	3416.48	3416.62	3417.8	OK	OK	
71	3	3413.35	3412.85	0.43	3413.71	3413.85	3414.9	OK	OK	
72	3	3411.75	3411.25	0.43	3412.11	3412.25	3413.4	OK	OK	
73	3	3411.77	3411.27	0.43	3412.13	3412.27	3413.4	OK	OK	
74	3	3414.13	3413.63	0.43	3414.49	3414.63	3415.8	OK	OK	
75	3	3416.35	3415.85	0.43	3416.71	3416.85	3418.0	OK	OK	
76	3	3418.57	3418.07	0.43	3418.93	3419.07	3420.2	OK	OK	
77	3	3421.09	3420.59	0.43	3421.45	3421.59	3422.7	OK	OK	
78	3	3424.31	3423.81	0.43	3424.67	3424.81	3426.2	OK	OK	
79	4	3433.40	3432.90	0.36	3433.62	3433.90	3435.0	OK	OK	
80	4	3431.48	3430.98	0.36	3431.70	3431.98	3433.1	OK	OK	
81	4	3428.62	3428.12	0.36	3428.84	3429.12	3430.2	OK	OK	
82	4	3425.76	3425.26	0.36	3425.98	3426.26	3427.4	OK	OK	
83	4	3422.89	3422.39	0.36	3423.11	3423.39	3424.5	OK	OK	
84	4	3420.03	3419.53	0.36	3420.25	3420.53	3421.6	OK	OK	
85	4	3415.70	3415.20	0.36	3415.92	3416.20	3417.3	OK	OK	
86	4	3412.79	3412.29	0.36	3413.01	3413.29	3414.4	OK	OK	
87	4	3409.97	3409.47	0.36	3410.19	3410.47	3411.6	OK	OK	
88	4	3407.14	3406.64	0.36	3407.36	3407.64	3408.7	OK	OK	
89	4	3404.32	3403.82	0.36	3404.54	3404.82	3405.9	OK	OK	
90	4	3401.24	3400.74	0.36	3401.46	3401.74	3402.8	OK	OK	
91	3	3393.88	3393.38	0.43	3394.24	3394.38	3395.5	OK	OK	6
92	3	3396.62	3396.12	0.43	3396.98	3397.12	3398.2	OK	OK	
93	3	3399.44	3398.94	0.43	3399.80	3399.94	3401.0	OK	OK	
94	3	3402.26	3401.76	0.43	3402.62	3402.76	3403.9	OK	OK	
95	3	3405.08	3404.58	0.43	3405.44	3405.58	3406.7	OK	OK	
96	3	3407.25	3406.75	0.43	3407.61	3407.75	3408.9	OK	OK	
97	3	3403.49	3402.99	0.43	3403.85	3403.99	3405.1	OK	OK	6
98	3	3401.73	3401.23	0.43	3402.09	3402.23	3403.3	OK	OK	
99	3	3399.13	3398.63	0.43	3399.49	3399.63	3400.7	OK	OK	

SUMMERLIN VILLAGE 23A PARCEL O
FINISH FLOOR ANALYSIS - CITY OF LAS VEGAS JURISDICTION

INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline F.F.$_{min}$[3] (ft)	T/C + 6" F.F.$_{min}$[4] (ft)	F.F.$_{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
100	3	3396.53	3396.03	0.43	3396.89	3397.03	3398.1	OK	OK	
101	3	3393.98	3393.48	0.43	3394.34	3394.48	3395.6	OK	OK	
102	5W	3390.69	3390.19	0.39	3390.97	3391.19	3392.3	OK	OK	
103	5W	3387.76	3387.26	0.39	3388.04	3388.26	3389.4	OK	OK	
104	5W	3386.11	3385.61	0.39	3386.39	3386.61	3387.7	OK	OK	
105	5E	3388.42	3387.92	0.39	3388.70	3388.92	3389.4	OK	OK	
106	5E	3390.80	3390.30	0.39	3391.08	3391.30	3392.4	OK	OK	

Where:

1: Top of Curb at High Side of Lot

2: TC-0.38 (For Roll Curb), TC-0.5 (For L Curb)

3: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = (2 x D_{100}) + F/L

4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches

5: Design G.F.F. calculated as 1' max below design F.F. per maximum step down in garage.

6: These lots have an adjacent solid grouted wall that protects the FF.

City of Las Vegas Finished Floor Criteria:

-The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street.

-The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb.

APPENDIX G

Reference Material

Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements
by G.C. Wallace, CLV DS3402, RFCD No. 03-5424

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: October 23, 2003
TO: **Land Development Services** Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Technical Drainage Study for: **Summerlin Village 23A - Unit 2 Improvements**			**COPIES TO:** G.C. Wallace
Cross Streets:	Desert Foothills Drive & Alta Drive			Howard Hughes Corp.
FILE NO.:	F:\Depot\DSMEMOS\DS3402B.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.#
1st Submittal	8/8/2003	8/26/2003	Conditional Approval	$250.00	109118: $250
CCRFCD	10/9/2003	10/23/2003	Concurrence	N/C	N/C
			TOTAL FEES (LDDRS):	**$250.00**	----

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. *All the interim berms and storm drains are owned and to be maintained by Howard Hughes Corporation.*

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

T/R/S: T20S/R59E/22
AREA K-22

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

RECEIVED
OCT 9 2003

Gale Wm. Fraser, II, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Chip Maxfield
Vice-Chairman
Clark County

Shari Buck
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Mayor James Gibson
City of Henderson

Michael Mack
City of Las Vegas

Mayor Bill Nicholes
City of Mesquite

Bruce L. Woodbury
Clark County

October 6, 2003

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. Fourth St
Las Vegas, NV 89101

DS3402

K-22
N/C

DISTRICT CONCURRENCE: SUMMERLIN VILLAGE 23A UNIT 2 IMPROVEMENTS (DS3402) (RFCD No. 03-5424)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated September 5, 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 September 5, 2003.

District concurs with acceptance of this Technical 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

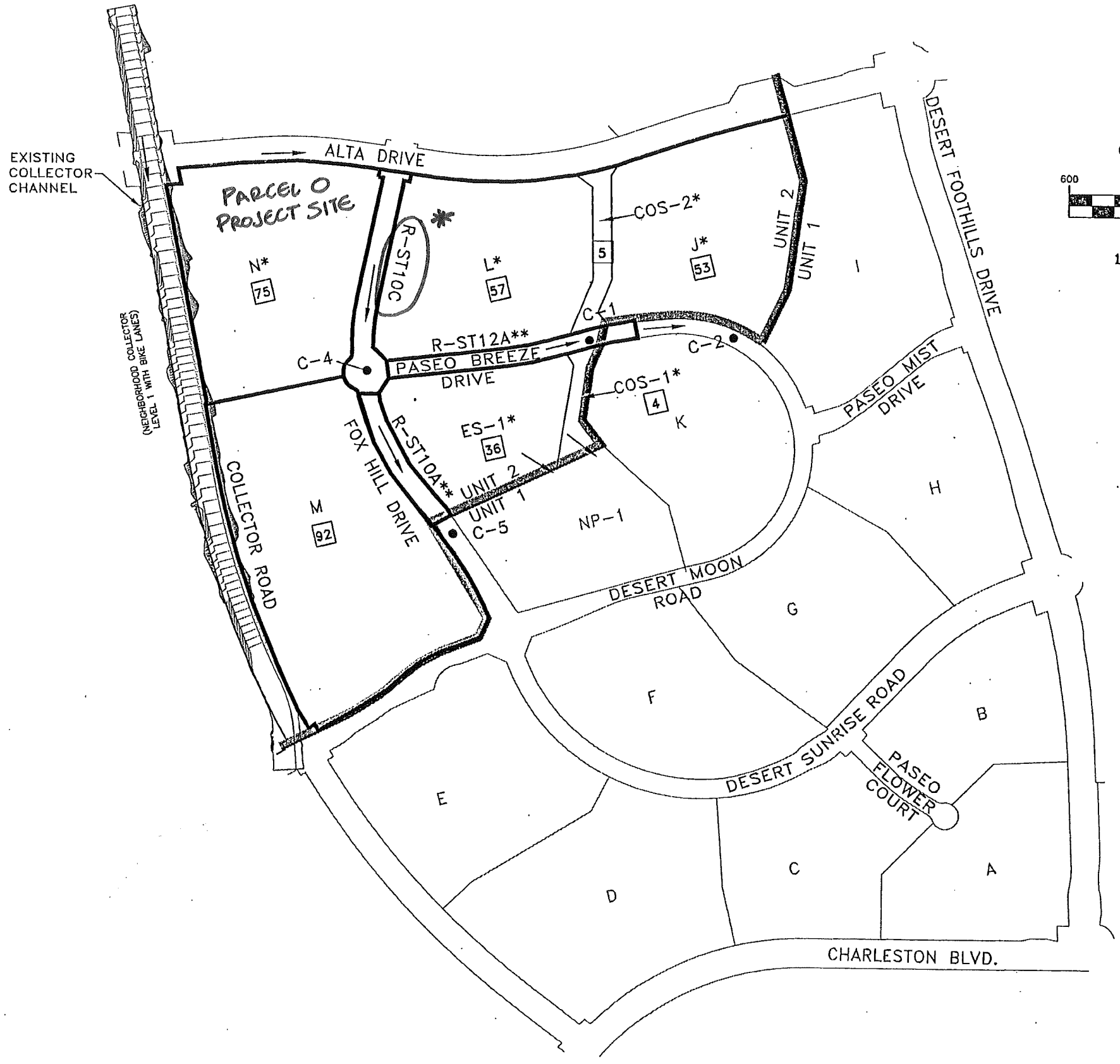
ART:css

c: Randall K. Gremlich, P.E., G. C. Wallace, Inc.

File: 20-59-22.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*

Referenced Drainage Exhibits



NORTH

SCALE: 1"=600'

GRAPHIC SCALE

600 0 300 600

(IN FEET)

1 inch = 600 ft.

SUMMARY OF HEC-1 MODEL

BASIN OR LOC.	Q100 (CFS)	Q10 (CFS)
RST10C	13	6
N*	75	33
C-4	88	40
RST10A**	8	4
M	92	36
C-5	178	76
L*	57	24
RST12A**	10	5
COS-2*	5	2
C-1	68	29
J*	53	21
C-2	121	51
ES-1*	36	15
COS-1*	4	1

* TAKEN DIRECTLY FROM THE CONCEPTUAL STUDY

**TAKEN DIRECTLY FROM THE UNIT 1 STUDY

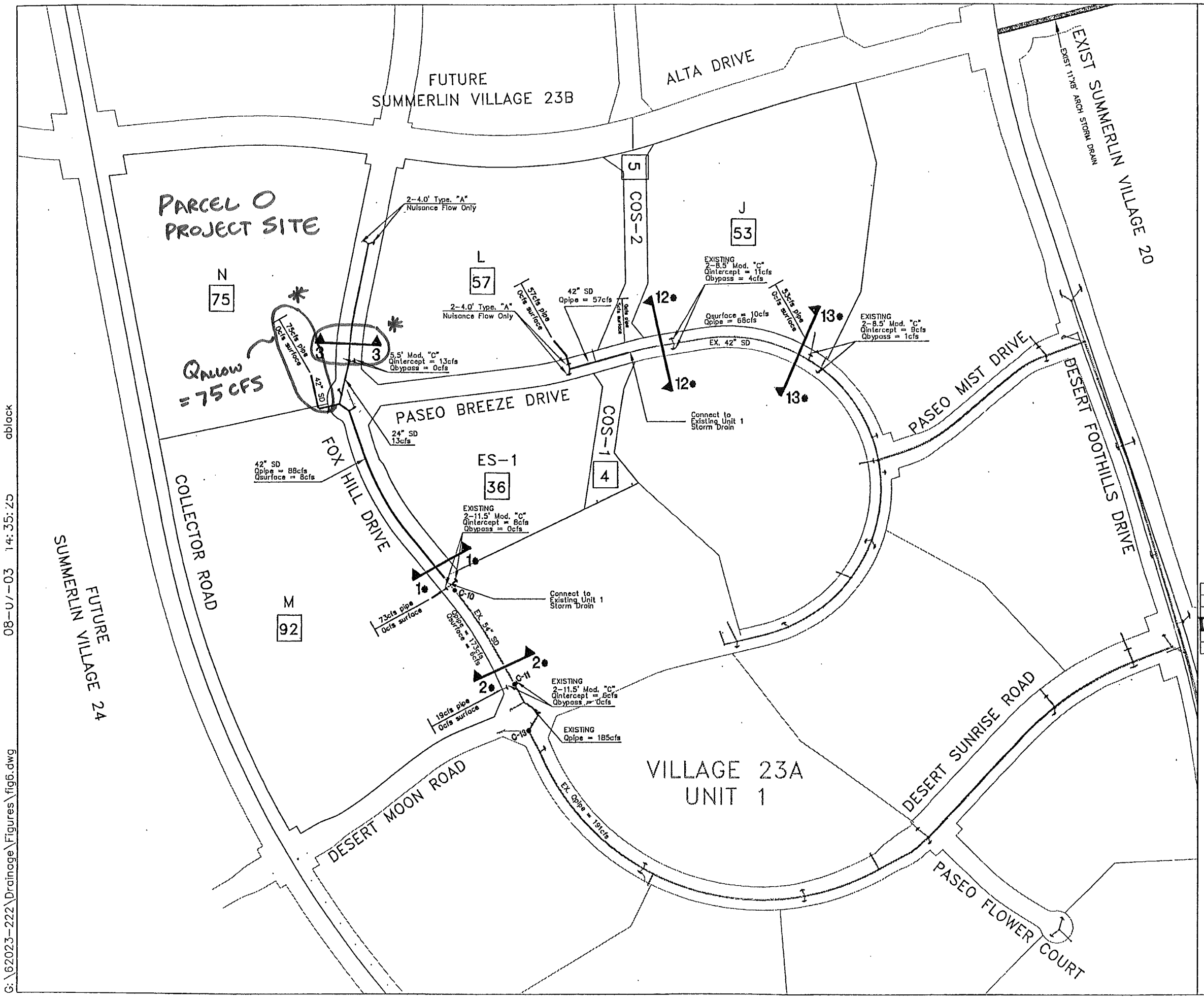
LEGEND

- R-ST11B — REVISED DRAINAGE BASINS
- ● COM1 — CONCENTRATION POINT
- SUBBASIN BOUNDARY
- UNIT BOUNDARY
- [5] — MAXIMUM DISCHARGE FROM PARCEL
- FLOW DIRECTION

SUMMERLIN VILLAGE 23A
UNIT 2 IMPROVEMENTS

FIGURE 5
DRAINAGE BASINS FOR
DROP INLET SIZES

G.C. WALLACE, INC.
Engineers/Planners/Surveyors



STREET CROSS SECTION SUMMARY

X-SECT LABEL	SLOPE %	Q100(cfs)	D100(ft)	V100(fps)	VxD
1*	4.9	28	0.44	5.9	2.6
2*	1.0	17	0.48	2.9	1.4
3	5.3	13	0.35	5.1	1.8
12*	2.7	15	0.40	4.1	1.6
13*	6.0	20	0.39	5.9	2.3

* ANALYZED IN THE UNIT 1 STUDY

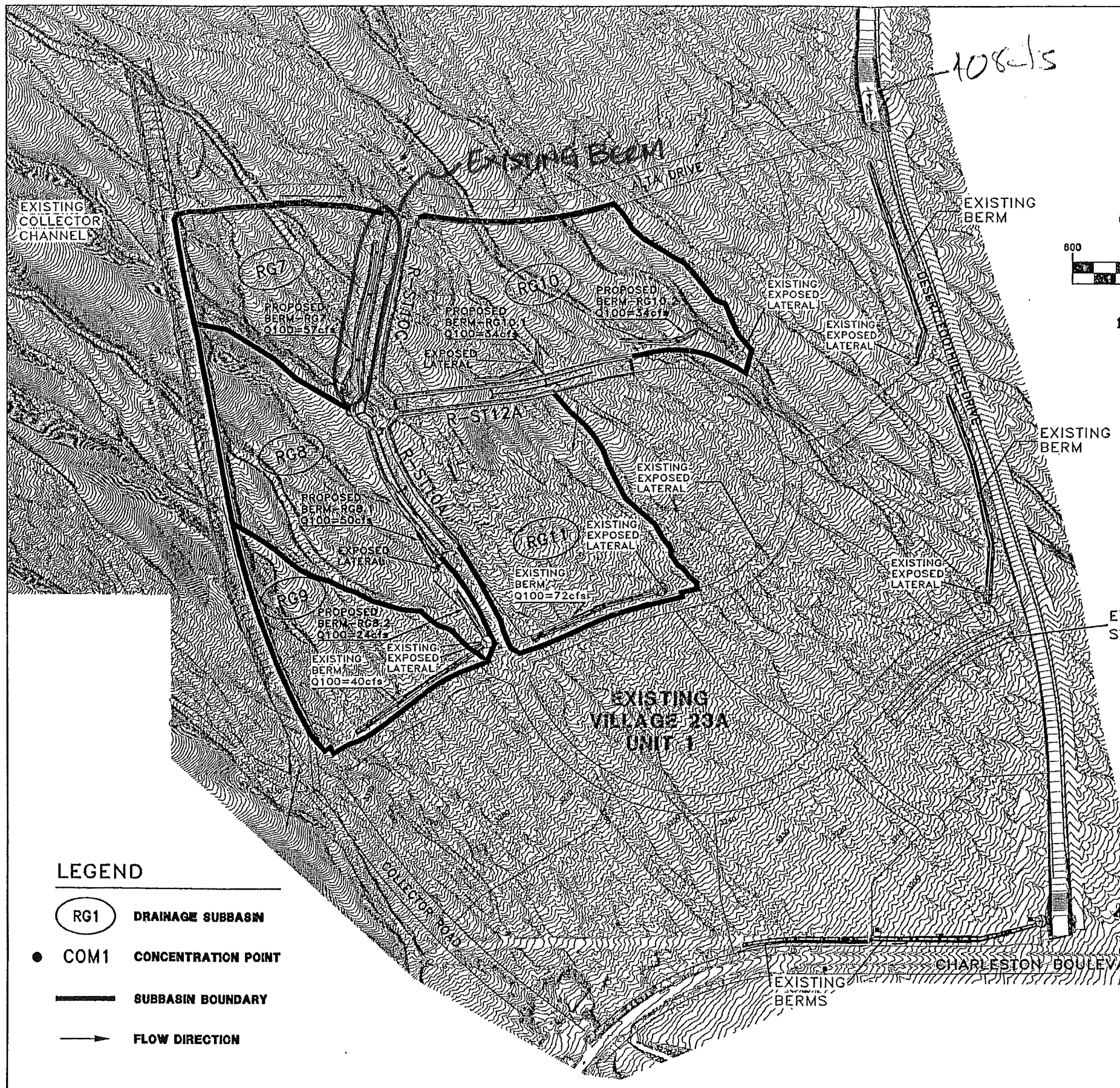
SUMMERLIN VILLAGE 23A
UNIT 2 IMPROVEMENTS

FIGURE 6

DRAINAGE FACILITIES MAP

G.C. WALLACE, INC.
Engineers/Planners/Surveyors

G:\62023-222\Drainage\Figures\fig6.dwg 08-07-03 14:35:25 ablock



-108-1s

NORTH

SCALE: 1"=600'

GRAPHIC SCALE

600 0 300 600

(IN FEET)

1 inch = 600 ft.

SUMMARY OF HEC-1 MODEL

BASIN OR LOC.	Q100 (CFS)	Q10 (CFS)
RG7*	57	22
RG8*	74	30
RG9*	40	15
RG10*	68	22
RG11*	72	26

* REFERENCED FROM THE VILLAGE 23A ROUGH GRADING STUDY

BERM SELECTIONS

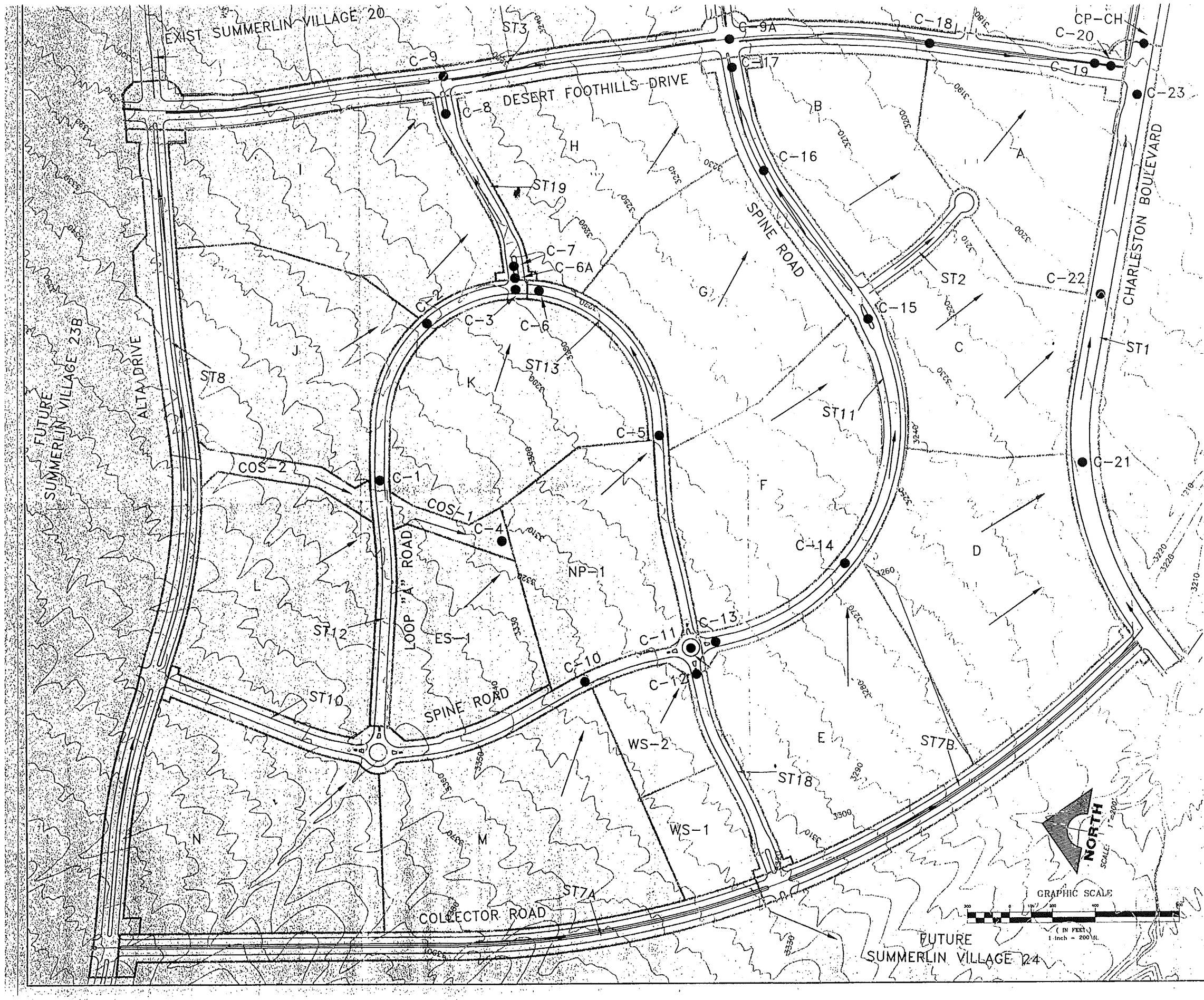
BERM LOCATION	Q100 (CFS)	D (ft)	V (fps)	INLET DEPTH
RG7	57	1.0	6.0	3.6
RG8.1	50	1.1	4.7	3.3
RG8.2	24	0.8	4.7	6.4
RG10.1	34	1.0	3.8	2.6
RG10.2	34	0.9	4.8	2.8

SUMMERLIN VILLAGE 23A
UNIT 2 IMPROVEMENTS

FIGURE 7

INTERIM CONDITIONS

G.C. WALLACE, INC.
Engineers/Planners/Surveyors



LEGEND

DRAINAGE SUBBASIN BOUNDARY

ST11 DRAINAGE SUBBASIN

C-21 CONCENTRATION POINT

SUMMARY OF HEC-1 MODEL

BASIN OR LOCATION	AREA (AC.)	Q100 (CFS)	Q10 (CFS)
L	20.8	57	24
COS-2	2.0	5	2
C-1	–	61	25
J	20.5	53	21
C-2	–	113	47
ST12	5.3	19	9
C-3	–	129	55
ES-1	25.9	36	15
COS-1	1.6	4	1
C-4	–	40	16
NP-1	15.5	23	5
C-5	–	61	21
ST13	3.4	12	6
C-6	–	72	27
C-6A	–	202	81
K	20.4	84	29
C-7	–	260	108
I	23.4	61	24
C-8	–	320	132
ST19	2.1	8	4
C-9	–	326	135
N	25.0	75	33
M	25.9	67	27
C-10	–	140	60
ST10	7.0	23	11
C-11	–	161	70
WS-1	5.0	18	9
WS-2	5.1	19	9
C-12	–	37	18
ST18	2.2	8	4
C-13	–	198	89
E	23.4	64	27
C-14	–	262	116
F	21.3	59	25
C-15	–	319	140
G	20.1	51	20
C-16	–	369	159
H	19.7	51	20
ST11	10.2	34	17
C-17	–	452	196
C-9A	–	777	329
ST2	1.3	6	3
B	15.4	46	20
C-18	–	799	348
A	16.1	50	22
C-19	–	839	365
ST3	17.0	53	27
C-20	–	891	392
ST7B	6.5	25	13
D	25.5	66	27
C-21	–	89	38
C	17.4	54	24
C-22	–	140	60
ST-1	–	33	17
C-23	–	170	76
CP-CH	–	1056	468
ST7A	9.4	32	16
ST8	12.9	42	21

DESIGN: FF
DRAWN: FF
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 01-23-02
PLOT TIME: 09:16:33

DATE | DESCRIPTION | REV | DATE | APP | DATE | CONF. APP | DATE

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
TELEPHONE: (702) 804-2000 • FAX: (702) 804-2299
G:\00222-070\Exhibits\235-EXHIBIT.dwg, 1:200, 1/23/02 9:16:33 AM, Administrator

THE HOWARD HUGHES CORPORATION
SUMMERLIN VILLAGE 23A
FIGURE 6
ULTIMATE DRAINAGE PATTERNS

SHEET FIG6
SHT OF SHTS

Report Excerpt

Paseo Breeze Drive

The existing 42-inch storm drain designed in the Unit 1 study will be extended into Unit 2 along Paseo Breeze Drive in order to serve Parcel L. The ultimate development of Parcel L may discharge a maximum of 57 cfs into the 42-inch storm drain lateral. Along with the 42-inch lateral two 4-foot Type "A" drop inlets are proposed to intercept nuisance flow. The total flow in the 42-inch main line is 57 cfs.

Sections 12 and 13 were analyzed and approved in the Unit 1 Study. This study is not altering and accepts anything that was previously proposed in the Unit 1 Study. Therefore, no further analysis is necessary. Storm drain calculations are provided for the extension of the 42-inch storm drain. Referenced drop inlet street depth calculations and storm drain for the existing line are provided in Appendix C.

VIII. INTERIM CONDITIONS

The interim analysis is based on the hydrology completed for the Summerlin Village 23A Rough Grade Study and the Unit 1 Study.

Figure 7 shows the referenced basins combined with the basins for the proposed improvements. The referenced HEC-1 model and supporting calculations are attached in Appendix C. The assumption is made that the Unit 1 Improvements will be constructed prior to or concurrently with this project.

The following is a list of the measures that will be required to intercept storm flows in the interim conditions:

- The 42-inch lateral to Parcel M will be left exposed.
- The 42-inch lateral to Parcel L will be left exposed.
- The 42-inch lateral to Parcel N will be left exposed. *
- A 2.0-foot high berm along the southern boundary of Parcel M will remain from the Unit 1 study.
- A 2.0-foot high berm along the southern boundary of Parcel NP-1 will remain from the Unit 1 study.
- A 2.2-foot high berm along the eastern boundary of Parcel N will be constructed to direct flow to the exposed 42-inch lateral. *
- A 2.2-foot high berm along the eastern boundary of Parcel M will be

Ultimate Condition HEC-1 Analysis

HEC-1 Model

Revised Conceptual Study

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY  1991                 *
*          VERSION 4.0.1E               *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  07/30/03  TIME  08:43:05   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
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
    1     ID   ************************************************************
    2     ID   * ..................................................... *
    3     ID   * :                SUMMERLIN VILLAGE 23A              : *
    4     ID   * :                UNIT 2 IMPROVEMENTS                : *
    5     ID   * :                DEVELOPED ONSITE                   : *
    6     ID   * :                                                   : *
    7     ID   * :...................................................: *
    8     ID   * :            RETURN PERIOD_ _ _ _10 & 100-YEAR      : *
    9     ID   * :            DISTRIBUTION_ _ _ _ 6-HOUR SDN3        : *
   10     ID   * :            PROJECT NO_ _ _ _ _ 62023.222          : *
   11     ID   * :            FILENAME_ _ _ _ _ _  222-ULT.H1        : *
   12     ID   * :            DATE_ _ _ _ _ _ _ _ 7/9/2003           : *
   13     ID   * :            MODELED BY_ _ _ _ _      KWL           : *
   14     ID   * :                                                   : *
   15     ID   * :  DEPTH AREA REDUCTION FACTORS:                    : *
   16     ID   * :  AREA              DARF                           : *
   17     ID   * :  0.5 SQ MI          .98                           : *
   18     ID   * :  10-YEAR STORM      .56                           : *
   19     ID   * :...................................................: *
   20     ID   ************************************************************
   21     IT       5       0       0     200
   22     IO       5       0
   23     IN       5       0       0
   24     JR    PREC     1.0     .98     .56

   25     KK       L
   26     KM
   27     KM    SINGLE FAMILY: DENSITY = 6.3 UNITS/ACRE
   28     KM
   29     KM             AREA    20.8      AC
   30     KM             Tlag   13.73     MIN
   31     KM               CN    88.0
   32     BA   .0325
   33     PB   3.29
   34     PC   0.000   .0200   .0570   .0700   .0870   .1080   .1240   .1300   .1300   .1300
   35     PC   .1300   .1300   .1300   .1330   .1400   .1420   .1480   .1580   .1720   .1810
   36     PC   .1900   .1970   .1990   .2000   .2010   .2040   .2140   .2290   .2410   .2490
   37     PC   .2510   .2560   .2700   .2780   .2810   .2830   .2950   .3220   .3520   .4090
   38     PC   .4990   .5900   .7100   .7440   .7810   .8120   .8190   .8350   .8510   .8560
   39     PC   .8600   .8680   .8760   .8880   .9100   .9260   .9370   .9500   .9700   .9760
   40     PC   .9820   .9850   .9870   .9890   .9900   .9930   .9930   .9940   .9950   .9980
   41     PC   .9980   .9990  1.000
   42     LS       0    88.0
   43     UD   .1373
          *

   44     KK   COS-2
   45     KM
   46     KM    OPEN SPACE (DESERT LANDSCAPING)
   47     KM
   48     KM             AREA     2.0      AC
   49     KM             Tlag    6.59     MIN
   50     KM               CN      81
   51     BA  0.0032
```

1 HEC-1 INPUT PAGE 2

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   52     LS       0    81.0
   53     UD   .0659
          *

   54     KK     C-1
   55     KM   COMBINE L AND COS-2
   56     HC       2
          *
```

```
 57          KK    RC-1
 58          KM   ROUTE DOWNSTREAM OF L THROUGH LOOP ROAD "A" TO LINK ROAD
 59          RD     600   0.023   0.013            CIRC     3.5
             *

 60          KK       J
 61          KM
 62          KM    SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
 63          KM
 64          KM           AREA    20.5      AC
 65          KM           Tlag   10.92     MIN
 66          KM             CN    86.0
 67          BA  0.0320
 68          LS       0    86.0
 69          UD   .1092
             *

 70          KK     C-2
 71          KM   COMBINE C-1 AND J
 72          HC       2
             *

 73          KK    RC-2
 74          KM   ROUTE DOWNSTREAM OF J THROUGH LOOP ROAD "A"
 75          RD     500   0.023   0.013            CIRC     3.0
             *

 76          KK    ST12
 77          KM
 78          KM    LOOP ROAD "A"
 79          KM
 80          KM           AREA     5.3      AC
 81          KM           Tlag    9.13     MIN
 82          KM             CN      94
 83          BA   .0083
 84          LS       0      94
 85          UD   .0913
             *

 86          KK     C-3
 87          KM   COMBINE C-2 AND LOOP ROAD "A"
 88          HC       2
             *
1                                      HEC-1 INPUT                                    PAGE  3

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

 89          KK    ES-1
 90          KM
 91          KM    SINGLE FAMILY: DENSITY = 6.3 UNITS/ACRE
 92          KM    (POSSIBLE SCHOOL SITE)
 93          KM
 94          KM           AREA    12.6      AC
 95          KM           Tlag   10.51     MIN
 96          KM             CN    88.0
 97          BA   .0198
 98          LS       0    88.0
 99          UD   .1051
             *

100          KK   COS-1
101          KM
102          KM    OPEN SPACE (DESERT LANDSCAPING)
103          KM
104          KM           AREA     1.6      AC
105          KM           Tlag    7.77     MIN
106          KM             CN    81.0
107          BA  0.0025
108          LS       0    81.0
109          UD   .0777
             *

110          KK     C-4
111          KM   COMBINE ES-1 AND COS-1
112          HC       2
             *

113          KK    NP-1
114          KM
115          KM    PARK (GRASS-FAIR CONDITIONS)
116          KM
117          KM           AREA    15.5      AC
118          KM           Tlag   14.44     MIN
119          KM             CN    74.0
120          BA   .0243
121          LS       0      74
122          UD   .1444
             *

123          KK     C-5
124          KM   COMBINE C-4 AND LOOP ROAD "A"
125          HC       2
             *

126          KK    RC-5
127          KM   ROUTE DOWNSTREAM OF NP-1 THROUGH LOOP ROAD "A"
128          RD    1000   0.023   0.013            CIRC     4.0
             *
1                                      HEC-1 INPUT                                    PAGE  4

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

```
129          KK    ST13
130          KM
131          KM    LOOP ROAD "A"
132          KM
133          KM           AREA     3.4      AC
134          KM           Tlag   10.56      MIN
135          KM             CN     95
136          BA   .0054
137          LS      0      95
138          UD   .1056
             *

139          KK     C-6
140          KM   COMBINE ST13 AND C-5
141          HC      2
             *

142          KK    C-6A
143          KM   COMBINE C-6 AND C-3
144          HC      2
             *

145          KK       K
146          KM
147          KM    SINGLE FAMILY ATTACHED: DENSITY = 10.0 UNITS/ACRE
148          KM
149          KM           AREA    20.4      AC
150          KM           Tlag    9.44      MIN
151          KM             CN     90
152          BA  0.0319
153          LS      0      90
154          UD   .0944
             *

155          KK     C-7
156          KM   COMBINE C-6A AND K
157          HC      2
             *

158          KK    RC-7
159          KM   ROUTE DOWNSTREAM OF K THROUGH LINK ROAD
160          RD    1000   0.046   0.013            CIRC     5.5
             *

161          KK       I
162          KM
163          KM   SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
164          KM
165          KM           AREA    23.4      AC
166          KM           TLAG   .1182      HR
167          KM             CN     86
168          BA   .0365
169          LS      0      86
170          UD   .1182
             *
```



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

171          KK     C-8
172          KM   COMBINE C-7 AND I
173          HC      2
             *

174          KK    ST19
175          KM
176          KM    LINK ROAD (SOUTH)
177          KM
178          KM           AREA     2.1      AC
179          KM           Tlag    6.63      MIN
180          KM             CN     95
181          BA  0.0033
182          LS      0      95
183          UD   .0663
             *

184          KK     C-9
185          KM   COMBINE SPINE ROAD AND C-8
186          HC      2
             *

187          KK   R-C-9
188          KM   ROUTE DOWNSTREAM OF I THROUGH DESERT FOOTHILLS DRIVE
189          RD    1350   0.029   0.013            CIRC     6.0
             *

190          KK       N
191          KM
192          KM    SINGLE FAMILY: DENSITY = 6.3 UNITS/ACRE
193          KM
194          KM           AREA    25.0      AC
195          KM           Tlag   10.63      MIN
196          KM             CN     90
197          BA   .0390
198          LS      0      90
199          UD   .1063
             *

200          KK     R-N
201          KM   ROUTE DOWNSTREAM OF N THROUGH SPINE ROAD
202          RD    1000   0.035   0.013            CIRC     3.5
             *

203          KK       M
```

```
204          KM
205          KM    SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
206          KM
207          KM            AREA   35.95      AC
208          KM            Tlag   0.140      HR
209          KM              CN      86
210          BA   .0561
211          LS      0       86
212          UD    .140
             *
```

1 HEC-1 INPUT PAGE 6

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

213          KK    C-10
214          KM   COMBINE N AND M
215          HC       2
             *

216          KK   RC-10
217          KM   ROUTE DOWNSTREAM OF M THROUGH SPINE ROAD
218          RD     750   0.035   0.013            CIRC     5.0
             *

219          KK    ST10
220          KM
221          KM     SPINE ROAD
222          KM
223          KM            AREA     7.0      AC
224          KM            Tlag   10.09      MIN
225          KM              CN      93
226          BA   .0109
227          LS      0       93
228          UD   .1009
             *

229          KK    C-11
230          KM   COMBINE C-11 AND SPINE ROAD
231          HC       2
             *

232          KK   RC-11
233          KM   ROUTE DOWNSTREAM OF WS-2 THROUGH LOOP ROAD "A"
234          RD     900   0.021   0.013            CIRC     2.5
             *

235          KK    ST18
236          KM
237          KM    LOOP ROAD "A"
238          KM
239          KM            AREA     2.2      AC
240          KM            Tlag    8.43      MIN
241          KM              CN      95
242          BA  0.0035
243          LS      0       95
244          UD   .0843
             *

245          KK   C-13
246          KM   COMBINE C-10 AND C-11
247          HC       2
             *
```

1 HEC-1 INPUT PAGE 7

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

248          KK       E
249          KM
250          KM    SINGLE FAMILY: DENSITY = 6.3 UNITS/ACRE
251          KM
252          KM            AREA    23.4      AC
253          KM            Tlag   13.20      MIN
254          KM              CN      88
255          BA   .0366
256          LS      0       88
257          UD   .1320
             *

258          KK    C-14
259          KM   COMBINE C-13 AND E
260          HC       2
             *

261          KK   RC-14
262          KM   ROUTE DOWNSTREAM OF E THROUGH SPINE ROAD
263          RD    1200   0.025   0.013            CIRC     4.0
             *

264          KK       F
265          KM
266          KM   SINGLE FAMILY: DENSITY = 6.3 UNITS/ACRE
267          KM
268          KM            AREA    20.5      AC
269          KM            Tlag   10.90      MIN
270          KM              CN      88
271          BA   .0320
272          LS      0       88
273          UD   .1090
             *

274          KK    C-15
275          KM   COMBINE C-14 AND F
276          HC       2
```

```
                *
277             KK   RC-15
278             KM   ROUTE DOWNSTREAM OF F THROUGH SPINE ROAD
279             RD    800   0.025   0.013            CIRC     4.5
                *

280             KK   COS-3
281             KM
282             KM   OPEN SPACE AREA (DESERT LANDSCAPING)
283             KM
284             KM           AREA     2.3      AC
285             KM           Tlag    8.14     MIN
286             KM             CN      81
287             BA   .0036
288             LS      0      81
289             UD   .0814
                *
```



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

290             KK   C-15A
291             KM   COMBINE C-15 AND COS-3
292             HC      2
                *

293             KK      G
294             KM
295             KM    SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
296             KM
297             KM           AREA    18.3      AC
298             KM           Tlag   14.29     MIN
299             KM             CN      86
300             BA  0.0286
301             LS      0      86
302             UD   .1429
                *

303             KK    C-16
304             KM   COMBINE C-15 AND G
305             HC      2
                *

306             KK   RC-16
307             KM   ROUTE DOWNSTREAM OF F THROUGH SPINE ROAD
308             RD    650   0.025   0.013            CIRC     5.5
                *

309             KK      H
310             KM
311             KM    SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
312             KM
313             KM           AREA    19.7      AC
314             KM           Tlag   12.43     MIN
315             KM             CN      86
316             BA   .0308
317             LS      0      86
318             UD   .1243
                *

319             KK    ST11
320             KM
321             KM    SPINE ROAD (SOUTH)
322             KM
323             KM           AREA    10.2      AC
324             KM           Tlag   13.78     MIN
325             KM             CN      95
326             BA   .0160
327             LS      0      95
328             UD   .1378
                *
```



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

329             KK    C-17
330             KM   COMBINE H, C-16 AND SPINE ROAD
331             HC      3
                *

332             KK    C-9A
333             KM   COMBINE C-17 AND C-9
334             HC      2
                *

335             KK   RC-9A
336             KM   ROUTE DOWNSTREAM OF H THROUGH DESERT FOOTHILLS DRIVE
337             RD    1000   0.029   0.013            CIRC     7.5
                *

338             KK     ST2
339             KM
340             KM    STREET "CDS"
341             KM
342             KM           AREA     1.3      AC
343             KM           Tlag    4.32     MIN
344             KM             CN      93
345             BA   .0021
346             LS      0      93
347             UD   .0423
                *
```

```
348          KK    RST2
349          KM   ROUTE DOWNSTREAM OF STREET "A" THROUGH B
350          RD    1200   0.025   0.013            CIRC     2.0
             *

351          KK       B
352          KM
353          KM    MULTI-FAMILY: DENSITY = 18.3 UNITS/ACRE
354          KM
355          KM            AREA    15.4      AC
356          KM            Tlag   10.81     MIN
357          KM              CN      90
358          BA   .0241
359          LS      0       90
360          UD   .1081
             *

361          KK    C-18
362          KM   COMBINE C-9A, ST2 AND B
363          HC       3
             *
1                                        HEC-1 INPUT                                        PAGE 10

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

364          KK   RC-18
365          KM   ROUTE DOWNSTREAM OF B THROUGH DESERT FOOTHILLS DRIVE
366          RD    1000   0.029   0.013            CIRC     7.5
             *

367          KK       A
368          KM
369          KM    MULTI-FAMILY: DENSITY = 18.3 UNITS/ACRE
370          KM
371          KM            AREA    16.1      AC
372          KM            Tlag   10.14     MIN
373          KM              CN      90
374          BA   .0252
375          LS      0       90
376          UD   .1014
             *

377          KK    C-19
378          KM   COMBINE C-18 AND A
379          HC       2
             *

380          KK     ST3
381          KM
382          KM    DESERT FOOTHILLS DRIVE (SOUTH)
383          KM
384          KM            AREA    17.0      AC
385          KM            Tlag   17.14     MIN
386          KM              CN      95
387          BA   .0265
388          LS      0       95
389          UD   .1714
             *

390          KK    C-20
391          KM   COMBINE C-19 AND A
392          HC       2
             *

393          KK    ST7B
394          KM
395          KM    COLLECTOR ROAD (SOUTH)
396          KM
397          KM            AREA     6.5      AC
398          KM            Tlag    7.94     MIN
399          KM              CN      95
400          BA   .0102
401          LS      0       95
402          UD   .0794
             *
1                                        HEC-1 INPUT                                        PAGE 11

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

403          KK       D
404          KM
405          KM    SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
406          KM
407          KM            AREA    25.5      AC
408          KM            Tlag   11.46     MIN
409          KM              CN      86
410          BA   .0398
411          LS      0       86
412          UD   .1146
             *

413          KK    C-21
414          KM   COMBINE COLLECTOR ROAD AND D
415          HC       2
             *

416          KK   RC-21
417          KM   ROUTE DOWNSTREAM OF D THROUGH CHARELSTON BLVD.
418          RD     900   0.023   0.013            CIRC     4.0
             *

419          KK       C
420          KM
```

```
421          KM    SINGLE FAMILY ATTACHED: DENSITY = 10.0 UNITS/ACRE
422          KM
423          KM             AREA    17.4      AC
424          KM             Tlag   10.09     MIN
425          KM               CN      90
426          BA   .0272
427          LS       0       90
428          UD   .1009
             *

429          KK    C-22
430          KM   COMBINE C-21 AND C
431          HC       2
             *

432          KK   RC-22
433          KM   ROUTE DOWNSTREAM OF C THROUGH CHARLESTON BLVD.
434          RD    1100   0.017   0.013            CIRC     4.0
             *

435          KK    ST-1
436          KM
437          KM    CHARLESTON BOULEVARD
438          KM
439          KM             AREA    10.6      AC
440          KM             Tlag   15.74     MIN
441          KM               CN      94
442          BA   .0165
443          LS       0       94
444          UD   .1574
             *
```

1 HEC-1 INPUT PAGE 12

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

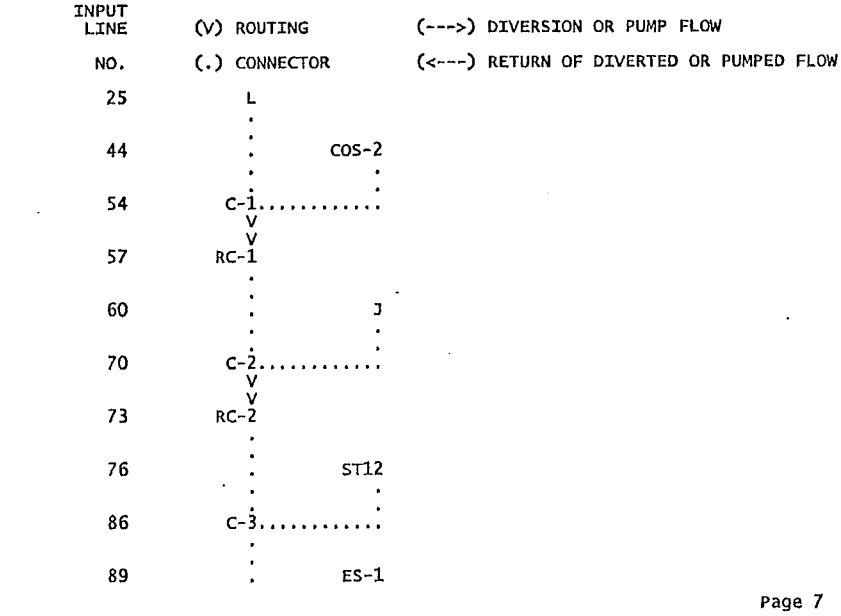
445          KK    C-23
446          KM   COMBINE C-22 AND ST-1
447          HC       2
             *

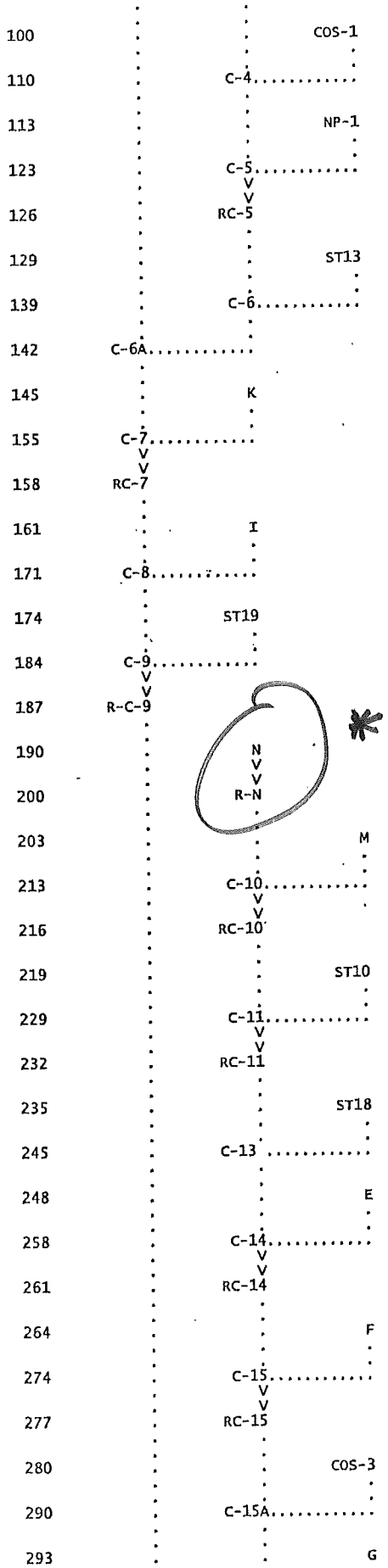
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449          KM   COMBINE C-23 AND C-9B
450          HC       2
             *

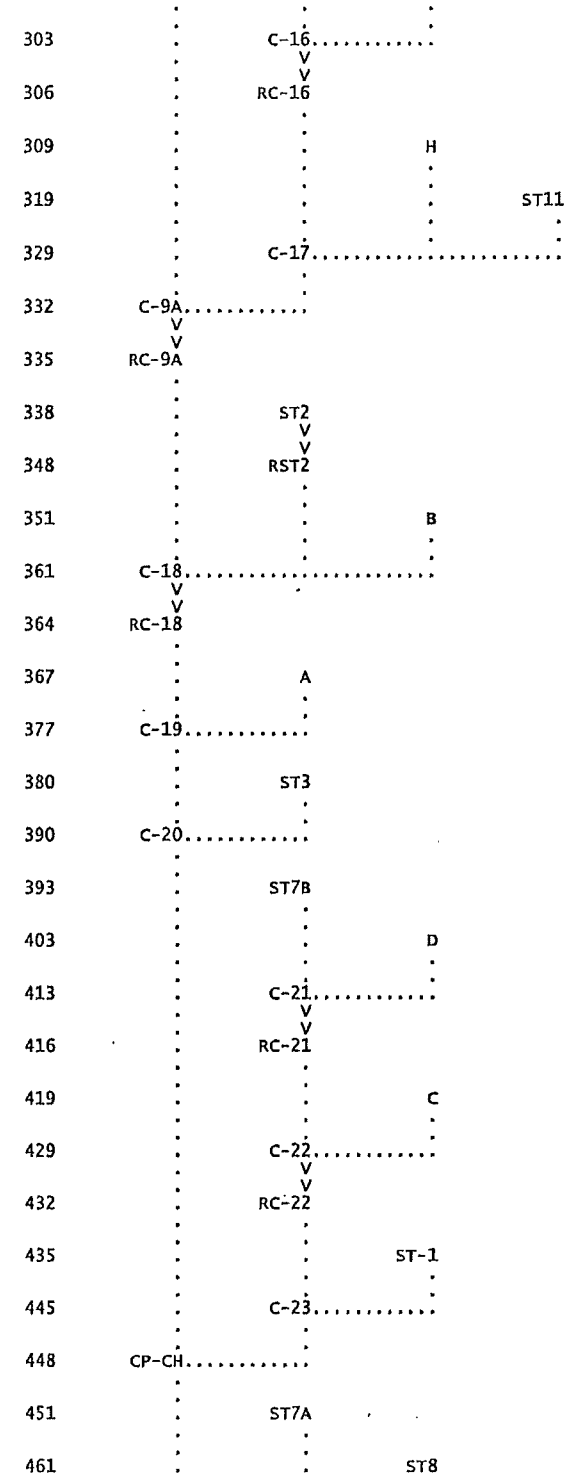
451          KK    ST7A
452          KM
453          KM    COLLECTOR ROAD ROUTED TO RED ROCK DETENTION BASIN
454          KM
455          KM             AREA     9.4      AC
456          KM             Tlag   10.97     MIN
457          KM               CN      95
458          BA   .0147
459          LS       0       95
460          UD   .1097
             *

461          KK     ST8
462          KM
463          KM    ALTA DRIVE
464          KM
465          KM             AREA    12.9      AC
466          KM             Tlag   13.55     MIN
467          KM               CN      94
468          BA   .0202
469          LS       0       94
470          UD   .1355
             *
471          ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK




100
COS-1
110
C-4
113
NP-1
123
C-5
126
RC-5
129
ST13
139
C-6
142
C-6A
145
K
155
C-7
158
RC-7
161
I
171
C-8
174
ST19
184
C-9
187
R-C-9
190
N
200
R-N
203
M
213
C-10
216
RC-10
219
ST10
229
C-11
232
RC-11
235
ST18
245
C-13
248
E
258
C-14
261
RC-14
264
F
274
C-15
277
RC-15
280
COS-3
290
C-15A
293
G



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********
* *
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* Lahey F77L-EM/32 version 5.01 *
* Dodson & Associates, Inc. *
* RUN DATE 07/30/03 TIME 08:43:05 *
****

****
* *
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
* *
****

****
* *
* SUMMERLIN VILLAGE 23A *
* UNIT 2 IMPROVEMENTS *
* DEVELOPED ONSITE *
* *
****

```
RETURN PERIOD_ _ _ _10 & 100-YEAR
DISTRIBUTION_ _ _ _ 6-HOUR SDN3
PROJECT NO_ _ _ _ _ 62023.222
FILENAME_ _ _ _ _ _ 222-ULT.H1
DATE_ _ _ _ _ _ _ _ 7/9/2003
MODELED BY_ _ _ _ _      KWL

DEPTH AREA REDUCTION FACTORS:
AREA                DARF
0.5 SQ MI            .98
10-YEAR STORM        .56
```

```
22 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     0.08 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      0.98      0.56
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 0.98	RATIO 3 0.56
HYDROGRAPH AT	L	0.03	1	FLOW	57.	55.	24.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	COS-2	0.00	1	FLOW	5.	5.	2.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	C-1	0.04	1	FLOW	61.	59.	25.
+				TIME	3.58	3.58	3.58
ROUTED TO	RC-1	0.04	1	FLOW	60.	59.	25.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	J	0.03	1	FLOW	53.	52.	21.
+				TIME	3.50	3.50	3.58
2 COMBINED AT	C-2	0.07	1	FLOW	113.	110.	47.
+				TIME	3.58	3.58	3.58
ROUTED TO	RC-2	0.07	1	FLOW	113.	110.	46.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	ST12	0.01	1	FLOW	19.	18.	9.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	C-3	0.08	1	FLOW	129.	126.	55.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	ES-1	0.02	1	FLOW	36.	35.	15.
+				TIME	3.50	3.50	3.58
HYDROGRAPH AT	COS-1	0.00	1	FLOW	4.	4.	1.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	C-4	0.02	1	FLOW	40.	39.	16.

				TIME	3.50	3.50	3.50
HYDROGRAPH AT	NP-1	0.02	1	FLOW	23.	23.	5.
+				TIME	3.58	3.58	3.58
2 COMBINED AT	C-5	0.05	1	FLOW	61.	60.	21.
+				TIME	3.58	3.58	3.58
ROUTED TO	RC-5	0.05	1	FLOW	61.	59.	21.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	ST13	0.01	1	FLOW	12.	12.	6.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	C-6	0.05	1	FLOW	72.	70.	27.
+				TIME	3.58	3.58	3.58
2 COMBINED AT	C-6A	0.13	1	FLOW	202.	196.	81.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	K	0.03	1	FLOW	64.	63.	29.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	C-7	0.16	1	FLOW	260.	253.	108.
+				TIME	3.58	3.58	3.58
ROUTED TO	RC-7	0.16	1	FLOW	259.	252.	107.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	I	0.04	1	FLOW	61.	59.	24.
+				TIME	3.58	3.58	3.58
2 COMBINED AT	C-8	0.20	1	FLOW	320.	311.	132.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	ST19	0.00	1	FLOW	8.	8.	4.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	C-9	0.20	1	FLOW	326.	317.	135.
+				TIME	3.58	3.58	3.58
ROUTED TO	R-C-9	0.20	1	FLOW	325.	315.	133.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	N	0.04	1	FLOW	75.	73.	33.
+				TIME	3.50	3.50	3.50
ROUTED TO	R-N	0.04	1	FLOW	73.	71.	33.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	M	0.06	1	FLOW	92.	89.	36.
+				TIME	3.58	3.58	3.58
2 COMBINED AT	C-10	0.10	1	FLOW	165.	160.	69.
+				TIME	3.58	3.58	3.58
ROUTED TO	RC-10	0.10	1	FLOW	164.	159.	69.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	ST10	0.01	1	FLOW	23.	23.	11.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	C-11	0.11	1	FLOW	185.	180.	79.
+				TIME	3.58	3.58	3.58
ROUTED TO	RC-11	0.11	1	FLOW	184.	179.	78.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	ST18	0.00	1	FLOW	8.	8.	4.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	C-13	0.11	1	FLOW	191.	186.	82.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	E	0.04	1	FLOW	64.	63.	27.
+				TIME	3.58	3.58	3.58
2 COMBINED AT	C-14	0.15	1	FLOW	255.	249.	109.
+				TIME	3.58	3.58	3.58

ROUTED TO							
+	RC-14	0.15	1	FLOW	252.	246.	107.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	F	0.03	1	FLOW	57.	56.	24.
				TIME	3.50	3.50	3.58
2 COMBINED AT							
+	C-15	0.18	1	FLOW	309.	301.	131.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	RC-15	0.18	1	FLOW	306.	299.	130.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	COS-3	0.00	1	FLOW	6.	5.	2.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	C-15A	0.18	1	FLOW	311.	303.	131.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	G	0.03	1	FLOW	47.	45.	18.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	C-16	0.21	1	FLOW	358.	348.	150.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	RC-16	0.21	1	FLOW	355.	346.	148.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	H	0.03	1	FLOW	51.	50.	20.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	ST11	0.02	1	FLOW	34.	33.	17.
				TIME	3.58	3.58	3.58
3 COMBINED AT							
+	C-17	0.26	1	FLOW	440.	429.	186.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	C-9A	0.46	1	FLOW	764.	744.	319.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	RC-9A	0.46	1	FLOW	759.	739.	315.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	ST2	0.00	1	FLOW	6.	5.	3.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	RST2	0.00	1	FLOW	5.	5.	2.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	B	0.02	1	FLOW	46.	45.	20.
				TIME	3.50	3.50	3.58
3 COMBINED AT							
+	C-18	0.48	1	FLOW	808.	786.	337.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	RC-18	0.48	1	FLOW	802.	780.	333.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A	0.03	1	FLOW	50.	48.	22.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	C-19	0.51	1	FLOW	848.	826.	354.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	ST3	0.03	1	FLOW	53.	52.	27.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	C-20	0.53	1	FLOW	901.	878.	381.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	ST7B	0.01	1	FLOW	25.	24.	13.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	D	0.04	1	FLOW	66.	64.	27.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	C-21	0.05	1	FLOW	89.	87.	38.
				TIME	3.50	3.50	3.50

ROUTED TO							
+	RC-21	0.05	1	FLOW	86.	84.	37.
				TIME	3.50	3.50	3.58
HYDROGRAPH AT							
+	C	0.03	1	FLOW	54.	52.	24.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	C-22	0.08	1	FLOW	140.	136.	60.
				TIME	3.50	3.50	3.58
ROUTED TO							
+	RC-22	0.08	1	FLOW	137.	133.	60.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	ST-1	0.02	1	FLOW	33.	32.	17.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	C-23	0.09	1	FLOW	170.	166.	76.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	CP-CH	0.63	1	FLOW	1071.	1043.	458.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	ST7A	0.01	1	FLOW	32.	31.	16.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	ST8	0.02	1	FLOW	42.	41.	21.
				TIME	3.58	3.58	3.58

1

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

Fox Hill Drive Hydraulic Street Section Computation

Fox Hill Drive (Section 3)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	5.3 %
Discharge	13 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.016
Water Surface Elevation	0.35 ft
Elevation Range	0.00 to 0.57
Flow Area	2.6 ft²
Wetted Perimeter	22.23 ft
Top Width	21.43 ft
Actual Depth	0.35 ft
Critical Elevation	0.46 ft
Critical Slope	0.7 %
Velocity	5.1 ft/s
Velocity Head	0.40 ft
Specific Energy	0.75 ft
Froude Number	2.58
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+44.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.50
0+00.5	0.00
0+02.0	0.13
0+02.0	0.17
0+22.0	0.57
0+42.0	0.17
0+42.0	0.13
0+43.5	0.00
0+43.5	0.50

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G. C. Wallace Inc
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Fox Hill Drive (Section 3)
Worksheet for Irregular Channel

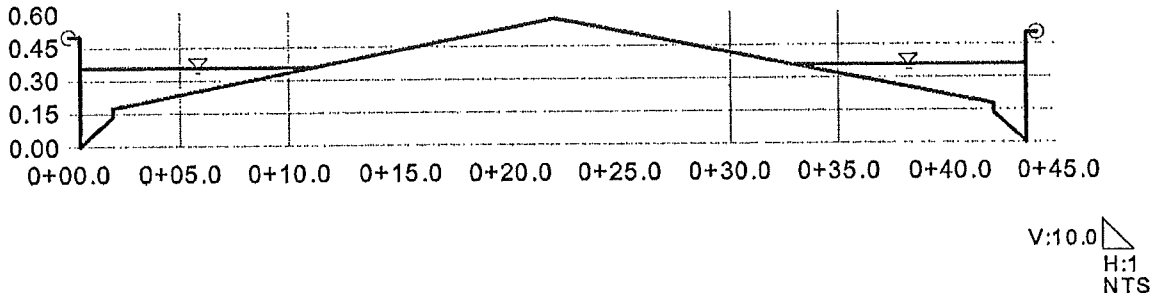
Natural Channel Points	
Station (ft)	Elevation (ft)
0+44.0	0.50

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Section 3
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.016	
Slope	5.3	%
Water Surface Elevation	0.35	ft
Elevation Range	0.00 to 0.57	
Discharge	13	cfs



Fox Hill Drive Drop Inlet and Storm Drain Computations

Modified Type C Drop Inlet Sizing on a C. G.

5.5-ft Drop Inlet @ Section 3-3

Known:

Q_s=	Half Street flow (cfs)	6.5
S_o=	Longitudinal slope (ft/ft)	0.053
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	5.1
D=	Flow depth (ft)	0.35
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
D_s=	Gutter Depression (in)	4.0
L_g=	Length of grate (ft)	6.0
L_c=	Length of curb opening (ft)	5.50
C_g=	Clogging factor for grate (%)	50
C_c=	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-r*L_g^2+s*L_g^3 (fps)	7.88
E_o = Grate flow ratio = Q_w/Q_s	1.00
Q_w= Frontal flow=Q_s-Q_x	6.49
Q_x= Side flow = 0.56/n*($S_x^{1.67}$+$T_x^{2.67}$*$S_o^{0.5}$)^ (cfs)	0.0
T_x= Side flow spread (D-Ds_{feet})/S_x (ft)	0.83
R_s = Side flow factor = 1/(1+(0.15*$V_s^{1.8}$)/(S_x*((1-C_g/100)*L_g)$^{2.3}$))	0.08
Q_{ig} = Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	6.5

*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 = S_x+S_w*E_o (ft/ft)	0.242
S_w = Gutter cross slope = Ds_{feet}/W	0.222
L_t = Total Interception L = 0.60*$Q_s^{0.42}$*$S_o^{0.30}$*(1/n*S_e)$^{0.6}$ (ft)	15.28
Q_{ic} = Flow intercepted = (1-(1-(1-C_c/100)*L_c/L_t)$^{1.8}$)*Q_s (cfs)	2.0

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	6.5
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	1.08
E_q = Efficiency = (Q_{ti}/Q_s)*100	100%

Storm Drain Hydraulic Calculations

G.C. Wallace, Inc. — Hydraulic Calculations for Example in Section 807.2 of CCRFCD Manual — **DATE:** 08/05/03 **FILE:** HGLSPINE.wb3

Storm Drain Manning's n (typ=0.013) = 0.013 — Inlet Structure Type or K_I = 1.1 Projecting Entrance: Grooved Edge (RCP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																				EGL & HGL				COMMENTS	
																				PIPE	TRANSITION																									
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	$V^2/2g$	S_f	Ave. S_f	Frict	Frict	Manhole			Junction			Contraction/Inlet			Expansion/Outlet			Bend					Misc			PIPE		TRANSITION		FULL/	
	FROM (ft)	TO (ft)	T/R	D (in)	SPAN (ft)	RISE (ft)	AREA (ft^2)	HYD RAD (ft)		D/S (ft)	U/S (ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(S_f) (ft/ft)	H_f (ft)	H_f (ft)	θ (deg)	K_{mh}	H_{mh} (ft)	θ (deg)	K_j	H_j (ft)	Inlet/ Cont	K_I	H_c (ft)	θ (deg)	K_o	H_e (ft)	R_{bend} (ft)	θ (deg)	K_b	H_b (ft)	H_m (ft)	Total (ft)	U/S EGL	U/S HGL	U/S EGL	U/S HGL	PART FLOW	CTRL
1		1000.00		42							219.18																															228.19	227.21		
																														Outlet Ko=	1.0														
2	1000.00	1173.23	R	42					1	219.18	227.67	173.2	4.90%	9.62	0.0049	88	9.15	1.30	0.0076	0.0076	1.32		0	0.02	0.03														0.03	232.47	231.17	232.47	231.17	PART	D/S
3	1173.23	1405.23	R	42					1	227.67	239.04	232.0	4.90%	9.62	0.0049	88	9.15	1.30	0.0076	0.0076	1.77		0	0.02	0.03														0.03	243.84	242.54	243.84	242.54	PART	D/S
4	1405.23	1733.38	R	42					1	239.04	252.17	328.2	4.00%	9.62	0.0049	88	9.15	1.30	0.0076	0.0076	2.51		0	0.02	0.03														0.03	256.97	255.67	256.97	255.67	PART	D/S
5	1733.38	1835.88	R	42					1	252.17	254.58	102.5	2.35%	9.62	0.0049	88	9.15	1.30	0.0076	0.0076	0.78		45	0.46	0.60														0.60	259.38	258.08	259.38	258.08	PART	D/S
6	1835.88	1885.10	R	42					1	254.58	255.70	49.2	2.27%	9.62	0.0049	88	9.15	1.30	0.0076	0.0076	0.38																		0.00	260.49	259.20			PART	D/S
7	1885.10	1889.10	T	42					1	255.70	255.80	4.0	2.63%	9.62	0.0049	75	7.80	0.94	0.0056	0.0066		0.03				45	0.50	0.83											0.85			261.35	260.40	FULL	U/S
8	1889.10	1934.70	R	42					1	255.80	257.17	45.6	3.00%	9.62	0.0049	75	7.80	0.94	0.0056	0.0056	0.25		0	0.02	0.02														0.02	261.60	260.66	261.62	260.68	FULL	U/S
9	1934.70	1971.18	R	42					1	257.17	258.26	36.5	2.99%	9.62	0.0049	75	7.80	0.94	0.0056	0.0056	0.20														12	45	0.18	0.17		0.17	262.70	261.76	262.70	261.76	PART	D/S
10	1971.18	1981.18	R	42					1	258.26	259.21	10.0	9.50%	9.62	0.0049	75	7.80	0.94	0.0056	0.0056	0.06														5	45	0.18	0.17		0.17	263.65	262.71	263.65	262.71	PART	D/S
11	1981.18	2121.18	R	42					1	259.21	272.50	140.0	9.49%	9.62	0.0049	75	7.80	0.94	0.0056	0.0056	0.78																		0.00	276.94	276.00			PART	D/S
12	2121.18	2121.18	CS	42					1	272.50	272.50	0.0		9.62	0.0049	75	7.80	0.94	0.0056	0.0056	0.00								KI=	0.25	0.24									0.24			277.18	277.18	FULL	U/S
13																																												
14																																												

HGL = 261.76 > Δ = 3.5' → THEREFORE, HGL IS AT SOFFIT OF 42" RCP
INV = 258.26

APPENDIX H

Reference Material

Technical Drainage Study for Summerlin Village 23A Rough Grading
by G.C. Wallace, CLV DS3077C

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: April 5, 2002
TO: Land Development Services Department of Public Works			FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: Summerlin Village 23A – Rough Grading		COPIES TO: G. C. Wallace, Inc.
Cross Streets:	NWC Charleston and Desert Foothills		Howard Hughes Corporation
FILE NO.:	F:\Depot\DSMEMOS\DS3077C.doc		Cheri Edelman, P.E., DEVCO
Parcel Number:	137-22-000-005		CCRFCD
Zoning Action:			
FEMA Flood Zone	YES	No X	
Proposed Storm Drain	YES X	No	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES
1st Submittal	2/1/2002	2/15/2002	Conditional Acceptance	$250.00
2nd Submittal	2/28/2002	3/13/2002	Not Acceptable	$250.00
3rd Submittal	3/22/2002	4/5/2002	See Comments Below	$250.00
			TOTAL FEES (LDDRS):	$750.00

REMARKS:

1st Submittal is for Conceptual Storm Facilities; 2nd & 3rd Submittals are for Rough Grading

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

X	is acceptable in concept subject to conformance to all City standards and the following conditions.
	must be resubmitted or supplemented including the following:
	must have Clark County Regional Flood Control District concurrence

1. *The submitted study proposes rough grading of interior streets and protection berm / channel only. Future development of interior parcels and improvement of roadways (asphalt paving, curb & gutter, storm drains and inlets etc.) and Collector Road will require detail hydrologic and hydraulic calculations with subsequent technical drainage studies.*

2. *The proposed rough graded interior streets and site are privately owned and maintained by Howard Hughes Corporation.*

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

ays

Post-it™ Fax Note 7671	Date 4-5-02	# of pages ▶
To Amanda Gonzales	From Albert Sung	
Co./Dept.	Co. City of Las Vegas	
Phone #	Phone # 229-2001	
Fax # 804-2299	Fax #	

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

RECEIVED
MAR 25 2002

Gale Wm. Fraser, II, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

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Chairman
City of Las Vegas

Crescent Hardy
Vice-Chairman
City of Mesquite

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City of Henderson

Michael Mack
City of Las Vegas

Chip Maxfield
Clark County

Bryan A. Nix
City of Boulder City

Bruce L. Woodbury
Clark County

March 21, 2002

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 South 4 St
Las Vegas, NV 89101

DISTRICT CONCURRENCE: SUMMERLIN VILLAGE 23A (CLV DS3077A)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Conceptual Drainage Study dated January 31, 2002, 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 February 15, 2002.

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. G. 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: Kayann Jongsma, 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

Report Excerpt

TABLE 1 SUMMARY OF HEC-1 MODEL		
Subbasin/ Combination Point*	Q_{10} (cfs)	Q_{100} (cfs)
RG15	14	44
COM15	75	215
RG16	15	48
COM16	89	243
RG17	19	59
COM17	172	509
RG14	35	107
RG18	32	100
COM18	64	198
COM20	222	656

*See Figure 5.

The rough grading proposed with this project will direct offsite storm flows in ultimate drainage patterns. A berm directs flow generated north of Alta Drive east into the existing Desert Foothills Channel. The proposed channel is 20 feet wide and the berm is 6.5 feet high. The berm / channel has a longitudinal slope of 1.4 percent. The calculated velocity along the berm is less than 8 fps. Riprap, d_{50} = 6-inch, thickness = 12 inches, will be placed along the berm and 3 feet across the bottom to protect the berm from erosive velocities.

Grading within the Collector Road alignment will direct existing storm flows generated west of Village 23A south to the Red Rock Detention Basin. The proposed graded roadway is 80 feet wide. A 3-foot high berm will be placed adjacent to the roadway to contain storm flows. Riprap, d_{50} = 12-inch, thickness = 24 inches, will be placed along the berm and 3 feet across the bottom to protect the berm from erosive velocities.

In addition, the existing detention basin berm (COM1 on Figure 5) will be extended north approximately 600 feet. This will allow the outflow from the detention basin to disperse in the natural washes which drain to the existing channel within the Desert Foothills Drive alignment. This channel was designed to intercept and convey a peak flow of 3,100 cfs. The existing channel drains to the existing 11-foot by 8-foot arch culvert located in Alta Drive. The proposed drainage patterns are consistent with the existing and future drainage patterns.

The flow collected in Spoke "A" and Spine Road (at the respective intersections with Desert Foothills Drive) is 167 cfs and 243 cfs for the 100-year storm. The flow within

Collector Channel (Sky Vista Drive) Hydraulic Computations

SECTION B (100-YEAR)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECT-B
Flow Element	*Irregular Channel*
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	2.5900	%
Discharge	430.00	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Method	mproved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.025	
Water Surface Elevation	0.68	ft
Elevation Range	0.00 to 2.50	
Flow Area	66.1	ft²
Wetted Perimeter	115.90	ft
Top Width	115.78	ft
Actual Depth	0.68	ft
Critical Elevation	0.87	ft
Critical Slope	1.0443	%
Velocity	6.51	ft/s
Velocity Head	0.66	ft
Specific Energy	1.33	ft
Froude Number	1.52	
Flow Type	Supercritical	

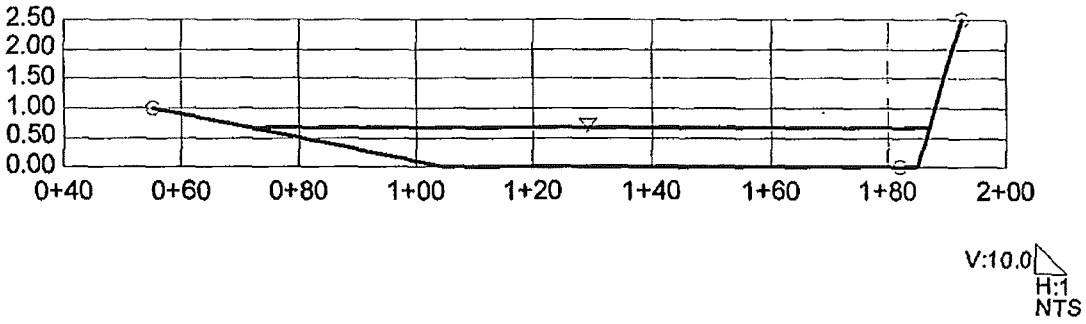
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+55	1+82	0.025
1+82	*1+93*	*0.035*

Natural Channel Points	
Station (ft)	Elevation (ft)
0+55	1.00
1+05	0.00
1+82	0.00
1+85	0.00
1+93	2.50

SECTION B (100-YEAR)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECT-B
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.025	
Slope	2.5900	%
Water Surface Elevation	0.68	ft
Elevation Range	0.00 to 2.50	
Discharge	430.00	cfs



RIP RAP SIZE FOR TRAPEZOIDAL CHANNEL
Normal depth calculations by Manning's equation.

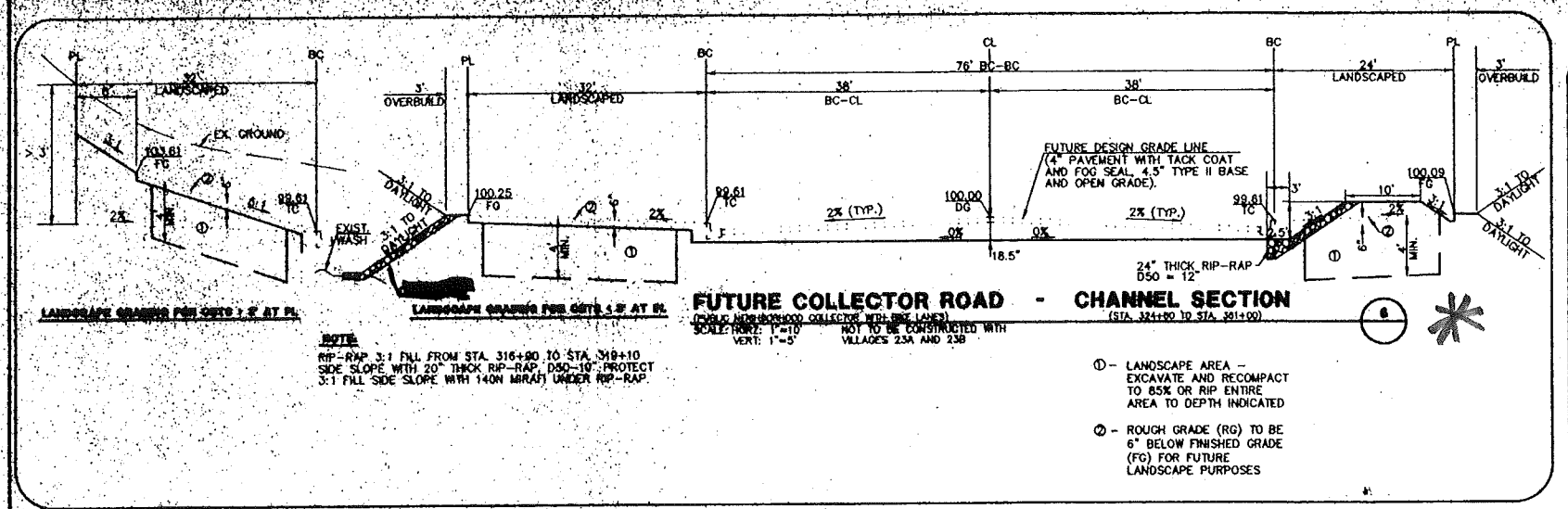
Riprap size for Collector Road south of Loop A Road (to protect Collector Road)

INPUT VARIABLES:		OUTPUT VARIABLES:	
FLOW (Q)	430 cfs	VELOCITY	6.98 ft/sec
MANNING's 'n'	0.038	DEPTH	1.12 ft
SLOPE	3.1 %	FREEBOARD	1.18 ft
BOTTOM WIDTH	50 ft	TOTAL DEPTH	2.30 ft
SIDE SLOPE (Lt)	3H:1V	FROUD No.	1.22
SIDE SLOPE (Rt)	6 H:1V	d50 Rip RAP SIZE	8.9 in
SPECIFIC GRAVITY	2.5		

Fb= 0.5+V^2/2g (Sub-critical) 1+0.025Vd^(1/3) (Super-critical)
Rip rap size and manning's 'n' per CCRFCD Design Manual

*USED 10 INCH RipRap, w/ a 3:1 side slope to protect Collector Road and the site. *

Relevant Plan, Profile and Detail Sheets



NOTE:
RIP-RAP 3:1 FILL FROM STA. 316+90 TO STA. 319+10 SIDE SLOPE WITH 20" THICK RIP-RAP, D50=10". PROTECT 3:1 FILL SIDE SLOPE WITH 140N MIRAFI UNDER RIP-RAP.

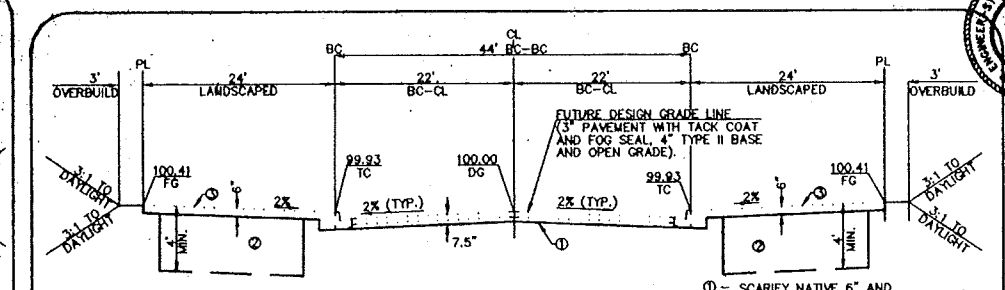
FUTURE COLLECTOR ROAD - CHANNEL SECTION

(PUBLIC NEIGHBORHOOD COLLECTOR WITH BIKE LANES)
SCALE: HORZ: 1"=10'
VERT: 1"=5'
NOT TO BE CONSTRUCTED WITH VILLAGES 23A AND 23B
(STA. 324+80 TO STA. 361+00)

6

① – LANDSCAPE AREA – EXCAVATE AND RECOMPACT TO 85% OR RIP ENTIRE AREA TO DEPTH INDICATED

② – ROUGH GRADE (RG) TO BE 6" BELOW FINISHED GRADE (FG) FOR FUTURE LANDSCAPE PURPOSES



LOOP "A"

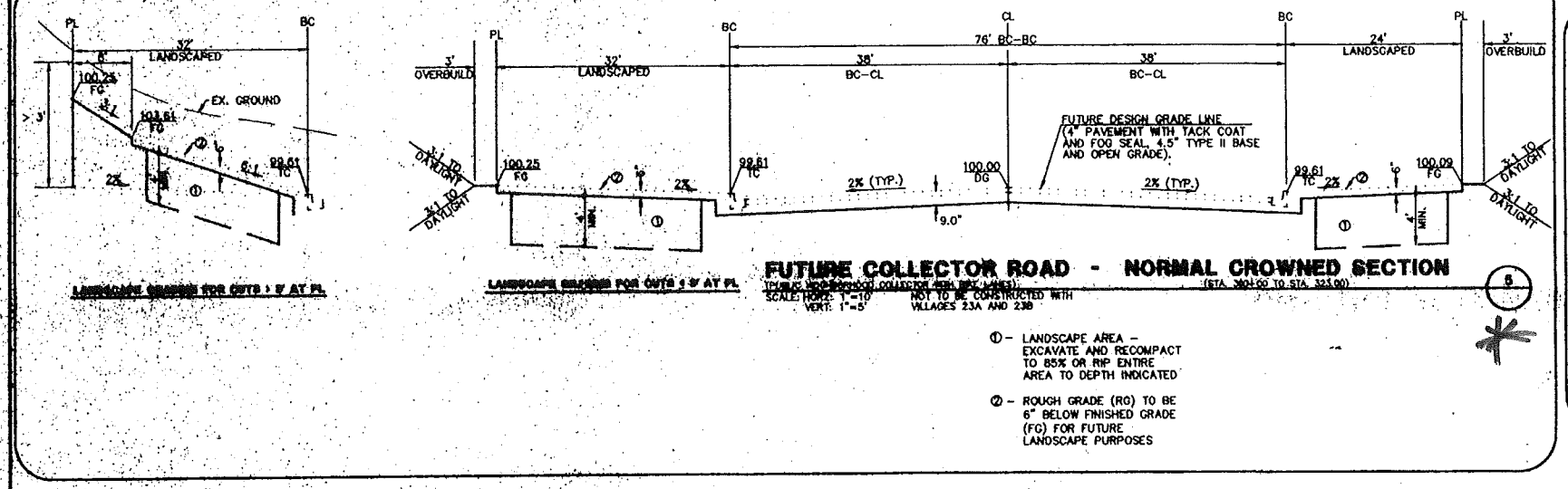
(PUBLIC RESIDENTIAL COLLECTOR)
SCALE: HORZ: 1"=10'
VERT: 1"=5'

3

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



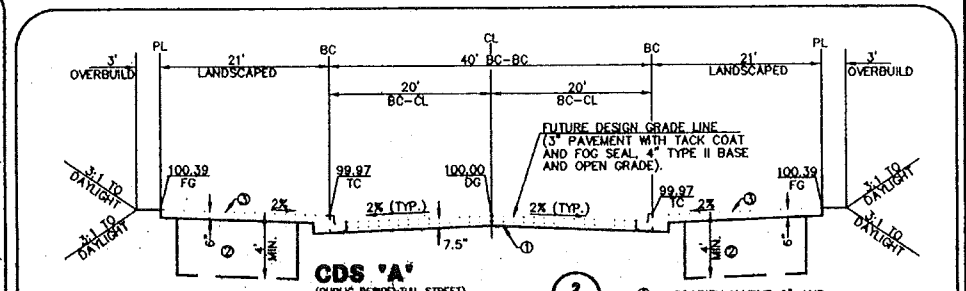
FUTURE COLLECTOR ROAD - NORMAL CROWNED SECTION

(PUBLIC NEIGHBORHOOD COLLECTOR WITH BIKE LANES)
SCALE: HORZ: 1"=10'
VERT: 1"=5'
NOT TO BE CONSTRUCTED WITH VILLAGES 23A AND 23B
(STA. 360+00 TO STA. 375+00)

5

① – LANDSCAPE AREA – EXCAVATE AND RECOMPACT TO 85% OR RIP ENTIRE AREA TO DEPTH INDICATED

② – ROUGH GRADE (RG) TO BE 6" BELOW FINISHED GRADE (FG) FOR FUTURE LANDSCAPE PURPOSES



CDS "A"

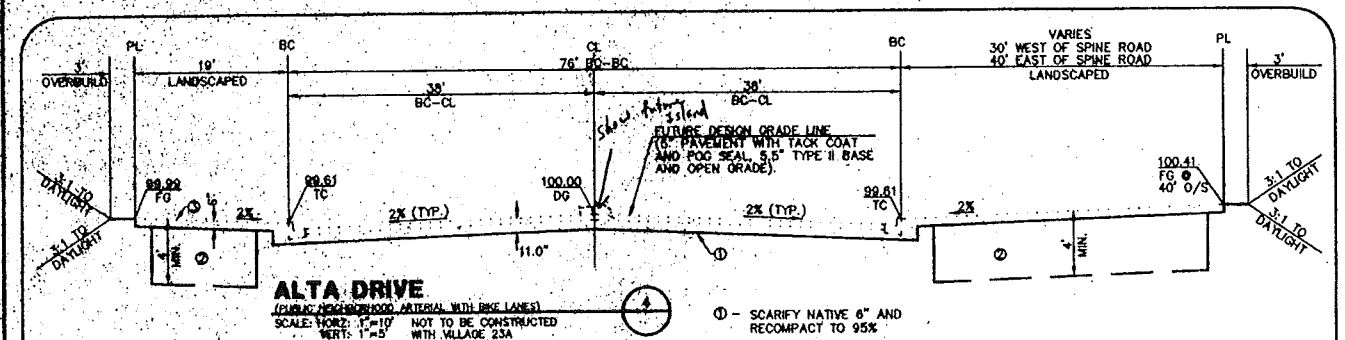
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SCALE: HORZ: 1"=10'
VERT: 1"=5'

3

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



ALTA DRIVE

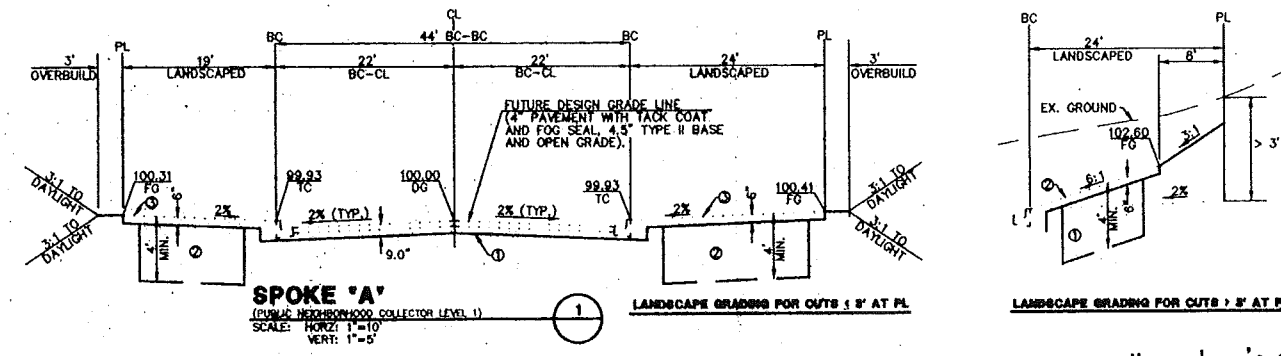
(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)
SCALE: HORZ: 1"=10'
VERT: 1"=5'
NOT TO BE CONSTRUCTED WITH VILLAGE 23A

4

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



SPOKE "A"

(PUBLIC NEIGHBORHOOD COLLECTOR LEVEL 1)
SCALE: HORZ: 1"=10'
VERT: 1"=5'

1

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

This grading plan is a part of drainage study #80717 which was received on 2/8/02 and reviewed on 2/18/02

Page 31 C9

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD., LAS VEGAS, NEVADA 89146
OFFICE (702) 804-2000, FAX (702) 804-2099
SUMMERLIN OFFICE: 10000 CHARLESTON BLVD., STE. 130
OFFICE (702) 804-2100, FAX (702) 804-2199

SUMMERLIN
VILLAGE 23A ROUGH GRADING PLANS
TYPICAL SECTIONS

SHEET 38
38 OF 40 SHTS

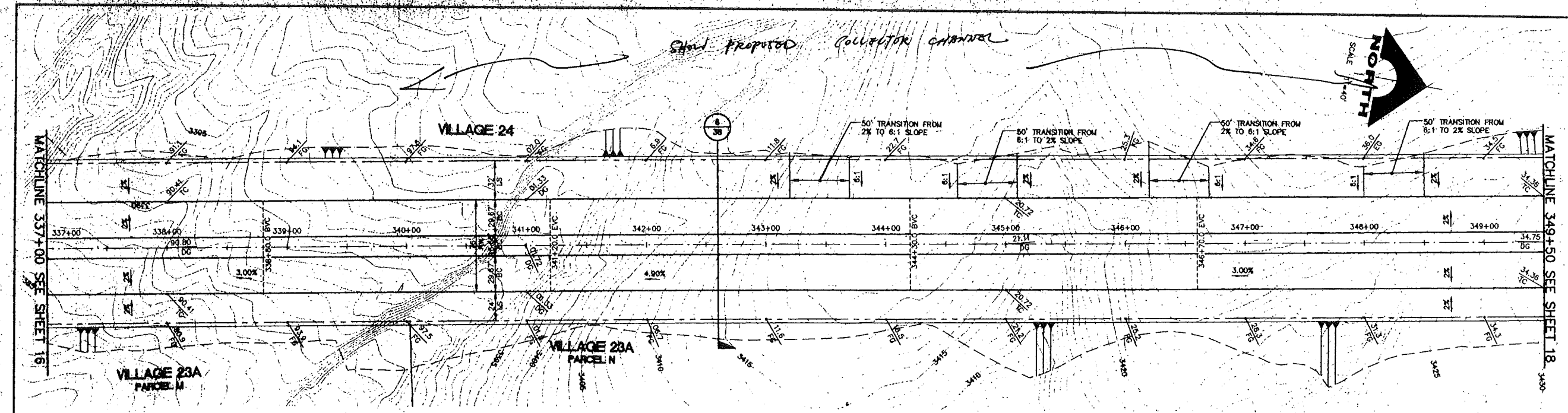
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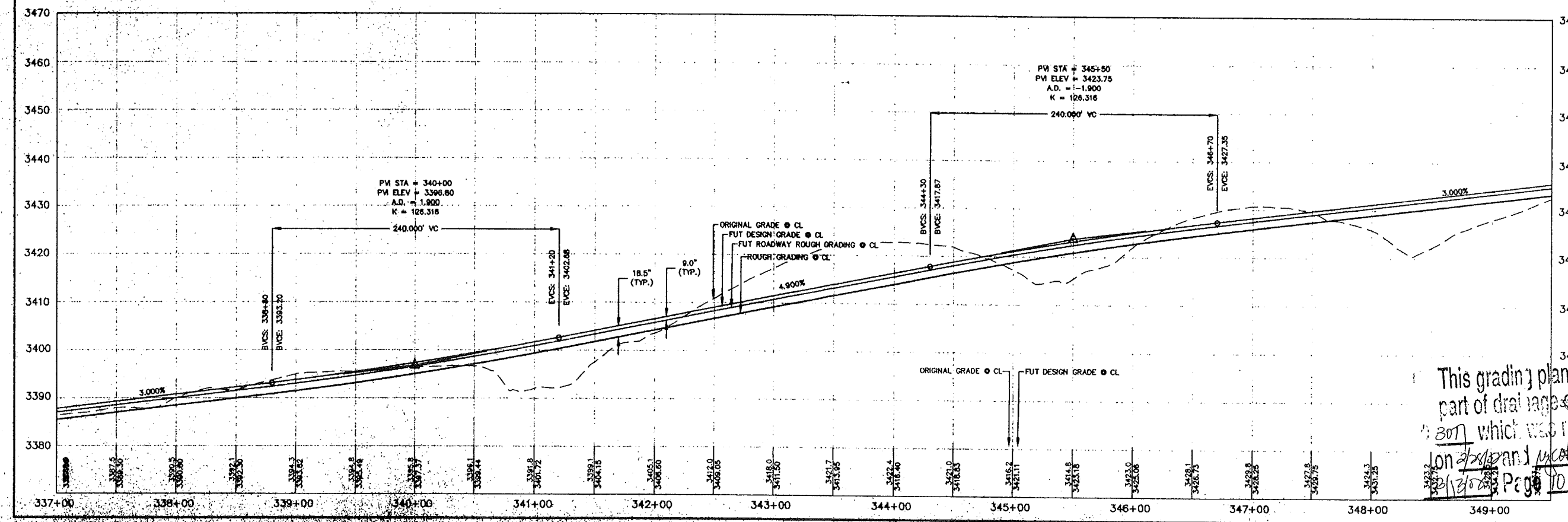
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DATE | APP'D | DATE REV. APP'D
DATE | APP'D | DATE REV. APP'D

ISSUE DATE: 2/25/02 - ISSUE FOR AGENCY REVIEW - NOT FOR CONSTRUCTION

REVISED 12-31-01 PER NEVADA BELL WEST COMM. NO. 9220

DATE: 12/31/01





BENCHMARK			
BM #	DESC.	NAVD 88 DATUM (FEET)	NAVD 88 DATUM (METERS)
CLV09-34BR2X	ROOT BRASS CAP, 80 FEET NORTH OF STATION 1010+42 OF CHARLESTON BOULEVARD.	3269.81	996.991

BASIS OF BEARINGS
NORTH 89°45'08" 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

FUTURE COLLECTOR ROAD

SCALE: HORIZ. 1" = 40'
VERT. 1" = 10'

40 0 40 80
SCALE FEET

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 buried underground utility lines. It's easy. Call before you Dig. 1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S EASY! CALL BEFORE YOU DO OVERHEAD. CALL 1-702-593-6111

BENJ. HURLEY PROFESSIONAL ENGINEER STATE OF NEVADA No. 12259

DESIGN: DSC/JJ
DRAWN: SDC
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 02-25-02
PLOT TIME: 12:30:07

NO.	DESCRIPTION	DATE	APP'D
	NOT FOR CONSTRUCTION		

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
OFFICE: (702) 804-2000, FAX: (702) 804-2291
5580 KIETZKE LANE/RENO, NEVADA 89511
OFFICE: (702) 804-3160, FAX: (702) 804-3345

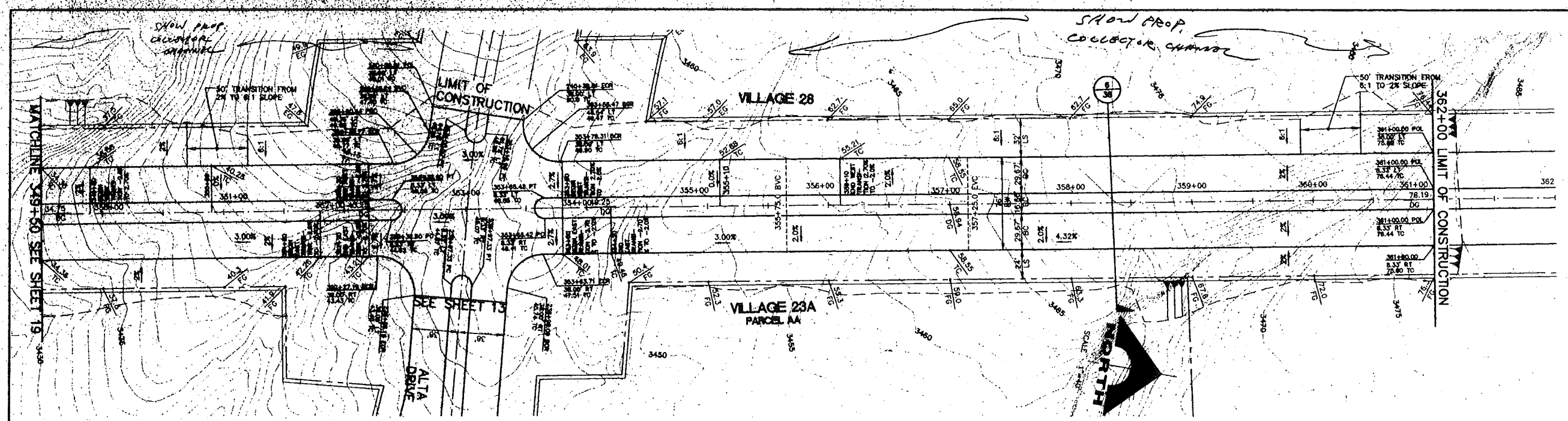
SUMMERLIN
VILLAGE 23A ROUGH GRADING PLANS
ROUGH GRADING IMPROVEMENTS
PLAN AND PROFILE

SHEET 17
17 OF 49 SHTS

JOB NO. 9808.000

This grading plan is a part of drainage study # 3071 which was received on 2/26/02 and approved on 3/13/02

Page 10 Of 37



BENCHMARK

BM #	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
CLARK-94528	NDOT BRASS CAP, 50 FEET NORTH OF STATION 767+18.48 OF CHARLESTON BOULEVARD:	3208.81 (FEET)	978.351 (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

FUTURE COLLECTOR ROAD

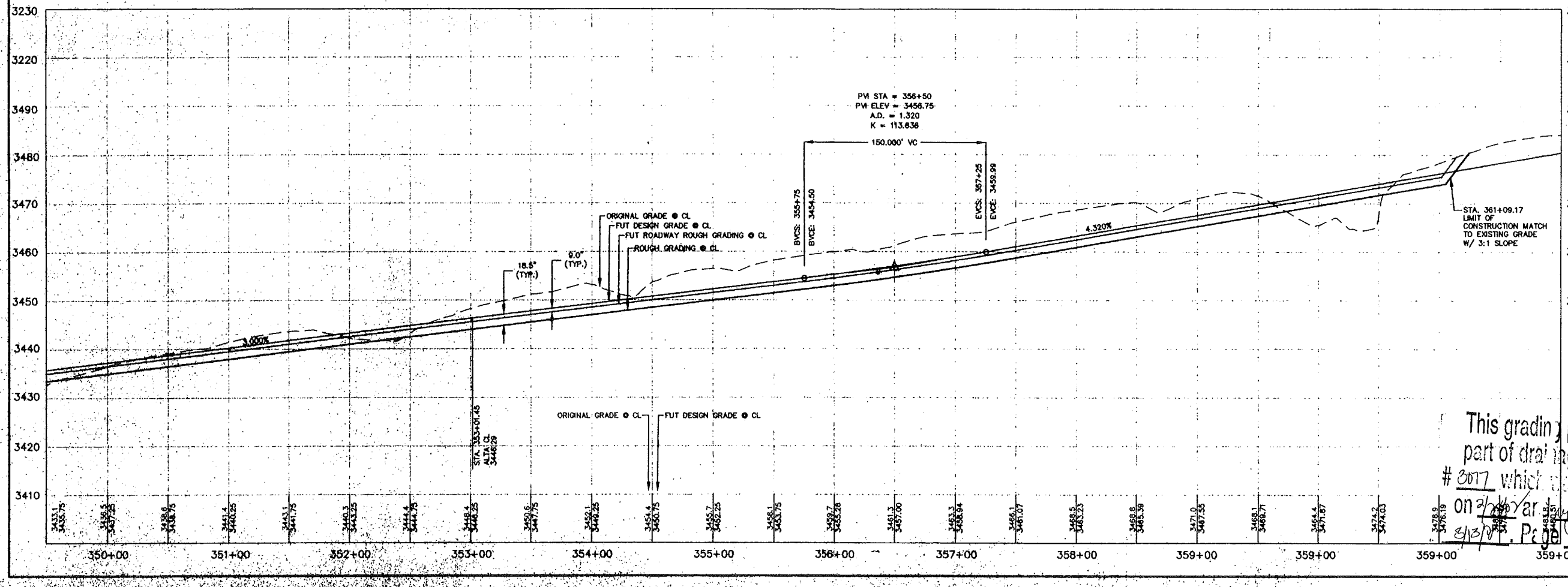
SCALE: HORIZ. 1" = 40'
VERT. 1" = 10'

40 0 40 80
SCALE FEET

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.

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AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
CALL 1-702-593-6111



This grading plan is a part of drainage study # 3017 which was received on 3/26/02 and approved on 4/3/02. Page 11 Of 31

DESIGN: DJS/JAJ
DRAWN: SSC
CHECK:
ISSUE DATE:
ISSUE EDITOR:
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PLOT TIME: 18:07:31

NO. DATE DESCRIPTION
1 4/25/02 ISSUED FOR AGENCY REVIEW - NOT FOR CONSTRUCTION

ISSUE DATES 2/22/02

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
OFFICE: (702) 804-2100, FAX: (702) 804-2299
SUMMERLIN OFFICE 10000 CHARLESTON BLVD., STE. 130
OFFICE: (702) 804-2100, FAX: (702) 804-2295

F:\V23\Road\Cover-A\Vert\Vert-X36x018.dgn

SUMMERLIN
VILLAGE 23A ROUGH GRADING PLANS
ROUGH GRADING IMPROVEMENTS
PLAN AND PROFILE

JOB NO. 023.0000

SHEET 18
18 OF 40 SHTS

APPENDIX I

Reference Material

Conceptual Drainage Study for Summerlin Village 23A
by G.C. Wallace, CLV DS3077A

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: February 15, 2002
TO: **Land Development Services** Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Summerlin Village 23A – Conceptual Storm Facilities**			**COPIES TO:** G. C. Wallace, Inc.
Cross Streets:	NWC Charleston and Desert Foothills			Howard Hughes Corporation
FILE NO.:	F:\Depot\DSMEMOS\DS3077A.doc			Cheri Edelman, P.E., DEVCO
Parcel Number:	137-22-000-005			CCRFCD
Zoning Action:				
FEMA Flood Zone	YES		No X	
Proposed Storm Drain	YES X		No	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES
1st Submittal	2/1/2002	2/15/2002	See Comments Below	$250.00
			TOTAL FEES (LDDRS):	**$250.00**

REMARKS:

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

	is acceptable in concept subject to conformance to all City standards and the following conditions.
	must be resubmitted or supplemented including the following:
X	must have Clark County Regional Flood Control District concurrence

1. The site is adjacent to or crosses an existing or proposed Clark County Regional Flood Control District (CCRFCD) master planned facility (APAD 0000 and APCB 0095). Therefore, CCRFCD concurrence is required prior to final acceptance of the drainage study.
2. The submitted study provides a conceptual layout of proposed storm facilities. Future development for roadways and interior parcels with improvement drawings within Village 23A will require detail hydraulic calculations in subsequent technical drainage reports.
3. Figure 8 – Conceptual Storm Drain Map: the stub provided for Parcel C must be revised to show 42" instead of 36" as specified in Page 20 of the conceptual study.

END OF REMARKS

ays

T/R/S: T20S/R59E/34

AREA K34

C L A R K C O U N T Y
REGIONAL FLOOD CONTROL DISTRICT

Wm. Fraser, II, P.E.
General Manager/Chief Engineer

ARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Cresent Hardy
Vice-Chairman
City of Mesquite

Shari Buck
City of North Las Vegas

ayor James Gibson
City of Henderson

Michael Mack
City of Las Vegas

Chip Maxfield
Clark County

Bryan A. Nix
City of Boulder City

Bruce L. Woodbury
Clark County

March 21, 2002

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 South 4 St
Las Vegas, NV 89101

DISTRICT CONCURRENCE: SUMMERLIN VILLAGE 23A (CLV DS3077A)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Conceptual Drainage Study dated January 31, 2002, 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 February 15, 2002.

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. G. 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: Kayann Jongsma, 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

Referenced Drainage Exhibits

EXISTING DBS (DETENTION BASINS)

EX1
166.8 AC.

EX2
42.0 AC.

EX3
40.3 AC.

EX4
31.5 AC.

EX5
24.7

EX6
383.1 AC.

EX7
26.8 AC.

PARCEL D
PROJECT SITE

ALTA DRIVE

EXISTING SUMMERLIN VILLAGE 20

COM2

COM3

COM4

CHARLESTON BLVD

DESERT FOOTHILLS

EXISTING RED ROCK
DETENTION BASIN

NORTH
SCALE: 1"=400'

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.

SUMMARY OF HEC-1 MODEL

BASIN OR LOC.	Q100 (CFS)	Q10 (CFS)
EX3	84	28
EX4	65	22
EX5	50	16
COM3	176	58
EX6	673	243
EX1	359	149
COM4	1088	412
EX2	95	38
EX7	54	18
COM2	141	52

LEGEND

- RG1 — DRAINAGE SUBBASIN
- PT1 — CONCENTRATION POINT
- SUBBASIN BOUNDARY
- FLOW DIRECTION

#307 C1 2/500 Q100 3107 Q10 87

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 01-29-02

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
7251 AMIGO STREET, SUITE 120 • LAS VEGAS, NEVADA 89119
(702) 804-2000 • FAX: (702) 804-2299

THE HOWARD HUGHES CORPORATION
SUMMERLIN VILLAGE 23A
FIGURE 5

SHEET 1
SHT OF

Existing Condition HEC-1 Analyses

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY  1991                 *
*           VERSION 4.0.1E              *
*       Lahey F77L-EM/32 version 5.01   *
*         Dodson & Associates, Inc.     *
*  RUN DATE  01/29/02  TIME  09:33:39   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*     U.S. ARMY CORPS OF ENGINEERS      *
*     HYDROLOGIC ENGINEERING CENTER     *
*           609 SECOND STREET           *
*         DAVIS, CALIFORNIA 95616       *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
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

HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              *DIAGRAM
    1         ID   ************************************************************
    2         ID   * ..................................................... *
    3         ID   * :                SUMMERLIN VILLAGE 23A              *
    4         ID   * :                CONCEPTUAL STUDY                   *
    5         ID   * :                EXISTING CONDITIONS              : *
    6         ID   * :                                                 : *
    7         ID   * :                                                 *
    8         ID   * :.................................................: *
    9         ID   * :            RETURN PERIOD_ _ _ _10/100-YEAR      : *
   10         ID   * :            DISTRIBUTUION_ _ _ _6-HOUR SDN3      : *
   11         ID   * :            PROJECT NO_ _ _ _ _ 62023-010        : *
   12         ID   * :            FILENAME_ _ _ _ _ _  010-EX.HI       : *
   13         ID   * :            DATE_ _ _ _ _ _ _ 12/28/01           : *
   14         ID   * :.................................................: *
   15         ID
   16         ID  DEPTH AREA REDUCTION FACTOR
   17         ID           AREA                DARF
   18         ID           0-.5   SQ MI        0.98
   19         ID           .5-1   SQ MI        0.97
   20         ID
   21         IT      3      0      0    300
   22         IO      5
   23         IN      5      0      0
   24         JR    PREC    1.0   0.98   0.97   0.56
              *
   25         KK     EX3
   26         KM  SUBBASIN EX3
   27         KM           AREA   40.3   ACRES
   28         BA  .06297
   29         PB    3.29
   30         PC    .000   .020   .057   .070   .087   .108   .124   .130   .130   .130
   31         PC    .130   .130   .130   .133   .140   .142   .148   .158   .172   .181
   32         PC    .190   .197   .199   .200   .201   .204   .214   .229   .241   .249
   33         PC    .251   .256   .270   .278   .281   .283   .295   .322   .352   .409
   34         PC    .499   .590   .710   .744   .781   .812   .819   .835   .851   .856
   35         PC    .860   .868   .876   .888   .910   .926   .937   .950   .970   .976
   36         PC    .982   .985   .987   .989   .990   .993   .993   .994   .995   .998
   37         PC    .998   .999  1.00
   38         LS       0     81
   39         UD   0.157
              *
   40         KK   R\EX3
   41         KM   ROUTE EX3 TO COM3
   42         KM  MUSKINGUM ROUTING
   43         RM       2   0.145    0.15
              *
```

HEC-1 INPUT PAGE 2

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   44         KK     EX4
   45         KM  SUBBASIN EX4
   46         KM           AREA   31.50   ACRES
   47         BA  .04922
   48         PB    3.29
   49         LS       0     81
   50         UD    .161
              *
   51         KK   R\EX4
   52         KM  ROUTE EX4 TO COM3
   53         KM  MUSKINGHUM ROUTING
   54         RM       2    .132    0.15
```

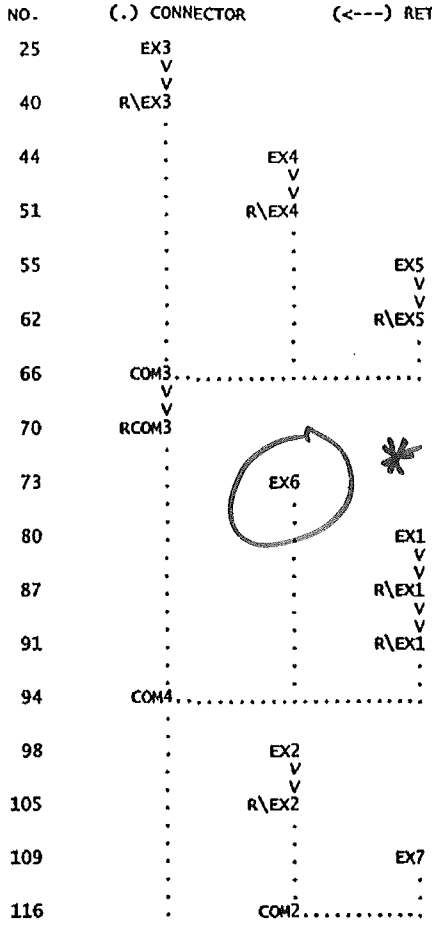
```
                *
     55         KK     EX5
     56         KM  SUBBASIN EX5
     57         KM           AREA    24.70   ACRES
     58         BA  .03859
     59         PB    3.29
     60         LS       0      81
     61         UD    .176
                *
     62         KK   R\EX5
     63         KM  ROUTE EX5 TO COM3
     64         KM  MUSKINGHUM ROUTING
     65         RM       1    .124    0.15
                *
     66         KK    COM3
     67         KM  CONCENTRATION    POINT    COM3
     68         KM  COMBINE       EX4, EX5, AND EX3
     69         HC       3
                *
     70         KK   RCOM3
     71         KM  ROUTE COM3 TO COM4
     72         RD    1610    .020    .025           TRAP      50       3
                *
     73         KK     EX6
     74         KM  SUBBASIN EX6
     75         KM           AREA  383.10   ACRES
     76         BA  .59859
     77         PB    3.29
     78         LS       0      83
     79         UD   0.274
                *
1                                    HEC-1 INPUT                                    PAGE  3

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

     80         KK     EX1
     81         KM  SUBBASIN EX1
     82         KM           AREA   166.8   ACRES
     83         BA  .26063
     84         PB    3.29
     85         LS       0      87
     86         UD   0.246
                *
     87         KK   R\EX1
     88         KM  ROUTE EX1 TO COM4
     89         KM  MUSKINGUM ROUTING
     90         RM       2   0.159    0.15
                *
     91         KK   R\EX1
     92         KM  ROUTE EX1 TO COM4
     93         RD    2160    .024    .016           TRAP       0      50
                *
     94         KK    COM4
     95         KM  CONCENTRATION POINT COM4
     96         KM  COMBINE EX1, EX6, AND COM3
     97         HC       3
                *
     98         KK     EX2
     99         KM  SUBBASIN EX2
    100         KM           AREA    42.0   ACRES
    101         BA  .06563
    102         PB    3.29
    103         LS       0      86
    104         UD    .204
                *
    105         KK   R\EX2
    106         KM  ROUTE EX2 TO COM2
    107         KM  MUSKINGHUM ROUTING
    108         RM       1    .076    0.15
                *
    109         KK     EX7
    110         KM  SUBBASIN EX7
    111         KM           AREA    26.80   ACRES
    112         BA  .04188
    113         PB    3.29
    114         LS       0      81
    115         UD    .171
                *
                                     HEC-1 INPUT                                    PAGE  4

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

    116         KK    COM2
    117         KM  CONCENTRATION POINT COM2
    118         KM  COMBINE EX2 AND EX7
    119         HC       2
                *
    120         ZZ
1
     SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1**********************************************
*                                            *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *
*             MAY  1991                      *
*          VERSION 4.0.1E                    *
*     Lahey F77L-EM/32 version 5.01          *
*       Dodson & Associates, Inc.            *
*  RUN DATE  01/29/02  TIME  09:33:39        *
**********************************************
```

```
**********************************************
*                                            *
*    U.S. ARMY CORPS OF ENGINEERS            *
*    HYDROLOGIC ENGINEERING CENTER           *
*          609 SECOND STREET                 *
*        DAVIS, CALIFORNIA 95616             *
*          (916) 551-1748                    *
*                                            *
**********************************************
```

```
*************************************************************
*                                                           *
*                  SUMMERLIN VILLAGE 23A                    *
*                  CONCEPTUAL STUDY                         *
*                  EXISTING CONDITIONS                      *
*                                                           *
*                                                           *
*            RETURN PERIOD_ _ _ _10/100-YEAR                *
*            DISTRIBUTUION_ _ _ _6-HOUR SDN3                *
*            PROJECT NO_ _ _ _ _ 62023-010                  *
*            FILENAME_ _ _ _ _ _  010-EX.H1                 *
*            DATE_ _ _ _ _ _ _ _ 12/28/01                   *
*                                                           *
*************************************************************
```

DEPTH AREA REDUCTION FACTOR

AREA		DARF
0-.5	SQ MI	0.98
.5-1	SQ MI	0.97

22 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	*HYDROGRAPH PLOT SCALE*

IT HYDROGRAPH TIME DATA

NMIN	3	MINUTES IN COMPUTATION INTERVAL
IDATE	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1 0	ENDING DATE
NDTIME	1457	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL 0.05 HOURS
TOTAL TIME BASE 14.95 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 0.98 0.97 0.56

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 0.98	RATIO 3 0.97	RATIO 4 0.56
HYDROGRAPH AT	EX3	0.06	1	FLOW	84.	81.	80.	28.
				TIME	3.60	3.60	3.60	3.60
ROUTED TO	R\EX3	0.06	1	FLOW	74.	72.	71.	25.
				TIME	3.75	3.75	3.75	3.75
+ HYDROGRAPH AT	EX4	0.05	1	FLOW	65.	63.	62.	22.
				TIME	3.60	3.60	3.60	3.60
ROUTED TO	R\EX4	0.05	1	FLOW	59.	57.	56.	19.
				TIME	3.70	3.70	3.70	3.75
HYDROGRAPH AT	EX5	0.04	1	FLOW	50.	48.	47.	16.
				TIME	3.60	3.60	3.60	3.60
ROUTED TO	R\EX5	0.04	1	FLOW	43.	42.	41.	14.
				TIME	3.70	3.70	3.70	3.75
3 COMBINED AT	COM3	0.15	1	FLOW	176.	170.	167.	58.
				TIME	3.70	3.70	3.70	3.75
ROUTED TO	RCOM3	0.15	1	FLOW	176.	170.	167.	58.
				TIME	3.75	3.75	3.75	3.80
HYDROGRAPH AT	EX6	0.60	1	FLOW	694.	673.	662.	243.
+				TIME	3.70	3.70	3.70	3.75
HYDROGRAPH AT	EX1	0.26	1	FLOW	369.	358.	353.	149.
				TIME	3.65	3.65	3.65	3.70
ROUTED TO	R\EX1	0.26	1	FLOW	337.	328.	323.	137.
				TIME	3.85	3.85	3.85	3.85
ROUTED TO	R\EX1	0.26	1	FLOW	338.	328.	324.	137.
+				TIME	3.90	3.90	3.90	3.90
3 COMBINED AT	COM4	1.01	1	FLOW	1141.	1106.	1088.	412.
+				TIME	3.75	3.75	3.75	3.80
HYDROGRAPH AT	EX2	0.07	1	FLOW	96.	93.	92.	38.
				TIME	3.60	3.65	3.65	3.65
ROUTED TO	R\EX2	0.07	1	FLOW	92.	89.	88.	36.
				TIME	3.70	3.70	3.70	3.70
HYDROGRAPH AT	EX7	0.04	1	FLOW	54.	53.	52.	18.
+				TIME	3.60	3.60	3.60	3.60
2 COMBINED AT	COM2	0.11	1	FLOW	141.	136.	134.	52.
				TIME	3.65	3.65	3.65	3.70

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

APPENDIX J

Reference Material

Technical Drainage Study for Summerlin Village 23A/23B Alta Drive Street Improvments
by G.C. Wallace, CLV DS4050, RFCD No. 06-7028

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: January 22, 2007
TO: **Land Development Services** Department of Public Works				**FROM:** Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:			**COPIES TO:**
Summerlin Village 23A/23B Alta Drive Street Imp. - Update				G.C. Wallace, Inc.
Cross Streets:	Alta Dr. between Desert Foothill & Sky Vista			Howard Hughes Corporation
File Number:	F:\Depot\DSMemos\DS4050C.doc			Bart Anderson, P.E., DevCo
Parcel Number:	137-34-299-001; -699-005; -699-006 & more			CCRFCD
Zoning Action:	N/A			
FEMA Flood Zone	YES	NO X		
Proposed Storm Drain	YES X	NO		

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	8/9/2006 & 8/31/2006	9/13/2006	Not Approved	$400.00	Paid: $400
2nd Submittal	10/19/2006	11/2/2006	Conditional Approval	$400.00	56131: $400
CCRFCD	1/8/2007	1/22/2007	Concurrence	N/C	N/C
			TOTAL FEES (LDDRS):	**$800.00**	----

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.

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.

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

END OF REMARKS

ays

T/R/S: T20S/R59E/22

AREA K-22

REGIONAL FLOOD CONTROL DISTRICT

Rec'd: 1/8/07
DS4050
~~K-24~~ K-22
N/C

Gale Wm. Fraser, II, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Chip Maxfield
Vice-Chairman
Clark County

Robert L. Eliason
City of North Las Vegas

Mayor Oscar Goodman
City of Las Vegas

Andy Hafen
City of Henderson

Mayor Bill Nicholes
City of Mesquite

Roger Tobler
City of Boulder City

Bruce L. Woodbury
Clark County

December 19, 2006

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. 4th Street
Las Vegas, NV 89101

DISTRICT CONCURRENCE: SUMMERLIN VILLAGE 23A/23B ALTA DRIVE STREET IMPROVEMENTS - UPDATE (DS4050) (RFCD No. 06-7028)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated August 2, 2006, and Addendum No. 1 dated October 18, 2006, for 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 November 7, 2006.

District concurs with acceptance of this Technical 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: _____
Abigail Mayrena, P.E.
Associate Engineer

_____
Andrew R. Trelease, P.E., CFM
Principal Civil Engineer

AM:ART:jb

c: Randall K. Gremlich, P.E., G. C. WALLACE, INC.

P:\Letters and Memos\Local Drainage\Land Development & Drainage\Concurrence Letters\2006\Dec06\20-59-22a.GCW.doc

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: *http://www.regionalflood.org*

Referenced Drainage Exhibits



VILLAGE 23A

** EX4-IA IS A PRORATED BASIN. CALCULATION REFERENCED FROM V23B ROUGH GRADE UPDATE (APPENDIX B)

** EX4-IB AND EX4-1C ARE PRORATED BASINS.

NORTH

SCALE 1"=300'

GRAPHIC SCALE

300 0 150 300

(IN FEET)

1 inch = 300 ft.

LEGEND

- (1-1) DRAINAGE SUBBASIN
- CP1 CONCENTRATION POINT
- SUBBASIN BOUNDARY
- FLOW DIRECTION

SUMMARY OF HEC-1 MODEL

BASIN OR LOC.	AREA (AC)	Q100 (CFS)	Q10 (CFS)
OFF1	107.5	284	121
CR	7.6	22	11
CPCR	–	306	132
OFF2	342.0	868	352
FH	13.2	43	21
OFF4	12.8	40	17
OFF3	45.3	117	49
CPFH	–	972	427
OFF5	73.5	197	83
EX1-1	32.6	101	43
CP1	–	281	120
EX2-1	9.91	21	9
ST2-2	2.8	10	5
CP2	–	353	151
EX2-3	50.6	131	55
ST2-4	3.5	11	6
CP3	–	495	211
ST3-1	9.1	27	14
EX3-2	56.5	159	67
EX3-3	20.5	58	24
CP4	–	239	102
EX3-4	12.1	34	14
CP5	–	272	117
EX4-1	73.2	87	36
CP6	–	359	153
EX5-1	34.2	93	39
ST1-2	10.62	32	16
CP7	–	938	408
OH1	10.2	24	9
OH2	9.91	21	9
CP1	–	24	9
EX1-3	80.1	229	98

(REVISED)

This grading plan is a part of drainage study which was received on 9/9/06 and revised on 9/13/06. Page 2 of

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DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE ENTITY:
PLOT DATE: 09-04-06
PLOT TIME: 11:52:19

DESCRIPTION	CKD	DATE
DATE LEGEND APP'D	DATE	CKD APP'D

DATE:

SUMMERLIN VILLAGE 23A/23B
ALTA DRIVE IMPROVEMENTS
FIGURE 6 (REVISED)
INTERIM DRAINAGE CONDITIONS

DRAWING
FIG 6
SHT OF SHTS

GRAPHIC SCALE

300 0 150 300

(IN FEET)

1 inch = 300 ft.

NORTH

LEGEND

- STREET SECTION LOCATION
- ALTA 1 — DROP INLET CAPACITIES
- ALTA — BASIN NAME
- EXISTING RCB STROM DRAIN
- PROPOSED DROP INLET
- BASIN DELINEATION

VILLAGE 28

COLLECTOR ROAD

PARCEL O

FOX HILL DRIVE

PARCEL X

COS-5

PARCEL W

FUTURE VILLAGE 23B

DESERT FOOTHILLS DRIVE

703 CFS

Existing 7' x 7' RCB Lateral

ALTA 1
Q_{100} = 14 CFS
$Q_{intercept}$ = 10 CFS
Q_{bypass} = 4 CFS

5' Type "CM" (NUISANCE FLOW)

EX. 60" LATERAL (PER V23B ROUGH GRADE UPDATE) Q=272 CFS

Existing 10'x8' RCB

ALTA 2B
Q_{100} = 10 CFS
$Q_{intercept}$ = 8 CFS
Q_{bypass} = 2 CFS

Q=4 CFS PER THIS UPDATE

ALTA 3A
Q_{100} = 9 CFS
$Q_{intercept}$ = 7 CFS
Q_{bypass} = 2 CFS

Q=7 CFS PER THIS UPDATE

ALTA 3B
Q_{100} = 9 CFS
$Q_{intercept}$ = 7 CFS
Q_{bypass} = 2 CFS

Q=27 CFS PER V23B CDS

10' Type "CM" (FUTURE PER DESERT FOOTHILLS IMPROVEMENTS)

ALTA 3C
Q_{100} = 8 CFS
$Q_{intercept}$ = 8 CFS
Q_{bypass} = 0 CFS

ALTA 1

ALTA 2

ALTA 3

ALTA DRIVE

40 CFS

42" LATERAL

5' Type "CM" (NUISANCE FLOW)

5' Type "CM" (NUISANCE FLOW)

10' Type "CM"

7.5' Type "CM"

7.5' Type "CM"

7.5' Type "CM"

5' Type "CM" (NUISANCE FLOW)

10' Type "CM"

ALTA 2A
Q_{100} = 10 CFS
$Q_{intercept}$ = 7 CFS
Q_{bypass} = 3 CFS

PARCEL O PROJECT SITE

EXISTING VILLAGE 23A

(REVISED)

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
TELEPHONE: (702) 804-2000 • FAX: (702) 804-2299

VILLAGE 23A/23B

ALTA DRIVE STREET IMPROVEMENTS

FIGURE 5 (REVISED)
PROPOSED DRAINAGE FACILITIES MAP

SHEET
FIG 5
1 OF 1 SHTS

gcw1117c.dwg,020912.rln

dyamachika 08-02-06 10:48:27 G:\62023-270\drainage\Update\fig5R-A.dwg

Alta Drive Interim Channel Hydraulic Computation

Worksheet for Trap Channel to ex. 60" stub

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	5.00	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	30.00	ft
Discharge	34.00	ft^3/s

Results

Normal Depth	0.23	ft
Flow Area	6.98	ft^2
Wetted Perimeter	31.44	ft
Top Width	31.36	ft
Critical Depth	0.34	ft
Critical Slope	0.01328	ft/ft
Velocity	4.87	ft/s
Velocity Head	0.37	ft
Specific Energy	0.60	ft
Froude Number	1.82	
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	0.23	ft
Critical Depth	0.34	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.01328	ft/ft

Cross Section for Trap Channel to ex. 60" stub

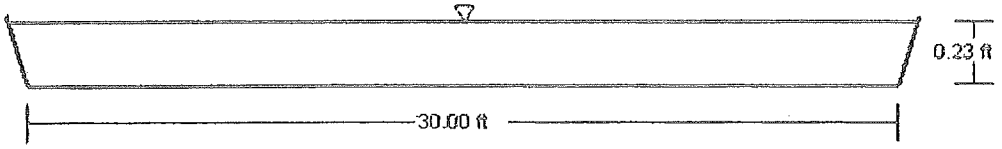
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	5.00	%
Normal Depth	0.23	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	34.00	ft³/s

Cross Section Image



V: 10
H: 1

Alta Drive Hydraulic Street Section Computation

Worksheet for ALTA-1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.00	%
Discharge	14.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.50
0+00.5	0.00
0+02.0	0.13
0+02.0	0.17
0+29.2	0.71
0+29.2	1.21
0+46.8	1.21
0+46.8	0.71
0+74.0	0.17
0+74.0	0.13
0+75.5	0.00
0+75.5	0.50
0+76.0	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.50)	(0+76.0, 0.50)	0.016

Results

Normal Depth		0.39	ft
Elevation Range	0.00 to 1.21 ft		
Flow Area		3.38	ft²
Wetted Perimeter		25.86	ft

Worksheet for ALTA-1

Results

Top Width	24.99	ft
Normal Depth	0.39	ft
Critical Depth	0.48	ft
Critical Slope	0.00694	ft/ft
Velocity	4.14	ft/s
Velocity Head	0.27	ft
Specific Energy	0.66	ft
Froude Number	1.98	
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	0.48	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.00694	ft/ft

Cross Section for ALTA-1

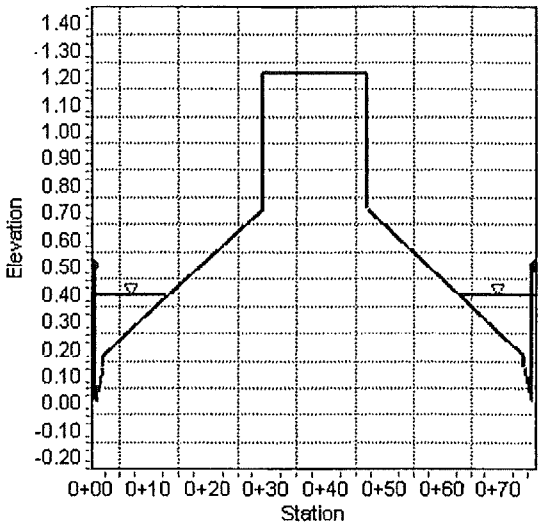
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.00	%
Normal Depth	0.39	ft
Discharge	14.00	ft³/s

Cross Section Image



Relevant Plan, Profile and Detail Sheets

SUMMERLIN

SM

VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS

APN NUMBERS:

137-34-299-001, 137-34-699-005, 137-34-699-006, 137-34-599-010, 137-34-599-011

SID #808 SUBPROJECT NUMBERS 8A, 8B, 8C, 11A, 11B AND 11C

2006

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

ENGINEER

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

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.

DERICK D.J YORO P.E. 16396 — DATE

THE HOWARD HUGHES CORPORATION,
a Delaware corporation

By: _____ DATE

Title: DIRECTOR OF PLANNING AND DESIGN

"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 — DATE
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

CLV PLANNING DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS IF THE PLANNING AND DEVELOPMENT DEPARTMENT

MARGO WHEELER, AICP, CURRENT PLANNING MANAGER — DATE

EMBARQ 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 _____ 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 _____ DATE

DATE

LAS VEGAS VALLEY WATER DISTRICT — DATE
(SHEETS 1, 2, 4, 8–15, 16–18, 20)(PROJECT #28258)

CLV FIRE DEPARTMENT — DATE

SOUTHWEST GAS CORP. — DATE

This grading plan is a part of drainage study # 4050 which was received on 8/9/06 and revised on 9/13/06. Page 3 of 25

SHEET 1 OF 32

CLV DRAWING NO. _____

DERICK D.J YORO No. 16396 PROFESSIONAL ENGINEER CIVIL 8/9/06

STATE OF NEVADA No. 16396 PROFESSIONAL ENGINEER DERICK D.J YORO Exp. 6-30-07 CIVIL 8/9/06

DESIGN:		DRAWN:		CHECK: BAH		ISSUE DATE:		ISSUE EDITOR:		PLOT DATE: 08-08-06		PLOT TIME: 14:57:48

REV	DATE	DESCRIPTION	DATE	APP'D	REV	DATE	DESCRIPTION	DATE	APP'D
1	08/08/06	ISSUE FOR DRAINAGE APPROVAL(- NOT FOR CONSTRUCTION							

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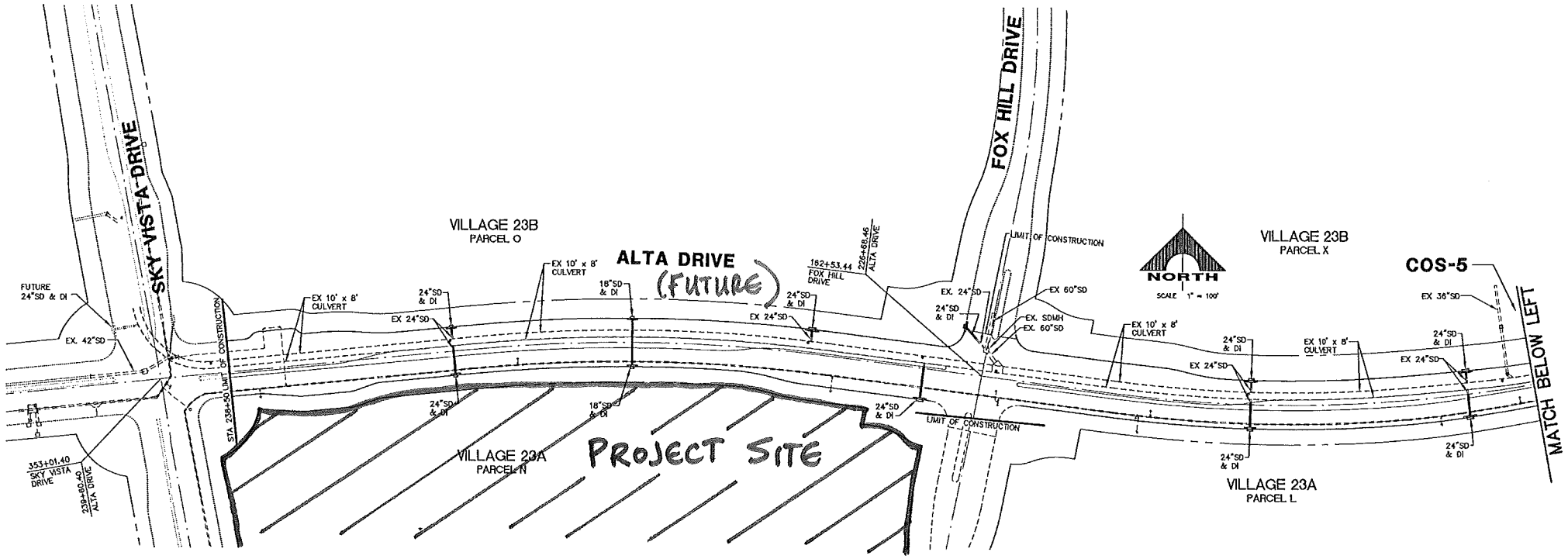
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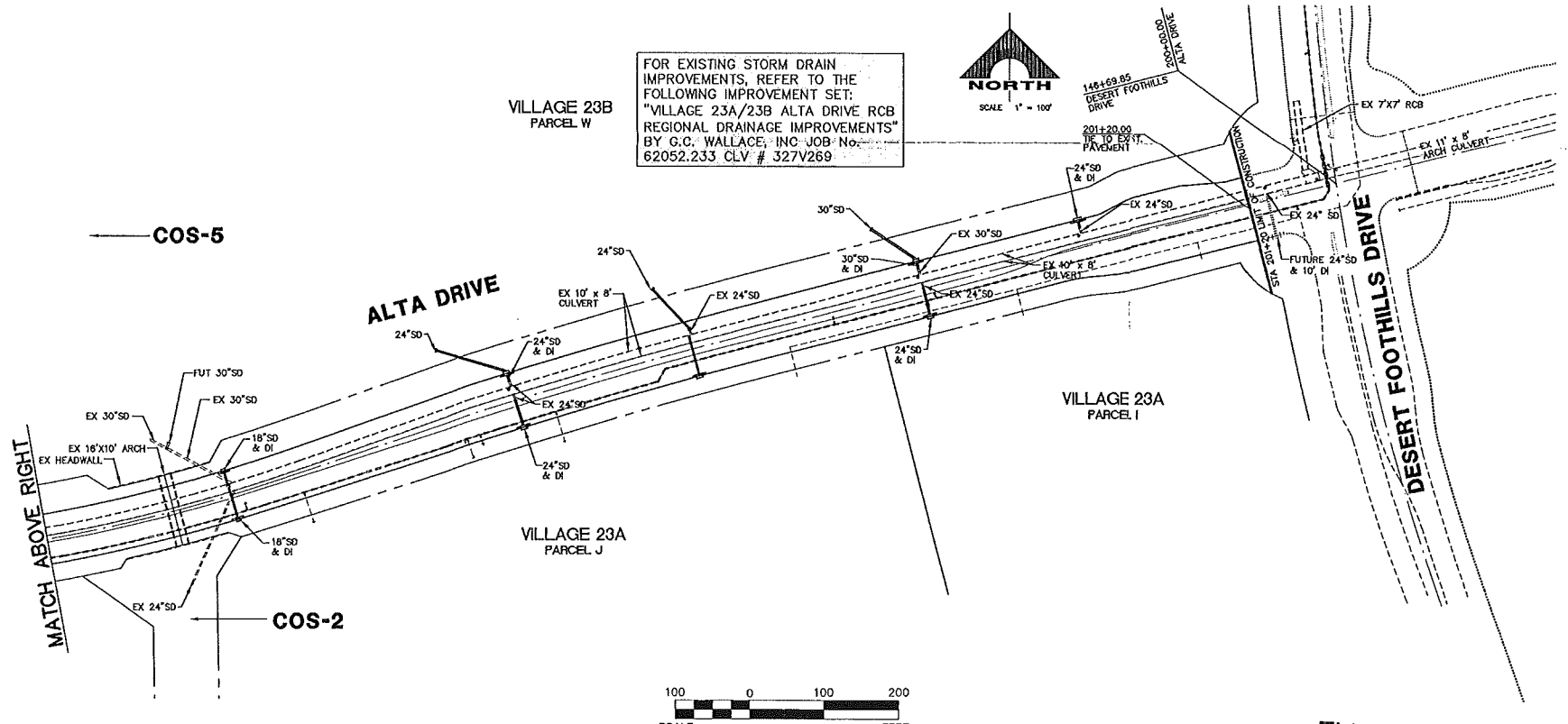
ISSUE DATE: 08/08/06

SUMMERLIN
VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS
COVER SHEET

JOB NO. 62023.270

DRAWING 1
1 OF 32 SHTS





STORM DRAIN ESTIMATED QUANTITIES (PUBLIC)

18" STORM DRAIN CLASS III RCP	190 LF
24" STORM DRAIN CLASS III RCP	505 LF
30" STORM DRAIN CLASS III RCP	83.5 LF
42" STORM DRAIN CLASS III RCP	0 LF
48" STORM DRAIN CLASS III RCP	0 LF
60" STORM DRAIN CLASS III RCP	0 LF
MANHOLE – TYPE III	0 EA
MOD "CM" DROP INLET (10.0')	5 EA
MOD "CM" DROP INLET (7.5')	6 EA
MOD "CM" DROP INLET (5.0')	8 EA
CONCRETE COLLAR 24"	2 EA
CONCRETE COLLAR 42"	0 EA

QUANTITIES ARE ESTIMATED ONLY. CONTRACTOR IS TO VERIFY DURING BIDDING PROCESS.

STORM DRAIN MANHOLE SCHEDULE

STREET NAME	STATION & OFFSET	INV IN	INV IN	INV OUT	RIM	NORTHING	EASTING
	NONE						

This grading plan is a part of drainage study # 4050 which was received on 8/9/06 and CA approved on 11/22/07. Page 5 of 25.

STATE OF NEVADA — DEREK C. JENSEN — No. 16386 — PROFESSIONAL ENGINEER — Exp. 06/30/2008 — CIVIL — DATE 9/8/06

REV	DATE	DESCRIPTION	DATE	JOB#	ADD	DATE	CHK
		ISSUE FOR DRAINAGE APPROVAL - NOT FOR CONSTRUCTION	08/08/06				

DESIGN: GBM/GTP
DRAWN: GTP
CHECK: BAH
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 08-08-06
PLOT TIME: 14:56:01

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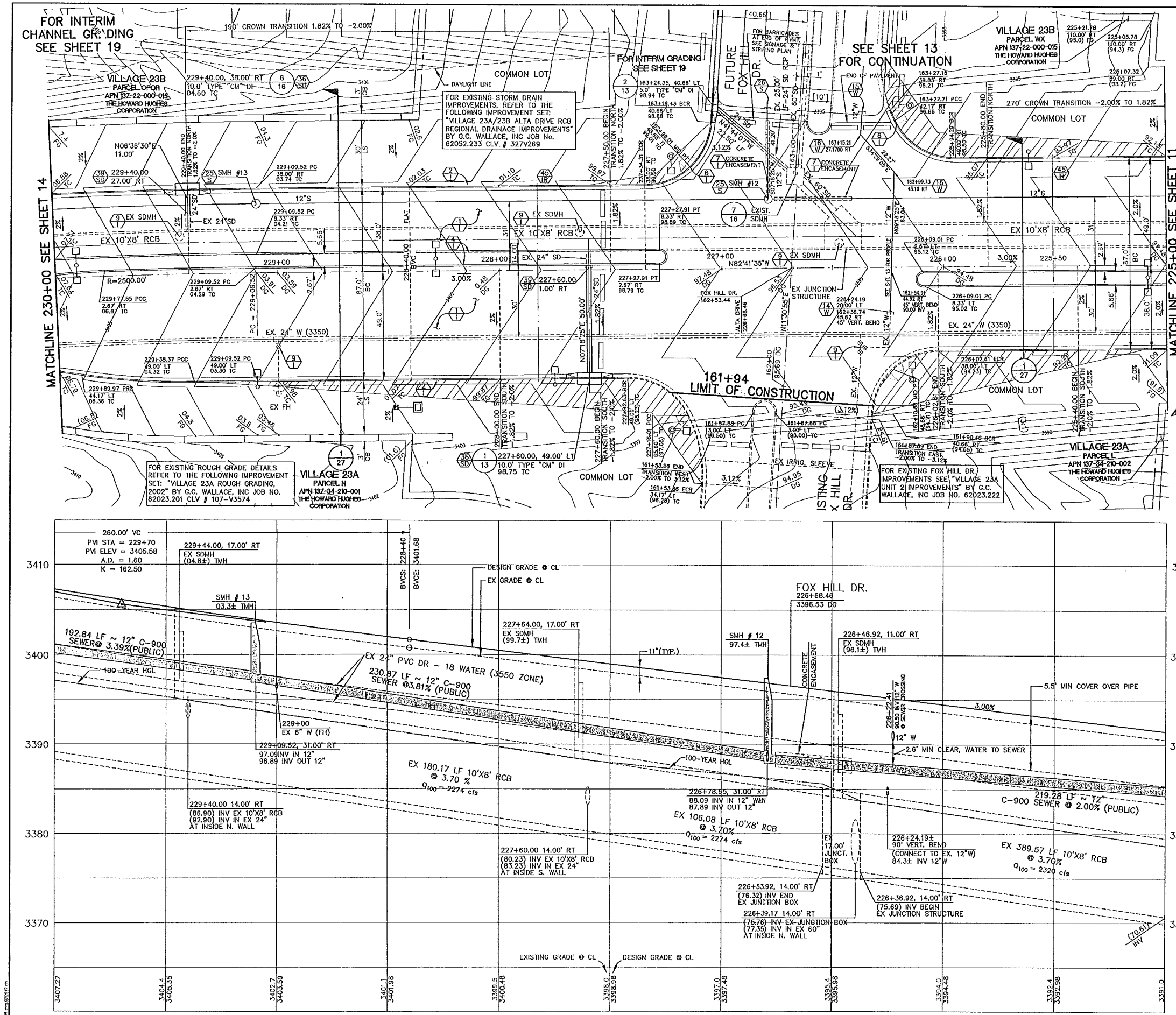
ISSUE DATE: 08/08/06

SUMMERLIN
VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS
STORM DRAIN MASTER PLAN

JOB NO. 62023.270

SHEET 6
6 OF 32 SHTS

CLV DRAWING NO.



BENCHMARK			
BM #	DESC.	NAVD 88 DATUM	NAVD 83 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.

APPROVAL:

LAS VEGAS VALLEY WATER DISTRICT (228138) DATE

This grading plan is a part of drainage study # 4050 which was received 1/24/07 on 10/18/06 and approved on 11/2/06. Page 1 of 2

Avoid cutting underground utility lines. It's costly. Call before you Dig. 1-800-227-2600 UNDERGROUND SERVICE ALERT (USA)

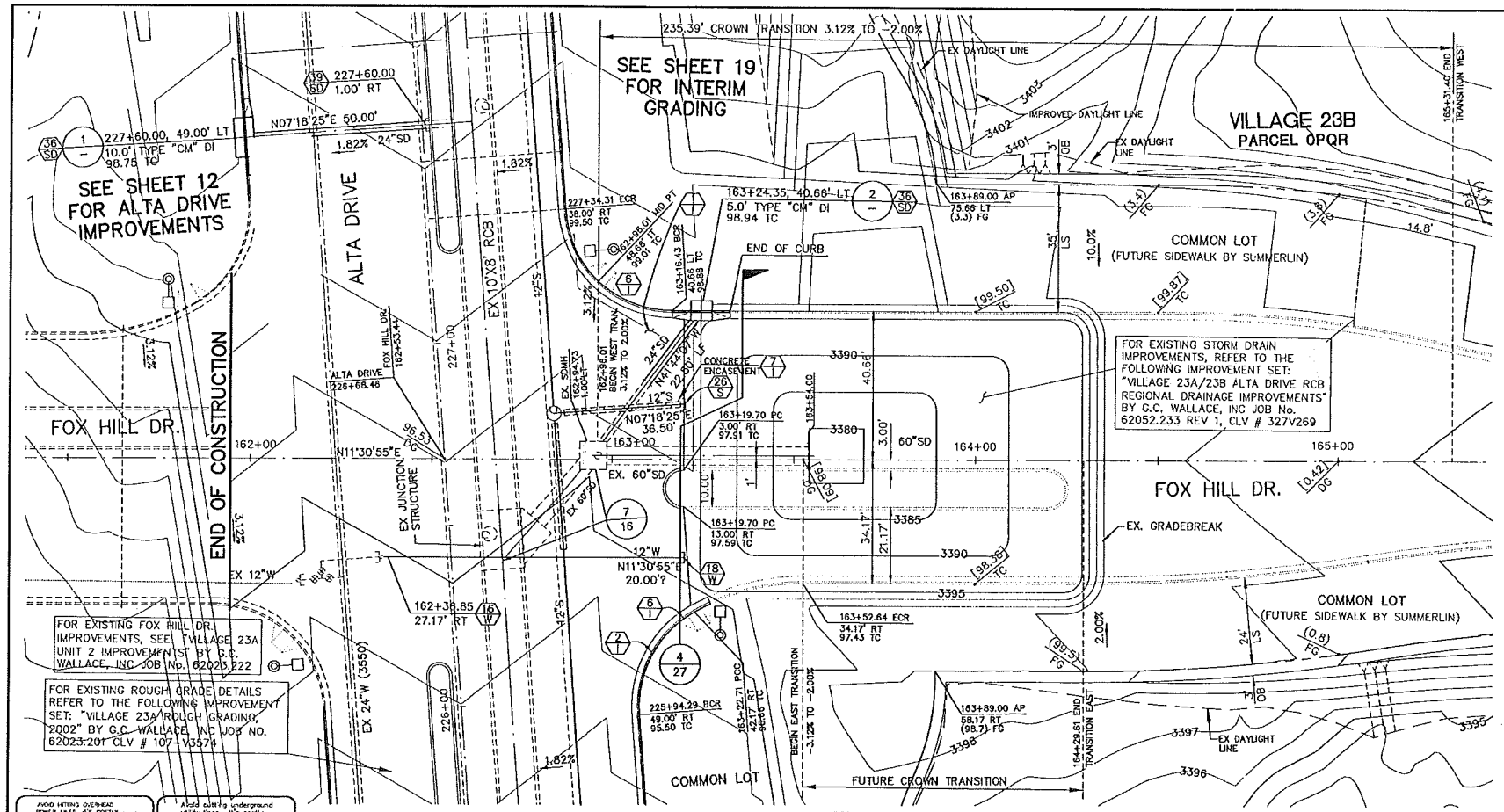
AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD. CALL 1-702-593-6111

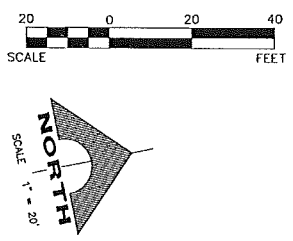
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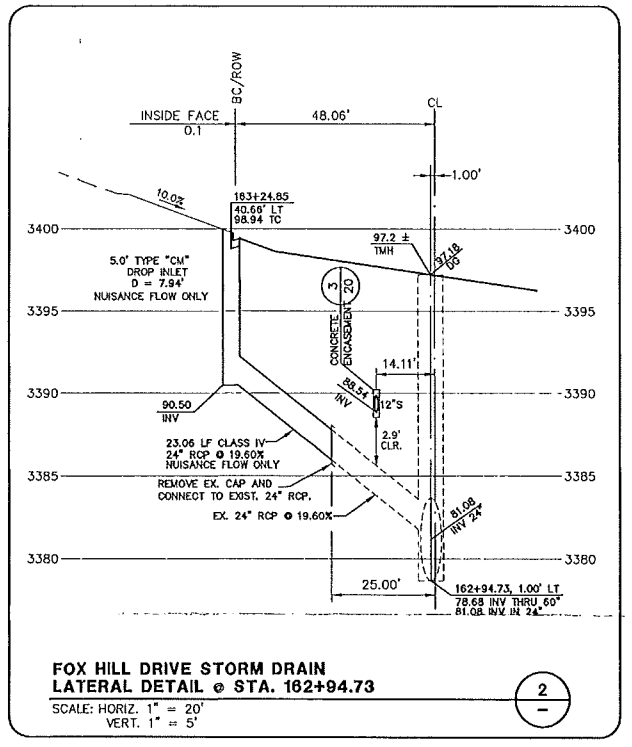
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DRAWN: GTP
CHECK: BAH
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 10-13-06
PLOT TIME: 10:46:31

DRV	DATE	DESCRIPTION







FOX HILL DRIVE STORM DRAIN
LATERAL DETAIL @ STA. 162+94.73 (2)
SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

FOX HILL DRIVE (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'
REFER TO SHEET 2 FOR CONSTRUCTION NOTES

BASIS OF BEARINGS

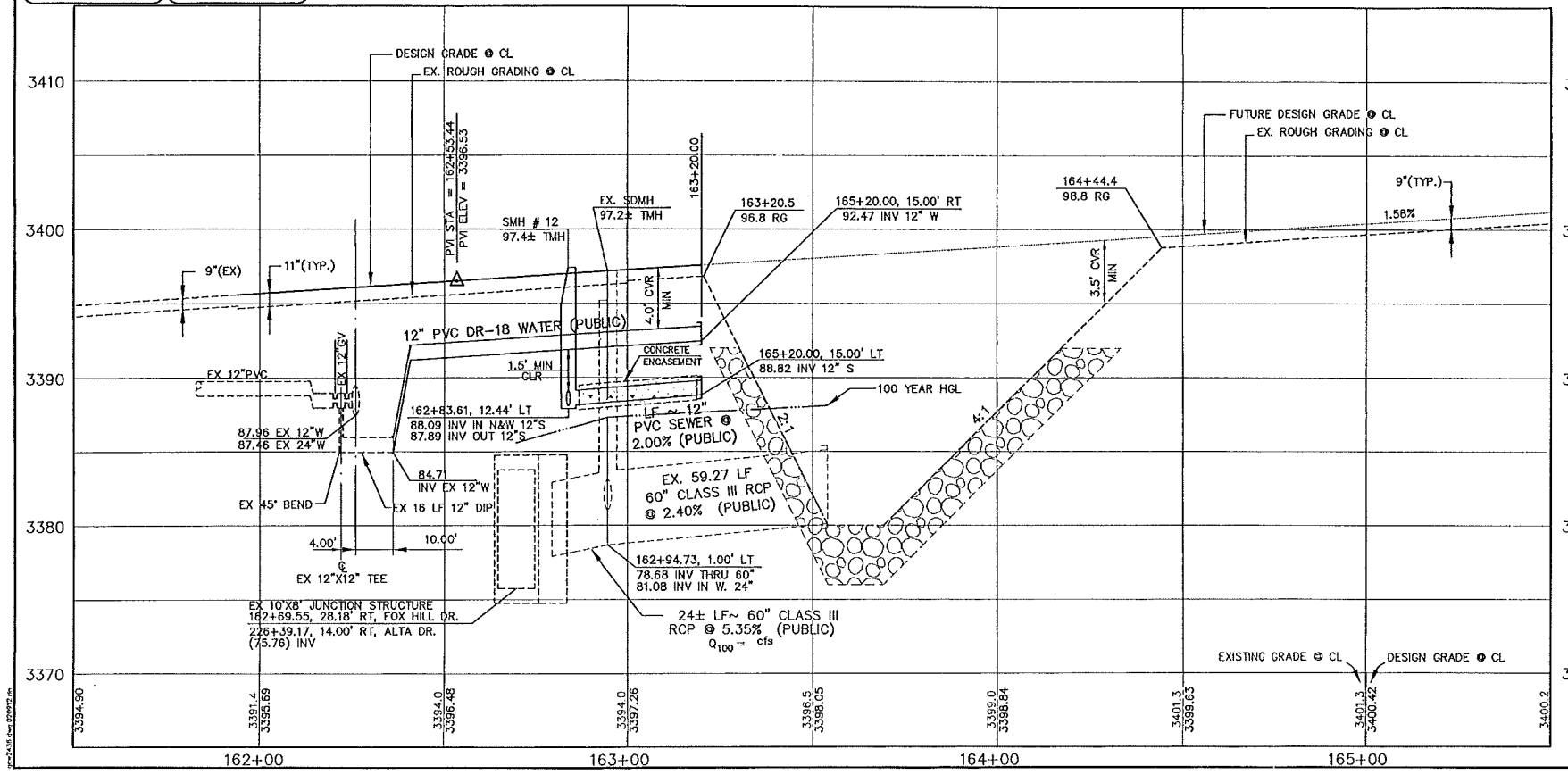
NORTH 89°45'05" EAST BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN BY MAP ON FILE IN FILE 91, PAGE 28 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA

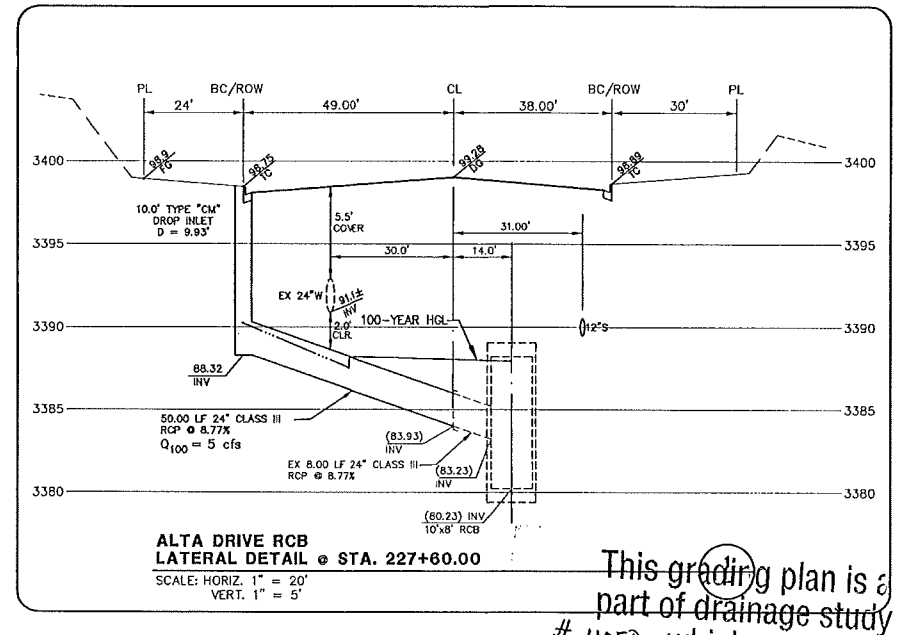
BENCHMARK

BM #	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. D368 3	U.S.C.& G.S. BRASS BISC SET IN ROCK ON THE EAST SIDE OF CHARLESTON BOULEVARD AND SOUTH OF THE RED ROCK DETENTION BASIN.	3246.71 (FEET)	989.599 (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.





ALTA DRIVE RCB
LATERAL DETAIL @ STA. 227+60.00 (1)
SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

This grading plan is a part of drainage study # 4050 which was received on 8/9/06 and CA'ed on 11/7/06 11/22/07

APPROVAL:

LAS VEGAS VALLEY WATER DISTRICT (PROJECT #28258) DATE

CLV DRAWING NO.

DESIGN: CRW/GTP
DRAWN: GTP
CHECK: BAH
ISSUE DATE: 08-08-06
ISSUE EDITOR:
PLOT DATE: 08-08-06
PLOT TIME: 15:00:19

REV.	DATE	DESCRIPTION	DATE	ACEN	APP	DATE	CON	APP

DATE 08/08/06

08/08/06 ISSUE FOR DRAINAGE APPROVAL- NOT FOR CONSTRUCTION

STATE OF NEVADA — DERICK H. TORY — No. 16398 — PROFESSIONAL ENGINEER — CIVIL — 08/08/2006

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
PH (702) 804-8000 FX (702) 804-8099 GCWALLACE.COM

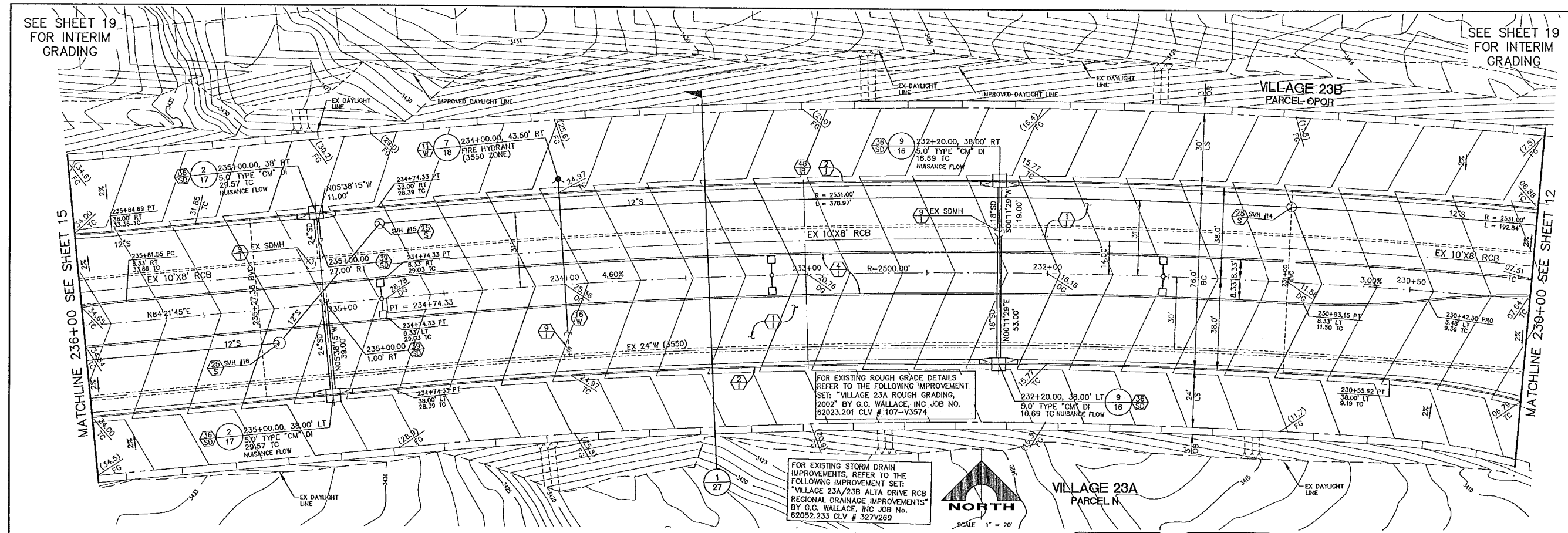
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SUMMERLIN
VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS
FOX HILL DRIVE UTILITY PLAN AND PROFILE
STA. 162+00 TO STA. 165+60

SHEET 13
13 OF 32 SHTS

JOB NO. 62023.270

ISSUE DATE: 08/08/06



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

ALTA DRIVE (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

REFER TO SHEET 2 FOR CONSTRUCTION NOTES

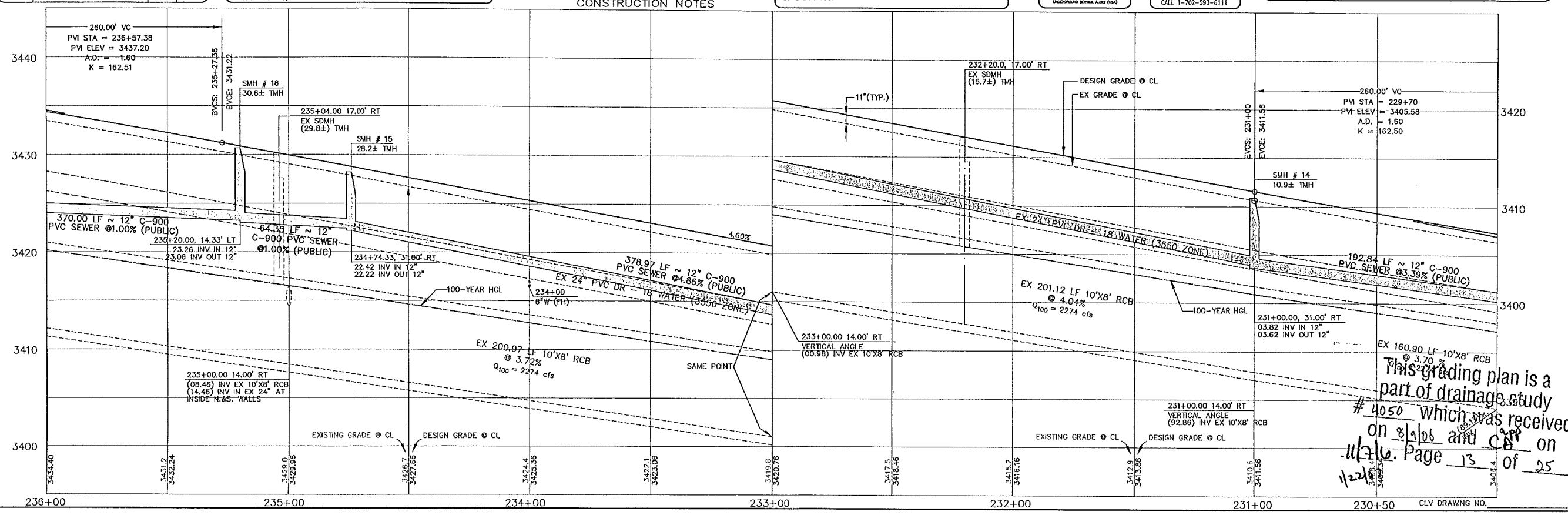
NOTE

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.

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APPROVAL:

LAS VEGAS VALLEY WATER DISTRICT (#28258) DATE



This grading plan is a part of drainage study # 4050 which was received on 8/8/06 and CO'd on 11/7/06. Page 13 of 25

1/22/08

REV	DATE	DESCRIPTION	DATE	APP	DATE	APP
		ISSUE FOR DRAINAGE APPROVAL - NOT FOR CONSTRUCTION	08/08/06	JSP		

DESIGN: GBW/GTP
DRAWN: GTP
CHECK: BJH
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 08-08-06
PLOT TIME: 15:05:37

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
5555 RAINBOW BOULEVARD - LAS VEGAS, NV 89146
PHONE (702) 804-2000 FAX (702) 804-2099

E:\V23\Alta Drive\LDWG\MPS\V23d01a.dwg

ISSUE DATE 08/08/06

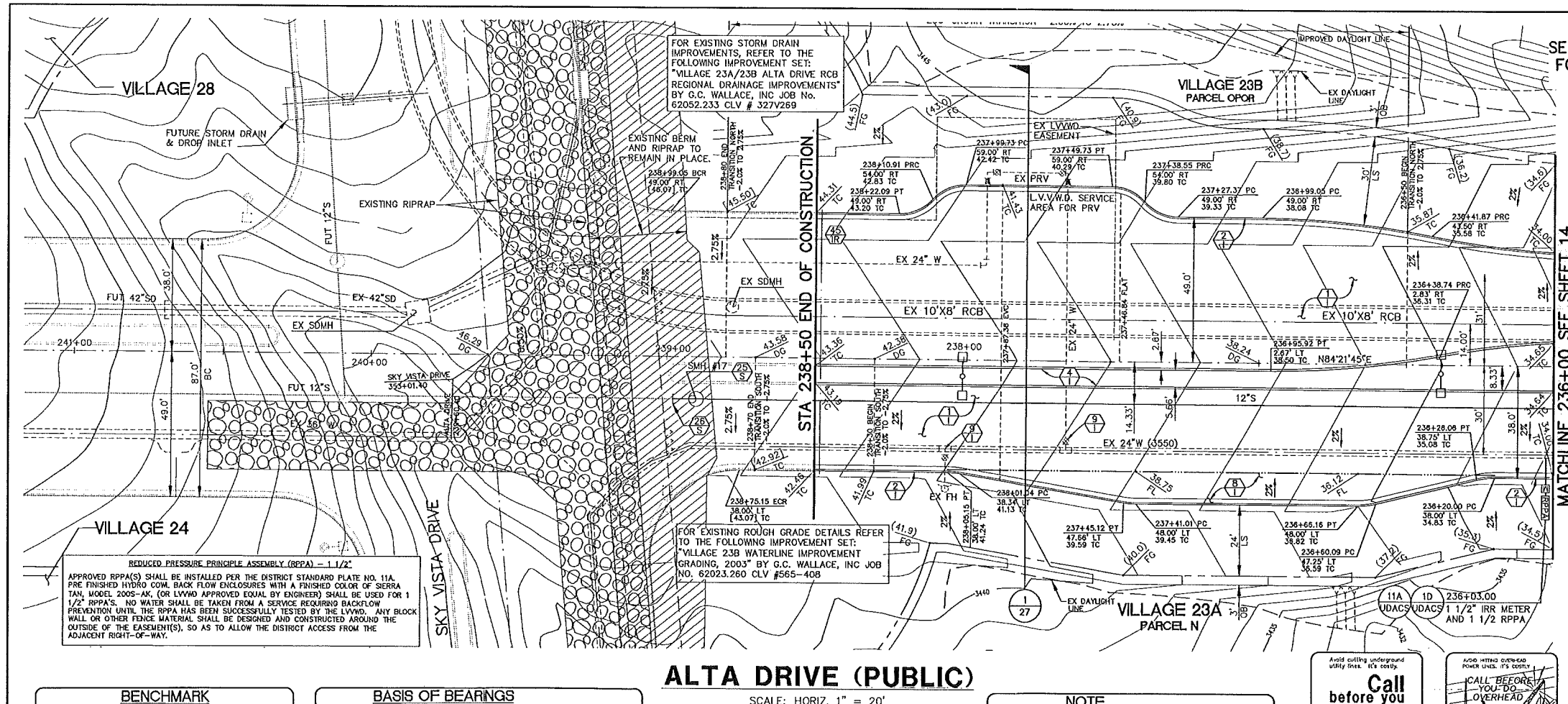
SUMMERLIN

VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS

ALTA DRIVE PLAN AND PROFILE
STA. 230+00 TO STA. 236+00

JOB NO. 62023.270

SHEET 14
14 OF 32 SHTS



ALTA DRIVE (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

REFER TO SHEET 2 FOR CONSTRUCTION NOTES

BENCHMARK

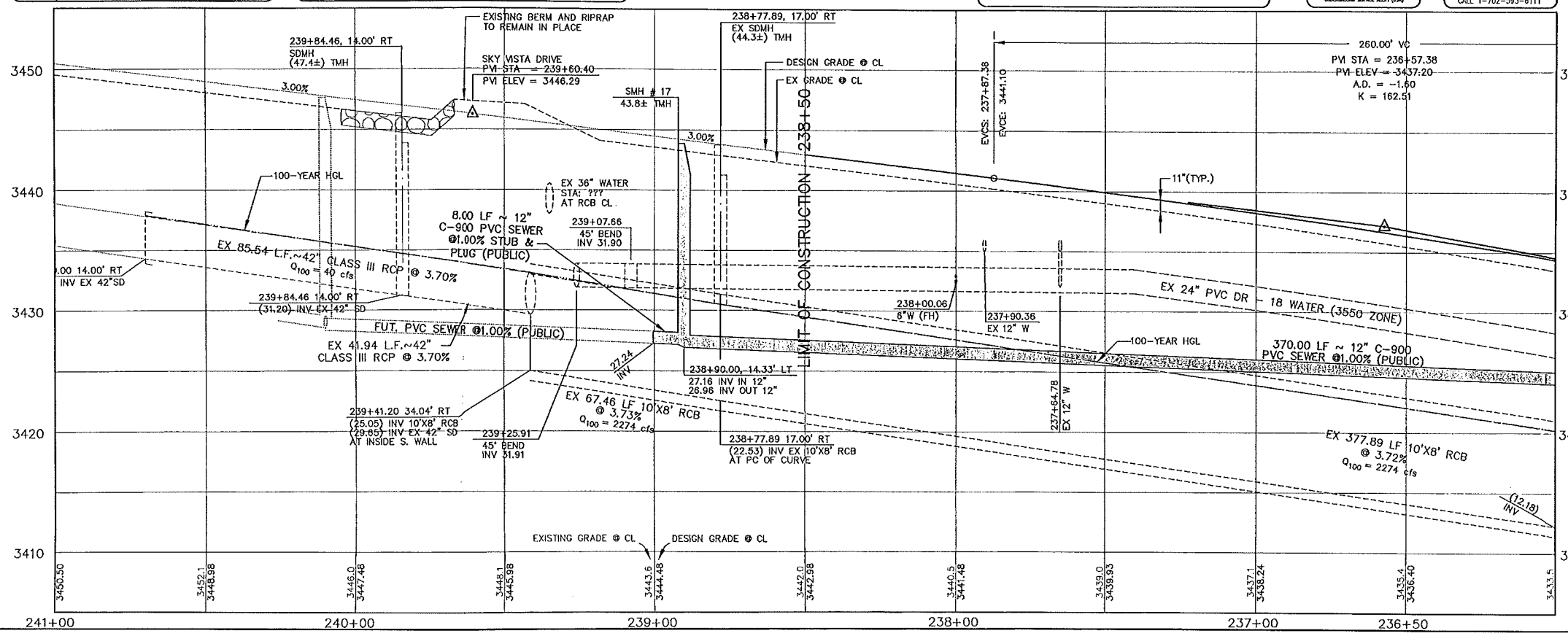
BM #	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. D368 3	U.S.C & G.S. BRASS DISC SET IN ROCK ON THE EAST SIDE OF CHARLESTON BOULEVARD AND SOUTH OF THE RED ROCK DETENTION BASIN.	3246.71 (FEET)	989.599 (METERS)

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.



This grading plan is a part of drainage study # 4050 which was received on 8/9/06 and CA'd on 11/7/14 Page 14 of 25. 1/24/07

APPROVAL:

LAS VEGAS VALLEY WATER DISTRICT (#28258) DATE

CLV DRAWING NO.

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ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM

SUMMERLIN
VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS
ALTA DRIVE UTILITY PLAN AND PROFILE
STA. 236+00 TO STA. 241+00

JOB NO. 62023.270
SHEET 15
15 OF 32 SHTS

ISSUE DATE: 08/08/06

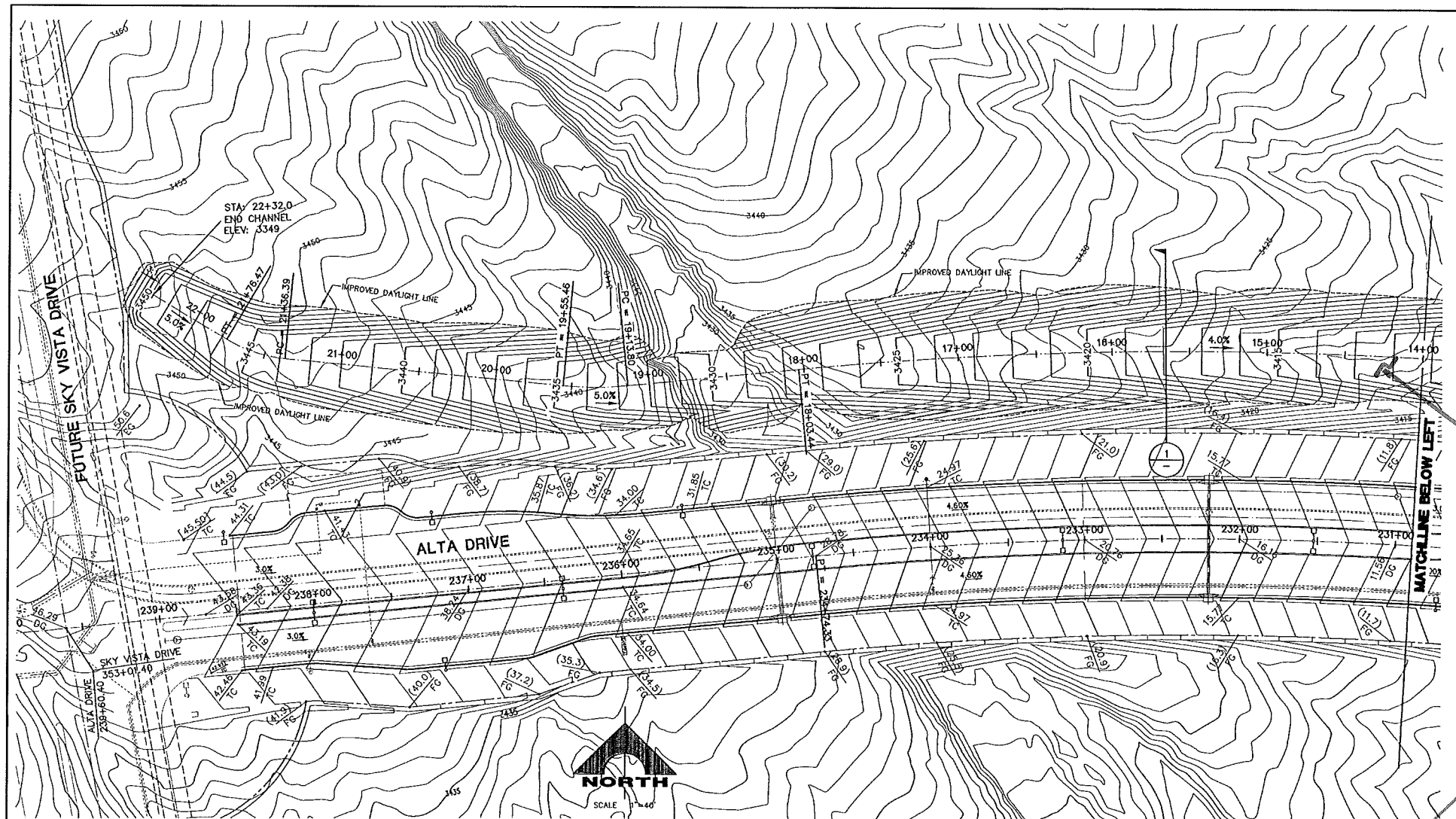
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ISSUE EDITOR:
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Name						

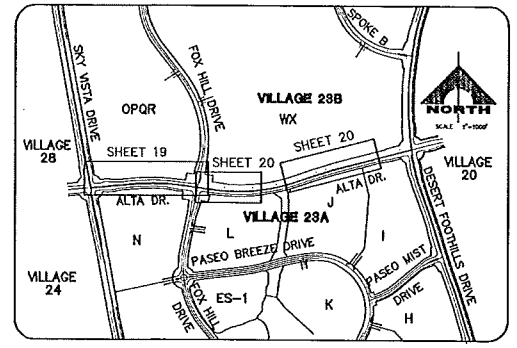
08/08/06 ISSUE FOR DRAINAGE APPROVAL - NOT FOR CONSTRUCTION

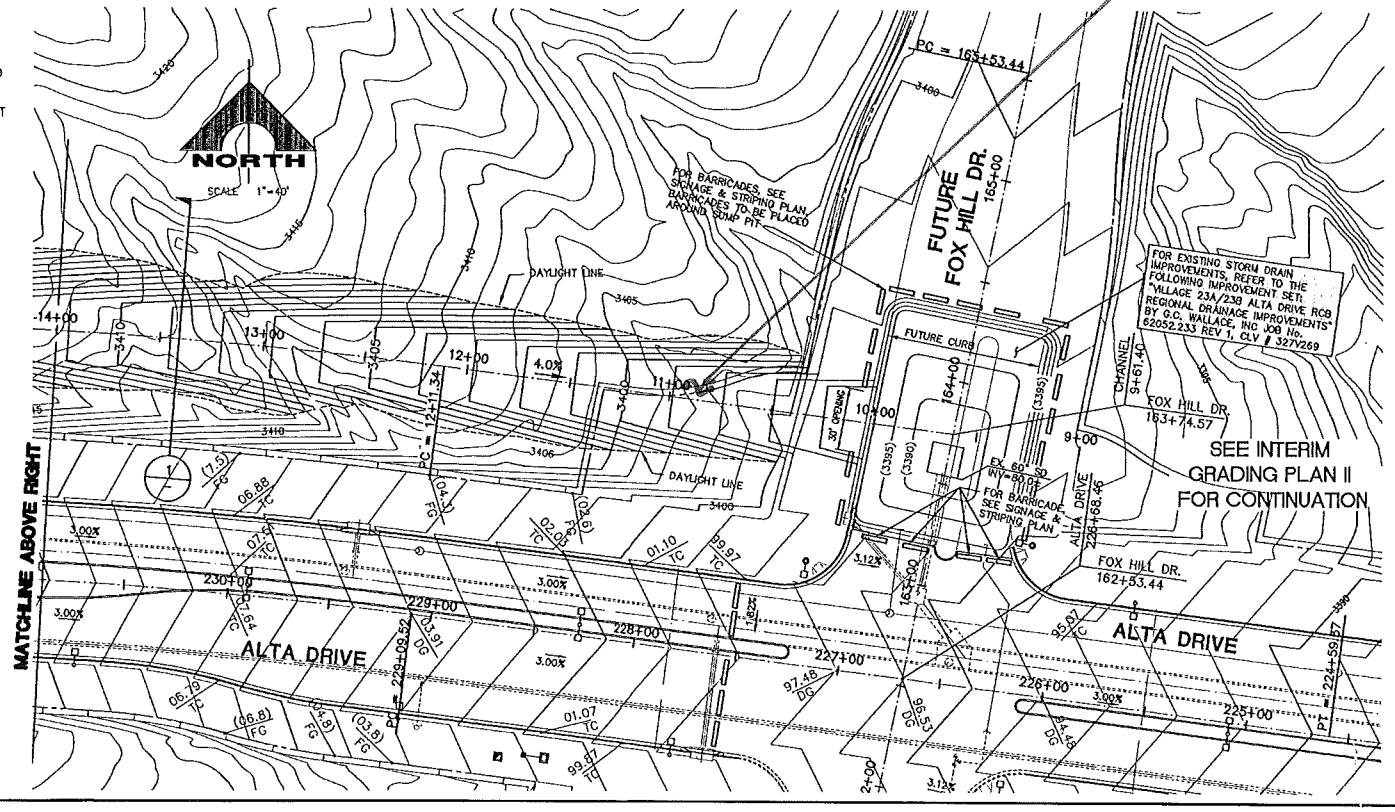
DATE: 8/8/06

PIONEER CITIZEN OF THE STATE OF NEVADA — PROFESSIONAL ENGINEER — PATRICK T. YORK — No. 9012 — CIVIL — EXP. 06/30/2006



INTERIM CHANNEL

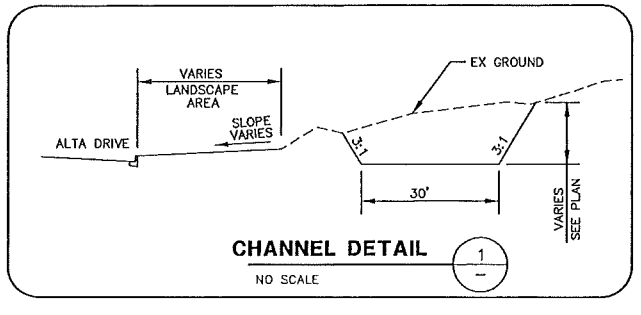




40 0 40 80
SCALE FEET

INTERIM DRAINAGE QUANTITIES

FILL =	22,048	C.Y.
CUT =	584	C.Y.
NET CUT =	18,623	C.Y.



CHANNEL DETAIL 1/—
NO SCALE

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

NOTE

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APPROVAL: This grading plan is a part of drainage study # 4050 which was received on 1/24/07 and on 11/21/06
LAS VEGAS VALLEY WATER DISTRICT (428258) DATE

167+00 — DRAWING No. 2 of 2

STATE OF NEVADA — DERICK J. TOTH — No. 16398 — PROFESSIONAL ENGINEER — CIVIL — EXP. 6/30/2008 — DATE: 10/13/06

ISSUE DATE: 10/13/06 ISSUE FOR: TDS SUBMITTAL

REV	DATE	DESCRIPTION	DATE	ASSN	JOB	DATE	DOW	JOB

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DRAWN: CTP
CHECK: BAH
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 10-13-06
PLOT TIME: 15:42:21

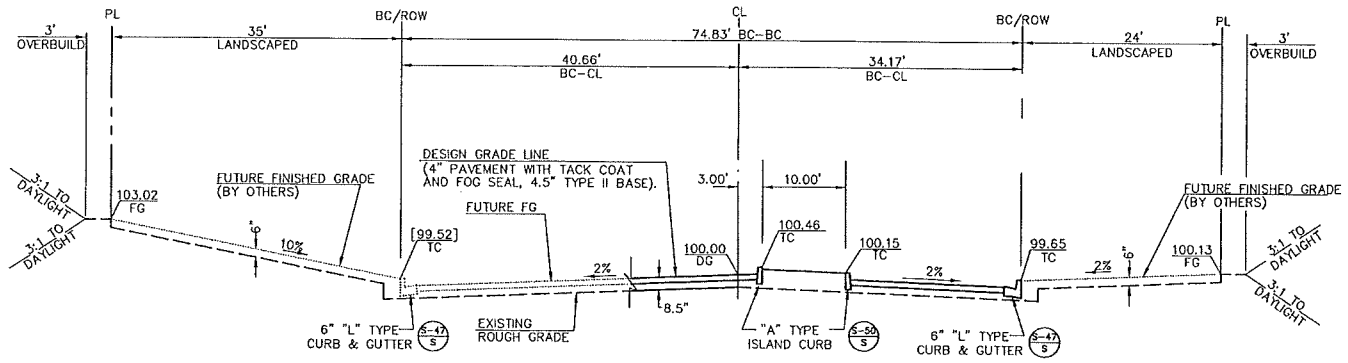
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SUMMERLIN
VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS
INTERIM GRADING PLAN I

SHEET 19 OF 38 SHTS

JOB NO. 62023.270

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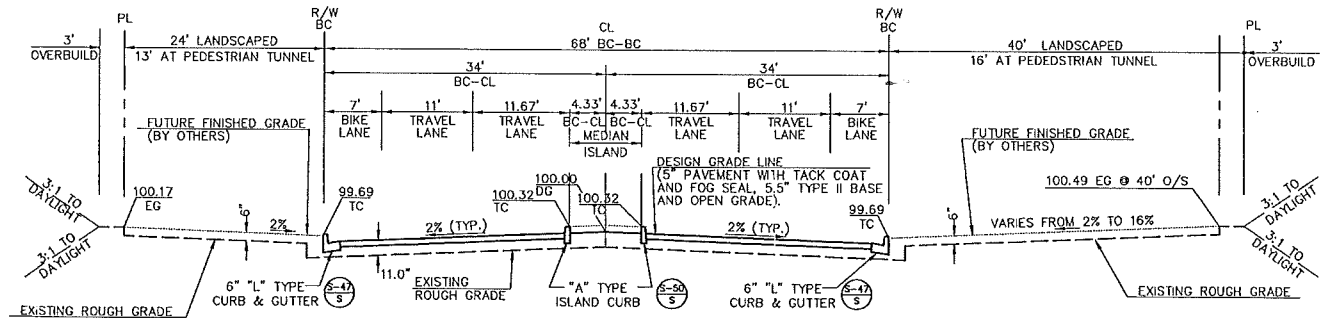


FOX HILL DRIVE

(PUBLIC NEIGHBORHOOD COLLECTOR LEVEL 1 WITH ADDITIONAL PARKING LANE AND SHARED BIKE LANES)

SCALE: HORZ: 1"=10'
VERT: 1"=5'

4



ALTA DRIVE - TYPICAL NARROWED MEDIAN SECTION

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

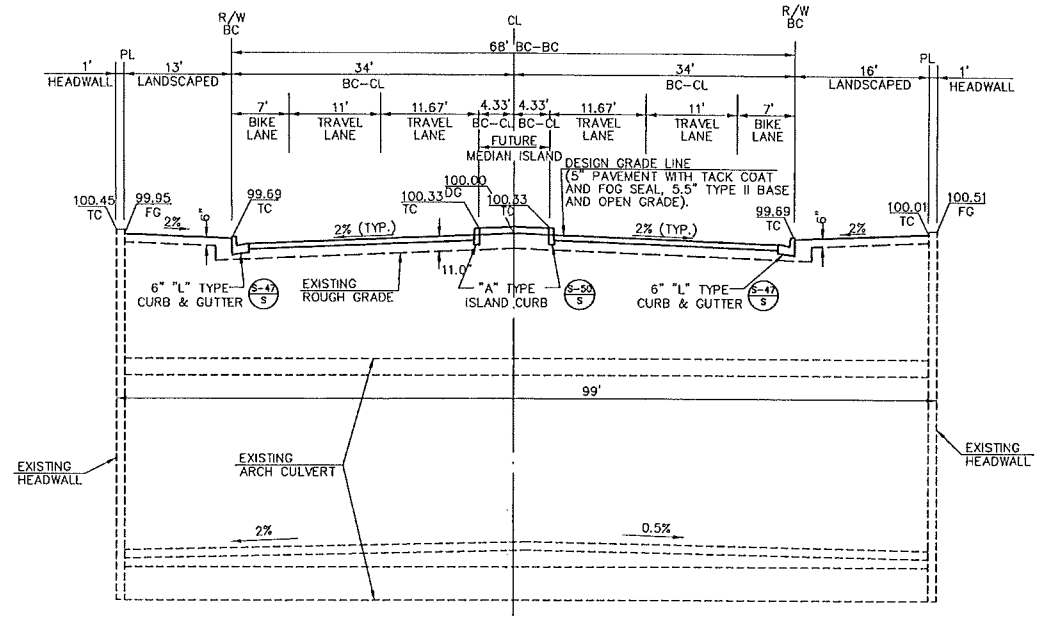
SCALE: HORZ: 1"=10'
VERT: 1"=5'

2

STA 215+08.34 TO STA 217+80.00

TRANSITION SECTION - 16.66' TO 8.66' MEDIAN FROM STA 211+71.68 TO STA 215+08.34

TRANSITION SECTION - 8.66' TO 16.66' MEDIAN FROM STA 217+80.00 TO STA 220+02.19



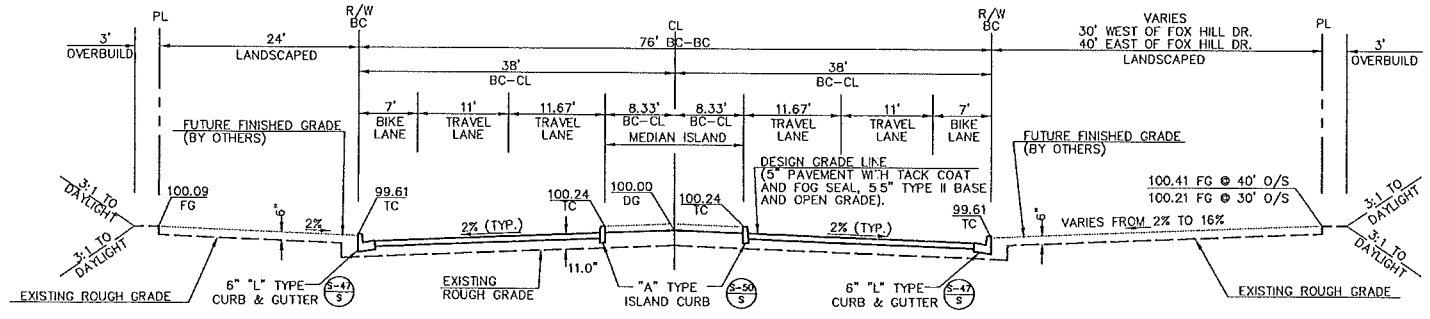
ALTA DRIVE - EXISTING ARCH CULVERT/ HEADWALL SECTION

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

SCALE: HORZ: 1"=10'
VERT: 1"=5'

3

NORTH WALL - STA 215+60.47 TO STA 217+04.90
SOUTH WALL - STA 215+63.36 TO STA 217+01.32



ALTA DRIVE - TYPICAL SECTION

(PUBLIC NEIGHBORHOOD ARTERIAL WITH BIKE LANES)

SCALE: HORZ: 1"=10'
VERT: 1"=5'

1

This grading plan is a part of drainage study #4050 which was received on 8/9/06 and CA'ed on 11/7/16. Page 25 of 25.
1/22/07

CLV DRAWING NO.

STATE OF NEVADA — PROFESSIONAL ENGINEER — DEREK J. PIKE — No. 18586 — CIVIL — DATE 8/8/06

REV	DATE	DESCRIPTION	DATE APP'D	DATE ASSY APP'D	DATE ROW APP'D

DESIGN: GBW/GTP
DRAWN: GTP
CHECK: BAH
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 08-08-06
PLOT TIME: 15:05:30

DATE: 08/08/06 ISSUE FOR DRAINAGE APPROVAL - NOT FOR CONSTRUCTION

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J:\V231 Alta Drive\DWG\MPS\A1023x027.dwg

SUMMERLIN
VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS
TYPICAL SECTIONS

SHEET 27
27 OF 32 SHTS

JOB NO. 62023.270
ISSUE DATE 08/08/06

APPENDIX K

Summerlin Coordination

SDRC Technical Drainage Study Approval with Conditions

Howard Hughes®
THE HOWARD HUGHES CORPORATION

January 13, 2012

Jim Foltz
Senior Vice-President
Woodside Homes of Nevada
4730 S. Fort Apache Road, Suite 370
Las Vegas, Nevada 89147

Re: **SDRC Technical Drainage Study Approval with Conditions** – Woodside Homes, Parcel O in Summerlin Village 23A (The Paseos)

Dear Jim,

The Summerlin Design Review Committee (SDRC) has reviewed the Technical Drainage Study for Parcel O we received December 28, 2011. The SDRC approves this technical drainage study with the following comments. Please note these comments are general in nature, and do not imply that they all need to be addressed for TDS submittal to the City of Las Vegas.

CLV Checklist, Page 1

1) A notarized letter from the adjacent property owner allowing off-site grading, i.e., grading onto Parcel N is checked as N/A. The next checked item however does state that they need Summerlin concurrence.

2) Why is the box checked N/A for CLV Current Planning approval for grading that is more than two feet above existing ground? Hopefully this is because of Summerlin review, and City is N/A.

Introduction

1) Site Description – Alta Drive is future. There is no obligation to complete Alta Drive prior to Parcel O being completed. Alta Drive has been rough graded, and the Sky Vista rip-rapped line channel extends to Far Hills.

The following are general comments on the grading plans and details submitted with the TDS. These plans are at 40 scale, and can be observed with better understanding of intent. It is understood that these plans may not have addressed all wall and grading details per Summerlin's previous comments, but my comments are intended to identify areas that do need review.

Sheet G-1

1) Elevations shown along Sky Vista are somewhat confusing, as there are proposed finished grades, existing grades and older contours. It is unclear if the existing grades are from previous prepared rough grade plans or actual current existing elevations. There is an existing channel and berm, but it is unclear as to what extent the berm width is versus the original intent of the design. Details 4&5 on sheet D-1 imply that the grades are taken from GC Wallace plans approved by the City, plan # 107-V3574.

The Howard Hughes Corporation - Summerlin
10801 W. Charleston Boulevard, Third Floor
Las Vegas, Nevada 89135
T 702.791.4000 F 702.791.4453

2) Recommend review crosswalks where street slopes are 5%.

3) Should there be a handicap ramp at mid-block where the pedestrian access enters for Sky Vista?

Sheet G-2

1) Recommend review of handicap ramps & street crossing at 4% cross slope for ADA compliance.

2) Some rear to rear retaining wall / slope details do not work based on detail callouts and scaled toe of slopes. Recommend reviewing to accurately establish retaining wall, TOE of slopes to confirm minimum desired pad and rear yard areas.

3) Lot 90 side yard slope (corner lot) does not work per detail callout

Sheet G-3

1) Same comment along Sky Vista.

2) What is happening with Grading/ walls at southwest corner of property at Sky Vista, especially since there is cut involved along a drainage berm?

3) Am concerned about 3:1 Slope grading from back of Lots 44, 45, and 102 onto Parcel N (12 to 15 foot high scarp and ultimate Parcel N is below this area.

Sheet G-4

1) Review grading transitioning at NW corner lot 102 and onto Parcel N.

2) General Comment – The location of DI # 1 appears to be working (draining) backwards at road is sloping to south and outlet is on north end. In conjunction with the two currently shown Handicapped ramp crossings to the park and intersection, it is recommended to move DI # 1 to the north and provide a single handicapped ramp crossing at the intersection, thereby eliminating the mid-block one. Again this comment is optional.

Sheets G-1.1 thru G-4.1
Not reviewed

Sheet D-1

Sections 2, 4 & 9 do not work as called out on plans for following lots, there may be more:

- Detail 2 – Lot 79 Rear to Lot 77 Rear
  Lot 80 Rear to Lot 76 Rear

- Detail 4 – Up to 2' feet of retaining wall can be added to village wall at Woodside's expense to reduce rear yard slope and retaining walls.

- Detail 9 – Lot 65 Rear to Lot 62 Side
  Lot 64 Rear to Lot 62 Side
  Lot 81 Rear to Lot 75 Rear
  Lot 82 Rear to Lot 74 Rear
  Lot 83 Rear to Lot 73 Rear

Sheet D-2

1) Detail 23 does not work with lot 91

2) Section AA – confirm that drainage does not go down handicap ramp versus where it is supposed to, into the sidewalk under drain.

Please direct your responses and revisions directly to me for distribution. In the meantime, please contact me with any questions or wish to meet with us to discuss these comments.

Sincerely,

Elizabeth Molina
Design Review Administrator
SDRC

CC: Cory Lieber, Slater Hanifan Group
Ed Duenas, Woodside Homes
Julie Cleaver, THHC

The Howard Hughes Corporation - Summerlin
10801 W. Charleston Boulevard, Third Floor
Las Vegas, Nevada 89135
T 702.791.4000 F 702.791.4453

Response to Comments Letter

TECHNICAL DRAINAGE STUDY
RESPONSE TO SUMMERLIN COMMENTS

Summerlin Village 23A Unit 2
Parcel O

City of Las Vegas, Nevada

Job No.: WSH1105.000
Date: January 2012

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

Prepared For:
Woodside Homes
5888 W. Sunset Road, Suite 200
Las Vegas, Nevada 89118
Phone: 702-889-7800 ▪ Fax: 702-889-0801

Kylie C. Rowbury, P.E.
NV Professional Engineer No. 21172

WSH1105-000

January 17, 2012

Elizabeth Molina – Design Review Administrator
The Howard Hughes Corporation
10801 W. Charleston Blvd, Third Floor
Las Vegas, Nevada 89135

Subject: Response to Comments for the Technical Drainage Study for Summerlin Village 23A Unit 2 Parcel O

Dear Mrs. Molina:

This letter is submitted in response to Summerlin review comments contained in the January 13, 2012 conditional approval letter for the above referenced project. A copy of the SDRC Technical Drainage Study Approval with Conditions has been provided in Appendix A of this submittal. The SDRC comments identified in the January 13, 2012 conditional approval letter have been individually addressed as follows:

CLV Checklist, Page 1

Comment:

1. **Comment:** *A notarized letter from the adjacent property owner allowing off-site grading, i.e., grading onto Parcel N is checked as N/A. The next checked item however does state that they need Summerlin concurrence.*

   Response: A notarized letter to allow grading on adjacent Parcel N is required. The CLV Checklist has been revised to reflect the permission to grade requirement. A permission to grade letter must be obtained from Summerlin prior to CLV drainage study approval.

2. **Comment:** *Why is the box checked N/A for CLV Current Planning approval for grading that is more than two feet above existing ground. Hopefully this is because of Summerlin review, and City is N/A.*

   Response: It is noted that there is more than two feet of grading above existing ground. Therefore, the CLV checklist has been revised to indicate the excessive grading. However, it has been noted on the checklist that Summerlin has approved the grading in excess of two feet and therefore, it is assumed that approval from CLV Current Planning will not be required.

Introduction

1. **Comment:** *Site Description – Alta Drive is future. There is no obligation to complete Alta Drive prior to Parcel O being completed. Alta Drive has been rough graded, and the Sky Vista rip-rapped line channel extends to Far Hills.*

   Response: Noted. Per coordination meeting with Summerlin including Chris Anderson (Howard Hughes Corporation), Julie Clever (Howard Hughes Corporation), Jim Fultz (Woodside Homes), Eddie Duenas (Woodside Homes) and Cory Lieber (Slater Hanifan Group) on January 12, 2012, it is agreed that there is no obligation to construct Alta Drive prior to development of the Parcel O site. However, in the interim condition (prior to the construction of Alta Drive), the interim channel proposed with the Alta Drive Improvement Plans (by G.C. Wallace) will be constructed by Summerlin. The interim channel runs parallel to Alta Drive along the north and will protect Parcel O from offsite interim flows draining to the Alta Drive alignment from the north. With the construction of the interim channel, the existing 60-inch RCP stub at the intersection of Fox Hill Drive will be exposed and flow from the channel will be collected and conveyed in the existing Alta Drive storm drain in accordance with the Alta Drive Study. The channel has been designed (by others) per the Alta Study. Additional reference material from the Alta Study, including a drainage exhibit (Figure 6) and Flowmaster computation are included in Appendix B for reference. The Parcel O improvement plans have been revised to show the interim channel as existing and Alta Drive as future. In conclusion, although the Alta Drive roadway may not be constructed prior to development of the proposed Parcel O site, the Alta drainage improvements intended for flood protection of the site (offsite channel and storm drain) is considered to be installed and functioning prior to development of Parcel O.

   Furthermore, the discussions of the existing and proposed drainage conditions have been revised in the Technical Drainage Study to reflect these revisions. See Appendix B for the revised drainage study text, along with the revised drainage exhibits. Revised improvement plans are located in Appendix C.

Sheet G-1

1. **Comment:** *Elevations shown along Sky Vista are somewhat confusing, as there are proposed finished grades, existing grades and older contours. It is unclear if the existing grades are from previous prepared rough grade plans or actual current existing elevations. There is an existing channel and berm, but it is unclear as to what extent the berm width is versus the original intent of the design. Details 4 & 5 on sheet D-1 imply that the grades are taken from GC Wallace plans approved by the City, plan # 107-V3574.*

   Response: SHG will obtain new aerial topography of the site that will accurately show the existing conditions in Sky Vista Drive and Alta Drive. The revised topography will be shown in future submittals. However, per field investigation, the Sky Vista collection channel and toe of slope intended for flood protection of the site is installed and functioning; therefore, the design grades from the referenced Rough Grade Study plans which constructed the collector channel are shown on the proposed Parcel O plans for drainage study purposes.

2. **Comment:** *Recommend review crosswalks where street slopes are 5%.*

   Response: Noted. SHG and WSH will research ADA requirements and options for this site.

3. **Comment:** *Should there be a handicap ramp at mid-block where the pedestrian access enters for Sky Vista?*

   Response: Yes. The construction notes label sidewalk ramps at the pedestrian access; however the ramps were not shown. The grading plans have been updated accordingly and are included in Appendix C.

Sheet G-2

1. **Comment:** *Recommend review of handicap ramps & street crossing at 4% cross slope for ADA compliance.*

   Response: Noted. SHG and WSH will research ADA requirements and options for this site.

2. **Comment:** *Some rear to rear retaining wall / slope details do not work based on detail callouts and scaled toe of slopes. Recommend reviewing to accurately establish retaining wall, TOE of slopes to confirm minimum desired pad and rear yard areas.*

   Response: The slopes have been revised to accurately show the length of the scarp and a maximum height has been labeled. See the revised grading plans located in Appendix C.

3. **Comment:** *Lot 90 side yard slope (corner lot) does not work per detail callout.*

   Response: The side yard condition and detail have been revised to match. See the revised grading plans located in Appendix C.

Sheet G-3

1. **Comment:** *Same comment along Sky Vista.*

   Response: Refer to Response to Sheet G-1 Comment No. 1.

2. **Comment:** *What is happening with grading/ walls at southwest corner of property at Sky Vista, especially since there is cut involved along a drainage berm?*

   Response: In the existing condition, the Collector Channel along Sky Vista Drive will provide positive drainage away from the wall to the south. In the proposed condition, a flowline is graded along the perimeter wall to provide positive drainage away from the walls. Note that the proposed FG elevations along the wall are the same as the future design elevations for Sky Vista Drive along the wall.

3. **Comment:** *Am concerned about 3:1 Slope grading from back of Lots 44, 45, and 102 onto Parcel N (12 to 15 foot high scarp and ultimate Parcel N is below this area.*

   Response: In a meeting with THHC, WSH and SHG it was agreed that the sloping in the area will not be nearly as drastic once Parcel N is designed. The large sloping areas are a result of trying to catch grade in an existing wash. WSH agreed to place extra dirt in this area during grading activities on the site.

Sheet G-4

1. **Comment:** *Review grading transitioning at NW corner lot 102 and onto Parcel N.*

   Response: The rear yard grading has been revised to accurately depict the sloping in this area. See the revised grading plans located in Appendix C.

2. **Comment:** *General Comment – The location of DI # 1 appears to be working (draining) backwards at road is sloping to south and outlet is on north end. In conjunction with the two currently shown Handicapped ramp crossings to the park and intersection, it is recommended to move DI # 1 to the north and provide a single handicapped ramp crossing at the intersection, thereby eliminating the mid-block one. Again this comment is optional.*

   Response: The location of DI #1 will not be moved to the north as suggested because the street steepens to the north and the efficiency of the drop inlet greatly reduces. By design, this drop inlet is placed as far south as possible. Positive drainage will be provided within the inlet and throughout the storm drain system. With respect to the sidewalk ramps at this intersection, they are acceptable as designed. The mid-block sidewalk ramps further north are intended to provide a more direct pedestrian access from the cul-de-sac to the proposed park area. SHG will review this and all proposed sidewalk ramps in the development with WSH to provide a favorable community for the potential buyers.

Sheets G-1.1 thru G-4.1
Not reviewed

Sheet D-1

1. **Comment:** *Sections 2, 4 & 9 do not work as called out on plans for following lots, there may be more:*

   - *Detail 2 – Lot 79 Rear to Lot 77 Rear*
     Lot 80 Rear to Lot 76 Rear
   - *Detail 4 – Up to 2' feet of retaining wall can be added to village wall at Woodside's expense to reduce rear yard slope and retaining walls.*
   - *Detail 9 – Lot 65 Rear to Lot 62 Side*
     Lot 64 Rear to Lot 62 Side
     Lot 81 Rear to Lot 75 Rear

Lot 82 Rear to Lot 74 Rear
Lot 83 Rear to Lot 73 Rear

Response: The details have been revised. See the revised grading plans located in Appendix C.

Sheet D-2

1. **Comment:** *Detail 23 does not work with lot 91.*

   Response: Lot 91 is re-labeled with Detail 20, which is the accurate section. See the revised grading plans located in Appendix C.

2. **Comment:** *Section AA – confirm that drainage does not go down handicap ramp versus where it is supposed to, into the sidewalk under drain.*

   Response: Hydraulic Section A within Common Lot C has been revised from a swale with a low flow valley gutter to a 2-foot-wide concrete flume to maintain same width of flow thru the flume and the underdrain. As a result, no flow will overtop the walking path nor impact the downstream handicap ramp. A revised Flowmaster computation has been performed for the flume to show that 8 cfs from Concentration CP1 is contained in the section. See Appendix B for the revised Flowmaster section. The results are summarized in the revised TDS report also included in Appendix B.

The revised plan, profile and detail sheets for Summerlin Village 23A Unit 2 Parcel O adopting the revisions addressed in this letter have been included in Appendix C. If you have any questions or require additional information, please do not hesitate to contact us at 284-5300.

Respectfully Submitted,

SLATER HANIFAN GROUP

Kylie Rowbury, P.E.
Flood Control Division

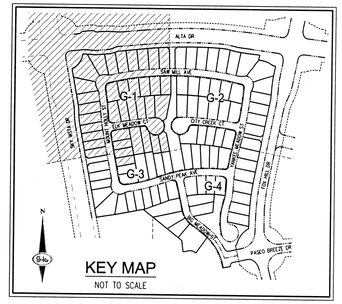
pc: Steve Jones, P.E., SHG
Corey Lieber, P.E., SHG

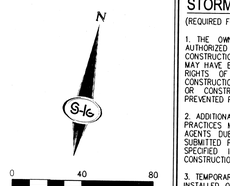
APPENDIX L

Plan, Profile and Detail Sheets



DRAINAGE QUANTITIES		PUBLIC	PRIVATE
1. 15.0' MOD TYPE "CM" DROP INLET	EA	1	–
2. 20.0' MOD TYPE "CM" DROP INLET	EA	2	–
3. 18" CLASS III RCP STORM DRAIN	LF	82	–
4. 60" TYPE III STORM DRAIN MANHOLE	EA	1	–
5. 1 COURSE SOLID GROUT CMU BLOCK WALL	LF	–	168
6. 2 COURSES SOLID GROUT CMU BLOCK WALL	LF	–	2,980
7. 8' WIDE CONCRETE VALLEY GUTTER	SF	1,920	–
8. SIDEWALK DRAIN	EA	2	–
9.			
PUBLIC DRAINAGE EASEMENT QUANTITIES			
10. 1.0' CONCRETE CHANNEL	SF	–	34
11. SIDEWALK DRAIN	EA	–	1
12.			
13.			





STORMWATER RUNOFF MANAGEMENT

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

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

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

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

4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AND 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.

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CALL BEFORE YOU DO OVERHEAD
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811
OR
1-800-227-2600
AND
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

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2. CONSTRUCT 3" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
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17. REMOVE EXISTING STORM DRAIN BEYOND PROPOSED DROP INLET
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19. PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

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- MATCHLINE
- ROADWAY CENTERLINE
- RIGHT-OF-WAY
- PROPERTY LINE
- CURB AND GUTTER
- EXISTING CURB AND GUTTER
- FUTURE CURB AND GUTTER
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- (00.00) TC — EXISTING ELEVATION
- [00.00] TC — FUTURE ELEVATION
- 3400 — EXISTING CONTOUR (5-FT)
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- PROPOSED CONTOUR (1-FT)
- PAD= 3400.0 FF = 3400.7 — PROPOSED PAD AND FINISHED FLOOR ELEVATION
- RETAINING WALL
- PLANTER RETAINING WALL
- DECORATIVE WALL
- DECORATIVE RETAINING WALL

LEGAL DESCRIPTION

SUMMERLIN VILLAGE 23A UNIT NO. 2 PARCEL O AS SHOWN ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA, LYING WITHIN SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CLARK COUNTY, NEVADA.

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X AND SHADED ZONE X (AREA OUTSIDE THE 500-YEAR FLOOD PLAIN AND AREA OF 2% ANNUAL CHANGE FLOOD), PER FIRM PANEL 32003C1750E, DATED SEPTEMBER 27, 2002.

FLOOD CERTIFICATION

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

COREY A. LIEBER, P.E. 15875 — DATE

SUMMERLIN

SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE — DATE

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FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, 0LV09-34SSE6

NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

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NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

LAS VEGAS, NV

Woodside Homes
BETTER BY DESIGN

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
PHASE I & II GRADING PLAN I

S34 T20S R59E

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DESIGNER: DSP
CHECKED: CAL

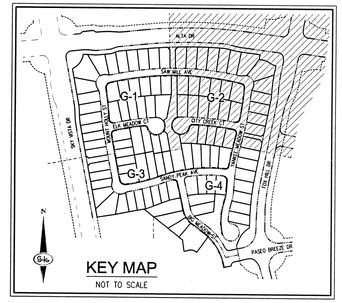
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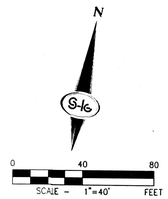
PROFESSIONAL ENGINEER – STATE OF NEVADA
COREY A. LIEBER
No. 15875
Exp. 12/31/2013
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1-18-12

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SHEET 3 OF 13

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PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

Woodside Homes — BETTER BY DESIGN

LAS VEGAS, NV

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
PHASE I & II GRADING PLAN II

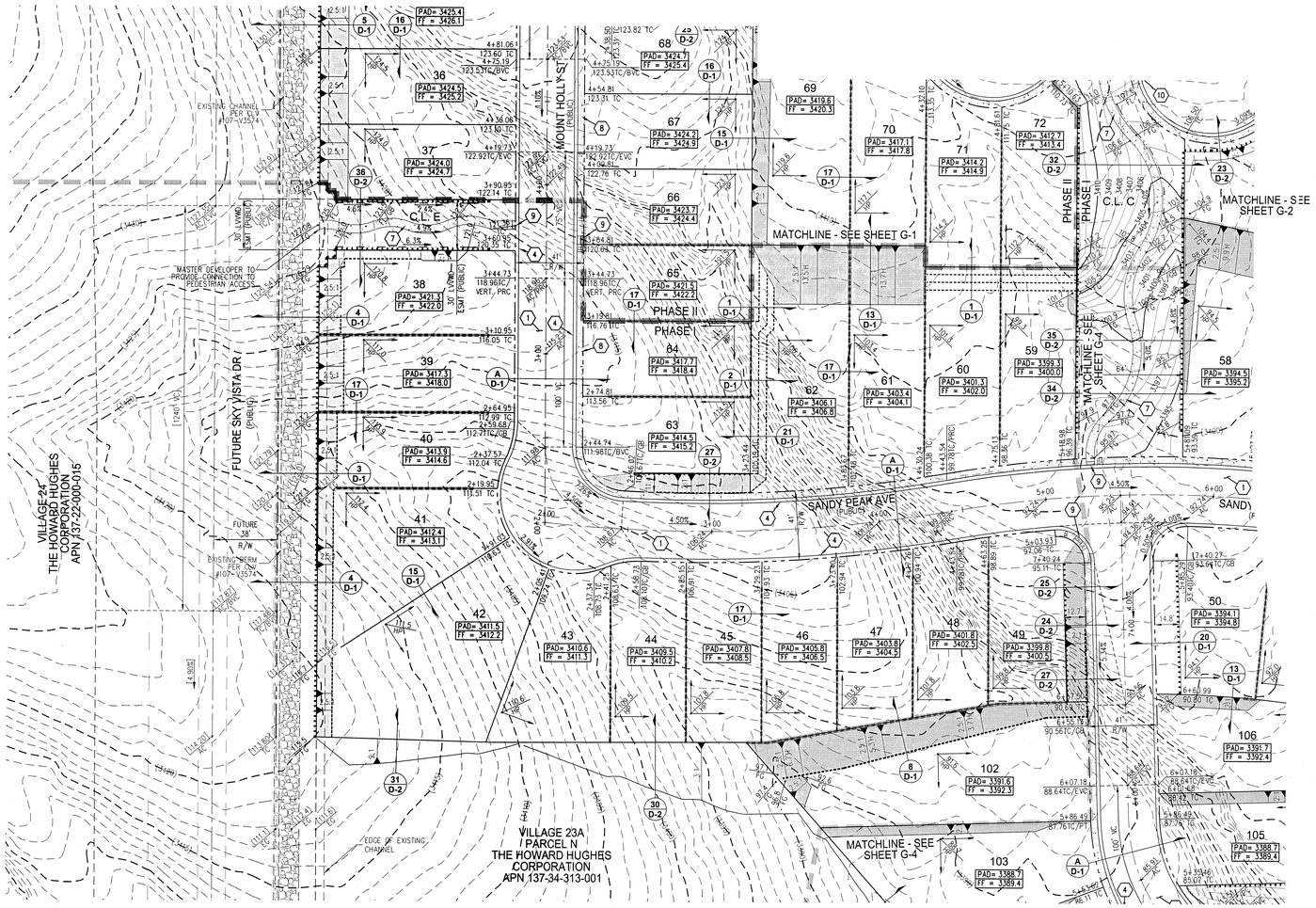
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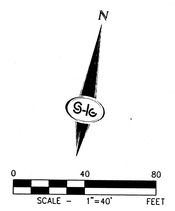
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DRAFTER: DSP
DESIGNER: DSP
CHECKED: CAL
PROJECT NO. WSH1105-000

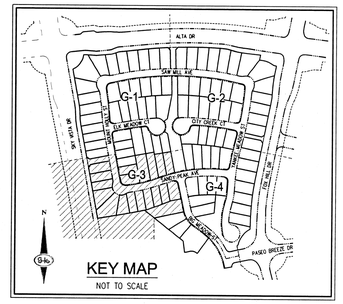
PROFESSIONAL ENGINEER — STATE OF NEVADA — COREY A. LIEBER — Exp. 12/31/2013 — CIVIL — No. 15875
1/18/12

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SHEET 4 OF 13

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4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER 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.

GENERAL NOTES

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2006, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL.
8. EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLACING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.
10. ALL ELEVATIONS SHOWN, WITH EXCEPTION TO PAD AND FINISHED FLOOR ELEVATIONS, ARE THE VALUE SHOWN PLUS 3300'.

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

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY.
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1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-432-5300
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call
811
OR
1-800-227-2600
AND
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

GRADING NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
2. CONSTRUCT 3" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
3. SAWCUT AND MATCH EXISTING IMPROVEMENTS
4. CONSTRUCT "L" TYPE CURB AND GUTTER PER SUMMERLIN IMPROVEMENT STANDARDS S-47
5. CONSTRUCT SIDEWALK DRAIN PER CCAUSD NO. 236
6. CONSTRUCT 8" CROSS GUTTER PER SUMMERLIN IMPROVEMENT STANDARDS S-64
7. CONSTRUCT 5' WIDE SIDEWALK PER SUMMERLIN IMPROVEMENT STANDARDS S-72
8. CONSTRUCT 4' WIDE SIDEWALK PER SUMMERLIN IMPROVEMENT STANDARDS S-72
9. CONSTRUCT SIDEWALK RAMPS PER SUMMERLIN IMPROVEMENT STANDARDS S-75
10. SEE DETAIL 38 ON SHEET D-2 FOR GRADING AND SECTIONS IN THIS AREA
11. FIELD VERIFY AND TIE INTO EXISTING CURB AND GUTTER
12. CONSTRUCT 4' TRANSITION TO DEPRESSED CURB PER CCAUSD NO. 223
13. INSTALL 18" CLASS III RCP STORM DRAIN
14. INSTALL 60" TYPE III STORM DRAIN MANHOLE
15. INSTALL 15.0' TYPE CM2 DROP INLET PER CCAUSD NO. 412A "TYPE C-D MODIFIED DROP INLET"
16. INSTALL 20.0' TYPE CM2 DROP INLET PER CCAUSD NO. 412A "TYPE C-D MODIFIED DROP INLET"
17. REMOVE EXISTING STORM DRAIN BEYOND PROPOSED DROP INLET
18. CONSTRUCT A-CURB PER SUMMERLIN IMPROVEMENT STANDARDS S-49
19. PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

LEGEND

- PHASE BOUNDARY
- MATCHLINE
- ROADWAY CENTERLINE
- RIGHT-OF-WAY
- PROPERTY LINE
- CURB AND GUTTER
- EXISTING CURB AND GUTTER
- FUTURE CURB AND GUTTER
- GRADE BREAK LINE
- FLOWLINE
- 00.00 TC — PROPOSED ELEVATION
- (00.00) TC — EXISTING ELEVATION
- [00.00] TC — FUTURE ELEVATION
- 3400 — EXISTING CONTOUR (5-FT)
- EXISTING CONTOUR (1-FT)
- 3400 — PROPOSED CONTOUR (5-FT)
- PROPOSED CONTOUR (1-FT)
- PAD= 3400.0 FF = 3400.7 — PROPOSED PAD AND FINISHED FLOOR ELEVATION
- RETAINING WALL
- PLANTER RETAINING WALL
- DECORATIVE WALL
- DECORATIVE RETAINING WALL

LEGAL DESCRIPTION

SUMMERLIN VILLAGE 23A UNIT NO. 2 PARCEL O AS SHOWN ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA, LYING WITHIN SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CLARK COUNTY, NEVADA.

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X AND SHADED ZONE X (AREA OUTSIDE THE 500-YEAR FLOOD PLAIN AND AREA OF 2% ANNUAL CHANGE FLOOD), PER FIRM PANEL 32003C1750E, DATED SEPTEMBER 27, 2002.

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED FLOOD STUDY __-_____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

COREY A. LIEBER, P.E. 15875 DATE

SUMMERLIN

SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE DATE

THIS SIGNATURE IS LIMITED TO APPROVAL OF THESE DOCUMENTS FOR CONFORMANCE TO THE DESIGN INTENT OF THE APPLICABLE DESIGN CRITERIA. NEITHER SUMMERLIN NOR THE SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE ASSUMES RESPONSIBILITY FOR PLAN CONFORMANCE WITH APPLICABLE LAWS, ORDINANCES, AND CODES.

BENCHMARK

FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, 0LV09-34SS66

NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

BASIS OF BEARING

NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

LAS VEGAS, NV

Woodside Homes
BETTER BY DESIGN

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
PHASE I & II GRADING PLAN III

S34 T20S R59E

DATE: 11/22/11
DRAFTER: DSP
DESIGNER: DSP
CHECKED: CAL
PROJECT NO. WSH1105-000

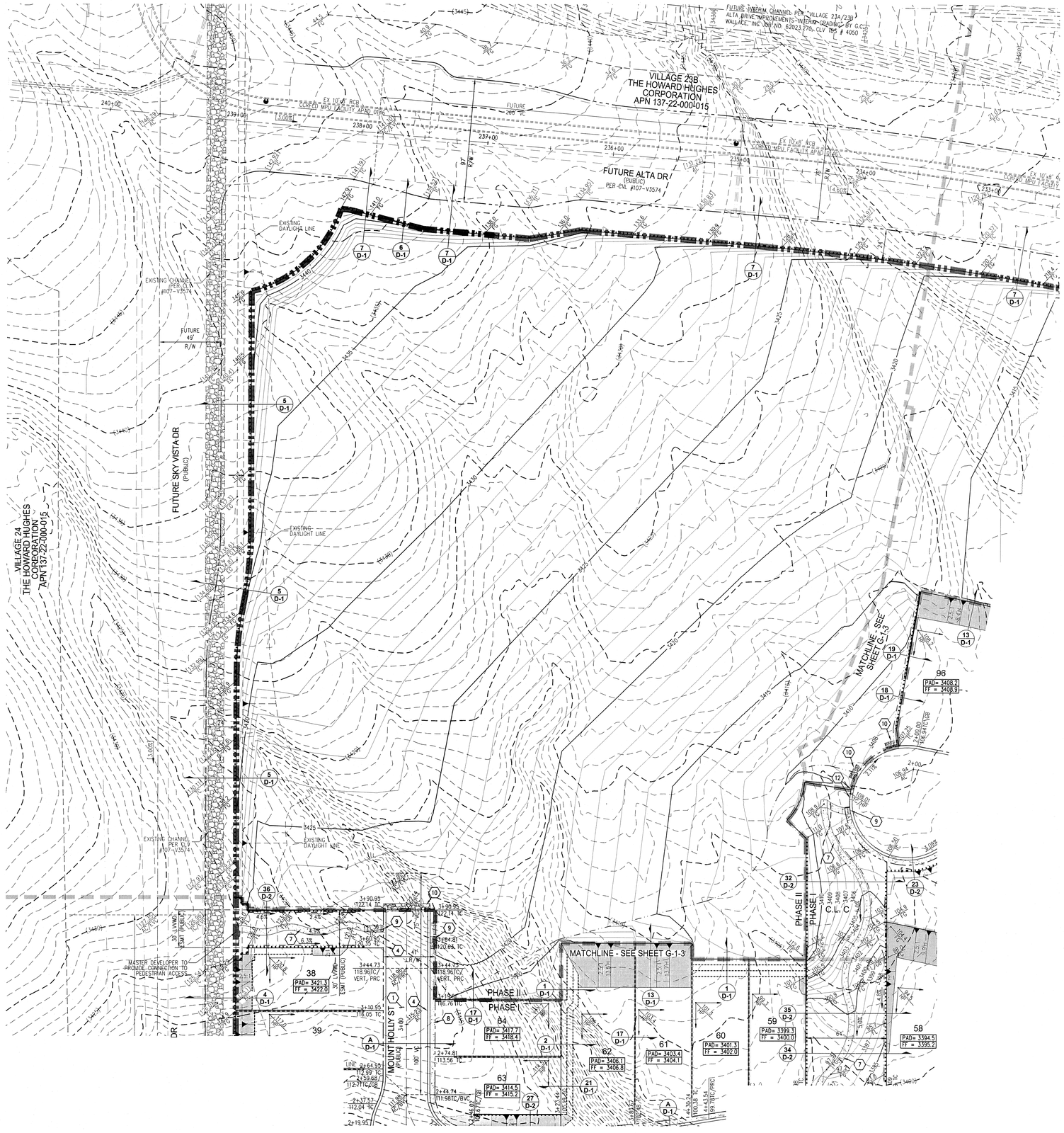
PROFESSIONAL ENGINEER - STATE OF NEVADA
COREY A. LIEBER
Exp. 12/31/2013
CIVIL
No. 15875

1-18-12

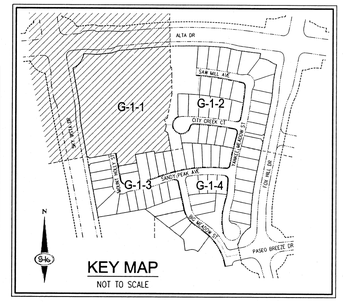
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SHEET 5 OF 13

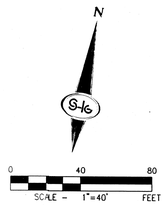
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MATCHLINE - SEE SHEET G-1
MATCHLINE - SEE SHEET G-2
MATCHLINE - SEE SHEET G-3
SANDY PEAK AVE
(PUBLIC)
BIG MEADOW ST
(PUBLIC)
FOYHILL DR
(PUBLIC)
PASEO BREEZE DR
(PUBLIC)
PHASE II
PHASE I
C.L. C
C.L. B
C.L. A
GROSS: 14,186 SF
NET: 11,400 SF
1.4%
VILLAGE 23A
PARCEL L
THE HOWARD HUGHES
CORPORATION
APN 137-34-210-002
VILLAGE 23A
PARCEL N
THE HOWARD HUGHES
CORPORATION
APN 137-34-313-001
VILLAGE 23A
PARCEL ES-1
THE HOWARD HUGHES
CORPORATION
APN 137-34-312-002
MASTER DEVELOPER TO GRANT UTILITY/ ACCESS EASEMENT
MASTER DEVELOPER TO PROVIDE CONNECTION TO PEDESTRIAN ACCESS
MASTER DEVELOPER TO PROVIDE CONNECTION TO PEDESTRIAN ACCESS
DI #1 (TYPE CM2)
DI #2 (TYPE CM2)
DI #3 (TYPE CM2)
EX 5.5' DI
EX SDMH
EX 42" SD
EX 24" SD
EX 18" SD
EX 8" SS
EX 12" SS
EX 15" SS
EX 18" SS
EX 24" SS
EX 30" SS
EX 36" SS
EX 42" SS
EX 48" SS
EX 54" SS
EX 60" SS
EX 66" SS
EX 72" SS
EX 78" SS
EX 84" SS
EX 90" SS
EX



PHASE I DRAINAGE QUANTITIES			PUBLIC	PRIVATE
1.	15.0' MOD TYPE "CM" DROP INLET	EA	1	–
2.	20.0' MOD TYPE "CM" DROP INLET	EA	2	–
3.	18" CLASS III RCP STORM DRAIN	LF	82	–
4.	60" TYPE III STORM DRAIN MANHOLE	EA	1	–
5.	1 COURSE SOLID GROUT CMU BLOCK WALL	LF	–	168
6.	2 COURSES SOLID GROUT CMU BLOCK WALL	LF	–	2,936
7.	8' WIDE CONCRETE VALLEY GUTTER	SF	1,920	–
8.				
9.				
PUBLIC DRAINAGE EASEMENT QUANTITIES				
10.				
11.				
12.				
13.				





STORMWATER RUNOFF MANAGEMENT

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

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

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

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4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER 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.

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OR
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GRADING NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
2. CONSTRUCT 3" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
3. SAWCUT AND MATCH EXISTING IMPROVEMENTS
4. CONSTRUCT ¾" TYPE CURB AND GUTTER PER SUMMERLIN IMPROVEMENT STANDARDS S-47
5. CONSTRUCT SIDEWALK DRAIN PER CCAUSD NO. 236
6. CONSTRUCT 8' CROSS GUTTER PER SUMMERLIN IMPROVEMENT STANDARDS S-64
7. CONSTRUCT 5' WIDE SIDEWALK PER SUMMERLIN IMPROVEMENT STANDARDS S-72
8. CONSTRUCT 4' WIDE SIDEWALK PER SUMMERLIN IMPROVEMENT STANDARDS S-72
9. CONSTRUCT SIDEWALK RAMPS PER SUMMERLIN IMPROVEMENT STANDARDS S-75
10. INSTALL RIPRAP PAD D50=6", THICKNESS=12" WITH FILTER FABRIC
11. FIELD VERIFY AND TIE INTO EXISTING CURB AND GUTTER
12. CONSTRUCT 4' TRANSITION TO DEPRESSED CURB PER CCAUSD NO. 223
13. INSTALL 18" CLASS III RCP STORM DRAIN
14. INSTALL 60" TYPE III STORM DRAIN MANHOLE
15. INSTALL 15.0' TYPE CM2 DROP INLET PER CCAUSD NO. 412A "TYPE C-D MODIFIED DROP INLET"
16. INSTALL 20.0' TYPE CM2 DROP INLET PER CCAUSD NO. 412A "TYPE C-D MODIFIED DROP INLET"
17. REMOVE EXISTING STORM DRAIN BEYOND PROPOSED DROP INLET
18. CONSTRUCT A-CURB PER SUMMERLIN IMPROVEMENT STANDARDS S-49
19. PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

LEGEND

- PHASE BOUNDARY
- MATCHLINE
- ROADWAY CENTERLINE
- RIGHT-OF-WAY
- PROPERTY LINE
- CURB AND GUTTER
- EXISTING CURB AND GUTTER
- FUTURE CURB AND GUTTER
- GRADE BREAK LINE
- FLOWLINE
- 00.00 TC — PROPOSED ELEVATION
- (00.00) TC — EXISTING ELEVATION
- [00.00] TC — FUTURE ELEVATION
- 3400 — EXISTING CONTOUR (5-FT)
- EXISTING CONTOUR (1-FT)
- 3400 — PROPOSED CONTOUR (5-FT)
- PROPOSED CONTOUR (1-FT)
- PAD= 3400.0 / FF = 3400.7 — PROPOSED PAD AND FINISHED FLOOR ELEVATION
- RETAINING WALL
- PLANTER RETAINING WALL
- DECORATIVE WALL
- DECORATIVE RETAINING WALL

LEGAL DESCRIPTION

SUMMERLIN VILLAGE 23A UNIT NO. 2 PARCEL O AS SHOWN ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA, LYING WITHIN SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CLARK COUNTY, NEVADA.

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X AND SHADED ZONE X (AREA OUTSIDE THE 500-YEAR FLOOD PLAIN AND AREA OF 2% ANNUAL CHANGE FLOOD), PER FIRM PANEL 32003C1750E, DATED SEPTEMBER 27, 2002.

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED FLOOD STUDY ____-_____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

COREY A. LIEBER, P.E. 15875 DATE

SUMMERLIN

SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE DATE

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BENCHMARK

FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, OLV09-34SSE6

NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

BASIS OF BEARING

NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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

NO.	DESCRIPTION	DATE	BY	APP'D	APP'D DATE

LAS VEGAS, NV

Woodside Homes
BETTER BY DESIGN

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
PHASE I GRADING PLAN I

S34 T20S R59E

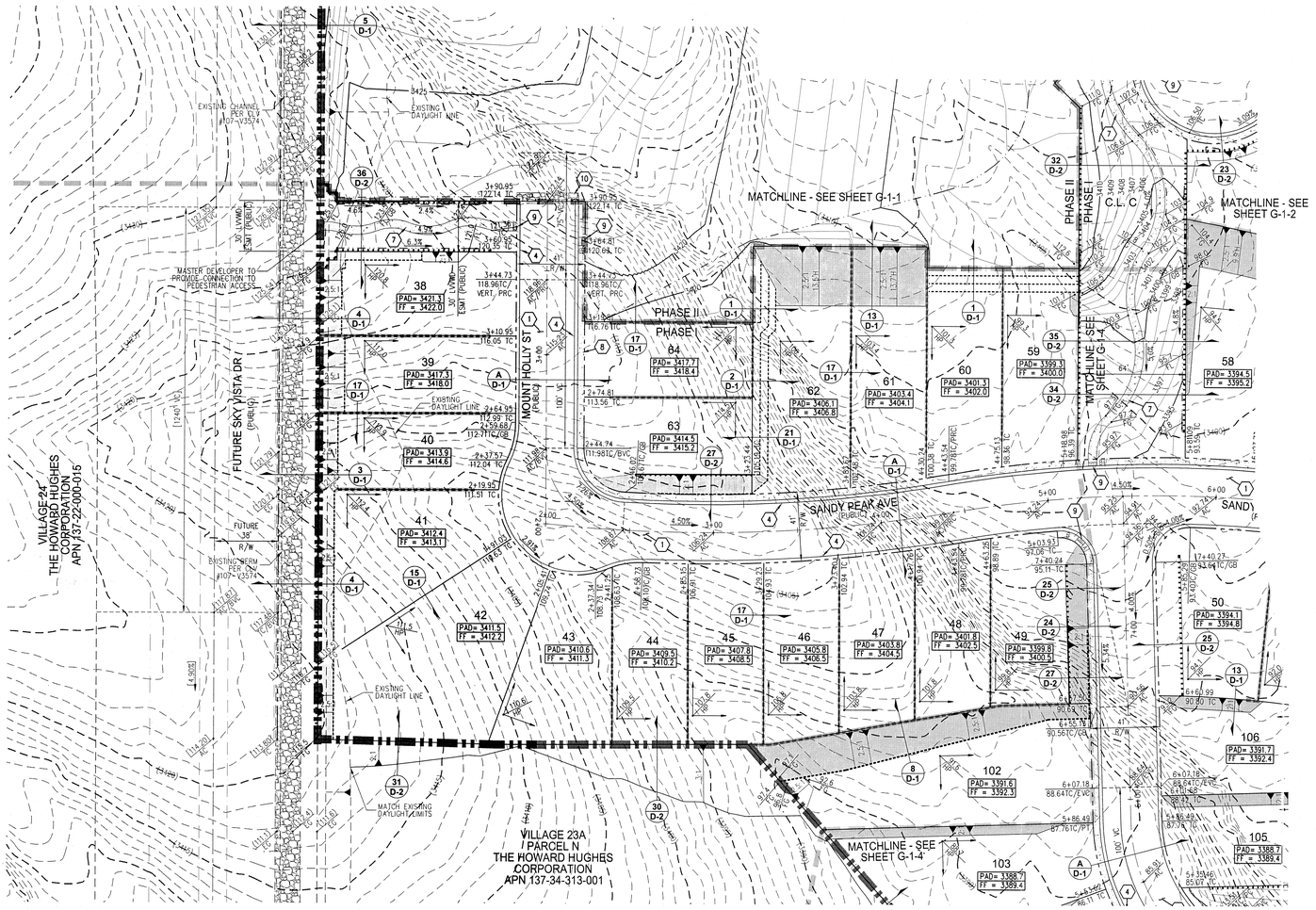
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DRAFTER: DSP
DESIGNER: DSP
CHECKED: CAL
PROJECT NO.
WSH1105-000

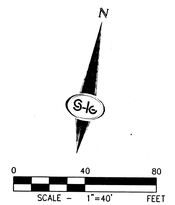
PROFESSIONAL ENGINEER STATE OF NEVADA
COREY A. LIEBER
Exp. 12/31/2013
CIVIL
No. 15875
1-18-12

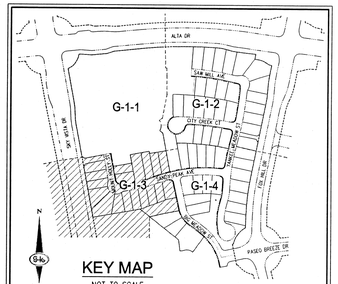
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SHEET 7 OF 13

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VILLAGE 23B
THE HOWARD HUGHES CORPORATION
APN 137-22-000-015
FUTURE ALTA DR
(PUBLIC)
PER CVL #107-V3524
SAW MILL AVE
(PUBLIC)
CITY CREEK CT
(PUBLIC)
YANKEE MEADOW ST
FOX HILL DR
(PUBLIC)
PER CVL #107-V3524
PHASE II
PHASE I
C.L.C.
MATCHLINE - SEE SHEET G-1-1
MATCHLINE - SEE SHEET G-1-4
VILLAGE 23A
PARCEL 11
THE HOWARD HUGHES CORPORATION
APN 137-34-210-002
MASTER DEVELOPER TO CONSTRUCT CONNECTION TO PEDESTRIAN ACCESS
FUTURE INTERIM CHANNEL PER VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS-INTERIM GRADING BY H.C. WALLACE, INC. JOB NO. 62023.270, CLV ID'S # 4150
FOR EXISTING STORM DRAIN IMPROVEMENTS, REFER TO THE FOLLOWING IMPROVEMENTS SET: VILLAGE 23A/23B ALTA DRIVE RCB REGIONAL DRAINAGE IMPROVEMENTS" BY H.C. WALLACE, INC. JOB NO. 62052.233 REV 1, CLV 327/269
EX 10'x8' RCB
EX 10'x8' RCB
20' MPU CAPACITY AB-0146
EX 10'x8' RCB
EX 10'x8' RCB
20' MPU CAPACITY AB-0146
FUTURE INTERIM CHANNEL PER VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS-INTERIM GRADING BY H.C. WALLACE, INC. JOB NO. 62023.270, CLV ID'S # 4150
FUTURE 100' RW
PAD= 3411.8 FF = 3412.5
PAD= 3409.2 FF = 3409.9
PAD= 3406.6 FF = 3407.3
PAD= 3404.0 FF = 3404.7
PAD= 3401.3 FF = 3402.0
PAD= 3399.6 FF = 3400.3
PAD= 3410.9 FF = 3411.6
PAD= 3408.0 FF = 3408.7
PAD= 3405.2 FF = 3405.9
PAD= 3402.7 FF = 3403.4
PAD= 3398.2 FF = 3398.9
PAD= 3396.8 FF = 3397.5
PAD= 3395.7 FF = 3396.4
PAD= 3394.6 FF = 3395.3
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PAD=







STORMWATER RUNOFF MANAGEMENT

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

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

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

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

4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL 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.

GENERAL NOTES

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2006, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL.
8. EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLACING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.
10. ALL ELEVATIONS SHOWN, WITH EXCEPTION TO PAD AND FINISHED FLOOR ELEVATIONS, ARE THE VALUE SHOWN PLUS 3300'.







GRADING NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
2. CONSTRUCT 3" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
3. SAWCUT AND MATCH EXISTING IMPROVEMENTS
4. CONSTRUCT "L" TYPE CURB AND GUTTER PER SUMMERLIN IMPROVEMENT STANDARDS S-47
5. CONSTRUCT SIDEWALK DRAIN PER CCAUSD NO. 236
6. CONSTRUCT 8' CROSS GUTTER PER SUMMERLIN IMPROVEMENT STANDARDS S-64
7. CONSTRUCT 5' WIDE SIDEWALK PER SUMMERLIN IMPROVEMENT STANDARDS S-72
8. CONSTRUCT 4' WIDE SIDEWALK PER SUMMERLIN IMPROVEMENT STANDARDS S-72
9. CONSTRUCT SIDEWALK RAMPS PER SUMMERLIN IMPROVEMENT STANDARDS S-75
10. INSTALL RIPRAP PAD D50=6", THICKNESS=12" WITH FILTER FABRIC
11. FIELD VERIFY AND TIE INTO EXISTING CURB AND GUTTER
12. CONSTRUCT 4" TRANSITION TO DEPRESSED CURB PER CCAUSD NO. 223
13. INSTALL 18" CLASS III RCP STORM DRAIN
14. INSTALL 60" TYPE III STORM DRAIN MANHOLE
15. INSTALL 15.0' TYPE CM2 DROP INLET PER CCAUSD NO. 412A "TYPE C-D MODIFIED DROP INLET"
16. INSTALL 20.0' TYPE CM2 DROP INLET PER CCAUSD NO. 412A "TYPE C-D MODIFIED DROP INLET"
17. REMOVE EXISTING STORM DRAIN BEYOND PROPOSED DROP INLET
18. CONSTRUCT A-CURB PER SUMMERLIN IMPROVEMENT STANDARDS S-49
19. PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

LEGEND

- PHASE BOUNDARY
- MATCHLINE
- ROADWAY CENTERLINE
- RIGHT-OF-WAY
- PROPERTY LINE
- CURB AND GUTTER
- EXISTING CURB AND GUTTER
- FUTURE CURB AND GUTTER
- GRADE BREAK LINE
- FLOWLINE
- 00.00 TC — PROPOSED ELEVATION
- (00.00) TC — EXISTING ELEVATION
- [00.00] TC — FUTURE ELEVATION
- 3400 — EXISTING CONTOUR (5-FT)
- EXISTING CONTOUR (1-FT)
- 3400 — PROPOSED CONTOUR (5-FT)
- PROPOSED CONTOUR (1-FT)
- PAD= 3400.0 FF = 3400.7 — PROPOSED PAD AND FINISHED FLOOR ELEVATION
- RETAINING WALL
- PLANTER RETAINING WALL
- DECORATIVE WALL
- DECORATIVE RETAINING WALL

LEGAL DESCRIPTION

SUMMERLIN VILLAGE 23A UNIT NO. 2 PARCEL O AS SHOWN ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA, LYING WITHIN SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CLARK COUNTY, NEVADA.

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X AND SHADED ZONE X (AREA OUTSIDE THE 500-YEAR FLOOD PLAIN AND AREA OF 2% ANNUAL CHANGE FLOOD), PER FIRM PANEL 32003C1750E, DATED SEPTEMBER 27, 2002.

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED FLOOD STUDY __-_____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

COREY A. LIEBER, P.E. 15875 DATE

SUMMERLIN

SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE DATE

THIS SIGNATURE IS LIMITED TO APPROVAL OF THESE DOCUMENTS FOR CONFORMANCE TO THE DESIGN INTENT OF THE APPLICABLE DESIGN CRITERIA. NEITHER SUMMERLIN NOR THE SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE ASSUMES RESPONSIBILITY FOR PLAN CONFORMANCE WITH APPLICABLE LAWS, ORDINANCES, AND CODES.

BENCHMARK

FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, 0LV09-34SSE6

NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

BASIS OF BEARING

NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

LAS VEGAS, NV

Woodside Homes
BETTER BY DESIGN

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
PHASE I GRADING PLAN III

S34 T20S R59E

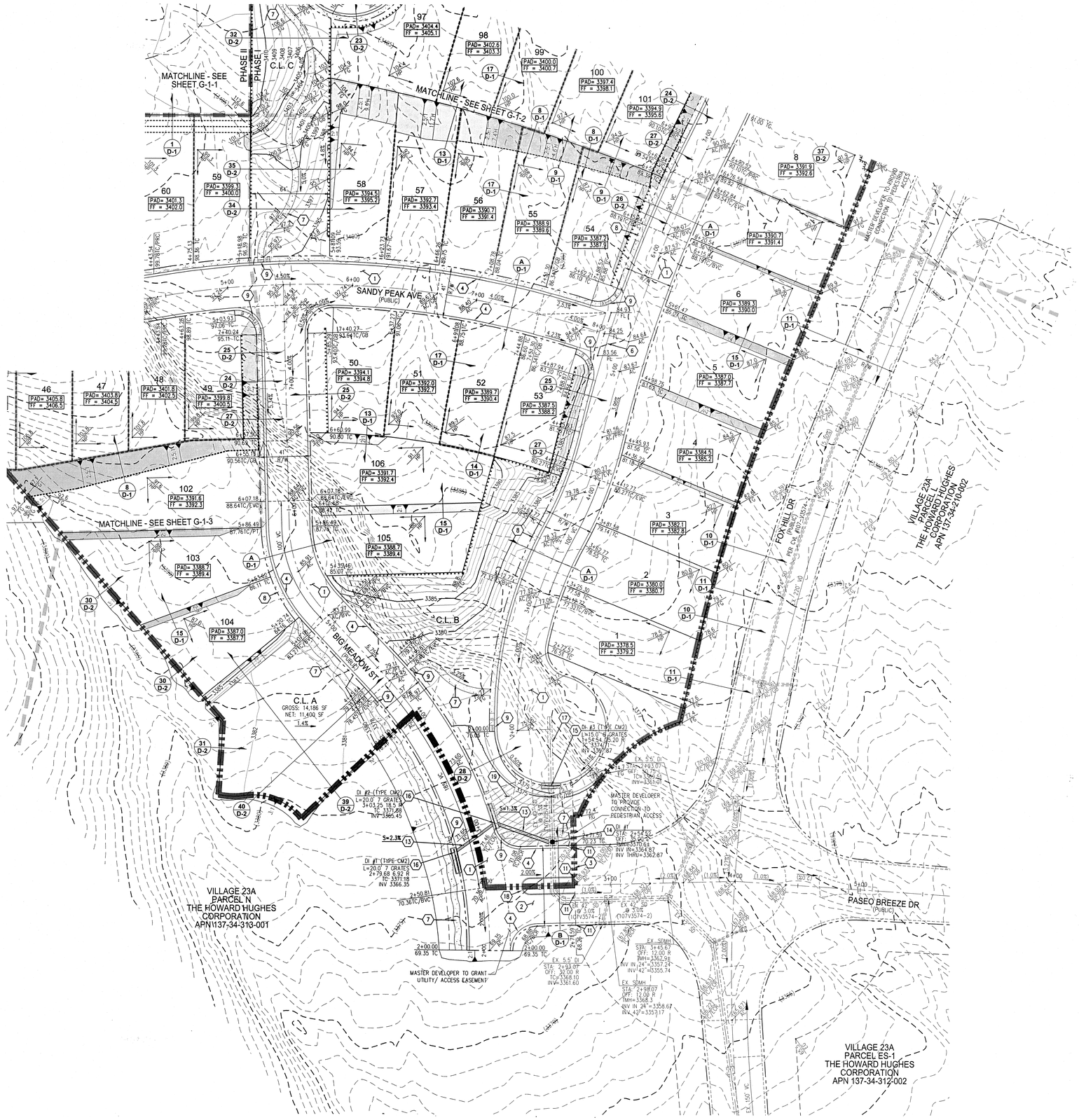
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DRAFTER: DSP
DESIGNER: DSP
CHECKED: CAL

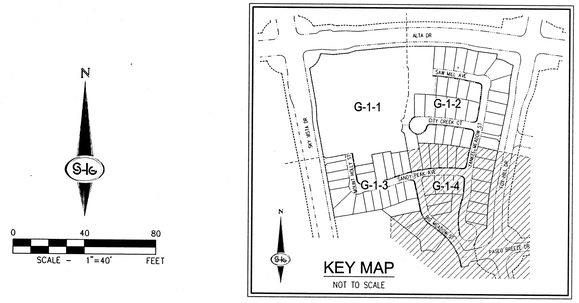
PROJECT NO.
WSH1105-000

PROFESSIONAL ENGINEER - STATE OF NEVADA
COREY A. LIEBER
No. 15875
Exp. 12/31/2013
CIVIL
1/18/12

G-1-3
SHEET 9 OF 13

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STORMWATER RUNOFF MANAGEMENT

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

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

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY.
Call before you do UnderGround
1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS AND
1-702-432-5300
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call
811
OR
1-800-227-2600
AND
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

GRADING NOTES

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SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

LEGEND

- PHASE BOUNDARY
- MATCHLINE
- ROADWAY CENTERLINE
- RIGHT-OF-WAY
- PROPERTY LINE
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- EXISTING CURB AND GUTTER
- FUTURE CURB AND GUTTER
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LEGAL DESCRIPTION

SUMMERLIN VILLAGE 23A UNIT NO. 2 PARCEL O AS SHOWN ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA, LYING WITHIN SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CLARK COUNTY, NEVADA.

FEMA FLOOD ZONE DESIGNATION

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FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED FLOOD STUDY ___-_____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

COREY A. LIEBER, P.E. 15875 DATE

SUMMERLIN

SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE DATE

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BENCHMARK

FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, 0LV09-34SSE6

NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

BASIS OF BEARING

NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

LAS VEGAS, NV

Woodside Homes
BETTER BY DESIGN

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
PHASE I GRADING PLAN IV

S34 T20S R59E

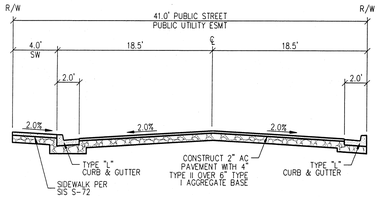
DATE: 11/22/11
DRAFTER: DSP
DESIGNER: DSP
CHECKED: CAL

PROJECT NO.
WSH1105-000

PROFESSIONAL ENGINEER - STATE OF NEVADA
COREY A. LIEBER
Exp. 12/31/2013
CIVIL
No. 15875
1-18-12

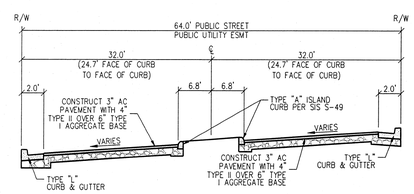
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SHEET 6 OF 13

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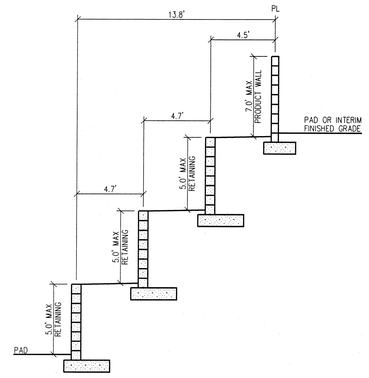
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NOT TO SCALE



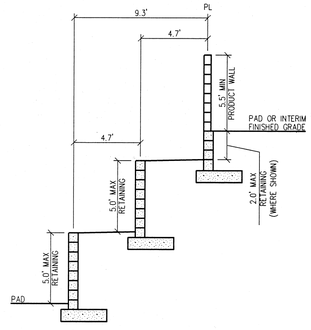
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NOT TO SCALE



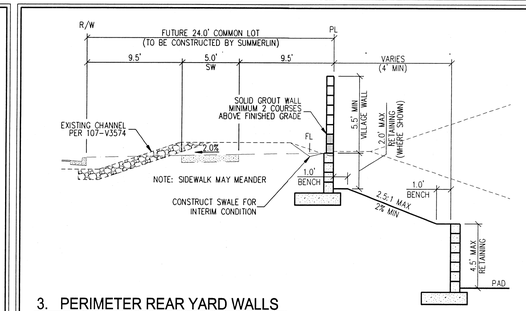
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NOT TO SCALE



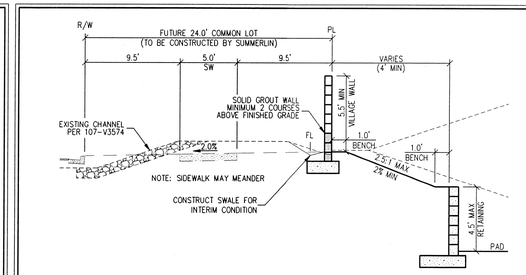
2. INTERIOR RETAINING WALLS

NOT TO SCALE



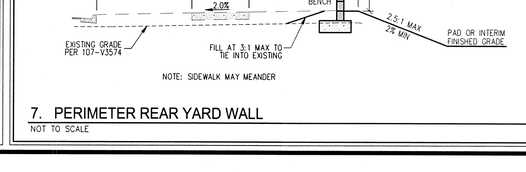
3. PERIMETER REAR YARD WALLS

NOT TO SCALE



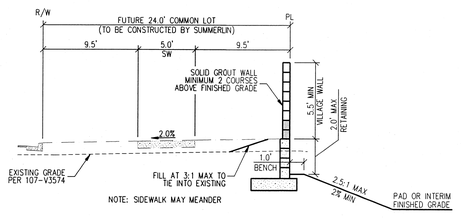
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NOT TO SCALE



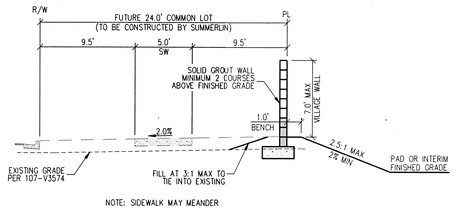
5. PERIMETER REAR YARD WALL

NOT TO SCALE



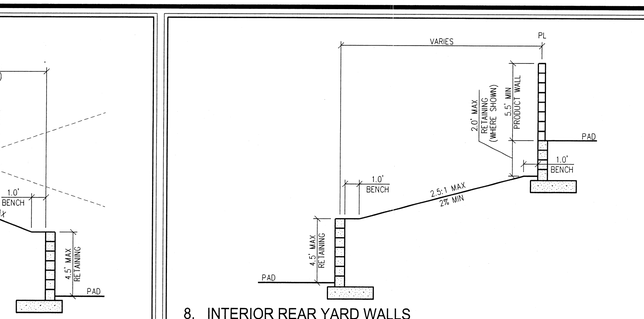
6. PERIMETER REAR YARD WALL

NOT TO SCALE



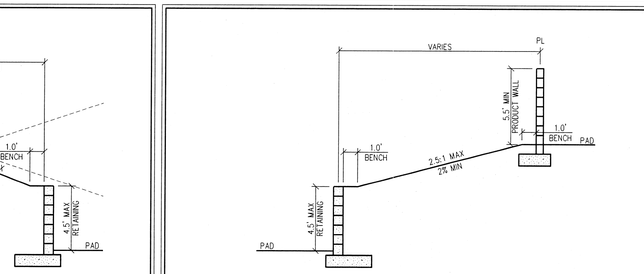
7. PERIMETER REAR YARD WALL

NOT TO SCALE



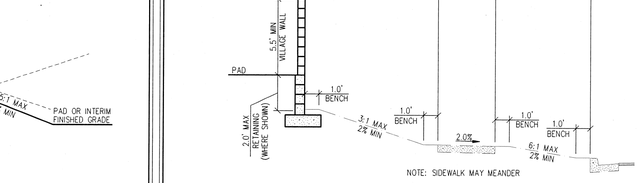
8. INTERIOR REAR YARD WALLS

NOT TO SCALE



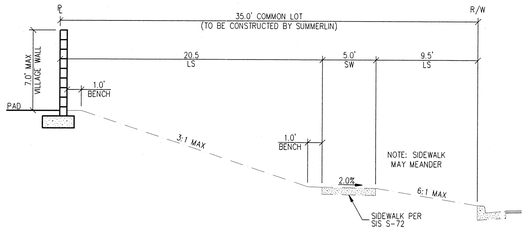
9. INTERIOR REAR YARD WALLS

NOT TO SCALE



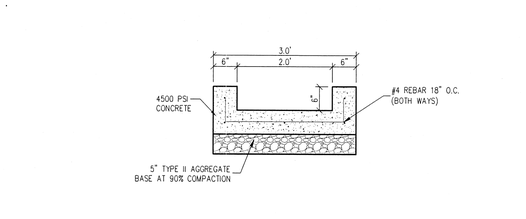
10. PERIMETER REAR YARD WALL

NOT TO SCALE



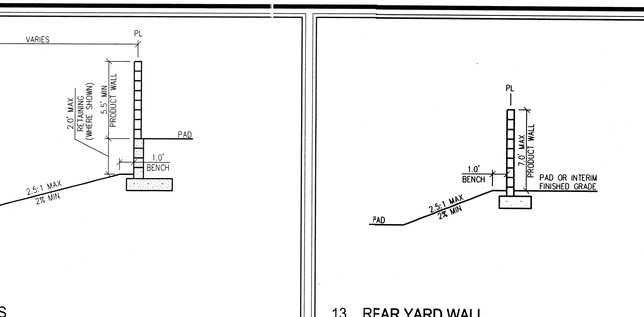
11. PERIMETER SCREEN WALL

NOT TO SCALE



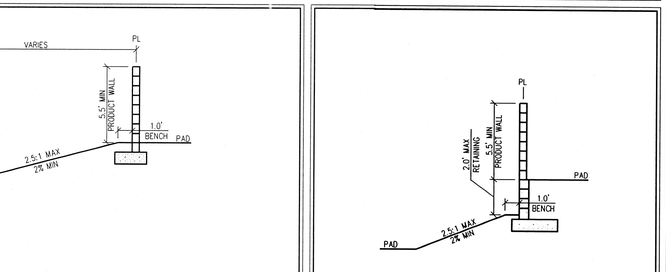
12. 24" U-CHANNEL DETAIL

NOT TO SCALE



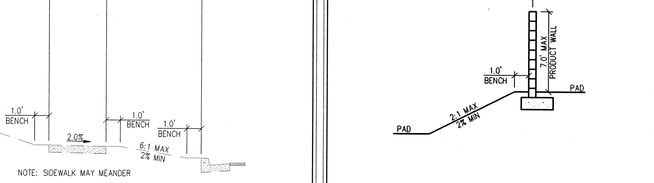
13. REAR YARD WALL

NOT TO SCALE



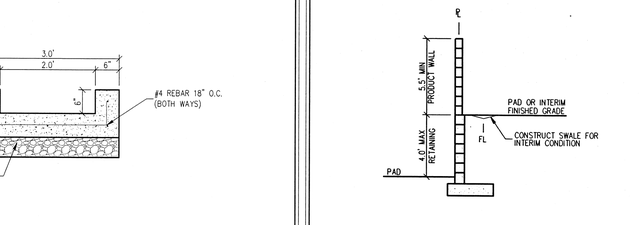
14. REAR YARD WALL

NOT TO SCALE



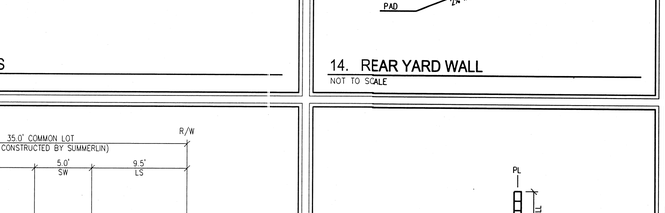
15. INTERIOR SIDE YARD WALL

NOT TO SCALE



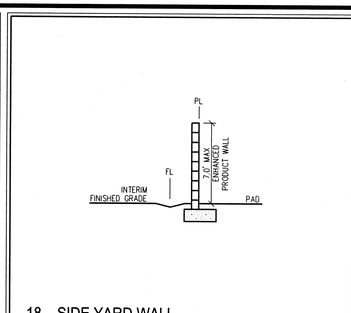
16. INTERIOR SIDE YARD WALL

NOT TO SCALE



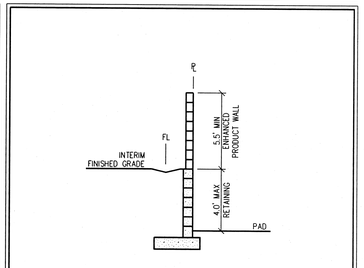
17. INTERIOR SIDE YARD WALLS

NOT TO SCALE



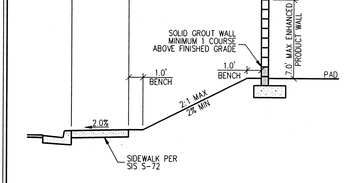
18. SIDE YARD WALL

NOT TO SCALE



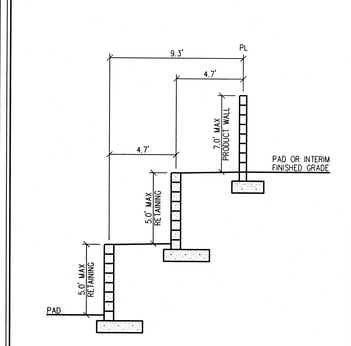
19. SIDE YARD WALL

NOT TO SCALE



20. CORNER LOT SCREEN WALL

NOT TO SCALE



21. INTERIOR RETAINING WALLS

NOT TO SCALE

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

LAS VEGAS, NV

Woodside Homes
BETTER BY DESIGN

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
GRADING SECTIONS AND DETAILS I

S34 T20S R59E

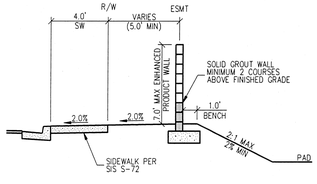
DATE: 11/22/11
DRAFTER: DSP
DESIGNER: DSP
CHECKED: CAL

PROJECT NO.
WSH1105-000

PROFESSIONAL ENGINEER STATE OF NEVADA
AUDREY A. LIEBER
No. 15575
Exp. 12/31/2013
CIVIL
1-18-12

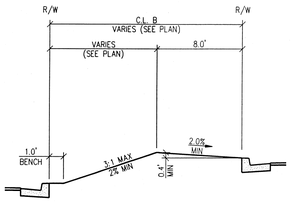
D-1
SHEET 11 OF 13

J:\wsh1105_000_v23 porcel o\dwg\improv\wsh1105-000slt.dwg 1/18/2012 7:31 AM Dan Poll



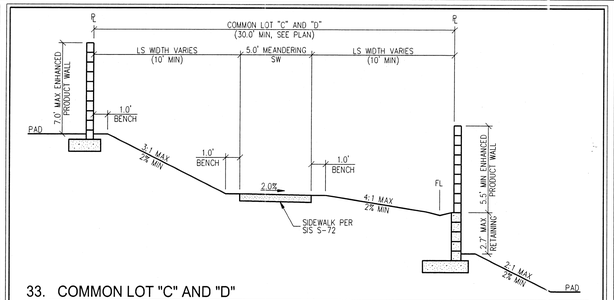
23. SIDE YARD SECTION

NOT TO SCALE



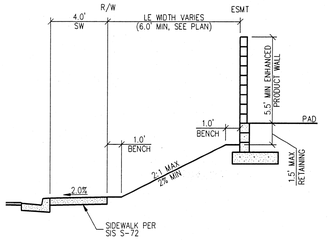
28. GRADING SECTION

NOT TO SCALE



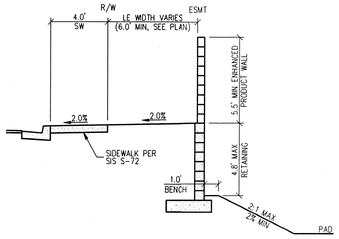
33. COMMON LOT "C" AND "D"

NOT TO SCALE



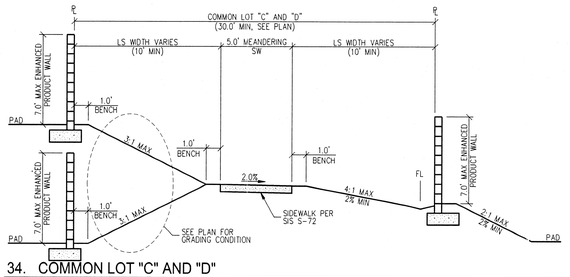
24. CORNER LOT RETAINING WALL

NOT TO SCALE



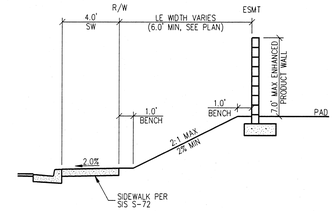
29. CORNER LOT RETAINING WALL

NOT TO SCALE



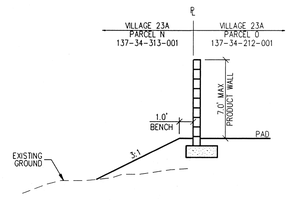
34. COMMON LOT "C" AND "D"

NOT TO SCALE



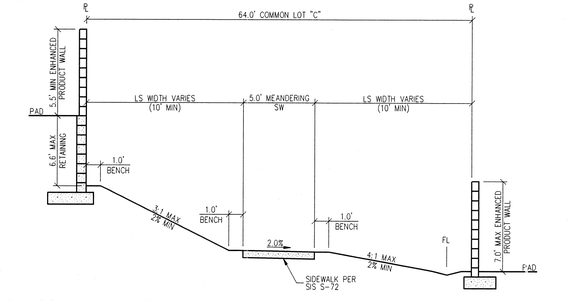
25. CORNER LOT SCREEN WALL

NOT TO SCALE



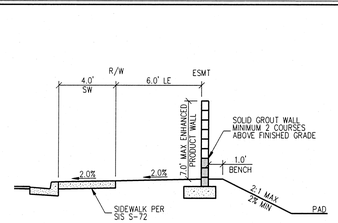
30. PERIMETER WALL

NOT TO SCALE



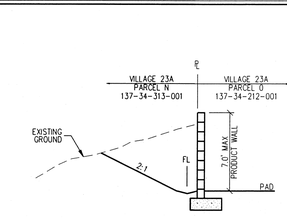
35. COMMON LOT "C"

NOT TO SCALE



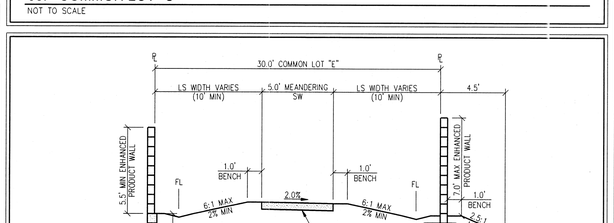
26. CORNER LOT SCREEN WALL

NOT TO SCALE



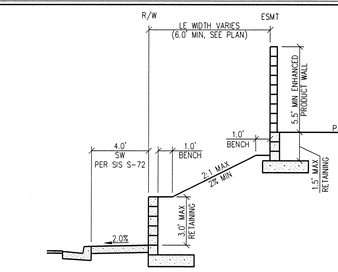
31. PERIMETER WALL

NOT TO SCALE



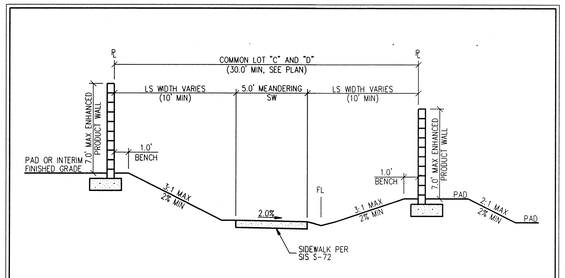
36. COMMON LOT "E"

NOT TO SCALE



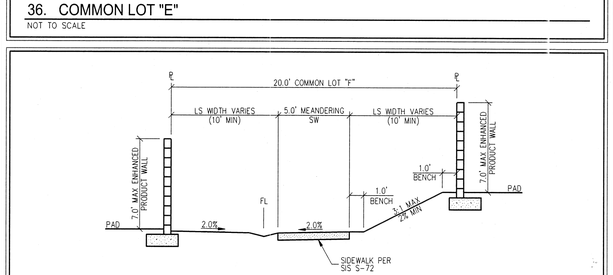
27. CORNER LOT STEPPED RETAINING WALLS

NOT TO SCALE



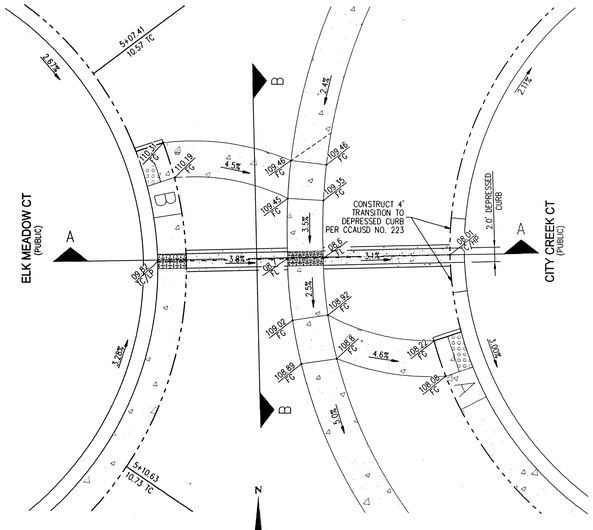
32. COMMON LOT "C" AND "D"

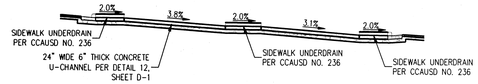
NOT TO SCALE



37. COMMON LOT "F"

NOT TO SCALE



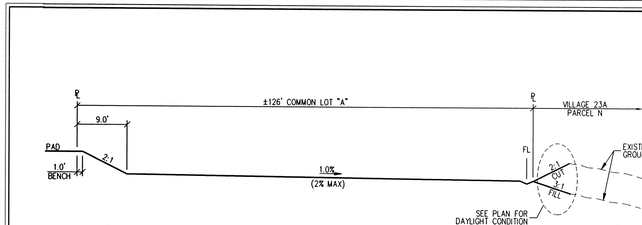


SECTION AA
SCALE - 1"=10'

SECTION BB
SCALE - 1"=10'

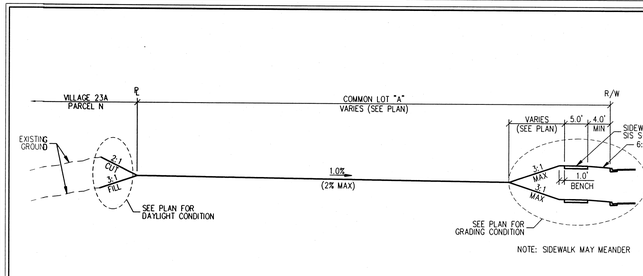
38. COMMON LOT "C" DETAIL

NOT TO SCALE



39. COMMON LOT "A"

NOT TO SCALE



NOTE: SIDEWALK MAY MEANDER

40. COMMON LOT "A"

NOT TO SCALE

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

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

LAS VEGAS, NV

Woodside Homes
BETTER BY DESIGN

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
GRADING DETAILS II

S34 T20S R59E

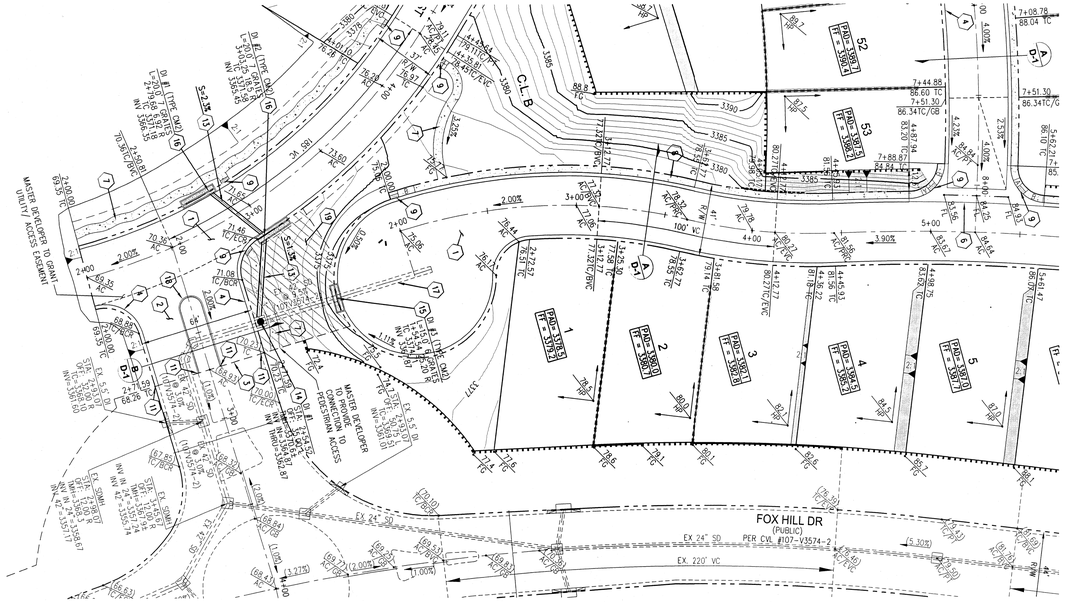
DATE: 11/22/11
DRAFTER: DSP
DESIGNER: DSP
CHECKED: CAL

PROJECT NO.
WSH1105-000

PROFESSIONAL ENGINEER STATE OF NEVADA
COREY A. LIEBER
Exp. 12/31/2013
CIVIL
No. 15875
1-18-12

D-2
SHEET 12 OF 13

J:\wsh1105-000 v23 parcel o\dwg\xrpnrv\wsh1105-000d11.dwg 1/18/2012 7:31 AM Dan Pell



YANKEE MEADOW ST PLAN
(PUBLIC)

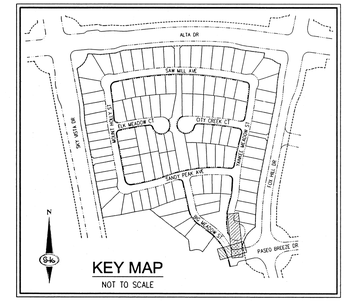
SCALE – 1=40' FEET

STORM DRAIN LATERAL PLAN
(PUBLIC)

SCALE – 1=40' FEET

PROFILE
HOR. : 1"=40'
VERT. : 1"=8'

PROFILE
HOR. : 1"=40'
VERT. : 1"=8'



STORMWATER RUNOFF MANAGEMENT

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

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

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

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

4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL 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.

GENERAL NOTES

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2006, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL.
8. EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLACING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.
10. ALL ELEVATIONS SHOWN, WITH EXCEPTION TO PAD AND FINISHED FLOOR ELEVATIONS, ARE THE VALUE SHOWN PLUS 3300'.

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

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY.
Call before you do UnderGround
1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-32-5300
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR
1-800-227-2600
AND
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

GRADING NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
2. CONSTRUCT 3" AC PAVEMENT WITH 4" TYPE II OVER 6" TYPE I AGGREGATE BASE
3. SAWCUT AND MATCH EXISTING IMPROVEMENTS
4. CONSTRUCT "L" TYPE CURB AND GUTTER PER SUMMERLIN IMPROVEMENT STANDARDS S-47
5. CONSTRUCT SIDEWALK DRAIN PER CCAUSD NO. 236
6. CONSTRUCT 8' CROSS GUTTER PER SUMMERLIN IMPROVEMENT STANDARDS S-64
7. CONSTRUCT 5' WIDE SIDEWALK PER SUMMERLIN IMPROVEMENT STANDARDS S-72
8. CONSTRUCT 4' WIDE SIDEWALK PER SUMMERLIN IMPROVEMENT STANDARDS S-72
9. CONSTRUCT SIDEWALK RAMPS PER SUMMERLIN IMPROVEMENT STANDARDS S-75
10. SEE DETAIL 38 ON SHEET D-2 FOR GRADING AND SECTIONS IN THIS AREA
11. FIELD VERIFY AND TIE INTO EXISTING CURB AND GUTTER
12. CONSTRUCT 4' TRANSITION TO DEPRESSED CURB PER CCAUSD NO. 223
13. INSTALL 18" CLASS III RCP STORM DRAIN
14. INSTALL 60" TYPE III STORM DRAIN MANHOLE
15. INSTALL 15.0' TYPE CM2 DROP INLET PER CCAUSD NO. 412A "TYPE C-D MODIFIED DROP INLET"
16. INSTALL 20.0' TYPE CM2 DROP INLET PER CCAUSD NO. 412A "TYPE C-D MODIFIED DROP INLET"
17. REMOVE EXISTING STORM DRAIN BEYOND PROPOSED DROP INLET
18. CONSTRUCT A-CURB PER SUMMERLIN IMPROVEMENT STANDARDS S-49
19. PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

LEGEND

- PHASE BOUNDARY
- MATCHLINE
- ROADWAY CENTERLINE
- RIGHT-OF-WAY
- PROPERTY LINE
- CURB AND GUTTER
- EXISTING CURB AND GUTTER
- FUTURE CURB AND GUTTER
- GRADE BREAK LINE
- FLOWLINE
- 00.00 TC — PROPOSED ELEVATION
- (00.00) TC — EXISTING ELEVATION
- [00.00] TC — FUTURE ELEVATION
- 3400 — EXISTING CONTOUR (5-FT)
- EXISTING CONTOUR (1-FT)
- 3400 — PROPOSED CONTOUR (5-FT)
- PROPOSED CONTOUR (1-FT)
- PAD= 3400.0 / FF = 3400.7 — PROPOSED PAD AND FINISHED FLOOR ELEVATION
- RETAINING WALL
- PLANTER RETAINING WALL
- DECORATIVE WALL
- DECORATIVE RETAINING WALL

LEGAL DESCRIPTION

SUMMERLIN VILLAGE 23A UNIT NO. 2 PARCEL O AS SHOWN ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA, LYING WITHIN SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CLARK COUNTY, NEVADA.

SUMMERLIN

SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE — DATE

THIS SIGNATURE IS LIMITED TO APPROVAL OF THESE DOCUMENTS FOR CONFORMANCE TO THE DESIGN INTENT OF THE APPLICABLE DESIGN CRITERIA. NEITHER SUMMERLIN NOR THE SUMMERLIN RESIDENTIAL DESIGN REVIEW COMMITTEE ASSUMES RESPONSIBILITY FOR PLAN CONFORMANCE WITH APPLICABLE LAWS, ORDINANCES, AND CODES.

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X AND SHADED ZONE X (AREA OUTSIDE THE 500-YEAR FLOOD PLAIN AND AREA OF 2% ANNUAL CHANCE FLOOD), PER FIRM PANEL 32003C1750E, DATED SEPTEMBER 27, 2002.

BENCHMARK

FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, OLVD9-34SSE6

NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED FLOOD STUDY __-_____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

COREY A. LIEBER, P.E. 15875 — DATE

BASIS OF BEARING

NORTH 05°59'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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

NO.	DESCRIPTION	DATE	BY	APP'D DATE	APP
-					

LAS VEGAS, NV

Woodside Homes — BETTER BY DESIGN

SUMMERLIN VILLAGE 23A, UNIT NO. 2, PARCEL O
STORM DRAIN PROFILES

S34 T20S R59E

DATE: 11/22/11
DRAFTER: DSP
DESIGNER: DSP
CHECKED: CAL
PROJECT NO. WSH1105-000

PROFESSIONAL ENGINEER – STATE OF NEVADA – COREY A. LIEBER – No. 15875 – CIVIL – 12/31/2013

PP-1
SHEET 13 OF 13

I:\wsh1105-000 v23 parcel o\dwg\smpro\v1wsh1105-000sno.dwg 1/18/2012 7:32 AM Don Poll