

DS #: 4555

APN: 137-34-313-002

PROJECT: Esperanza - Summerlin V23A Parcel M

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		May 24, 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:	
	Esperanza – Summerlin V23A Parcel M	
Cross Streets:	NWC of Desert Moon Road & Fox Hill Drive	
File Number:	F:\Depot\DSMemos\DS4555A.doc	
Parcel Number:	137-34-313-002	
Zoning Action:	TMP-44928	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X
COPIES TO:		
		Slater Hanifan Group
		Greystone Nevada / Lennar Homes
		Bart Anderson, P.E., DevCo

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	5/14/2012	5/23/2012	See Comments Below	\$400.00	283362: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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

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

1. Provide a copy of the zoning/planning conditions associated with this site (**TMP-44928**) 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.
2. Sites with a grade difference of 2 feet above or below existing are required to have approval from the *City 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.
3. The developer/engineer proposed rough grading in the future *Phase 2* 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. *Imp. Plans*
4. Offsite grading and swale are proposed in the adjacent Parcel N to the north. A notarized letter of permission for the offsite construction must be obtained from the parcel owner prior to the final acceptance of the drainage study.

5. Excerpt from Page 10 of the Study:

“Note the following regarding the interior street sections:

- *Street Section A has been analyzed to show the amount of flow conveyed in the south half of Delano Avenue that has been designed to discharge out the site entry road into Desert Moon Road toward the existing 17.5 drop inlet.....”*

Unless Desert Moon Road is a cross fall street, the flow out from the subject development will not cross the center line to the existing 17.5 drop inlet which locates on the other half of the street. Verify whether Desert Moon Road is a cross fall street with cross section in the next submittal.

6. **Sheet G-1 (Phase 1):**

- Per Section Detail 10/D-1, a swale is proposed adjacent to the screen/flood wall. Show the swale on plan with flow line elevations at regular intervals.
- Provide dimension of a proposed riprap pad at the interface between Phase 1 and Phase 2 in Escala Street.
- It is not clear that what kind of surface materials are within a proposed public drainage easement at the cul-de-sac end of Barcelona Court? Are they concrete or compacted dirt with riprap for erosion protection? Provide a cross section to clarify in the next submittal.

7. **Sheet G-4 (Phase 1):** Provide a cross section at the 45'-public drainage easement (CE “D”) to clarify the surface materials.

8. **Sheet D-1 (Phase 1):**

Details 9 and 10: Specify the solid grout wall as “8”-CMU”. Indicate that the depth in the proposed swale is 6”-minimum.

9. **Phase 2 Plans:** Address whether Sky Vista Drive will be at least half-street improved prior to the Phase 2 construction.

10. Private streets must be public drainage easements. Provide a note on the grading plans “Note: All Private Streets are P.U., Public Sewer Easements and Public Drainage Easements to be privately maintained by the HOA.”

11. 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.

12. 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.

13. The subject drainage study addresses *Interim improvements (Phase 1)* as well as the *Final improvements (Phase 1 and Phase 2)*. However, if *Phase 2 Improvements* commence more than one year after the final approval of this study, a drainage study update will be required to address the future *Phase 2 Improvements*.

14. 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

TRANSMITTAL

To: Albert Sung, P.E.

Date: May 14, 2012

City of Las Vegas

Project No.: LEN1201.000

333 N. Rancho Drive

Las Vegas, NV 89106

From: Steve Jones, P.E.

Subject: Technical Drainage Study for Esperanza

CC: Tracy Stratton, SHG

CC: _____

CC: Chelsea Peltier, SHG

CC: _____

CC: Mark Failla, SHG

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: _____

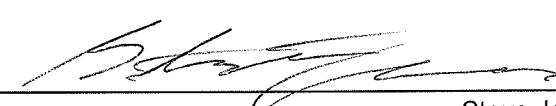
Copies	Description
<u>1</u>	<u>Subject Study</u>
<u>1</u>	<u>Grading Plan, Profile and Detail Sheets (bound in back)</u>
<u>1</u>	<u>Stamped and Signed Standard Form 1 (bound in front)</u>
<u>1</u>	<u>\$400 Submittal Fee (Greystone Nevada, LLC Check # 00289470)</u>
<u>1</u>	<u>CD containing PDF of submittal documents</u>

Comments:

Enclosed please find the above listed items in support of development of a residential subdivision on Parcel M, within Summerlin Village 23A. This study is intended to show the project's conformance with the previously established master drainage patterns for the site.

Please contact us if there are any questions at 702-284-5300. Thanks.

Signed: _____


Steve Jones, P.E.
Assistant Project Manager – Flood Control Division

TECHNICAL DRAINAGE STUDY

Esperanza

City of Las Vegas, Nevada

Job No.: LEN1201.000

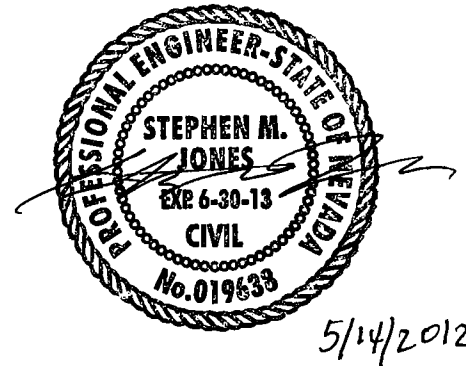
Date: May 2012

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:

Lennar Homes
2490 Paseo Verde Parkway, Suite 120
Henderson, Nevada 89014
Phone: 702-736-9100 • Fax: 702-736-9200



Steve Jones, P.E.
NV Professional Engineer No. 19638

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Esperanza Date: May 2012
Location of Development: a) Descriptive (Cross Streets): North/South: Fox Hill Drive
East/West: Desert Moon Road
b) Section: 34 Township: 20 South Range: 59 East
c) APN: 137-34-313-002

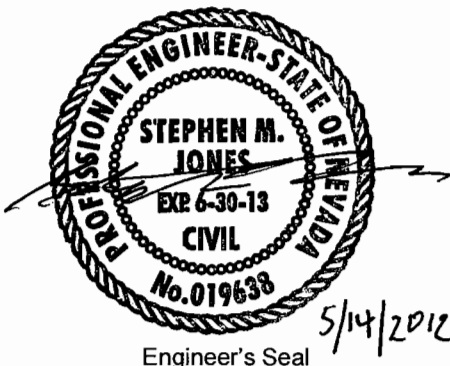
Name of Owner/Developer: Greystone Nevada, LLC / Lennar Homes
Telephone No.: 702-736-9100 Fax No.: 702-736-9200 E-mail Address: Robert.Johnson@Lennar.com
Address: 2490 Paseo Verde Parkway, Suite 120, Henderson, NV 89074

Contact Person – Name: Steve Jones, P.E. Telephone No.: 702-284-5300
*E-mail Address: sjones@shg-inc.com Fax No.: 702-284-5399
Firm: Slater Hanifan Group
Address: 5740 S. Arville Street, Suite 216, Las Vegas, NV 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 22.7 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.): Single-Family Residential
5. Approximate upstream land area which drains to the subject site: 16.5 Acres
6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation:
Conceptual Drainage Study for Summerlin Village 23A, by G.C. Wallace (DS3077);
Technical Drainage Study for Summerlin Village 23A Unit 1 Improvements, by G.C. Wallace (DS3126);
Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements, by G.C. Wallace (DS3402)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Existing Storm Drain in Fox Hill Drive
8. Briefly describe your proposed schedule for the subject project: 2 Phases;
Both Phase 1 & Phase 2 technically addressed by this study.



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

Local Entity File No. _____

REFERENCE: SHG Job LEN1201.000

STANDARD FORM 1

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Esperanza		Map ID:
Firm Name: Slater Hanifan Group		Engineer: Steve Jones, P.E.
Address: 5740 S. Arville St., Suite 216		
City: Las Vegas	State: Nevada	Zip: 89118
Phone Number: 702-284-5300	Fax Number: 702-284-5399	
Property Owner/Developer: Greystone Nevada, LLC / Lennar Homes		
Address: 2490 Paseo Verde Parkway, Suite 120		
City: Henderson	State: NV	Zip: 89074
Reviewed By:	Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

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

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

I. GENERAL REQUIREMENT:

Yes	No	
X		Design Manual Standard Form 1 with the engineer's seal and signature.
X		Design Manual Standard Form 4 .
X		2 copies of the 24" x 36" Drainage Plan.
	X	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge. (CURRENTLY IN PROCESS OF OBTAINING)

Reference:	STANDARD FORM 2
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HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS

Yes	No	
<u>X</u>	<u> </u>	A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
<u>X</u>	<u> </u>	A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.
<u>X</u>	<u> </u>	On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
<u>X</u>	<u> </u>	Vicinity Map with local and major cross streets identified and a north arrow.
<u>X</u>	<u> </u>	Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.

III. DRAINAGE PLAN

Yes	No	
<u>X</u>	<u> </u>	Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
<u>X</u>	<u> </u>	Minimum scale: 1" = 60'.
<u>X</u>	<u> </u>	Project name.
<u>X</u>	<u> </u>	Vicinity Map with local and major cross streets.
<u>X</u>	<u> </u>	Revision box.
<u>X</u>	<u> </u>	North arrow and bar scale.
<u>X</u>	<u> </u>	Engineer's/consultant's address and phone number.
<u>X</u>	<u> </u>	Elevation datum and benchmark.
<u>X</u>	<u> </u>	Legend for symbols and abbreviations.
<u>X</u>	<u> </u>	Cut/fill scarps, where applicable.
<u>X</u>	<u> </u>	Street names, grades, widths.
<u>X</u>	<u> </u>	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.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
X		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
X		Proposed typical street sections.
	N/A	Streets with off-set crowns.
X		Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
X		Property lines.
X		Right-of-way lines and widths, existing and proposed.
X		Existing improvements and their elevations.
X		Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
X		Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
X		Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
X		Location and cross-section of street capacity calculations.
X		Cross-sectional detail for channels, including cutoff wall locations.
X		Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
X		Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16"x48". Wrought iron gate is required for flows > 10 cfs.
	N/A	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood Walls with 8-inch concrete masonry unit.
X		Building and/or lot numbers.
	N/A	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
X		Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.
	N/A	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
	N/A	Appropriately elevated "humps" 6 inches above the 100-year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
X		Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
N/A		Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
X		Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
N/A		Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
X		Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
X		Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, which ever is greater.
N/A		A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones.
X		• Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub- and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
X		Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
X		Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
X		The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.

REFERENCE:

STANDARD FORM 2



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.) <i>IN PROCESS OF OBTAINING</i>
	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. <i>CITY COUNCIL MEETING 6/6/12</i>

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. <i>IN PROCESS OF OBTAINING</i>
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.
	N/A	Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
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.
X		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.

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6-Jun-01

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	<i>Project Overview & Study Purpose.....</i>	<i>1</i>
1.2	<i>Site Description.....</i>	<i>1</i>
1.3	<i>FEMA Flood Zone Designation.....</i>	<i>2</i>
1.4	<i>CCRFCD Facility Information.....</i>	<i>2</i>
1.5	<i>Reference Studies</i>	<i>2</i>
2	METHODOLOGY	3
2.1	<i>Compliance</i>	<i>3</i>
2.2	<i>Hydrologic Modeling.....</i>	<i>3</i>
2.3	<i>Hydraulic Modeling.....</i>	<i>5</i>
3	EXISTING DRAINAGE CONDITION.....	5
3.1	<i>Definition of Existing Drainage Condition</i>	<i>5</i>
3.2	<i>Discussion of Existing Drainage Condition.....</i>	<i>6</i>
4	PROPOSED DRAINAGE CONDITION.....	6
4.1	<i>Definition of Proposed Condition</i>	<i>6</i>
4.2	<i>Discussion of Developed Phase 2 Proposed Condition</i>	<i>6</i>
4.3	<i>Discussion of Interim Phase 1 Proposed Condition.....</i>	<i>7</i>
4.4	<i>Summary of Proposed Condition Flows.....</i>	<i>7</i>
4.5	<i>Summary of Proposed Condition Street Flows.....</i>	<i>9</i>
4.6	<i>Summary of Proposed Recommended Facilities</i>	<i>10</i>
4.7	<i>Summary of Proposed Finished Floor</i>	<i>11</i>
5	ULTIMATE DRAINAGE CONDITION.....	12
5.1	<i>Definition of Ultimate Condition.....</i>	<i>12</i>
5.2	<i>Discussion of Future Drainage Condition</i>	<i>12</i>
6	CONCLUSIONS & RECOMMENDATIONS	12
7	REFERENCES.....	13

TABLES

TABLE 1:	SUMMARY OF PROPOSED CONDITION FLOW RATES.....	7
TABLE 2:	SUMMARY OF DISCHARGE LOCATIONS & PROPOSED CONDITION FLOW RATES	8
TABLE 3:	SUMMARY OF ONSITE PRO-RATED FLOW RATES	9
TABLE 4:	SUMMARY OF 100-YR ONSITE STREET FLOW HYDRAULIC CHARACTERISTICS	9
TABLE 5:	SUMMARY OF PROPOSED DROP INLET HYDRAULIC CHARACTERISTICS.....	10
TABLE 6:	SUMMARY OF OFFSITE DITCH HYDRAULIC CHARACTERISTICS.....	11

LIST OF APPENDICES

- Appendix A** Drainage Exhibits
- Exhibit A – Location Map
 - Exhibit B – Current FEMA FIRM Panel Exhibit
 - Exhibit C – CCRFCD 2008 MPU Facilities Exhibit
 - Exhibit D – Soils Map
 - Exhibit E – Proposed Condition Drainage Map
- Appendix B** Hydrologic Data & Computations
- Precipitation
 - Soils & Curve Number
 - Standard Form 4 Lag Time
- Appendix C** HEC-1 Analysis
- Appendix D** Flowmaster Hydraulic Computations
- Street Flow
 - Offsite Interim Ditch Flow
- Appendix E** Drainage Facility Hydraulic Design
- Proposed Drop Inlets
 - Emergency Overflow
 - Barcelona Ct. Drainage Easement
 - Onsite Storm Drain WSPG Analysis
 - Granada Storm Drain WSPG Analysis
 - Offsite Parcel N Storm Drain Inlet Control Nomograph
- Appendix F** Proposed Finished Floors Evaluation
- Appendix G** Reference Material
Update #2 to the Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements
- Approval Letters
 - Developed Condition HEC-1 Analysis
 - Fox Hill Storm Drain Hydraulic Analysis & Drainage Facilities Exhibit
 - Relevant Storm Drain Profile Sheets
- Appendix H** Reference Material
Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements
- Approval Letters
 - Interim Drainage Patterns Exhibit
 - Transitional Drainage Plan Sheet
- Appendix I** Reference Material
Technical Drainage Study for Summerlin Village 23A Unit 1 Improvements
- Approval Letters
 - Relevant Report Excerpts
 - Drainage Facilities Exhibit
 - Street Drainage Basin & Hydraulic Section Exhibits
 - Fox Hill Street Section Computation
 - Desert Moon Road Street Section & Drop Inlet Computations
 - Relevant Storm Drain Profile Sheets

- Appendix J** Reference Material
Technical Drainage Study for Summerlin Village 23A Rough Grading
- Approval Letters
 - Relevant Report Excerpts
 - Drainage Plan & Interim Collector Channel Hydraulic Computations
 - Relevant Profile and Detail Sheets
- Appendix K** Reference Material
Technical Drainage Study for Summerlin Village 24 Unit 1 Improvements
- Approval Letters
 - Relevant Report Excerpts
 - Drainage Facility Exhibits
 - Relevant Storm Drain Profile Sheets
- Appendix L** Grading Plan, Profile and Detail Sheets

1 INTRODUCTION

1.1 Project Overview & Study Purpose

Lennar Homes is proposing to develop a single family residential development on an approximate 22.7 acre sized parcel within the Summerlin master planned community located in the City of Las Vegas, Nevada. Further, the development is located within the Summerlin Village 23A Unit 2 boundary on Parcel M, and is identified as *Esperanza*.

Note that Esperanza will be developed in two (2) phases as follows. This study and its associated grading plans, included in Appendix L, have been prepared in a manner that technically addresses both phases.

- **Phase 1** – Residential development of the southern half of the project, including Lots 1 thru 14 and 35 thru 84. Additionally, the Phase 2 portion of the site is proposed to be rough graded (pending approval from the City of Las Vegas Planning Department).
- **Phase 2** – Residential development of the remainder of the site that had been mass graded as a part of Phase 1, including Lots 15 thru 34 and 85 thru 95.

The purpose of this study is to show that the development of Esperanza is in conformance with the previously established Summerlin master planned drainage patterns. A detailed hydrologic and hydraulic analysis for the project site is provided in order to protect the property from onsite and offsite runoff in accordance with the master plan and local flood control criteria. An inventory of existing and master planned stormwater facilities intended for use by Esperanza is provided, and this study provides recommendations for additional flood control facilities necessary to protect the project site and adjacent downstream properties.

1.2 Site Description

Esperanza is located on APN 137-34-313-002 within Township 20 South, Range 59 East, Section 34, whose location has been shown on Exhibit A, included in Appendix A. The proposed project is proposed to be constructed in two (2) phases, as discussed above. An approximate 0.5 acre park is proposed as a part of Phase 1 across from the site entry from Desert Moon Road.

As Esperanza is located within Summerlin, the Summerlin Development Agreement designates that perimeter roadways will be completed, as necessary, by the Master Developer (Summerlin). Thus, this study assumes that the adjacent perimeter infrastructure and roadway improvements for Fox Hill Drive and Desert Moon Road are considered complete and existing prior to the start of Esperanza grading and construction. Note that although the roads are improved, the landscaping and perimeter walls (by THHC) are to be constructed once certified pads are obtained. Additionally, although Sky Vista Drive is not considered a roadway for use by Esperanza, its interim condition as a collector channel intended for flood protection from offsite flow generated to the west is considered complete and functioning.

Village 23A Unit 2 – Parcel N is also adjacent to the north, but considered undeveloped by this study in the existing condition. Note that existing topography shows that Parcel N runoff is conveyed to the northern boundary of Esperanza. Detail regarding flood control facilities required to accommodate re-routing of Parcel N runoff is included in this study.

In addition, all development completed in Summerlin is required to be reviewed by the Summerlin Design Review Committee, and this study has been forwarded for their review. All correspondence with Summerlin will be forwarded to City of Las Vegas for records.

1.3 FEMA Flood Zone Designation

The current FEMA Flood Insurance Rate Map (FIRM) that covers the Esperanza site is Panel 32003C2150E, dated September 27, 2002, as shown on Exhibit B included in Appendix A. Per the current FIRM Panel, Esperanza is located in a FEMA designated Zone 'X', or an area described as outside the 0.2% annual chance flood.

1.4 CCRFCD Facility Information

Esperanza is not located adjacent to an existing or future planned Clark County Regional Flood Control District (CCRFCD) designated regional facility. Figure F-29 from the current 2008 MPU has been utilized as Exhibit C, included in Appendix A, showing the location of Esperanza in relation to regional facilities in the vicinity.

1.5 Reference Studies

The following approved documents have been reviewed, considered acceptable and utilized as reference material in preparation of this study:

The document entitled, *Update #2 to the Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements* (hereafter referred to as the Unit 2 Update Study, Reference 4) and prepared by G.C. Wallace (CLV DS3402) had conceptually addressed the development of the Esperanza site. Esperanza was previously identified as Parcel M within Summerlin Village 23A Unit 2. The Unit 2 Study had conceptually determined a 100-year storm runoff of 60 cfs generated by Parcel M and contributing to Village 23A Unit 1 storm drain in Fox Hill Drive. Relevant reference material from the Unit 2 Update Study has been included in Appendix G for reference.

The document entitled, *Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements* (hereafter referred to as the Unit 2 Study, Reference 5) and prepared by G.C. Wallace (CLV DS3402) had addressed the current existing condition drainage patterns for the site. Relevant reference material from the Unit 2 Study has been included in Appendix H for reference.

The document entitled, *Technical Drainage Study for Summerlin Village 23A Unit 1 Improvements* (hereafter referred to as the Unit 1 Study, Reference 6) and prepared by G.C. Wallace (CLV DS3126) had constructed a lateral from the storm drain in Fox Hill Drive that the Esperanza site intends to utilize for conveyance of its discharge. The Unit 1 Study had designated a 48-inch lateral storm drain that the entire 100-year storm runoff produced by Esperanza is to be conveyed thru. Note that although the lateral into Esperanza had been constructed by the Unit 1 Study, the referenced Unit 2 Update Study re-established the flow generated by Esperanza and its hydraulic analysis of the Unit 1

storm drain in the vicinity of Esperanza supersedes what the Unit 1 Study had provided.. The Unit 1 Study also designed the adjacent perimeter roadways of Fox Hill Drive and Desert Moon Road and associated infrastructure that are to be utilized by the Esperanza site. Relevant reference material from the Unit 1 Study has been included in Appendix I for reference.

The document entitled, *Technical Drainage Study for Summerlin Village 23A Rough Grading* (hereafter referred to as the Rough Grading Study, Reference 7) and prepared by G.C. Wallace (CLV DS3077) had technically designed the interim collector channel adjacent to the western property boundary that is intended to protect the Esperanza site from offsite flow. The Rough Grading Study also set forth the design of the future Sky Vista Drive in the alignment of the collector channel. Relevant reference material from the Rough Grading Study has been included in Appendix J for reference.

The document entitled, *Technical Drainage Study for Summerlin Village 24 Unit 1 Improvements including Parcels "A" & "B" Mass Grading* (hereafter referred to as the V24 Unit 1 Study, Reference 8) and prepared by G.C. Wallace (CLV DS3551) had technically designed the storm drain and interim sump at the intersection of Sky Vista Drive and Desert Moon Road intended to collect the flow conveyed in the interim collector channel adjacent to the western property boundary. Additionally, the V24 Unit 1 Study had established the ultimate condition drainage pattern in Sky Vista Drive adjacent to Esperanza after it is improved into a roadway from the current interim collector channel. Relevant reference material from the V24 Unit 1 Study has been included in Appendix K 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 2).

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 basins analyzed by this study.

Precipitation: The site is located outside of 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. Upon review of the Unit 2 Study, the precipitation values are in conformance with those utilized in the previous conceptual analysis of the Esperanza site (formerly Parcel M). 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 has been utilized to approximate infiltration for the basins. The soils information within the watershed was obtained from the SCS Soil Survey of the Las Vegas Valley Area (Soil Survey, Reference 3). Exhibit D, depicting the project site on the soils map, has been included in Appendix A. Per the Soil Survey, the project site lies within Soil Types 155 and 502. Soil Type 155 is described as cave gravelly fine sandy loam, 4 to 15 percent slopes and is comprised of entirely hydrologic soil group (HSG) 'D'. Soil Type 502 is described as canutio-cave gravelly fine sandy loams, 2 to 8 percent slopes and is comprised of 55% HSG 'B', 40% HSG 'D' and 5% HSG 'A'.

The following is information regarding curve number selection for this study. Note that the site is located on two (2) different soil types, and also several types of land uses encompass several of the basins analyzed in this study; therefore, composite curve number calculations have been included in Appendix B.

- **Onsite** - The average lot size proposed on the Esperanza site has been computed as 8,400 ft²; therefore, an intermediate computed curve number between "8,000 ft² lots" and "10,000 ft² lots" has been selected from CCRFCD Manual Table 602A. Additionally, a ½ acre park has been proposed in the middle of the Phase 1 development and is assumed to be covered with at least 50% grass; therefore, a curve number corresponding to "open space, fair condition" has been selected from CCRFCD Manual Table 602 – 1 of 4. Esperanza is proposed to be developed in 2 phases where, during the interim, a portion of the site is to be rough graded; therefore, a curve number corresponding to "newly graded" has been selected from CCRFCD Manual Table 602 – 1 of 4.
- **Offsite** - The offsite and upstream Parcel N is planned to drain its runoff toward Esperanza. Currently, Parcel N is undeveloped; therefore, a curve number corresponding to "desert shrub in poor condition" has been selected from CCRFCD Manual Table 602 – 4 of 4.

Note the referenced Unit 2 Update Study had anticipated a curve number corresponding to 8,000 ft² lots for the Esperanza site. Therefore, development of proposed Esperanza conforms to the master planned drainage patterns for the site.

All soil and curve number data/computations, including CCRFCD Manual reference tables, have been included in Appendix B.

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 basin to the outlet point of the subbasin. Standard Form 4, as included in the CCRFCD Manual, was utilized to determine the lag times for basins modeled. A copy of the Standard Form 4 lag time computations is included in Appendix B.

2.3 Hydraulic Modeling

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 ($v \times d$) 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 ($v \times d$) for street flow for the 100-year storm event must be less than or equal to 8 with a maximum depth of 2 feet. Note all streets proposed by Esperanza are less than 80-ft right-of-ways.

Storm Drain & Drop Inlets: The hydraulic gradient for the proposed storm drain was determined utilizing the Water Surface and Pressure Gradient (WSPG) Hydraulic Analysis System software by the Los Angeles County Department of Public Works. Per the CCRFCD Manual, the resulting hydraulic gradient in the storm drain has been limited to minimum 1-ft below above finished grade and the flow velocities maintained to not exceed 25 ft/s.

Drop inlets were modeled using a computation spreadsheet which incorporates methodologies from Section 805 of the Manual.

Ditch Sections: Ditch sections were analyzed utilizing the Flowmaster Version 7.0 software by Haestad Methods. If flow velocity in the ditch exceeds 5 ft/s, then it is considered erosive and riprap lining has been designed utilizing methodologies outlined in Section 705.4.6 of the CCRFCD Manual. If necessary, adjacent proposed lots and/or perimeter walls have been flood protected up to twice the depth of flow not exceeding 1-ft above the water surface elevation.

3 EXISTING DRAINAGE CONDITION

3.1 Definition of Existing Drainage Condition

The existing drainage condition is considered the current condition of the site. The interim condition presented in the Unit 2 Study is considered the same as the existing condition of Esperanza; therefore, a project specific existing condition drainage analysis has not been prepared by this study. Currently, the Fox Hill Drive roadway and associated storm drain infrastructure is considered existing. Existing storm drain laterals from Fox Hill are considered existing and are intended to collect the runoff generated by the existing condition of the site. In addition to the storm drain in Fox Hill, the Unit 2 Study also proposed a series of berms that are intended to direct the existing condition flow to the lateral storm drain openings from Fox Hill.

Additionally, the collector channel adjacent to the west of the site, as well as Alta Drive located to the further north, are considered to be complete. These improvements are intended to function as hydrologic cut-off boundaries. Therefore, only runoff generated by onsite Village 23A properties is to be conveyed to the existing lateral storm drain openings from Fox Hill Drive. Thus, the existing condition drainage patterns mimic the ultimate condition drainage plan for Village 23A and the site.

3.2 Discussion of Existing Drainage Condition

Esperanza is located in both referenced Basin RG9 and the southern portion of referenced Basin RG8. Storm runoff produced by the existing condition of Esperanza is directed by existing berms to an existing 30-inch RCP storm drain opening in sump located at approximately the northwest corner of the roundabout intersection of Fox Hill Drive and Desert Moon Road. The runoff is then conveyed to the existing storm drain in Fox Hill to match the ultimate condition drainage plan for the site.

An existing 42-inch RCP storm drain opening in sump is located at the northeast corner of the Esperanza site. This facility is intended to collect the runoff produced by referenced Basin RG8 or the existing condition of offsite Parcel N, which is directed to this location by a berm. Similar to the existing 30-inch RCP storm drain opening facility identified above, the runoff is then conveyed to the existing storm drain in Fox Hill Drive to conform to ultimate condition drainage patterns.

4 PROPOSED DRAINAGE CONDITION

4.1 Definition of Proposed Condition

The proposed condition considers the Esperanza development complete. As discussed, Esperanza is proposed to be developed in two (2) phases; thus this study has analyzed the proposed condition after completion of each phase of the project. Thus, the Phase 1 proposed condition includes the interim rough grading of the north half of the site and the Phase 2 proposed condition considers Esperanza fully complete as a single-family residential development.

The adjacent perimeter roadways of Fox Hill Drive, Desert Moon Road and the adjacent interim collector channel are considered complete by Summerlin, prior to Esperanza. Note that in the future the interim collector channel will be improved as Sky Vista Drive roadway.

4.2 Discussion of Developed Phase 2 Proposed Condition

Refer to Exhibit E, included in Appendix A, for a detailed illustration of the proposed condition drainage patterns.

After final completion of Esperanza, the site generates a total flow rate of 59/25 cfs (Q_{100}/Q_{10}) as analyzed by Basin DEV1. The site has been graded to discharge its onsite runoff at the following two (2) discharge locations:

- 1) Thru onsite storm drain and drop inlets located in Granada Street that connect into an existing 48-inch storm drain lateral provided from the existing storm drain in Fox Hill Drive as constructed by Village 23A Unit 1 Improvements. The subject existing storm drain lateral utilized by Esperanza had been designated by the Unit 1 Study as the facility to accommodate the entire runoff produced by former Parcel M, or the current combination of Esperanza and offsite Parcel N. Therefore, this discharge location is considered acceptable.

- 2) Thru the site entry La Quinta Street into Desert Moon Road toward an existing drop inlet located west of the roundabout intersection between Desert Moon and Fox Hill Drive. Although the approved master planned drainage patterns do not allow for flow from any parcel to be conveyed in the infrastructure roadways, the Unit 1 Study had initially planned for a portion of the Esperanza property to discharge into Desert Moon Road. Therefore, this discharge location is considered acceptable.

In addition to discharge of the onsite runoff, the development of the Esperanza site impedes the existing condition drainage pattern that allows the runoff generated by offsite Parcel N to discharge thru an existing 42-inch RCP storm drain lateral opening in sump at the northeast corner of the Esperanza site. Therefore, offsite ditch grading has been proposed to direct the offsite runoff from the north to the existing 36-inch storm drain lateral from Fox Hill intended by master planned drainage patterns to accept Parcel N runoff in its developed condition.

Note that the series of berms and existing 42-inch RCP and 30-inch RCP storm drains located on the property that are utilized in the existing condition to collect the flow in the existing Fox Hill Drive storm drain are proposed to be removed or abandoned by development of Esperanza.

4.3 Discussion of Interim Phase 1 Proposed Condition

Esperanza is to be partially rough graded by the completion of Phase 1. The interim rough grading of Phase 2 has been proposed in a manner such that the Phase 1 drainage patterns match the Phase 2 drainage patterns discussed above in Section 4.2 of this study. However, due to curve number differences of the interim rough graded area, the total runoff generated by Esperanza is more during the Phase 1 proposed condition in comparison to the Phase 2 proposed condition. During the Phase 1 proposed condition, Esperanza generates a total flow rate of 62/27 cfs (Q_{100}/Q_{10}) as analyzed by Basin INT1.

4.4 Summary of Proposed Condition Flows

A summary of both the Phase 1 and Phase 2 proposed condition flow rates for Esperanza has been presented below in Table 1. Note that Phase 1 has been identified as Basin INT1 and Phase 2 has been identified as Basin DEV1. Also note that during both Phase 1 and Phase 2 proposed conditions, the runoff generated by the offsite area remains the same and is identified as Basin E.OFF1. The HEC-1 analysis utilized to determine the flow rates in Table 1 has been included in Appendix C.

Table 1: Summary of Proposed Condition Flow Rates			
Basin ID	Area (acres)	Q_{100} (cfs)	Q_{10} (cfs)
INT1	22.7	62	27
DEV1	22.7	59	25
E.OFF1	16.5	45	20

Review of Table 1 shows that, due to curve number differences, the interim rough grade present on the site during Phase 1 results in a larger runoff quantity produced by Esperanza. Therefore, the INT1 flow rates have been utilized in the onsite hydraulic design presented in this study.

The referenced Unit 1 and Unit 2 Studies had designated a single 48-inch RCP storm drain lateral from the existing storm drain in Fox Hill Drive to accommodate the entire runoff generated by Esperanza. As discussed, this study proposes two (2) discharge locations into the Fox Hill storm drain for onsite runoff whose flow rates have been summarized below in Table 2. Additionally, Esperanza also proposes to open the existing 36-inch storm drain lateral from Fox Hill for collection of offsite Parcel N runoff to conform to master planned drainage patterns and Table 2 also summarizes the flow rates at this discharge location.

Table 2: Summary of Discharge Locations & Proposed Condition Flow Rates			
Discharge Location	Approved Q_{100} (cfs)	Phase 1 Q_{100} (cfs)	Phase 2 Q_{100} (cfs)
Existing 48-inch RCP Stubbed Lateral @ Unit 1 Fox Hill Sta. 137+81.33	60	54	51
Existing Unit 1 17.5-ft Mod. Type C Drop Inlet @ Desert Moon Road Sta. 110+60.28	8	16	16
Existing 36-inch RCP Lateral @ Unit 2 Fox Hill Sta. 147+35.46	46	45	45
TOTAL	114	116	113

After review of Table 2, although Esperanza has utilized an additional location for collection of its runoff, the total flow discharged into the existing storm drain in Fox Hill has increased by a small amount of 2 cfs. The increase in flow is considered very small and insignificant considering that it only occurs during the interim Phase 1 condition. The total flow rate after full development of Esperanza (post-Phase 2), the total flow rate reduces to match the master planned flows established in the referenced Unit 2 Update Study. Therefore, the flow rates generated by the Esperanza project are considered acceptable.

Although the previous approved conceptual studies for the site planned that the entire runoff generated by the Esperanza project would discharge thru the existing 48-inch RCP storm drain lateral, initially the Unit 1 study had allowed 18 cfs to discharge to Desert Moon Road (former Parcel WS-1) into a 17.5-ft drop inlet near the roundabout intersection with Fox Hill Drive. After revisions to the master planned drainage patterns, the 17.5-ft drop inlet designed to collect 26 cfs remained and was constructed; therefore, the proposed discharge from Esperanza to Desert Moon Road is considered acceptable because a drop inlet exists with capacity to collect the flow into the existing Fox Hill storm drain as master planned.

4.5 Summary of Proposed Condition Street Flows

The interim partially rough graded Phase 1 condition generates the largest flow onsite; therefore the runoff generated by Basin INT1 has been utilized to hydraulically analyze the Esperanza interior streets. Basin INT1 has been pro-rated into smaller subbasins to determine the flow rates utilized for the hydraulic analysis, and Table 3 summarizes the pro-rated flows.

Table 3: Summary of Onsite Pro-Rated Flow Rates					
Basin ID	Area (acres)	Q₁₀₀ (cfs)	Q₁₀ (cfs)	Unit Q₁₀₀ (cfs)	Unit Q₁₀ (cfs)
INT1	22.7	62	27	2.7	1.2
Subbasin ID	Area (acres)	Q₁₀₀ (cfs)	Q₁₀ (cfs)	Unit Q₁₀₀ (cfs)	Unit Q₁₀ (cfs)
A	5.8	16	7	2.7	1.2
B	6.5	18	8	2.7	1.2
C	6.8	19	8	2.7	1.2
D	3.6	10	4	2.7	1.2
TOTAL	22.7	62	27	2.7	1.2

Table 4 summarizes the 100-year street flow hydraulic computations for the interior Esperanza streets utilizing the pro-rated flow rates reported in Table 3. Refer to Exhibit E for the location of each street section. The associated Flowmaster street flow computations have been included in Appendix D.

Table 4: Summary of 100-Yr Onsite Street Flow Hydraulic Characteristics						
Location	Q₁₀₀ (cfs)	Contributing Subbasins	Slope (%)	Depth, D (ft)	Velocity, V (ft/s)	D x V
Section A <i>Delano Avenue</i>	16	A	1.00	0.43	2.78	1.2
Section B1 <i>Granada Street</i>	18	B	4.56	0.35	5.13	1.8
Section B2 <i>Altimar Avenue</i>	18	B	2.56	0.39	4.07	1.6
Section C1 <i>Granada Street</i>	37	B + C	5.04	0.43	6.30	2.7
Section C2 <i>Calavera Court</i>	19	C	2.83	0.39	4.28	1.7
Section D <i>Delano Avenue</i>	18	D + Bypass(A)	3.44	0.37	4.61	1.7

After review of Table 4, it has been determined that the street flow criteria set forth in Section 2.3 of this study has been satisfied. The 100-year flows are shown to satisfy the 10-year DxV criteria; therefore, only the 100-year street flow computations have been performed.

Note the following regarding the interior street sections:

- Street Section A has been analyzed to show the amount of flow conveyed in the south half of Delano Avenue that has been designed to discharge out the site entry road into Desert Moon Road toward the existing 17.5-ft drop inlet. The portion of site flow combines with flow generated by Desert Moon Road (8 cfs) itself for a total flow rate of 16 cfs impacting the existing drop inlet. The Unit 1 Study had designed Desert Moon and the subject drop inlet for a total flow of 26 cfs, which is higher than proposed. Therefore, no further hydraulic analysis of Desert Moon Road has been provided by this study.
- The flow rate conveyed at Street Section C1 exceeds the back of curb and its velocity also exceeds 5 ft/s, which is considered erosive to landscaping and front yards. Therefore, storm drain and drop inlets have been proposed immediately downstream of the point of confluence of flow that generates the erosive velocity over the back of curb. The drop inlets have been designed to collect the amount of flow required for the flow depth to be maintained within the curb line, per a Flowmaster capacity computation, to remove the erosive velocities to landscaping and/or front yards.

The adjacent Fox Hill Drive has been designed to limit the street flow to that generated by the roadway itself. The resulting street flow is 6 cfs at 0.36-ft depth, per referenced Unit 1 Study's Street Section 2 included in Appendix G; therefore, the flow rates do not exceed the back of curb.

4.6 Summary of Proposed Recommended Facilities

Drop Inlets: Several drop inlets are proposed by this project to collect the Esperanza flow into proposed onsite storm drain that connects into the existing 48-inch RCP lateral supplied by the existing Fox Hill storm drain for use by the site. Table 5 summarizes the proposed drop inlets and their hydraulic characteristics. Refer to Exhibit E, included in Appendix A, for identification to the locations of the proposed drop inlets. The supporting drop inlet computations have been included in Appendix E.

Table 5: Summary of Proposed Drop Inlet Hydraulic Characteristics						
Phase	Drop Inlet No.	Size & Type	Flow Breakdown	Impacting Q₁₀₀ (cfs)	Collected Q₁₀₀ (cfs)	Bypass Q₁₀₀ (cfs)
1	1 & 2	(2) 7.5-ft Type CM2	B + C	37	14	23
1	3 & 4	(2) 10.0-ft Type CM2	INT1 – (A – Desert Moon) – (DIs 1&2)	40	40	0

Note that Drop Inlets #3 & #4 have been proposed at the low point in the southeast corner of the site. In the case the low point drop inlets become clogged, the emergency overflow path would be to weir thru the adjacent 45-ft wide drainage easement toward Fox Hill Drive. If this clogging condition were to occur, the emergency water surface elevation at the low point would reach 3311.3-ft at the highest location as included in Appendix E; however, the proposed finished floor elevations of the adjacent lots would be higher than the emergency weir water surface. Therefore, in the case of emergency overflow, the site is adequately flood protected.

Onsite Storm Drain: An 18-inch RCP storm drain is extended in Granada Street from Drop Inlets #1 & #2 that convey a flow of 14 cfs to the point of confluence of the low point drop inlets. After inclusion of the flow collected by Drop Inlets #3 & #4, a proposed 36-inch RCP storm drain conveys a flow of 54 cfs from Esperanza into the existing storm drain lateral from the Fox Hill storm drain. Note that this project proposes to remove the existing 48-inch RCP to the existing storm drain manhole and replace it with the 36-inch RCP. The starting HGL for the hydraulic analysis of this storm drain has been referenced from referenced Unit 2 Update Study's Standard Form 6 Station 4821.09.

Desert Moon Storm Drain: Although this study shows an increase in flow to this storm drain from what was approved in the referenced Unit 2 Studies, the design of the storm drain prior to revision had accommodated more flow than proposed. Therefore, no hydraulic analysis of this storm drain is necessary.

Offsite Ditch & Storm Drain: The existing 36-inch RCP storm lateral constructed by the Unit 2 Update Study, intended for Parcel N runoff, has been opened in sump by the Esperanza project. Riprap ($D_{50} = 6$ -inch) stabilization has been provided in the sump up to the headwater depth at the opening of the storm drain. A ditch has been graded to direct the Basin E.OFF1 flow that impacts the northern boundary of Esperanza toward the storm drain opening. Riprap stabilization has been provided in the sump Table 6 summarizes the hydraulic characteristics of the proposed ditch and the associated computations have been included in Appendix D.

Table 6: Summary of Offsite Ditch Hydraulic Characteristics					
Facility ID	Q_{100} (cfs)	Slope (%)	Velocity, V (ft/s)	Depth, D (ft)	Description
F	22	0.5	2.83	0.65	Earthen Trap. Type Ditch; 10-ft Bottom Width, 3:1 SS (Max.)

Although the primary longitudinal flow in the ditch results in a flow velocity that is less than 5 ft/s, riprap stabilization has been proposed at the locations in the ditch where it steepens to match existing topography. Also, locations where a significant amount of transverse flow impacts the 3:1 slope have been riprap lined. The riprap has been extended up the 3:1 slope for minimum 1-ft and at the bottom of the ditch to reduce scouring and degradation that may occur due to perpendicular impacting flow. The erosion control measures have been provided since the offsite grading has been proposed at an elevation above the northernmost lots of the Esperanza site.

Note that the ditch grading and proposed storm drain improvements are located on offsite property, not currently owned by Lennar Homes; therefore, the required permission to grade is in the process of being obtained.

4.7 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 also 6-inches above the top of curb on the high side of the lot in accordance with the CCRFCD Manual and

local criteria. The proposed finished floor evaluation and protection analysis has been included in Appendix F.

5 ULTIMATE DRAINAGE CONDITION

5.1 Definition of Ultimate Condition

In addition to considering that the proposed Esperanza development is complete, the ultimate condition also assumes that all improvements within Village 23A are installed. The ultimate condition considers that offsite Parcel N is developed and discharges into the existing 36-inch storm drain lateral that is utilized by the Esperanza interim offsite ditch. Also, the interim collector channel currently flood protecting the site from offsite flow generated to the west is to be improved as a street with associated storm drain infrastructure.

5.2 Discussion of Future Drainage Condition

This study shows that the development of Esperanza is in conformance with the previously established master planned drainage patterns. Therefore, the ultimate drainage condition approved in the referenced Unit 2 Update Study remains valid and no further analyses has been performed by this study. Relevant reference material regarding the ultimate drainage condition has been included in Appendix G.

6 CONCLUSIONS & RECOMMENDATIONS

1. The collection of flow from Esperanza and its contributing offsite drainage area varies from the master planned drainage patterns in the area. Esperanza proposes two (2) discharge locations for its onsite runoff into the existing Fox Hill storm drain, whereas, the master planned drainage patterns had anticipated only one (1) discharge location into the Fox Hill storm drain. However, the total flow collected at these locations is considered to be in conformance with the previously established master planned drainage patterns.
2. Resulting street flow hydraulic characteristics within the Esperanza site are in conformance with CCRFCD Manual criteria.
3. Proposed storm drain and drop inlets have been designed to satisfy CCRFCD Manual criteria. Note drop inlets have been placed onsite where flow exceeds the back of curb and its velocities are considered erosive or greater than 5 ft/s.
4. Proposed finished floor elevations have been elevated to at least a height of two times the depth of the 100-year flow in the adjacent street and also 6-inches above the top of curb measured from the high side of the lot. Therefore, the finished floors are considered adequately flood protected.
5. Esperanza is located outside an SFHA. It is located within a FEMA designated Zone 'X', defined as an area determined to be outside the 0.2% annual chance flood.

6. The project is not located adjacent to an existing or future planned CCRFCD regional facility.

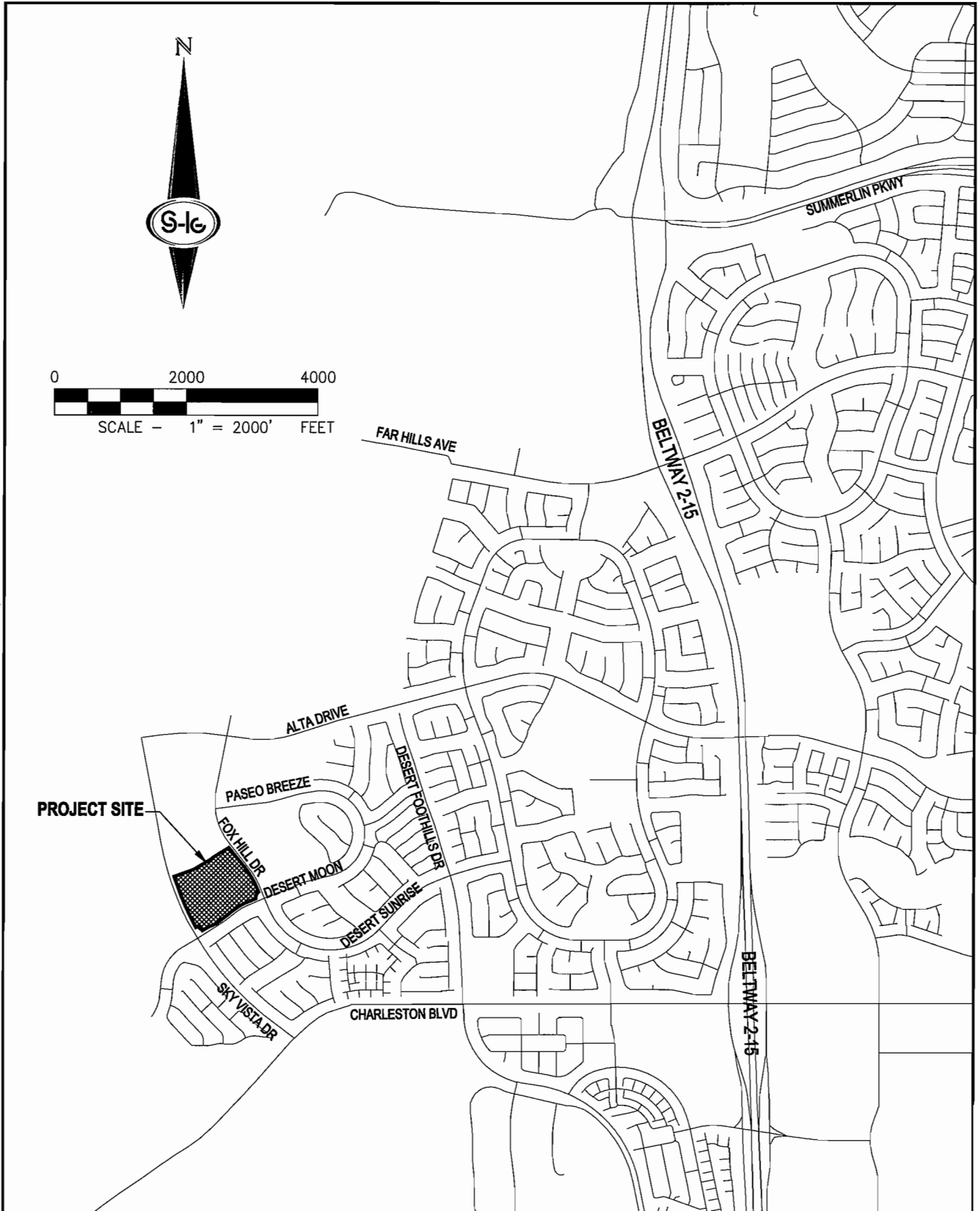
7 REFERENCES

1. *Las Vegas Valley Flood Control Master Plan Update*, PBS&J, Inc. and G.C. Wallace, Inc, November 2002.
2. *Hydrologic Criteria and Drainage Design Manual*, Clark County Regional Flood Control District, 1990.
3. *Soil Survey of Las Vegas Valley Area, Nevada*, U.S. Department of Agriculture, Soil Conservation Service, July 1985.
4. *Update #2 to the Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements*, G.C. Wallace, June 2011.
5. *Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements*, G.C. Wallace, October 2003.
6. *Technical Drainage Study for Summerlin Village 23A Unit 1 Improvements*, G.C. Wallace, December 2003.
7. *Technical Drainage Study for Summerlin Village 23A Rough Grading*, G.C. Wallace, May 2002.
8. *Technical Drainage Study for Summerlin Village 24 Unit 1 Improvements including Parcels "A" & "B" Mass Grading*, G.C. Wallace, March 2006.

APPENDIX A

Drainage Exhibits

j:\len1201-000 sum v23 parcel m\drainage\technical study\figures\exhibit a - location map.dwg 4/9/2012 6:12 PM Steve Jones



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LENNAR HOMES

**ESPERANZA
LOCATION MAP**

DATE: 04/09/2012

DRAFTER: KC

DESIGNER: KC

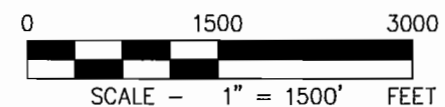
CHECKED: SMJ

PROJECT NO.

LEN1201.000

EXHIBIT A

SHEET 1 OF 1



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LENNAR HOMES

ESPERANZA

FEMA FIRM PANEL EXHIBIT

DATE: 04/09/2012

DRAFTER: KC

DESIGNER: KC

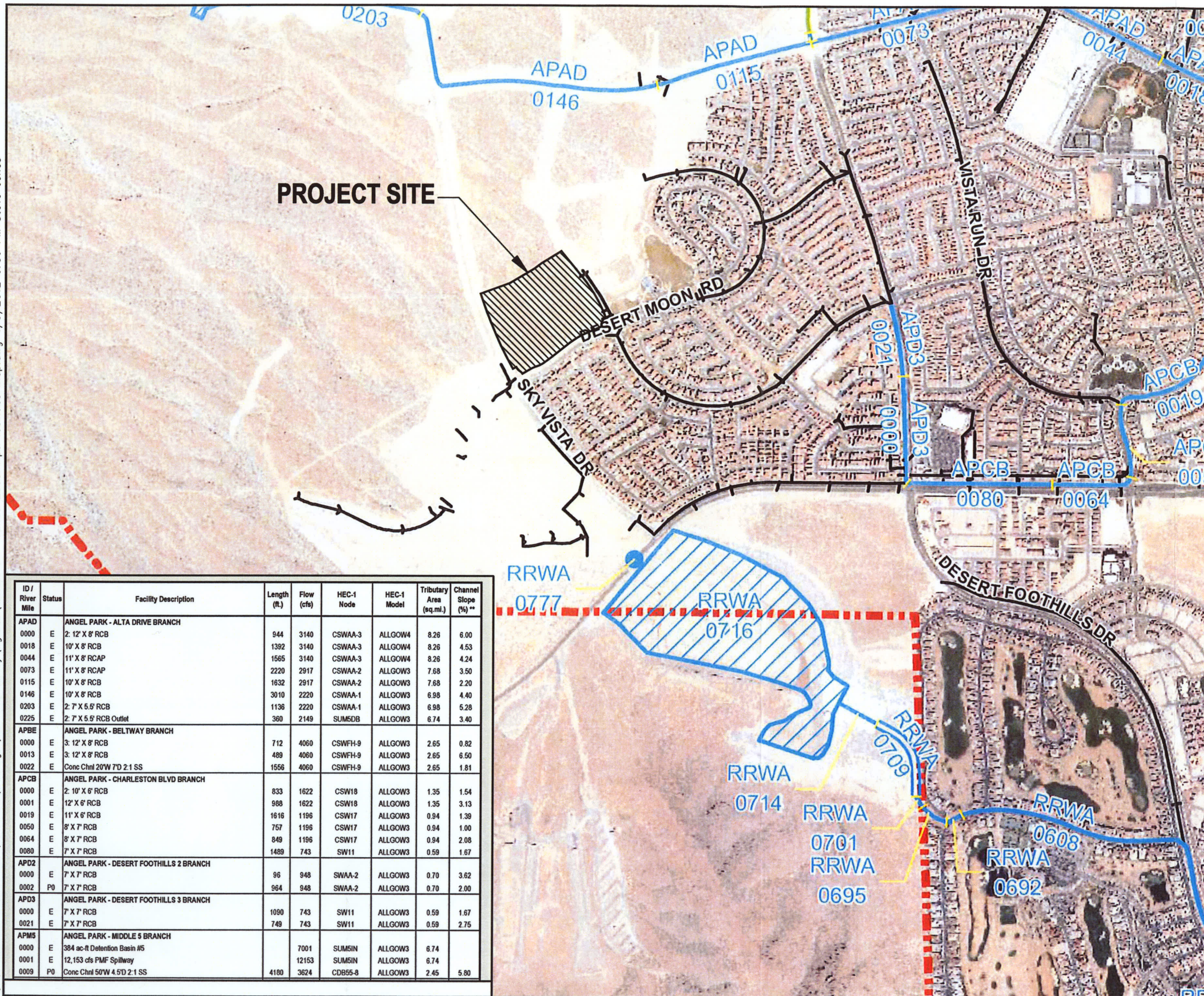
CHECKED: SMJ

PROJECT NO.

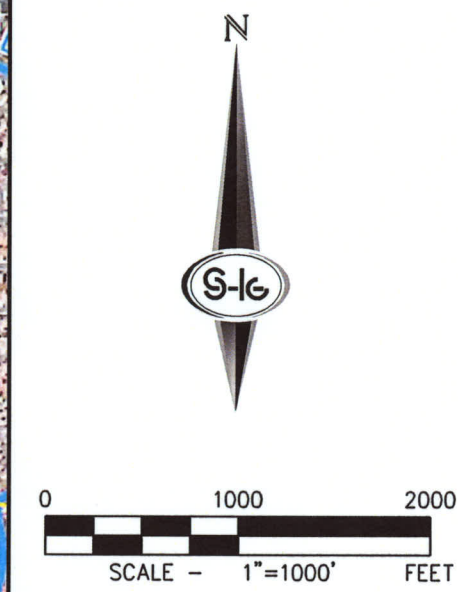
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EXHIBIT B

SHEET 1 OF 1



ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
APAD 0000	E	ANGEL PARK - ALTA DRIVE BRANCH	944	3140	CSWAA-3	ALLGOW4	8.26	6.00
0018	E	2: 12' X 8' RCB	1392	3140	CSWAA-3	ALLGOW4	8.26	4.53
0044	E	10' X 8' RCB	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
APBE 0000	E	ANGEL PARK - BELTWAY BRANCH	712	4060	CSWFH-9	ALLGOW3	2.65	0.82
0013	E	3: 12' X 8' RCB	489	4060	CSWFH-9	ALLGOW3	2.65	6.50
0022	E	Conc Chnl 20'W 7'D 2:1 SS	1556	4060	CSWFH-9	ALLGOW3	2.65	1.81
APCB 0000	E	ANGEL PARK - CHARLESTON BLVD BRANCH	833	1622	CSW18	ALLGOW3	1.35	1.54
0001	E	2: 10' X 6' RCB	988	1622	CSW18	ALLGOW3	1.35	3.13
0019	E	12' X 6' RCB	1616	1196	CSW17	ALLGOW3	0.94	1.39
0050	E	11' X 6' RCB	757	1196	CSW17	ALLGOW3	0.94	1.00
0064	E	8' X 7' RCB	849	1196	CSW17	ALLGOW3	0.94	2.08
0080	E	7' X 7' RCB	1489	743	SW11	ALLGOW3	0.59	1.67
APD2 0000	E	ANGEL PARK - DESERT FOOTHILLS 2 BRANCH	96	948	SWAA-2	ALLGOW3	0.70	3.62
0002	P0	7' X 7' RCB	964	948	SWAA-2	ALLGOW3	0.70	2.00
APD3 0000	E	ANGEL PARK - DESERT FOOTHILLS 3 BRANCH	1090	743	SW11	ALLGOW3	0.59	1.67
0021	E	7' X 7' RCB	749	743	SW11	ALLGOW3	0.59	2.75
APM5 0000	E	ANGEL PARK - MIDDLE 5 BRANCH		7001	SUM5IN	ALLGOW3	6.74	
0001	E	384 ac-ft Detention Basin #5		12153	SUM5IN	ALLGOW3	6.74	
0009	P0	12,153 cfs PMF Spillway	4180	3624	CDB55-8	ALLGOW3	2.45	5.80
		Conc Chnl 50'W 4.5'D 2:1 SS						





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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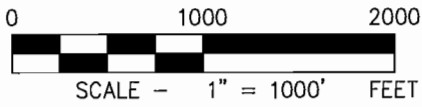
NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

LENNAR HOMES
ESPERANZA

CCRFCD 2008 MPU REGIONAL FACILITIES EXHIBIT

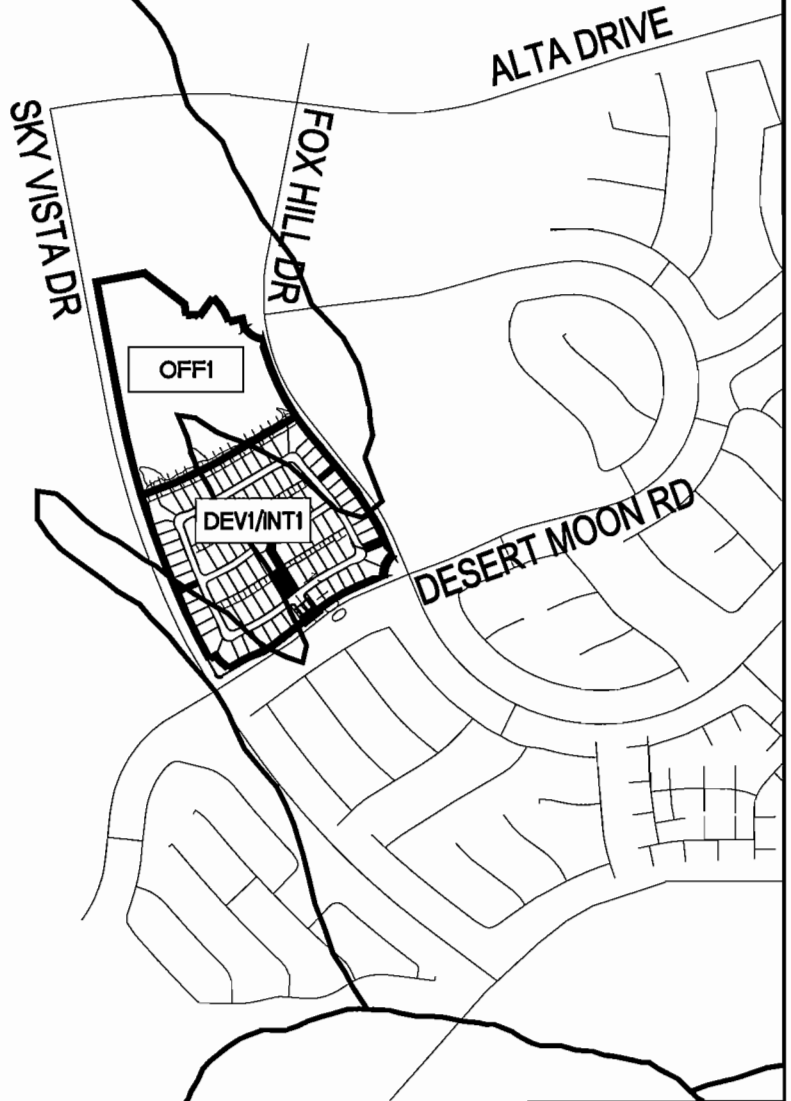
DATE: 04/09/2012
DRAFTER: KC
DESIGNER: KC
CHECKED: SMJ
PROJECT NO.
LEN1201.000
EXHIBIT C
SHEET 1 OF 1

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S-IG
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LENNAR HOMES

**ESPERANZA
SOILS MAP**

DATE: 04/09/2012

DRAFTER: KC

DESIGNER: KC

CHECKED: SMJ

PROJECT NO.

LEN1201.000

EXHIBIT D

SHEET 1 OF 1

Flow Rate Summary					
Phase 1 & Phase 2 Proposed Condition					
Basin	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)	Area (acres)	Q ₁₀₀ Unit Flow (cfs/acre)	Q ₁₀ Unit Flow (cfs/acre)
DEV1	59	25	22.7	2.6	1.1
INT1	62	27	22.7	2.7	1.2
E.OFF1	45	20	16.5	2.7	1.2
Subbasin	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)	Area (acres)	Q ₁₀₀ Unit Flow (cfs/acre)	Q ₁₀ Unit Flow (cfs/acre)
INT1-A	16	7	5.8	2.7	1.2
INT1-B	18	8	6.5	2.7	1.2
INT1-C	19	8	6.8	2.7	1.2
INT1-D	10	4	3.6	2.7	1.2
TOTAL	62	27	22.7	2.7	1.2
E.OFF1-1	21	9	7.7	2.7	1.2
E.OFF1-2	24	11	8.8	2.7	1.2
TOTAL	45	20	16.5	2.7	1.2

100-Year Street Flow Summary - Proposed Condition Flow Rates						
Street Section ID	Contributing Flow	Slope (%)	Q ₁₀₀ (cfs)	D ₁₀₀ (ft)	V ₁₀₀ (ft/s)	D ₁₀₀ •V ₁₀₀
A	INT1-A	1.00	16	0.43	2.78	1.2
B1	INT1-B	4.56	18	0.35	5.13	1.8
B2	INT1-B	2.56	18	0.39	4.07	1.6
C1	INT1-B + INT1-C	5.04	37	0.43	6.30	2.7
C2	INT1-C	2.83	19	0.39	4.28	1.7
D	INT1-D + Bypass(INT1-A)	3.44	18	0.37	4.61	1.7

Summary of Proposed Flood Control Facilities - Proposed Condition Flow Rates					
Drainage Facility ID	Proposed Q ₁₀₀ (cfs)	Inflow Description	Size & Type	Comment	
1	7	INT1-B + INT1-C	7.5-ft Type CM2 Drop Inlet & 18-inch RCP	Q _{daypass} = 11.5 cfs; Bypass flow is considered non-erosive	
2	7	INT1-B + INT1-C	7.5-ft Type CM2 Drop Inlet & 18-inch RCP	Q _{daypass} = 11.5 cfs; Bypass flow is considered non-erosive	
3	20	INT1 - (A - Desert Moon) - (DIs 1&2)	10.0-ft Type CM2 Drop Inlet & 24-inch RCP	Sag Inlet	
4	20	INT1 - (A - Desert Moon) - (DIs 1&2)	10.0-ft Type CM2 Drop Inlet	Sag Inlet	
A	54	INT1 - Desert Moon	36-inch RCP	Ex. Fox Hill SD designed to accommodate 60 cfs at this lateral location.	
B	34	Dis 1&2&3	36-inch RCP		
C	14	Dis 1&2	18-inch RCP		
D	9	Half(INT1-C)	2-ft concrete flume for low flow, remainder of easement earthen/landscape rock lined	Drainage Easement to be Privately Maintained	
E	45	E.OFF1	Ex. 36-inch RCP	Proposed Interim Sump Opening with 3.3-ft Headwater	
F	22	E.OFF1-1	Earthen Ditch; Riprap Lined (D ₅₀ = 6-inch) at locations of slope steeper than 0.5% or of significant transverse flow	Offsite Grading to protect Esperanza and conform Parcel N to master drainage plan	

LEGEND

DEV1

PRO-RATED SUBBASIN BOUNDARY

PRO-RATED SUBBASIN ID

FLOW DIRECTION

STREET HYDRAULIC SECTION

FACILITY ID

8 CFS

(200 CFS)

PHASE LINE

BASIN BOUNDARY

BASIN ID

PRO-RATED SUBBASIN ID

FLOW DIRECTION

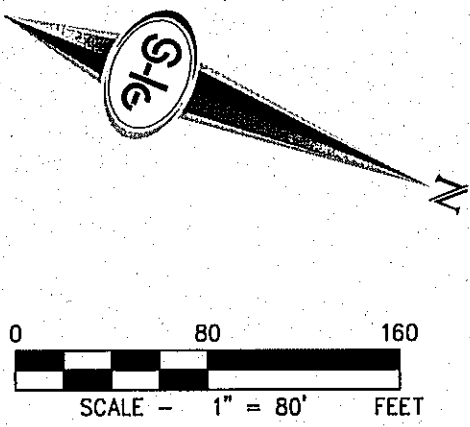
STREET HYDRAULIC SECTION

FACILITY ID

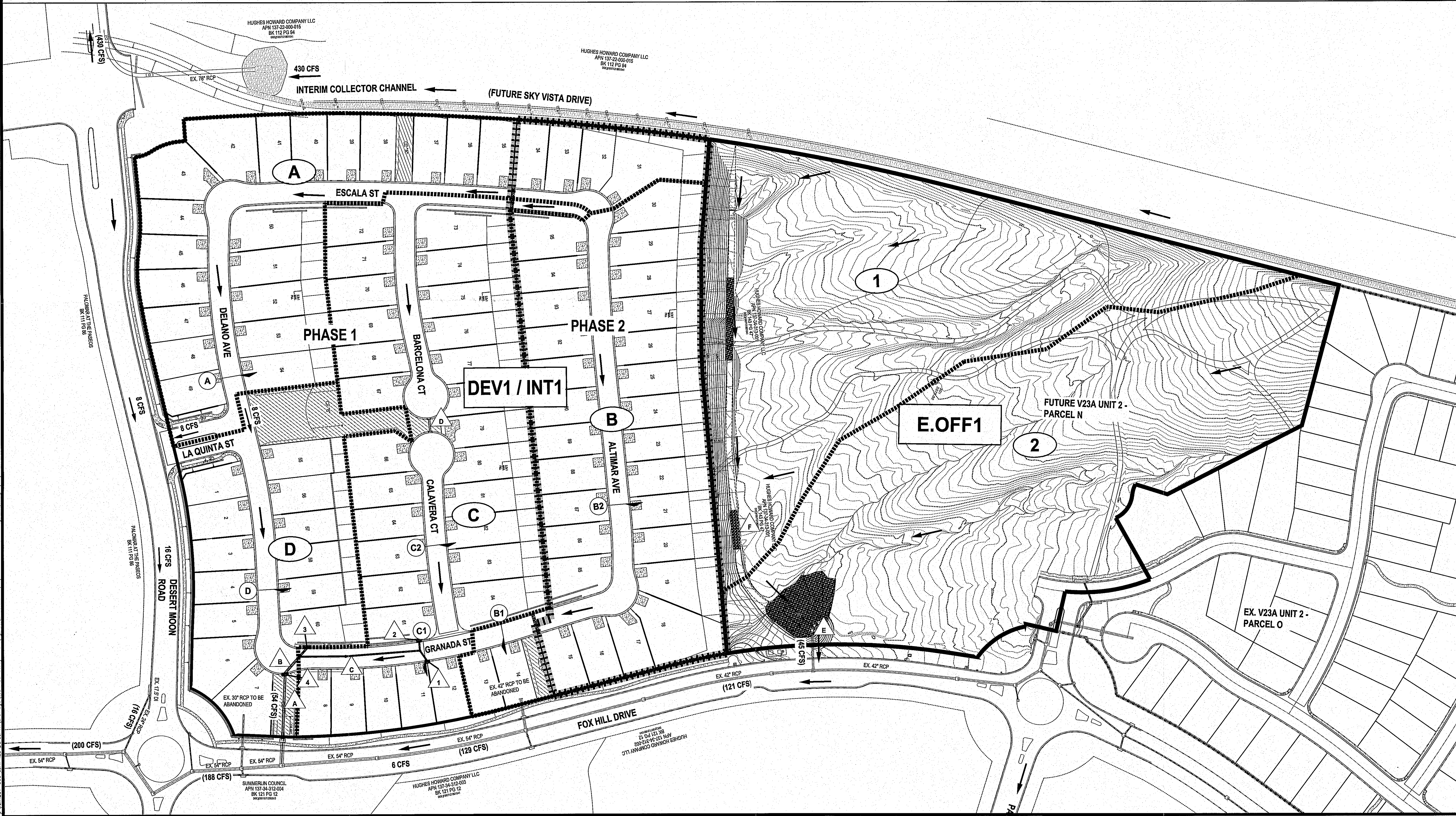
8 CFS

(200 CFS)

PHASE LINE



NOTE - STORM DRAIN FLOW RATES IN FOX HILL STORM DRAIN ARE ASSOCIATED WITH THE INTERIM PHASE 1 CONDITION, UPON COMPLETION OF PHASE 2 AND FULL DEVELOPMENT OF ESPERANZA, THE STORM DRAIN FLOW RATES IN FOX HILL REDUCE TO CONFORMANCE WITH THE APPROVED UPDATE #2 TO TECHNICAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23A UNIT 2 IMPROVEMENTS.



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LENNAR HOMES

ESPERANZA

PROPOSED CONDITION DRAINAGE MAP

DATE: 05/14/2012

DRAFTER: SMJ

DESIGNER: SMJ

CHECKED: KCR

PROJECT NO. LEN1201.000

EXHIBIT E

SHEET 1 OF 1

NO.

DESCRIPTION

DATE

BY

APP. DATE

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APPENDIX B

Hydrologic Data & Computations

Precipitation

Rainfall and Precipitation Computation

Project Name: **Esperanza**
Date: **3/27/2012**
File Name: **SF4 - Esperanza - TDS.xls**
By: **SMJ**

Data:

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

Site is NOT located in the McCarran 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): **39.2** = 0.0613 square miles

Table 502*

DARF = 1.00

Calculations:

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

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

$P_{10}/P_{100} = 0.57$ HEC-1 Multiple Ratio Value

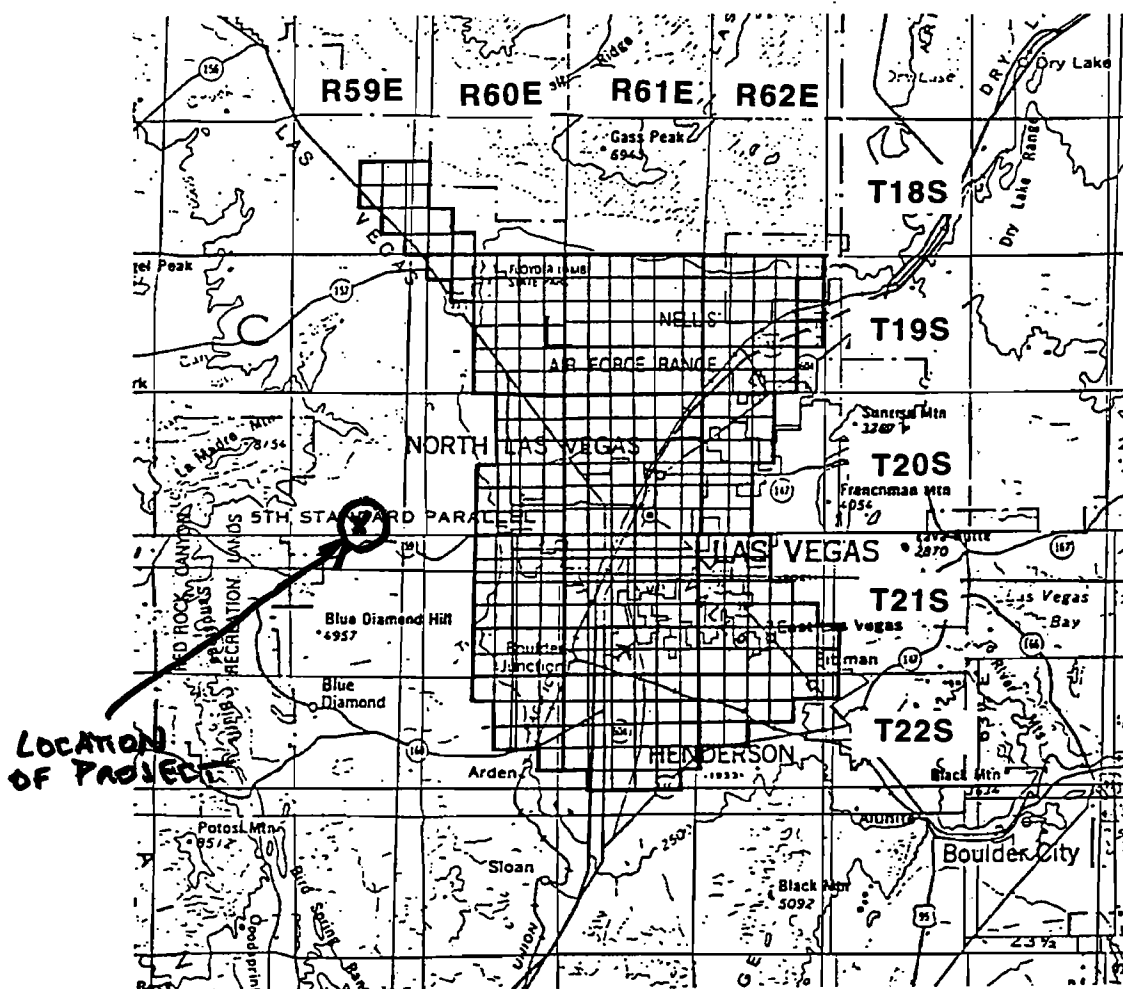
Equations:

$P = (\text{Rainfall}) * (\text{Precipitation Adjustment Ratio}) * (\text{Depth Area Reduction Factor})$

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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)

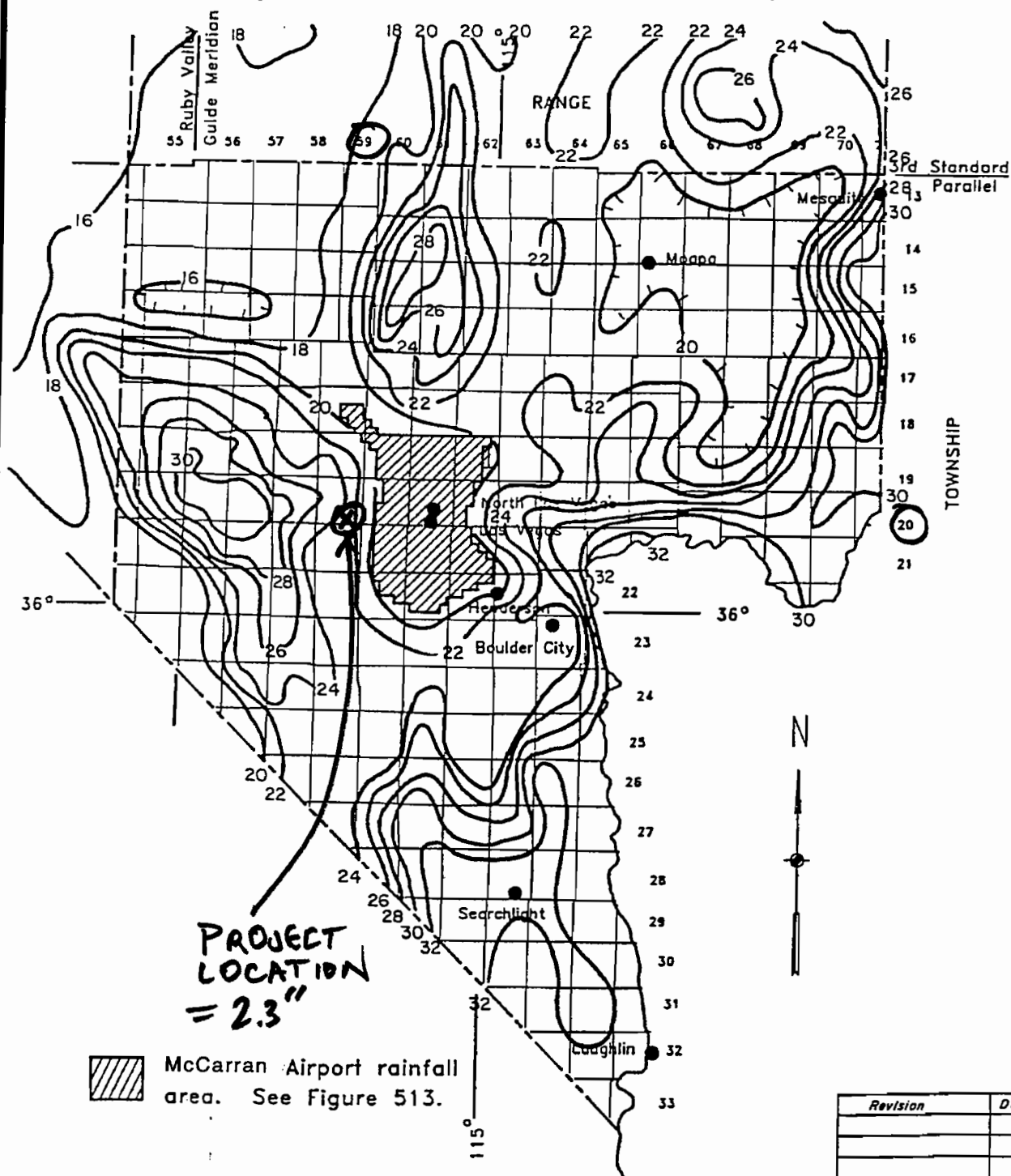


NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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



HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

PRECIPITATION ADJUSTMENT RATIOS

<u>Recurrence Interval</u>	<u>Ratio to NOAA Atlas 2</u>
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.

<i>Revision</i>	<i>Date</i>

**WRC
ENGINEERING**

REFERENCE:

USACE, Los Angeles District, 1988

TABLE 501

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX HOUR DEPTH-AREA REDUCTION FACTORS

<u>Drainage Area (Square Miles)</u>	<u>Six-Hour Depth-Area Reduction Factor</u>
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.

<i>Revision</i>	<i>Date</i>

**WRC
ENGINEERING**

REFERENCE:

USACE, Los Angeles District, 1988

TABLE 502

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX-HOUR STORM DISTRIBUTIONS

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

- 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

Soils & Curve Number

Soil & Curve Number Computation

Project Name: **Esperanza**
Date: **5/14/2012**
File Name: **SF4 - Esperanza - TDS.xls**
By: **SMJ**

Data:

Project is located in the following soil types:

155 Cave gravelly fine sandy loam, 4 to 15 percent slopes

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

Reference:

Exhibit D

SCS Soil Survey

Soil Group:

D

55% B, 40% D, 5% A

Hydrologic Soil Group	Desert Shrub (Poor Condition)	Newly Graded	Park (Fair Condition, Approx. 50% Grass)	Residential (10,000 sq ft lot)	Residential (8,000 sq ft lot)	Residential (6,000 sq ft lot)
A	63	77	49	61	73	80
B	77	86	69	75	82	87
C	85	91	79	83	88	90
D	88	94	84	87	90	92

Soil Type	Desert Shrub (Poor Condition)	Newly Graded	Park (Fair Condition, Approx. 50% Grass)	Residential (10,000 ft ² lot)	Residential (8,400 ft ² lot)	Residential (8,000 ft ² lot)
155	88	94	84	87	89.4	90
502	80.7	88.8	74.0	79.1	83.6	84.8

Basin	Soil Type	% Area	Land Use	CN	Area (Acres)	Composite CN
DEV1	155	45.8%	8,400 ft ² lots	89.4	10.4	41.0
	502	2.2%	Park	74.0	0.5	1.6
	502	52.0%	8,400 ft ² lots	83.6	11.8	43.5
INT1		100.0%		247.0	22.7	86.1
	155	31.3%	8,400 ft ² lots	89.4	7.1	28.0
	502	37.4%	8,400 ft ² lots	83.6	8.5	31.3
E.OFF1	155	14.5%	Newly Graded	94.0	3.3	13.7
	502	16.7%	Newly Graded	88.8	3.8	14.9
		100.0%		355.8	22.7	87.8
	155	93.3%	Desert Shrub	88.0	15.4	82.1
	502	6.7%	Desert Shrub	80.7	1.1	5.4
		100.0%		168.7	16.5	87.5

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area ²	A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
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 $I_a = 0.25$.
- 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

**WRC
ENGINEERING**

REFERENCE:
SCS TR-55, USDA, June 1986.

**TABLE 602
1 of 4**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (SEMIARID RANGELANDS¹)

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

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

²Poor: < 30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: > 70% ground cover.

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

Revision	Date

**WRC
ENGINEERING**

REFERENCE:

SCS TR-55, USDA, June 1986.

**TABLE 602
4 of 4**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

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

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

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

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

Revision	Date

REFERENCE:

TABLE 602A



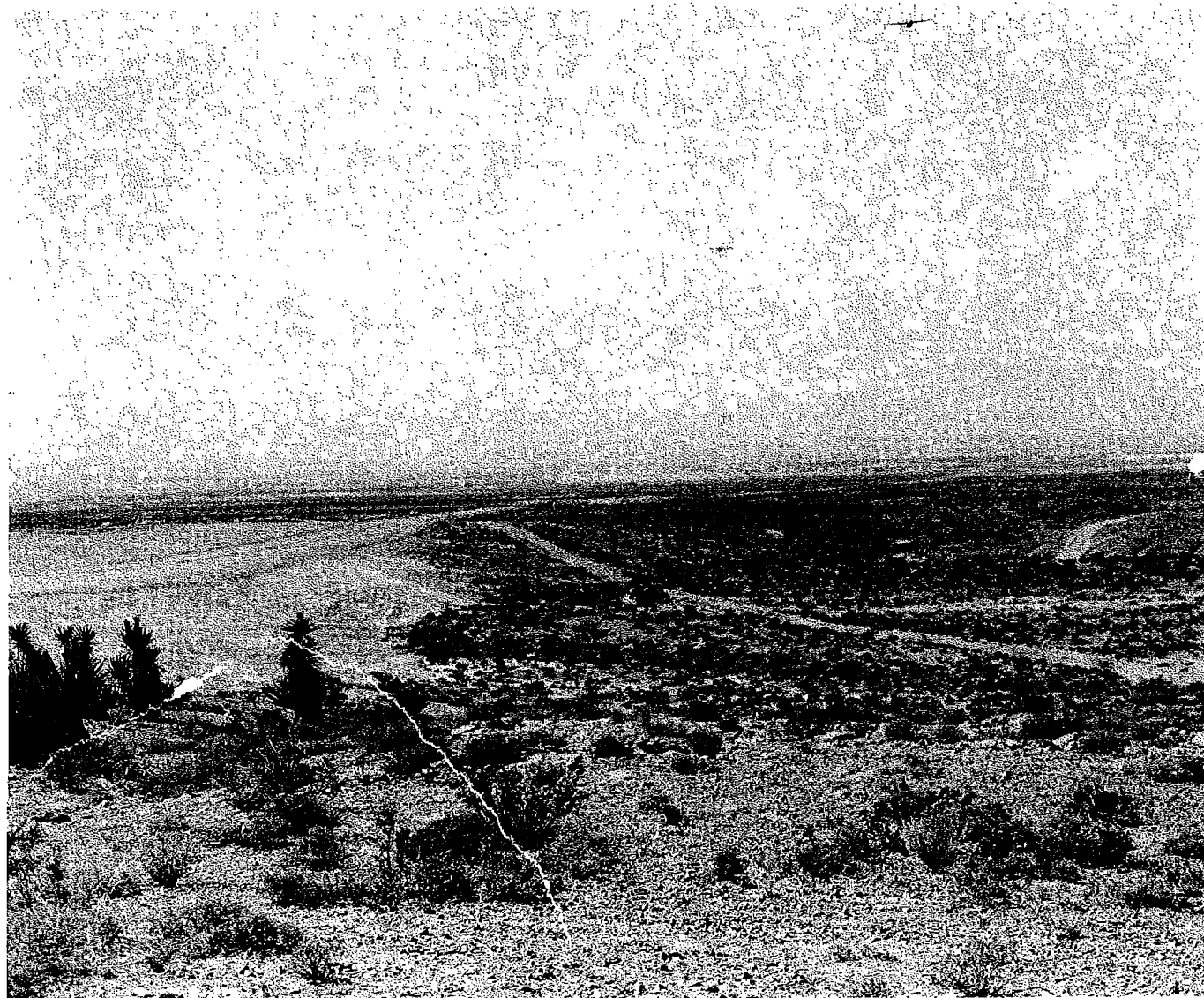
United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
United States Department
of the Interior, Bureau
of Land Management, and
University of Nevada
Agricultural Experiment
Station

Soil Survey of Las Vegas Valley Area Nevada

Part of Clark County



This unit is limited for roads because of the depth to the indurated hardpan. Roads should be designed to minimize cuts.

This map unit is in capability subclass VII, nonirrigated, and in horticultural group 6.

152—Cave gravelly fine sandy loam, 0 to 4 percent slopes. This shallow, well drained soil is on erosional fan remnants. It formed in alluvium derived from various kinds of rock.

Typically, about 80 percent of the surface is covered with a desert pavement of pebbles and cobbles. The surface layer is pale brown gravelly fine sandy loam about 12 inches thick. The next layer to a depth of 36 inches is an indurated, lime-cemented hardpan. The underlying material to a depth of 60 inches or more is light brown very gravelly sandy loam. Depth to the hardpan ranges from 4 to 20 inches.

Included in this unit are about 5 percent Arizo soils, flooded, in channels, 5 percent Canutio soils on inset fans, and 5 percent Grapevine soils on side slopes of erosional fan remnants. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of the Cave soil is moderate above the hardpan. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high if the surface is disturbed.

This unit is used mainly for urban development. It is also used as habitat for desert wildlife and for recreation.

This unit is poorly suited to urban development. The main limitation is the shallow depth to the hardpan. Excavation for building sites is limited by the hardpan, and heavy equipment is needed. Special design of septic tank absorption fields is needed.

Roads should be designed to minimize cuts because of the limited depth to the hardpan.

It is difficult to establish plants in areas where the pan is exposed. Mulching and fertilizing cut areas help to establish plants. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

Intermittent streams form the drainageways in this unit. These drainageways are subject to rare or occasional periods of high-velocity flooding. Care should be taken during urbanization to accommodate the runoff from the drainageways. If drains become plugged during a major flood, accelerated erosion and damage to roads, buildings, and other structures can occur.

This map unit is in capability subclass VII, nonirrigated, and in horticultural group 6.

155—Cave gravelly fine sandy loam, 4 to 15 percent slopes. This shallow, well drained soil is on

erosional fan remnants. It formed in alluvium derived from various kinds of rock.

Typically, about 70 percent of the surface is covered with a desert pavement of rock fragments and pan fragments. The surface layer is light brown gravelly fine sandy loam about 5 inches thick. The underlying material to a depth of 15 inches is light brown gravelly fine sandy loam. The next layer to a depth of 60 inches or more is an indurated, lime-cemented hardpan. Depth to the hardpan ranges from 4 to 20 inches.

Included in this unit are about 5 percent Arizo soils, flooded, in channels and 5 percent Caliza soils on side slopes of erosional fan remnants. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of the Cave soil is moderate above the hardpan. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is moderate, and the hazard of water erosion is slight. The hazard of soil blowing is high if the surface is disturbed.

This unit is used as habitat for desert wildlife and for recreation.

This unit is limited for roads because of the depth to the indurated hardpan. Roads should be designed to minimize cuts. Cutting and filling can be reduced by building roads in the less sloping areas.

This map unit is in capability subclass VII, nonirrigated and in horticultural group 6.

160—Destazo cobbly fine sandy loam, 0 to 2 percent slopes. This very deep, well drained soil is on relict alluvial flats. It formed in alluvium derived dominantly from limestone and dolomite.

Typically, about 60 percent of the surface is covered with a desert pavement of pebbles and cobbles. The surface layer is pink cobbly fine sandy loam about 11 inches thick. The upper 29 inches of the underlying material is light brown very gravelly sandy clay loam, and the lower part to a depth of 60 inches or more is pinkish white gravelly sandy loam containing some crystalline gypsum.

Included in this unit are about 5 percent Bracken very cobbly fine sandy loam, 2 to 8 percent slopes, on side slopes of slightly higher remnants of relict alluvial flats and 10 percent Las Vegas soils on summits of slightly higher remnants of alluvial flats. Included areas make up about 15 percent of the total acreage.

Permeability of this Destazo soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used mainly as habitat for desert wildlife and for recreation. It is also used for urban development.

This unit is well suited to the construction of dwellings.

The main limitation for septic tank absorption fields is restricted permeability. The operation of septic tank

of 43 inches is stratified, light brown very cobbly sandy loam, brown very gravelly sandy loam, and brown extremely gravelly sandy loam, averaging extremely gravelly sandy loam. Bedrock is at a depth of about 43 inches. Depth to bedrock ranges from 40 to 60 inches or more.

Permeability of the Canutio soil is moderately rapid above the bedrock. Available water capacity is very low. Effective rooting depth is 40 to 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

The Akela soil is shallow and well drained. It formed in residuum derived dominantly from basalt and andesite. Typically, about 92 percent of the surface is covered with a desert pavement of pebbles, cobbles, and stones. The surface layer is pale brown very cobbly fine sandy loam about 3 inches thick. The underlying material to a depth of 11 inches is light brown very gravelly fine sandy loam. Basalt is at a depth of about 11 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Akela soil is moderate above the bedrock. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is moderate if the surface is disturbed.

This unit is used as habitat for desert wildlife and for recreation.

This unit is limited for roads because of the depth to bedrock in the Akela soil. Roads should be designed to minimize cuts because of the limited depth to bedrock. Heavy equipment is needed for excavation.

This map unit is in capability subclass VII_s, nonirrigated. The Canutio soil is in horticultural group 1, and the Akela soil is in horticultural group 6.

501—Canutio gravelly fine sandy loam, 0 to 2 percent slopes. This very deep, well drained soil is on inset fans. It formed in mixed alluvium derived dominantly from limestone, quartzite, and sandstone.

Typically, about 60 percent of the surface is covered with a desert pavement of pebbles and cobbles. The surface layer is light brown gravelly fine sandy loam about 11 inches thick. The underlying material to a depth of 60 inches or more is light brown, stratified very gravelly sandy loam to very gravelly loam.

Included in this unit are about 5 percent Cave soils on erosional fan remnants and 5 percent Arizo soils, flooded, in channels. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Canutio soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is high if the surface is disturbed.

This unit is used mainly as habitat for desert wildlife and for recreation. It is also used for urban development.

This unit is well suited to the construction of dwellings. Unless the density of housing is too high, septic tank absorption fields normally function well on this unit.

Roads can easily be constructed and maintained on this unit.

The main limitations for lawns and landscaping are the desert pavement and the low available water capacity. Removing the desert pavement is necessary for best results when landscaping, particularly in areas used for lawns. Because the soil is droughty, applications of irrigation water should be light and frequent.

Intermittent streams form the drainageways in this unit. These drainageways are subject to rare or occasional periods of high-velocity flooding. Care should be taken during urbanization to accommodate the runoff from the drainageways. During major floods, plugging of the drains is likely to result in accelerated erosion and possible damage to roads, homesites, and structures.

This map unit is in capability subclasses III_s, irrigated, and VII_c, nonirrigated. It is in horticultural group 1.

502—Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes. This map unit is on inset fans.

This unit is 55 percent Canutio gravelly fine sandy loam, 2 to 8 percent slopes, and 40 percent Cave gravelly fine sandy loam, 2 to 8 percent slopes. The Canutio soil is on inset fans, and the Cave soil is on nonburied fan remnants. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Arizo soils, flooded, in channels. The percentage varies from one area to another.

The Canutio soil is very deep and well drained. It formed in mixed alluvium derived dominantly from limestone, quartzite, and sandstone. Typically, about 35 percent of the surface is covered with pebbles and 5 percent is covered with cobbles. The surface layer is light brown gravelly fine sandy loam about 9 inches thick. The underlying material to a depth of 60 inches or more is light brown, stratified very gravelly sandy loam to very gravelly loam.

Permeability of the Canutio soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Cave soil is shallow and well drained. It formed in mixed alluvium derived dominantly from limestone, quartzite, and sandstone. Typically, about 30 percent of the surface is covered with pebbles and 5 percent is covered with cobbles. The surface layer is pale brown gravelly fine sandy loam about 16 inches thick. The upper 14 inches of the underlying material is an indurated, lime-cemented hardpan, and the lower part to a depth of 60 inches or more is light brown very gravelly sandy loam. Depth to the hardpan ranges from 4 to 20 inches.

Permeability of the Cave soil is moderate to the hardpan. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used mainly as habitat for desert wildlife and for recreation. It is also used for urban development.

The main limitation for construction of dwellings is the shallow depth to the hardpan in areas of the Cave soil. Excavation for building sites is limited by the hardpan.

The main limitation for septic tank absorption fields is the shallow depth to the hardpan in areas of the Cave soil. Excavation is limited by the hardpan. Special design of septic tank absorption fields is needed.

The Cave soil is limited for roads because of the shallow depth to the hardpan. Roads should be designed to minimize cuts. Heavy equipment is needed for excavation.

The main limitation for lawns and landscaping is the shallow depth to the hardpan in areas of the Cave soil. The Cave soil is also moderately limited by the desert pavement and the low available water capacity of the Canutio soil. It is difficult to establish plants in areas where the pan is exposed. Mulching and fertilizing cut areas help to establish plants. Removing the desert pavement is necessary for best results when landscaping, particularly in areas used for lawns. Because the soils are droughty, applications of irrigation water should be light and frequent. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

Intermittent streams form the drainageways in this unit. These drainageways are subject to rare or occasional periods of high-velocity flooding. Care should be taken during urbanization to accommodate the runoff from the drainageways. If drains become plugged during a major flood, accelerated erosion and damage to roads, buildings, and other structures can occur.

This map unit is in capability subclass VII, nonirrigated. The Canutio soil is in horticultural group 1, and the Cave soil is in horticultural group 6.

505—Canutio-Akela complex, 15 to 50 percent slopes. This map unit is on hills.

This unit is 50 percent Canutio very cobbly sandy loam, 15 to 30 percent slopes, and 40 percent Akela very cobbly fine sandy loam, 15 to 50 percent slopes. The Canutio soil is on foot slopes, and the Akela soil is on upper back slopes and shoulders. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Bracken soils, 4 to 15 percent slopes, on pediment remnants and 5 percent Rock outcrop on side slopes and ridges. Included areas make up about 10 percent of the total

acreage. The percentage varies from one area to another.

The Canutio soil is deep and well drained. It formed in alluvium derived from various kinds of rock. Typically, 50 percent of the surface is covered with pebbles and 25 percent is covered with cobbles. The surface layer is light brown very cobbly sandy loam about 10 inches thick. The underlying material to a depth of 43 inches is brown very gravelly sandy loam and extremely gravelly sandy loam, averaging extremely gravelly sandy loam. Bedrock is at a depth of about 43 inches. Depth to bedrock ranges from 40 to 60 inches or more.

Permeability of the Canutio soil is moderately rapid above the bedrock. Available water capacity is very low. Effective rooting depth is 40 to 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Akela soil is shallow and well drained. It formed in residuum derived dominantly from basalt and andesite. Typically, about 92 percent of the surface is covered with a desert pavement of pebbles, cobbles, and stones. The surface layer is pale brown very cobbly fine sandy loam about 3 inches thick. The underlying material to a depth of 11 inches is light brown very gravelly fine sandy loam. Basalt is at a depth of about 11 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Akela soil is moderate above the bedrock. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate if the surface is disturbed.

This unit is used as habitat for desert wildlife and for recreation.

This unit is limited for roads because of the steepness of slope and the limited depth to bedrock in areas of the Akela soil. Roads should be designed to minimize cuts because of the limited depth to the bedrock. Cutting and filling can be reduced by building roads in the less sloping areas of the unit. Roads should be provided with adequate surface drainage. Erosion can be controlled and maintenance costs reduced by stabilizing areas that have been disturbed.

This map unit is in capability subclass VII, nonirrigated. The Canutio soil is in horticultural group 1, and the Akela soil is in horticultural group 6.

510—Akela-Rock outcrop complex, 15 to 50 percent slopes. This map unit is on mountains.

This unit is 55 percent Akela very cobbly fine sandy loam, 15 to 50 percent slopes, and 35 percent Rock outcrop. The Akela soil is on side slopes, and Rock outcrop is exposed on ridges and side slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent Canutio soils, 8 to 30 percent slopes, on side slopes. The percentage

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare" and "occasional" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding		High water table		Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Months	Depth	Months	Depth	Thick-ness	Depth	Hard-ness	Uncoated steel	Concrete
				<u>Ft</u>		<u>In</u>		<u>In</u>			
105*: McCullough-----	B	Rare-----	---	>6.0	---	>60	---	---	---	High-----	High.
Jean-----	A	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
Bluepoint-----	A	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
107----- Arizo	A	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
112----- Arizo	A	Occasional	Mar-Sep	>6.0	---	>60	---	---	---	High-----	Low.
113----- Arizo	A	Rare-----	---	>6.0	---	>60	---	---	---	High-----	High.
117----- Arizo	A	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
120----- Bluepoint	A	Rare-----	---	4.0-6.0	Jun-Sep	>60	---	---	---	High-----	Moderate.
127, 128, 129----- Bluepoint	A	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
130*: Bracken-----	B	None-----	---	>6.0	---	40-60	Soft	---	---	High-----	High.
Destazo-----	B	None-----	---	>6.0	---	>60	---	---	---	High-----	High.
132----- Bracken	B	None-----	---	>6.0	---	40-60	Soft	---	---	High-----	High.
133*: Bracken-----	B	None-----	---	>6.0	---	40-60	Soft	---	---	High-----	High.
Rock outcrop.											
134----- Bracken	B	None-----	---	>6.0	---	40-60	Soft	---	---	High-----	High.
140----- Casaga	C	None-----	---	>6.0	---	>60	---	---	---	High-----	High.
150----- Cave	D	None-----	---	>6.0	---	>60	---	4-20	Thick	High-----	Low.
151----- Cave	D	None-----	---	>6.0	---	>60	---	10-20	Thick	High-----	Low.
152, 155----- Cave	D	None-----	---	>6.0	---	>60	---	4-20	Thick	High-----	Low.
160----- Destazo	B	None-----	---	>6.0	---	>60	---	---	---	High-----	High.
181*: Caliza-----	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
Pittman-----	C	None-----	---	>6.0	---	>60	---	20-30	Thick	High-----	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding		High water table		Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Months	Depth	Months	Depth	Thick-ness	Depth	Hard-ness	Uncoated steel	Concrete
				<u>Ft</u>		<u>In</u>		<u>In</u>			
419*: Aztec-----	B	None-----	---	>6.0	---	>60	---	---	---	High-----	High.
Bracken-----	B	None-----	---	>6.0	---	40-60	Soft	---	---	High-----	High.
430----- Knob Hill	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
440----- Nickel	B	None-----	---	>6.0	---	40-60	Hard	---	---	High-----	Low.
450----- Cave Variant	D	None-----	---	>6.0	---	>60	---	5-18	Thick	High-----	High.
481, 484----- Hobog	D	None-----	---	>6.0	---	8-20	Hard	---	---	High-----	Low.
500* Canutio-----	B	None-----	---	>6.0	---	40-60	Hard	---	---	High-----	Low.
Akela-----	D	None-----	---	>6.0	---	10-20	Hard	---	---	High-----	Low.
501----- Canutio	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
502*: Canutio-----	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
Cave-----	D	None-----	---	>6.0	---	>60	---	4-20	Thick	High-----	Low.
505* Canutio-----	B	None-----	---	>6.0	---	40-60	Hard	---	---	High-----	Low.
Akela-----	D	None-----	---	>6.0	---	10-20	Hard	---	---	High-----	Low.
510*: Akela-----	D	None-----	---	>6.0	---	10-20	Hard	---	---	High-----	Low.
Rock outcrop.											
540----- Weiser	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
542*: Weiser-----	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
Aztec-----	B	None-----	---	>6.0	---	>60	---	---	---	High-----	High.
545*: Weiser-----	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
Goodsprings-----	D	None-----	---	>6.0	---	>60	---	9-20	Thick	High-----	Low.
600*. Slickens											
605*. Dumps											
610*. Pits											
615*. Urban land											
630*. Badlands											
635*, 640*. Rock outcrop											
645*. Pits											

* See description of the map unit for composition and behavior characteristics of the map unit.

Standard Form 4 Lag Time



Esperanza	TDS	SMJ	5/14/2012
-----------	-----	-----	-----------

[illegible]

APPENDIX C

HEC-1 Analysis

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 10MAY12 TIME 08:38:24 *
*****

```

Esperanza.out

```

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

```

```

      X  X  XXXXXX  XXXXX  X
      X  X  X  X  X  X  XX
      X  X  X  X  X  X  X
      XXXXXX  XXXX  X  XXXXX  X
      X  X  X  X  X  X  X
      X  X  X  X  X  X  X
      X  X  XXXXXX  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

1 *DIAGRAM
2 ID SLATER HANIFAN GROUP
3 ID ESPERANZA
4 ID SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M
5 ID BY LENNAR HOMES
6 ID TECHNICAL DRAINAGE STUDY
7 ID PROPOSED & INTERIM DRAINAGE CONDITIONS
8 ID
9 ID RETURN PERIOD ----- 100-YEAR & 10-YEAR
10 ID DISTRIBUTION ----- 6-HOUR SDN3
11 ID PROJECT NO. ----- LEN1201.000
12 ID FILENAME ----- Esperanza.H1
13 ID DATE ----- 03/27/2012
14 ID MODELED BY ----- SMJ
15 ID
16 ID STORM EVENT RETURN PERIODS
17 ID PRECIPITATION DEPTHS INCHES)
18 ID 100-YEAR = 3.29
19 ID 10-YEAR = 1.86
20 ID
21 ID PRECIPITATION DEPTH RATIOS
22 ID STORM EVENT RATIO
23 ID 100-YR 1.00
24 ID 10-YR 0.57
25 ID
26 IT 5 0 0 300
27 IO 5 0 0
28 IN 5 0 0
29 JR PREC 1.00 0.57
30 *
31 KK DEV1
32 KM PROPOSED CONDITION OF SITE
33 KM PHASES 1 & 2 COMPLETE AS SINGLE-FAMILY RESIDENTIAL DEVELOPMENT
34 PB 3.29
35 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
36 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
37 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
38 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
39 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
40 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
41 PC 0.998 0.999 1.000
42 BA 0.0355
43 LS 0 86.1
44 UD 0.118
45 *
46 KK INT1
47 KM INTERIM CONDITION OF SITE
48 KM PHASE 1 COMPLETE AS SINGLE-FAMILY RESIDENTIAL DEVELOPMENT
49 KM PHASE 2 COMPLETE AS ROUGH GRADE
50 BA 0.0355
51 LS 0 87.8
52 UD 0.114
53 *

```

1 HEC-1 INPUT PAGE 2

```

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

51 KK E.OFF1
52 KM INTERIM OFFSITE FLOW GENERATED BY ADJACENT "PARCEL N" TO THE NORTH
53 KM DRAINAGE DITCH PROPOSED TO ROUTE FLOW TO FOX HILL STORM DRAIN
54 KM PROPOSED INTERIM DRAINAGE PATTERN CONFORMS TO MASTER STUDY
55 BA 0.0258
56 LS 0 87.5
57 UD 0.110
58 ZZ

```

```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT LINE (V) ROUTING (---->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW
29 DEV1
.
.
44 INT1
.
.
51 E.OFF1
.

```

(****) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 10MAY12 TIME 08:38:24 *
*****

```

```

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

```

SLATER HANIFAN GROUP
 ESPERANZA
 SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M
 BY LENNAR HOMES
 TECHNICAL DRAINAGE STUDY
 PROPOSED & INTERIM DRAINAGE CONDITIONS

RETURN PERIOD ----- 100-YEAR & 10-YEAR
 DISTRIBUTION ----- 6-HOUR SDN3
 PROJECT NO. ----- LEN1201.000
 FILENAME ----- Esperanza.H1
 DATE ----- 03/27/2012
 MODELED BY ----- SMJ

STORM EVENT RETURN PERIODS
 PRECIPITATION DEPTHS (INCHES)
 100-YEAR = 3.29
 10-YEAR = 1.86

PRECIPITATION DEPTH RATIOS
 STORM EVENT RATIO
 100-YR 1.00
 10-YR 0.57

26 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	FLOW TIME	RATIOS APPLIED TO PRECIPITATION	
					RATIO 1 1.00	RATIO 2 .57
HYDROGRAPH AT	DEV1	.04	1	59. 3.58	25. 3.58	
HYDROGRAPH AT	INT1	.04	1	62. 3.58	27. 3.58	
HYDROGRAPH AT	E.OFF1	.03	1	45. 3.50	20. 3.58	

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

APPENDIX D

Flowmaster Hydraulic Computations

Street Flow

Street Section A

Worksheet for Irregular Channel

Project Description	
Worksheet	Section A - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	1.00 %
Discharge	16.00 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	0.43 ft
Elevation Range	0.00 to 0.47
Flow Area	5.7 ft ²
Wetted Perimeter	35.05 ft
Top Width	34.72 ft
Actual Depth	0.43 ft
Critical Elevation	0.45 ft
Critical Slope	0.67 %
Velocity	2.78 ft/s
Velocity Head	0.12 ft
Specific Energy	0.55 ft
Froude Number	1.21
Flow Type	Supercritical

Calculation Messages:
 Water elevation exceeds lowest end station by 0.47173064e-1 ft.
 Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+39.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.08
0+02.5	0.13
0+19.5	0.47
0+36.5	0.13
0+36.5	0.08
0+37.5	0.00
0+38.6	0.38

Street Section A
Worksheet for Irregular Channel

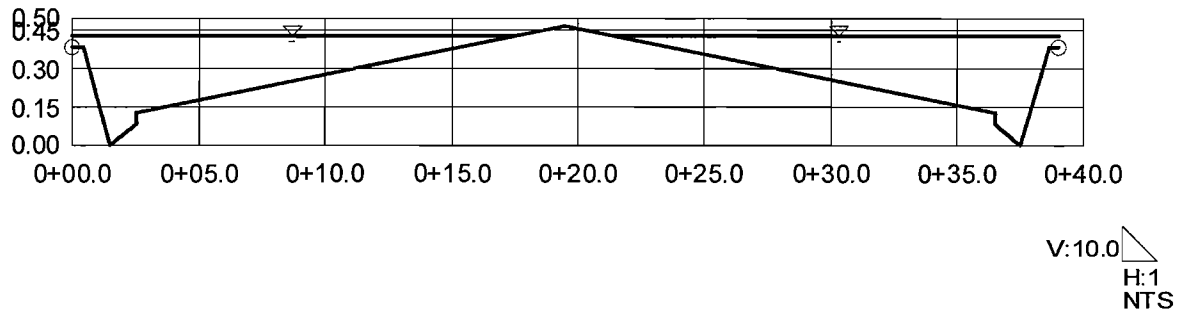
Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.0	0.38

Notes: Q = Subbasin A

Street Section A **Cross Section for Irregular Channel**

Project Description	
Worksheet	Section A - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	1.00 %
Water Surface Elevation	0.43 ft
Elevation Range	0.00 to 0.47
Discharge	16.00 cfs



Street Section B1

Worksheet for Irregular Channel

Project Description	
Worksheet	Section B1 - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	4.56 %
Discharge	18.00 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 0.47
Flow Area	3.5 ft ²
Wetted Perimeter	26.73 ft
Top Width	26.50 ft
Actual Depth	0.35 ft
Critical Elevation	0.47 ft
Critical Slope	0.66 %
Velocity	5.13 ft/s
Velocity Head	0.41 ft
Specific Energy	0.76 ft
Froude Number	2.48
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+39.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.08
0+02.5	0.13
0+19.5	0.47
0+36.5	0.13
0+36.5	0.08
0+37.5	0.00
0+38.6	0.38
0+39.0	0.38

Street Section B1

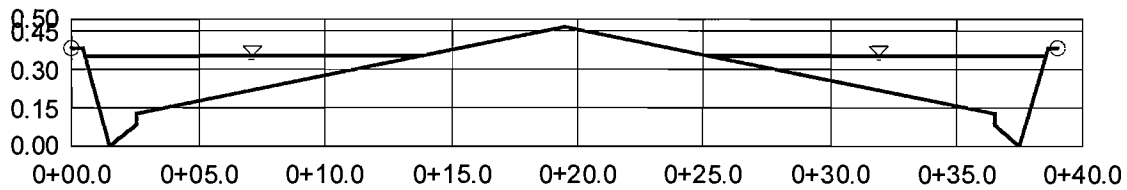
Worksheet for Irregular Channel

Notes: Q = Subbasin B

Street Section B1 **Cross Section for Irregular Channel**

Project Description	
Worksheet	Section B1 - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	4.56 %
Water Surface Elevation	0.35 ft
Elevation Range	0.00 to 0.47
Discharge	18.00 cfs



V:10.0
H:1
NTS

Street Section B2

Worksheet for Irregular Channel

Project Description	
Worksheet	Section B2 - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	2.56 %
Discharge	18.00 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	0.39 ft
Elevation Range	0.00 to 0.47
Flow Area	4.4 ft ²
Wetted Perimeter	30.92 ft
Top Width	30.67 ft
Actual Depth	0.39 ft
Critical Elevation	0.47 ft
Critical Slope	0.66 %
Velocity	4.07 ft/s
Velocity Head	0.26 ft
Specific Energy	0.64 ft
Froude Number	1.89
Flow Type	Supercritical

Calculation Messages:
 Water elevation exceeds lowest end station by 0.67152718e-2 ft.
 Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+39.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.08
0+02.5	0.13
0+19.5	0.47
0+36.5	0.13
0+36.5	0.08
0+37.5	0.00
0+38.6	0.38

Street Section B2
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.0	0.38

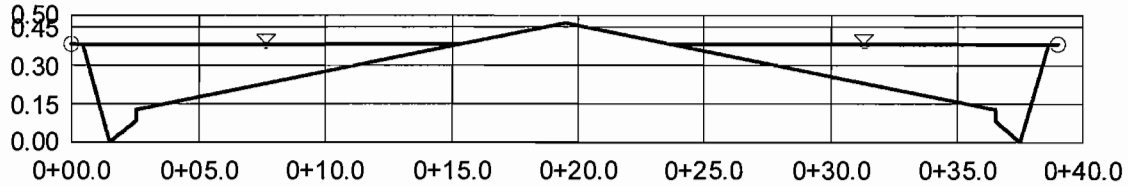
Notes: Q = Subbasin B

Street Section B2

Cross Section for Irregular Channel

Project Description	
Worksheet	Section B2 - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	2.56 %
Water Surface Elevation	0.39 ft
Elevation Range	0.00 to 0.47
Discharge	18.00 cfs



V:10.0
H:1
NTS

Street Section C1

Worksheet for Irregular Channel

Project Description	
Worksheet	Section C1 - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	5.04 %
Discharge	37.00 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	0.43 ft
Elevation Range	0.00 to 0.47
Flow Area	5.9 ft ²
Wetted Perimeter	35.43 ft
Top Width	35.08 ft
Actual Depth	0.43 ft
Critical Elevation	0.59 ft
Critical Slope	0.57 %
Velocity	6.30 ft/s
Velocity Head	0.62 ft
Specific Energy	1.05 ft
Froude Number	2.71
Flow Type	Supercritical

Calculation Messages:
 Water elevation exceeds lowest end station by 0.05084230 ft.
 Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+39.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.08
0+02.5	0.13
0+19.5	0.47
0+36.5	0.13
0+36.5	0.08
0+37.5	0.00
0+38.6	0.38

Street Section C1
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.0	0.38

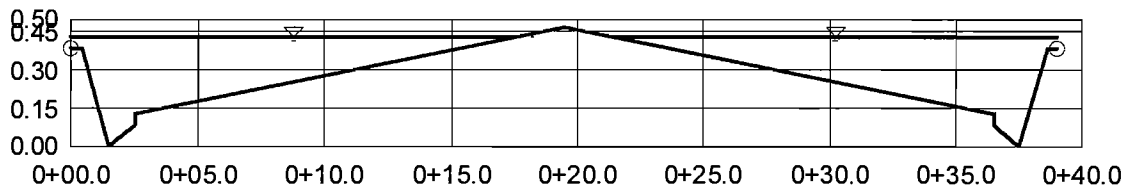
Notes: Q = Subbasins B + C

Street Section C1

Cross Section for Irregular Channel

Project Description	
Worksheet	Section C1 - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	5.04 %
Water Surface Elevation	0.43 ft
Elevation Range	0.00 to 0.47
Discharge	37.00 cfs



V:10.0
H:1
NTS

Street Section C2

Worksheet for Irregular Channel

Project Description	
Worksheet	Section C2 - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	2.83 %
Discharge	19.00 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	0.39 ft
Elevation Range	0.00 to 0.47
Flow Area	4.4 ft ²
Wetted Perimeter	30.97 ft
Top Width	30.71 ft
Actual Depth	0.39 ft
Critical Elevation	0.48 ft
Critical Slope	0.65 %
Velocity	4.28 ft/s
Velocity Head	0.28 ft
Specific Energy	0.67 ft
Froude Number	1.98
Flow Type	Supercritical

Calculation Messages:
 Water elevation exceeds lowest end station by 0.71362988e-2 ft.
 Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+39.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.08
0+02.5	0.13
0+19.5	0.47
0+36.5	0.13
0+36.5	0.08
0+37.5	0.00
0+38.6	0.38

Street Section C2
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+39.0	0.38

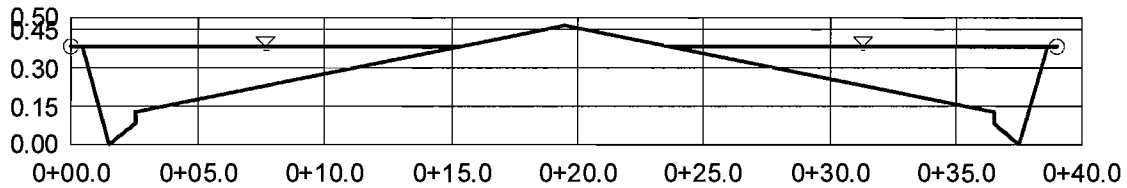
Notes: Q = Subbasin C

Street Section C2

Cross Section for Irregular Channel

Project Description	
Worksheet	Section C2 - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	2.83 %
Water Surface Elevation	0.39 ft
Elevation Range	0.00 to 0.47
Discharge	19.00 cfs



V:10.0
H:1
NTS

Street Section D

Worksheet for Irregular Channel

Project Description	
Worksheet	Section D - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	3.44 %
Discharge	18.00 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	0.37 ft
Elevation Range	0.00 to 0.47
Flow Area	3.9 ft ²
Wetted Perimeter	28.27 ft
Top Width	28.04 ft
Actual Depth	0.37 ft
Critical Elevation	0.47 ft
Critical Slope	0.66 %
Velocity	4.61 ft/s
Velocity Head	0.33 ft
Specific Energy	0.70 ft
Froude Number	2.17
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+39.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.08
0+02.5	0.13
0+19.5	0.47
0+36.5	0.13
0+36.5	0.08
0+37.5	0.00
0+38.6	0.38
0+39.0	0.38

Street Section D

Worksheet for Irregular Channel

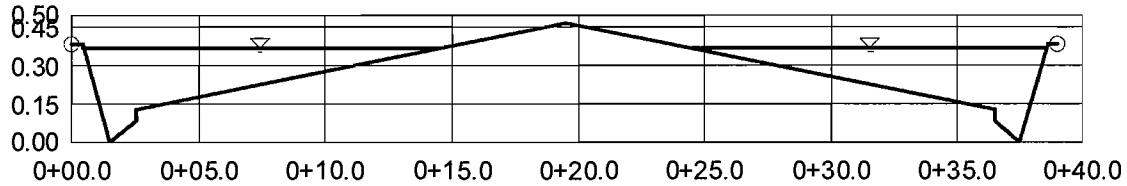
Notes: $Q = \text{Subbasin D} + \text{Bypass Subbasin A}$

Street Section D

Cross Section for Irregular Channel

Project Description	
Worksheet	Section D - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	3.44 %
Water Surface Elevation	0.37 ft
Elevation Range	0.00 to 0.47
Discharge	18.00 cfs



V:10.0
H:1
NTS

Typical Onsite Street - Curb Capacity Rating Table **Rating Table for Irregular Channel**

Project Description	
Worksheet	Curb Capacity - Onsite Full Street Section
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Water Surface Elevation	0.38 ft

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

Attribute	Minimum	Maximum	Increment
Channel Slope (%)	1.00	8.00	0.50

Channel Slope (%)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
1.00	10.75	2.54	4.2	29.44	29.20
1.50	13.16	3.12	4.2	29.44	29.20
2.00	15.20	3.60	4.2	29.44	29.20
2.50	16.99	4.02	4.2	29.44	29.20
3.00	18.61	4.41	4.2	29.44	29.20
3.50	20.11	4.76	4.2	29.44	29.20
4.00	21.49	5.09	4.2	29.44	29.20
4.50	22.80	5.40	4.2	29.44	29.20
5.00	24.03	5.69	4.2	29.44	29.20
5.50	25.20	5.97	4.2	29.44	29.20
6.00	26.33	6.23	4.2	29.44	29.20
6.50	27.40	6.49	4.2	29.44	29.20
7.00	28.43	6.73	4.2	29.44	29.20
7.50	29.43	6.97	4.2	29.44	29.20
8.00	30.40	7.20	4.2	29.44	29.20

Offsite Interim Ditch Flow

Offsite Interim Ditch

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Trapezoidal Channel - 1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.025
Channel Slope	0.50 %
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V
Bottom Width	10.00 ft
Discharge	22.00 cfs

Results	
Depth	0.65 ft
Flow Area	7.8 ft²
Wetted Perimeter	14.12 ft
Top Width	13.91 ft
Critical Depth	0.50 ft
Critical Slope	1.21 %
Velocity	2.83 ft/s
Velocity Head	0.12 ft
Specific Energy	0.78 ft
Froude Number	0.67
Flow Type	Subcritical

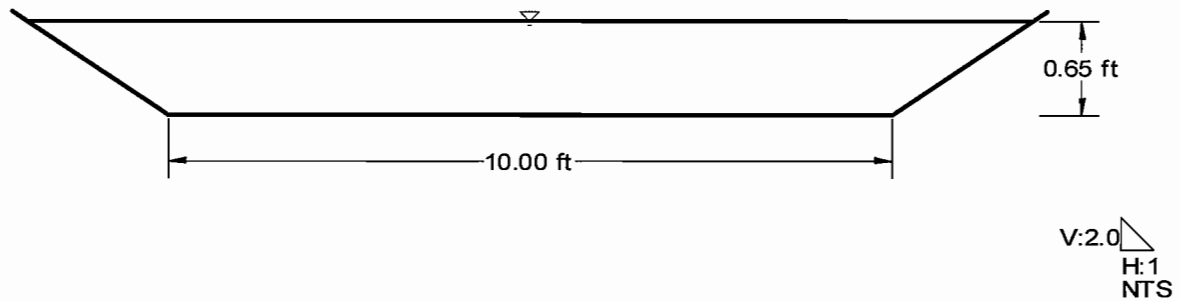
Notes: Q = E.OFF1-1

Offsite Interim Ditch

Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Trapezoidal Channel - 1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.025
Channel Slope	0.50 %
Depth	0.65 ft
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V
Bottom Width	10.00 ft
Discharge	22.00 cfs



APPENDIX E

Drainage Facility Hydraulic Design

Proposed Drop Inlets

Project:		ESPERANZA
Title:		Type CM2 Drop Inlet (Continuous Grade)
Subtitle:		(2) 7.5-ft Drop Inlets @ Street Section C1
By:		SMJ
Date:		4/4/2012
Input:	Variable:	Input:
Street Flow (cfs)	Q	18.5
Longitudinal Slope (ft/ft)	S _o	0.0504
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	6.30
Street Flow Depth (ft)	D	0.43
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	5.0
Length of Curb Opening (ft)	L _c	7.5
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	2.5
Effective Curb Opening Length (ft)	L _{ce}	3.75
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*L _g -r*L _{ge} ² +sy*L _{ge} ³ ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	6.58
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.28
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	5.11
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	13.4
T - Side Flow Spread (ft)	(D-D _g)/S _x	13.17
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.04
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	5.6
Output (Curb):	Equation:	Output (Curb):
¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.051
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	12.880
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}	51.26
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _t) ^{1.8})*Q _{sx}	1.6
	or Q _{sx} if L _t is less than L _{ce}	
Output (Combination):		Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	7.3

¹ Formula referenced from the CCRFCD Manual

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

¹ Formula referenced from the CCRFCD Manual

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

Project:		ESPERANZA	
Title:		Type CM2 Drop Inlet (LP)	
Subtitle:		(2) 10-ft Drop Inlets @ LP in SE Corner of Site	
By:		SMJ	
Date:		4/4/2012	
Input:		Variable:	Input:
Depth at Inlet (ft)		D	0.67
Grate Width (ft)		W	1.50
Length of Grate (ft)		L _g	10.0
Length of Curb Opening (ft)		L _c	10.0
Height of Curb Opening (ft)		H	0.500
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	13.00
Adjusted Effective Weir Length (ft)		2*(1-CF _g /100)*W+(1-CF _g /100)*L _g	6.50
Grate Open Area (sf)		W*L _g	15.00
Adjusted Grate Open Area (sf)		Grate Open Area * G _c *(1-CF _g /100)	4.50
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}	10.7
		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	12.70
Adjusted Effective Weir Length (ft)		L+1.8(1-CF _c /100)*W	11.41
Curb Open Area (sf)		L*H	5.00
Adjusted Curb Open Area (sf)		Curb Open Area * (1-CF _c /100)	2.50
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}	10.97
		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)	21.7
			Q _{COLLECTED} = 20 cfs

Emergency Overflow

Emergency Overflow Weir Worksheet for Generic Weir

Project Description	
Worksheet	Overflow Weir
Type	Generic Weir
Solve For	Headwater Elevation

Input Data	
Discharge	40.00 cfs
Crest Elevation	3,310.86 ft
Discharge Coefficient	3.00 US
Crest Length	45.00 ft

Results	
Headwater Elevation	3,311.30 ft
Headwater Height Above Crest	0.44 ft
Flow Area	20.0 ft ²
Velocity	2.00 ft/s
Wetted Perimeter	45.89 ft
Top Width	45.00 ft

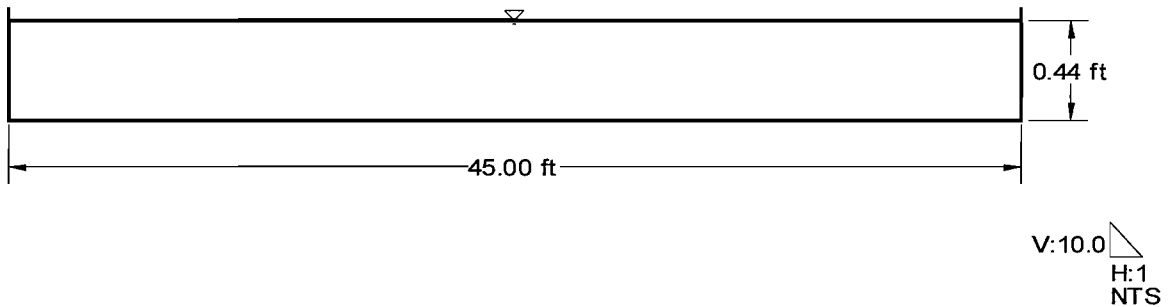
Notes: Proposed FF for Lot 7 = 3312.4-ft
Proposed FF for Lot 8 = 3315.1-ft
Lots 7 & 8 above Emergency Overflow WSE; therefore, OK.

Emergency Overflow Weir

Cross Section for Generic Weir

Project Description	
Worksheet	Overflow Weir
Type	Generic Weir
Solve For	Headwater Elevation

Section Data	
Discharge	40.00 cfs
Headwater Elevation	3,311.30 ft
Crest Elevation	3,310.86 ft
Discharge Coefficient	3.00 US
Crest Length	45.00 ft



Barcelona Ct. Drainage Easement

Barcelona Ct. Drainage Easement - Weir
Worksheet for Generic Weir

Project Description	
Worksheet	Barcelona Court Drainage Easement - Weir
Type	Generic Weir
Solve For	Headwater Elevation

Input Data	
Discharge	9.00 cfs
Crest Elevation	3,334.33 ft
Discharge Coefficient	3.00 US
Crest Length	39.00 ft

Results	
Headwater Elevation	3,334.51 ft
Headwater Height Above Crest	0.18 ft
Flow Area	7.1 ft ²
Velocity	1.28 ft/s
Wetted Perimeter	39.36 ft
Top Width	39.00 ft

→ MIN. ADJ. FF = 18" ABOVE



MIN. FF ELEV. = 3,336.0-FT

Barcelona Ct. Drainage Easement - Weir

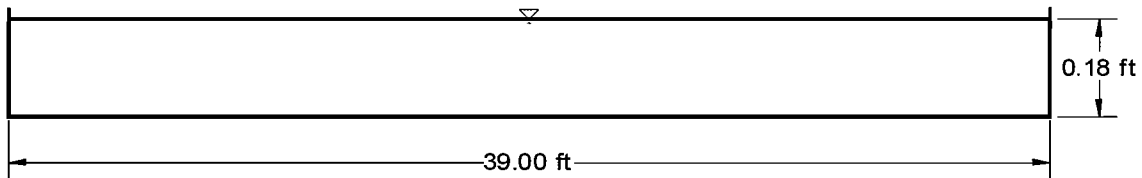
Cross Section for Generic Weir

Project Description

Worksheet	Barcelona Court Drainage Easement - Weir
Type	Generic Weir
Solve For	Headwater Elevation

Section Data

Discharge	9.00 cfs
Headwater Elevation	3,334.51 ft
Crest Elevation	3,334.33 ft
Discharge Coefficient	3.00 US
Crest Length	39.00 ft



V:20.0
H:1
NTS

Onsite Storm Drain WSPG Analysis

	0	1	2	3	4	5	6	7	8	9	Onsite.WSP
T1	ESPERANZA BY LENNAR HOMES - TECHNICAL DRAINAGE STUDY										
T2	SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M										
T3	ONSITE STORM DRAIN EXTENDING FROM EX. 48-INCH LATERAL										
SO	1000.00	198.40	42								
R	1041.70	198.75	42								1
TS	1046.70	198.75	36								
R	1158.65	201.73	36								40.
JX	1158.65	201.73	36	36							45.
R	1198.48	202.77	36								1
JX	1198.48	203.77	24	18							50.
R	1219.24	204.10	24								
SH	1219.24	204.10	24								
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.						
CD	54	4			4.5						
CD	60	4			5.						
CD	66	4			5.5						
CD	72	4			6.						
CD	78	4			6.5						
CD	90	4			7.5						

ONSITE.OUT

DATE: 5/10/2012
TIME: 7:49

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	ZL	ZR	INV	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			DROP										
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													
CD	54	4			4.50													
CD	60	4			5.00													
CD	66	4			5.50													
CD	72	4			6.00													
CD	78	4			6.50													
CD	90	4			7.50													

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

ESPERANZA BY LENNAR HOMES - TECHNICAL DRAINAGE STUDY

HEADING LINE NO 2 IS -

SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M

HEADING LINE NO 3 IS -

ONSITE STORM DRAIN EXTENDING FROM EX. 48-INCH LATERAL
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	INVERT SECT	W S ELEV
		1000.00	198.40	42	205.93
ELEMENT NO	2 IS A REACH U/S DATA	STATION	INVERT SECT	INVERT SECT	RADIUS
		1041.70	198.75	42	0.00
ELEMENT NO	3 IS A TRANSITION U/S DATA	STATION	INVERT SECT	INVERT SECT	ANGLE
		1046.70	198.75	36	0.00
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	INVERT SECT	ANGLE
		1158.65	201.73	36	0.00
					MAN H
					1

Page 1

ELEMENT NO 5 IS A JUNCTION
U/S DATA
STATION 1158.65
INVERT 201.73
SECT 36
LAT-1 36
LAT-2 0
Q3 0.013
N 20.0
Q4 0.0
INVERT-3 201.73
INVERT-4 0.00
PHI 3 45.00
PHI 4 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 6 IS A REACH
U/S DATA
STATION 1198.48
INVERT 202.77
SECT 36
N 0.013

ELEMENT NO 7 IS A JUNCTION
U/S DATA
STATION 1198.48
INVERT 203.77
SECT 24
LAT-1 18
LAT-2 0
Q3 0.013
N 14.0
Q4 0.0
INVERT-3 204.27
INVERT-4 0.00
PHI 3 50.00
PHI 4 0.00

ELEMENT NO 8 IS A REACH
U/S DATA
STATION 1219.24
INVERT 204.10
SECT 24
N 0.013

ELEMENT NO 9 IS A SYSTEM HEADWORKS
U/S DATA
STATION 1219.24
INVERT 204.10
SECT 24
W S ELEV 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

ON SITE OUT

PAGE 1

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													
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1000.00	198.40	7.530	205.930	54.0	5.61	0.489	206.419	0.00	2.300	3.50	0.00	0.00	0	0.00
41.70	0.00839					.002881	0.12			1.925				
1041.70	198.75	7.325	206.075	54.0	5.61	0.489	206.564	0.00	2.300	3.50	0.00	0.00	0	0.00
TRANS STR	0.00000					.004718	0.02							
1046.70	198.75	7.015	205.765	54.0	7.64	0.906	206.671	0.00	2.387	3.00	0.00	0.00	0	0.00
111.95	0.02662					.006555	0.73			1.492				
1158.65	201.73	4.933	206.663	54.0	7.64	0.906	207.569	0.00	2.387	3.00	0.00	0.00	0	0.00
JUNCT STR	0.00000					.004577	0.00							
1158.65	201.73	5.851	207.581	34.0	4.81	0.359	207.940	0.00	1.894	3.00	0.00	0.00	0	0.00
39.83	0.02611					.002599	0.10			1.156				
1198.48	202.77	4.933	207.703	34.0	4.81	0.359	208.062	0.00	1.894	3.00	0.00	0.00	0	0.00

STARTING HGL FOR GRANADA SD ANALYSIS

[illegible]

ESPERANZA BY LENNAR HOMES - TECHNICAL DRAINAGE STUDY
SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M
ONSITE STORM DRAIN EXTENDING FROM EX. 48-INCH LATERAL

[illegible]

Granada Storm Drain WSPG Analysis

Granada.wsp

[illegible]

±

DATE: 5/10/2012
TIME: 7:51

Granada.OUT

F0515P

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE WIDTH	PIER WIDTH	HEIGHT 1	BASE 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													
CD	54	4				4.50													
CD	60	4				5.00													
CD	66	4				5.50													
CD	72	4				6.00													
CD	78	4				6.50													
CD	90	4				7.50													

F 0 5 1 5 P

PAGE NO 3

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WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

ESPERANZA BY LENNAR HOMES - TECHNICAL DRAINAGE STUDY

HEADING LINE NO 2 IS -

SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M

HEADING LINE NO 3 IS -

GRANADA LATERAL EXTENDING FROM ONSITE 36-INCH STORM DRAIN
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
		1000.00	204.27	18	207.70

ELEMENT NO	2 IS A REACH U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
		1081.53	206.22	18	0.00	0.00	5.00	1

ELEMENT NO	3 IS A REACH U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
		1212.56	215.39	18	0.00	0.00	80.00	1

ELEMENT NO	4 IS A JUNCTION U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
		1212.56	215.39	18	0.00	0.00	80.00	1

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	5 IS A REACH U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
		1235.37	215.85	18	0.00	0.00	0.00	0

Page 1

Granada.OUT

ELEMENT NO 6 IS A SYSTEM HEADWORKS
 U/S DATA STATION INVERT SECT *
 1235.37 215.85 18
 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
 WATER SURFACE PROFILE LISTING
 ESPERANZA BY LENNAR HOMES - TECHNICAL DRAINAGE STUDY
 SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M
 GRANADA LATERAL EXTENDING FROM ONSITE 36-INCH STORM DRAIN

W S ELEV
 0.00

PAGE 1

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							
1000.00	204.27	3.430	207.700	14.0	7.92	0.975	208.675	0.00	1.381	1.50	0.00	0.00	0	0.00
81.53	0.02392					.017763	1.45					1.070		0.00
1081.53	206.22	2.993	209.213	14.0	7.92	0.975	210.188	0.00	1.381	1.50	0.00	0.00	0	0.00
4.42	0.06998					.017763	0.08					0.750		0.00
1085.95	206.53	2.799	209.329	14.0	7.92	0.975	210.304	0.00	1.381	1.50	0.00	0.00	0	0.00
HYDRAULIC JUMP														
1085.95	206.53	0.759	207.289	14.0	15.61	3.783	211.072	0.00	1.381	1.50	0.00	0.00	0	0.00
36.08	0.06998					.066445	2.40					0.750		0.00
1122.03	209.05	0.771	209.825	14.0	15.30	3.635	213.460	0.00	1.381	1.50	0.00	0.00	0	0.00
32.77	0.06998					.060827	1.99					0.750		0.00
1154.80	211.35	0.801	212.149	14.0	14.58	3.302	215.451	0.00	1.381	1.50	0.00	0.00	0	0.00
16.47	0.06998					.053642	0.88					0.750		0.00
1171.27	212.50	0.832	213.333	14.0	13.90	3.001	216.334	0.00	1.381	1.50	0.00	0.00	0	0.00
10.60	0.06998					.047346	0.50					0.750		0.00
1181.87	213.24	0.865	214.107	14.0	13.26	2.729	216.836	0.00	1.381	1.50	0.00	0.00	0	0.00
7.57	0.06998					.041848	0.32					0.750		0.00
1189.44	213.77	0.900	214.672	14.0	12.64	2.479	217.151	0.00	1.381	1.50	0.00	0.00	0	0.00
5.72	0.06998					.037041	0.21					0.750		0.00
1195.16	214.17	0.937	215.110	14.0	12.05	2.254	217.364	0.00	1.381	1.50	0.00	0.00	0	0.00
4.47	0.06998					.032832	0.15					0.750		0.00
1199.63	214.49	0.976	215.461	14.0	11.49	2.052	217.513	0.00	1.381	1.50	0.00	0.00	0	0.00
3.54	0.06998					.029158	0.10					0.750		0.00

WATER SURFACE PROFILE LISTING
 ESPERANZA BY LENNAR HOMES - TECHNICAL DRAINAGE STUDY
 SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M
 GRANADA LATERAL EXTENDING FROM ONSITE 36-INCH STORM DRAIN

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		
1203.17	214.73	1.018	215.751	14.0	10.95	1.863	217.614	0.00	1.381	1.50	0.00	0.00	0	0.00
2.82	0.06998					.025961	0.07		0.750			0.00		
1205.99	214.93	1.063	215.993	14.0	10.45	1.695	217.688	0.00	1.381	1.50	0.00	0.00	0	0.00
2.25	0.06998					.023188	0.05		0.750			0.00		
1208.24	215.09	1.112	216.200	14.0	9.96	1.540	217.740	0.00	1.381	1.50	0.00	0.00	0	0.00
1.75	0.06998					.020803	0.04		0.750			0.00		
1209.99	215.21	1.166	216.376	14.0	9.50	1.401	217.777	0.00	1.381	1.50	0.00	0.00	0	0.00
1.31	0.06998					.018778	0.02		0.750			0.00		
1211.30	215.30	1.226	216.528	14.0	9.06	1.273	217.801	0.00	1.381	1.50	0.00	0.00	0	0.00
0.90	0.06998					.017104	0.02		0.750			0.00		
1212.20	215.37	1.294	216.659	14.0	8.63	1.157	217.816	0.00	1.381	1.50	0.00	0.00	0	0.00
0.36	0.06998					.015886	0.01		0.750			0.00		
1212.56	215.39	1.381	216.771	14.0	8.23	1.051	217.822	0.00	1.381	1.50	0.00	0.00	0	0.00
JUNCT STR	0.00000					.009928	0.00					0.00		
1212.56	215.39	2.947	218.337	7.0	3.96	0.244	218.581	0.00	1.024	1.50	0.00	0.00	0	0.00
22.81	0.02017					.004441	0.10		0.720			0.00		
1235.37	215.85	2.588	218.438	7.0	3.96	0.244	218.682	0.00	1.024	1.50	0.00	0.00	0	0.00?

ESPERANZA BY LENNAR HOMES - TECHNICAL DRAINAGE STUDY
 SUMMERLIN VILLAGE 23A UNIT 2 - PARCEL M
 GRANADA LATERAL EXTENDING FROM ONSITE 36-INCH STORM DRAIN

1000.00	.I	CH	.	W	E	.	.	.	.	.	.	.	.	R
1004.80	.													
1009.61	.													
1014.41	.													
1019.21	.													
1024.02	.													
1028.82	.													
1033.62	.													
1038.43	.													

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

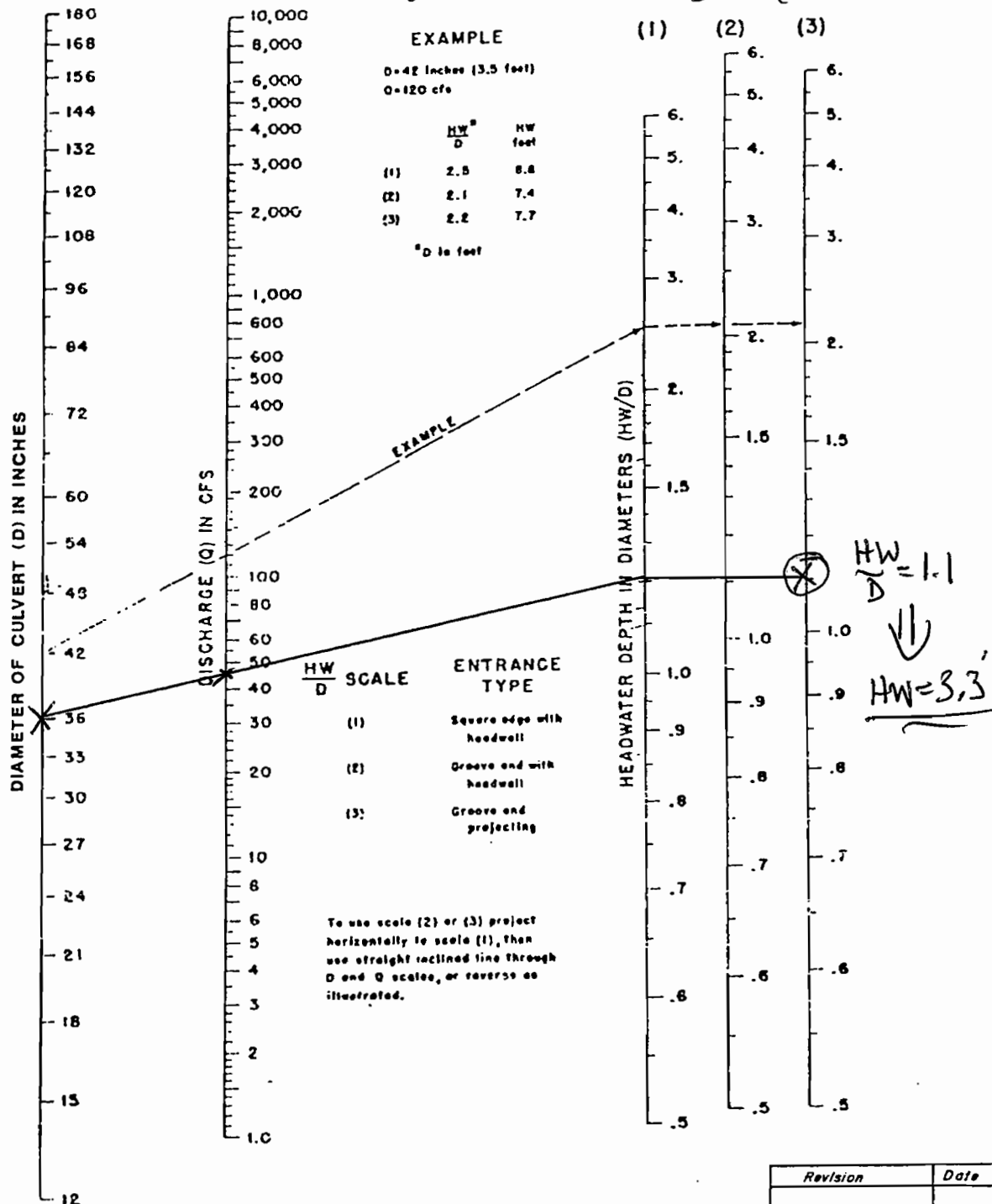
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY?

Offsite Parcel N Storm Drain Inlet Control Nomograph

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

Ex. 36" RCP (PARCEL N) = 45 cfs (E.OFF 1)



Revision	Date

WRC
ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Desert Moon Storm Drain WSPG Analysis

APPENDIX F

Finished Floor Elevation Analysis

ESPERANZA PHASES 1 & 2 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	Phase?
1	D	3319.34	3318.96	0.37	3319.70	3319.84	3321.2	OK	OK	1
2	D	3318.58	3318.20	0.37	3318.94	3319.08	3320.4	OK	OK	1
3	D	3316.75	3316.37	0.37	3317.11	3317.25	3318.6	OK	OK	1
4	D	3314.62	3314.24	0.37	3314.98	3315.12	3316.5	OK	OK	1
5	D	3312.66	3312.28	0.37	3313.02	3313.16	3314.5	OK	OK	1
6	D	3311.35	3310.97	0.37	3311.71	3311.85	3313.2	OK	OK	1
7	D	3310.93	3310.55	0.37	3311.29	3311.43	3312.8	OK	OK	1
8	C1	3311.55	3311.17	0.43	3312.03	3312.05	3313.4	OK	OK	1
9	C1	3315.25	3314.87	0.43	3315.73	3315.75	3317.1	OK	OK	1
10	C1	3319.65	3319.27	0.43	3320.13	3320.15	3321.5	OK	OK	1
11	C1	3322.88	3322.50	0.43	3323.36	3323.38	3324.7	OK	OK	1
12	C1	3325.64	3325.26	0.43	3326.12	3326.14	3327.5	OK	OK	1
13	B1	3328.17	3327.79	0.35	3328.49	3328.67	3330.0	OK	OK	1
14	B1	3330.73	3330.35	0.35	3331.05	3331.23	3332.6	OK	OK	1
15	B1	3334.91	3334.53	0.35	3335.23	3335.41	3336.7	OK	OK	2
16	B1	3337.68	3337.30	0.35	3338.00	3338.18	3339.5	OK	OK	2
17	B1	3339.01	3338.63	0.35	3339.33	3339.51	3340.9	OK	OK	2
18	B1	3339.85	3339.47	0.35	3340.17	3340.35	3341.7	OK	OK	2
19	B2	3340.92	3340.54	0.39	3341.32	3341.42	3342.8	OK	OK	2
20	B2	3342.43	3342.05	0.39	3342.83	3342.93	3344.3	OK	OK	2
21	B2	3343.87	3343.49	0.39	3344.27	3344.37	3345.7	OK	OK	2
22	B2	3345.46	3345.08	0.39	3345.86	3345.96	3347.3	OK	OK	2
23	B2	3346.91	3346.53	0.39	3347.31	3347.41	3348.8	OK	OK	2
24	B2	3348.37	3347.99	0.39	3348.77	3348.87	3350.2	OK	OK	2
25	B2	3349.83	3349.45	0.39	3350.23	3350.33	3351.7	OK	OK	2
26	B2	3351.50	3351.12	0.39	3351.90	3352.00	3353.3	OK	OK	2
27	B2	3353.31	3352.93	0.39	3353.71	3353.81	3355.2	OK	OK	2
28	B2	3354.98	3354.60	0.39	3355.38	3355.48	3356.8	OK	OK	2
29	B2	3356.24	3355.86	0.39	3356.64	3356.74	3358.1	OK	OK	2
30	B2	3356.82	3356.44	0.39	3357.22	3357.32	3358.6	OK	OK	2
31	A	3356.82	3356.44	0.43	3357.30	3357.32	3358.7	OK	OK	2
32	A	3356.68	3356.30	0.43	3357.16	3357.18	3358.5	OK	OK	2
33	A	3355.75	3355.37	0.43	3356.23	3356.25	3357.6	OK	OK	2
34	A	3353.22	3352.84	0.43	3353.70	3353.72	3355.1	OK	OK	2
35	A	3350.40	3350.02	0.43	3350.88	3350.90	3352.2	OK	OK	1
36	A	3347.33	3346.95	0.43	3347.81	3347.83	3349.2	OK	OK	1
37	A	3344.51	3344.13	0.43	3344.99	3345.01	3346.3	OK	OK	1
38	A	3340.23	3339.85	0.43	3340.71	3340.73	3342.1	OK	OK	1
39	A	3337.24	3336.86	0.43	3337.72	3337.74	3339.1	OK	OK	1
40	A	3334.49	3334.11	0.43	3334.97	3334.99	3336.3	OK	OK	1
41	A	3331.52	3331.14	0.43	3332.00	3332.02	3333.4	OK	OK	1
42	A	3328.79	3328.41	0.43	3329.27	3329.29	3330.6	OK	OK	1
43	A	3327.02	3326.64	0.43	3327.50	3327.52	3328.9	OK	OK	1
44	A	3326.11	3325.73	0.43	3326.59	3326.61	3328.0	OK	OK	1
45	A	3324.60	3324.22	0.43	3325.08	3325.10	3326.4	OK	OK	1
46	A	3323.30	3322.92	0.43	3323.78	3323.80	3325.1	OK	OK	1
47	A	3322.27	3321.89	0.43	3322.75	3322.77	3324.1	OK	OK	1
48	A	3321.61	3321.23	0.43	3322.09	3322.11	3323.4	OK	OK	1
49	A	3321.00	3320.62	0.43	3321.48	3321.50	3322.8	OK	OK	1
50	A	3325.48	3325.10	0.43	3325.96	3325.98	3326.7	OK	OK	1
51	A	3323.74	3323.36	0.43	3324.22	3324.24	3325.6	OK	OK	1
52	A	3322.66	3322.28	0.43	3323.14	3323.16	3324.5	OK	OK	1
53	A	3321.76	3321.38	0.43	3322.24	3322.26	3323.6	OK	OK	1
54	A	3321.12	3320.74	0.43	3321.60	3321.62	3323.0	OK	OK	1
55	D	3319.52	3319.14	0.37	3319.88	3320.02	3321.4	OK	OK	1
56	D	3318.89	3318.51	0.37	3319.25	3319.39	3320.7	OK	OK	1
57	D	3317.67	3317.29	0.37	3318.03	3318.17	3319.5	OK	OK	1
58	D	3315.85	3315.47	0.37	3316.21	3316.35	3317.7	OK	OK	1
59	D	3313.90	3313.52	0.37	3314.26	3314.40	3315.7	OK	OK	1
60	D	3311.94	3311.56	0.37	3312.30	3312.44	3313.8	OK	OK	1
61	C2	3326.39	3326.01	0.39	3326.79	3326.89	3328.2	OK	OK	1
62	C2	3328.14	3327.76	0.39	3328.54	3328.64	3330.0	OK	OK	1
63	C2	3329.47	3329.09	0.39	3329.87	3329.97	3331.3	OK	OK	1

ESPERANZA - PHASES 1 & 2 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	Phase?
64	C2	3330.56	3330.18	0.39	3330.96	3331.06	3332.4	OK	OK	1
65	C2	3331.65	3331.27	0.39	3332.05	3332.15	3333.3	OK	OK	1
66	C2	3332.60	3332.22	0.39	3333.00	3333.10	3334.5	OK	OK	1
67	C2	3335.09	3334.71	0.39	3335.49	3335.59	3336.9	OK	OK	1
68	C2	3336.20	3335.82	0.39	3336.60	3336.70	3338.0	OK	OK	1
69	C2	3337.35	3336.97	0.39	3337.75	3337.85	3339.2	OK	OK	1
70	C2	3338.42	3338.04	0.39	3338.82	3338.92	3340.3	OK	OK	1
71	C2	3339.37	3338.99	0.39	3339.77	3339.87	3341.2	OK	OK	1
72	C2	3339.95	3339.57	0.39	3340.35	3340.45	3341.7	OK	OK	1
73	C2	3341.61	3341.23	0.39	3342.01	3342.11	3342.2	OK	OK	1
74	C2	3339.09	3338.71	0.39	3339.49	3339.59	3340.9	OK	OK	1
75	C2	3337.87	3337.49	0.39	3338.27	3338.37	3339.7	OK	OK	1
76	C2	3336.74	3336.36	0.39	3337.14	3337.24	3338.6	OK	OK	1
77	C2	3335.62	3335.24	0.39	3336.02	3336.12	3337.5	OK	OK	1
78	C2	3334.62	3334.24	0.39	3335.02	3335.12	3336.3	OK	OK	1
79	C2	3332.91	3332.53	0.39	3333.31	3333.41	3334.9	OK	OK	1
80	C2	3332.31	3331.93	0.39	3332.71	3332.81	3333.9	OK	OK	1
81	C2	3331.12	3330.74	0.39	3331.52	3331.62	3333.0	OK	OK	1
82	C2	3330.01	3329.63	0.39	3330.41	3330.51	3331.8	OK	OK	1
83	C2	3328.91	3328.53	0.39	3329.31	3329.41	3330.7	OK	OK	1
84	C2	3327.27	3326.89	0.39	3327.67	3327.77	3329.1	OK	OK	1
85	B2	3341.43	3341.05	0.39	3341.83	3341.93	3343.3	OK	OK	1
86	B2	3342.92	3342.54	0.39	3343.32	3343.42	3344.8	OK	OK	2
87	B2	3344.38	3344.00	0.39	3344.78	3344.88	3346.2	OK	OK	2
88	B2	3345.97	3345.59	0.39	3346.37	3346.47	3347.8	OK	OK	2
89	B2	3347.43	3347.05	0.39	3347.83	3347.93	3349.3	OK	OK	2
90	B2	3349.01	3348.63	0.39	3349.41	3349.51	3350.8	OK	OK	2
91	B2	3350.55	3350.17	0.39	3350.95	3351.05	3352.4	OK	OK	2
92	B2	3352.20	3351.82	0.39	3352.60	3352.70	3354.0	OK	OK	2
93	B2	3353.98	3353.60	0.39	3354.38	3354.48	3355.8	OK	OK	2
94	B2	3355.63	3355.25	0.39	3356.03	3356.13	3357.5	OK	OK	2
95	B2	3356.54	3356.16	0.39	3356.94	3357.04	3358.2	OK	OK	2
Where:										
1: Top of Curb at High Side of Lot										
2: TC-0.38 (For Roll 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										
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

*Update #2 to the Technical Drainage Study for Summerlin Village 23A Unit 2
Improvements*

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: June 27, 2011	
TO: Land Development Services Department of Public Works				FROM: Albert Sung, P.E. <i>ask</i> Flood Control Project Engineer Department of Public Works	
SUBJECT: Technical Drainage Study for; Summerlin Village 23A - Unit 2 Improvements - Update #2				COPIES TO: G.C. Wallace	
Cross Streets: Desert Foothills Drive & Alta Drive				Howard Hughes Corp.	
FILE NO.: F:\Depot\DSMEMOS\DS3402D.doc				Bart Anderson, P.E., DEVCO	
Parcel Number: 137-22-000-010				CCRFC	
Zoning Action:					
FEMA Flood Zone:		YES	No	X	
Proposed Storm Drain:		YES	X	No	
HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID
1 st Submittal	8/8/2003	8/26/2003	Conditional Approval	\$250.00	109118: \$250
CCRFC	10/9/2003	10/23/2003	Concurrence	N/C	N/C
2 nd Submittal	1/13/2011	1/18/2011	Approved	\$100.00	160693: \$100
3 rd Submittal	6/16/2011	6/27/2011	See Comments Below	\$100.00	171098: \$100
TOTAL FEES (LDDRS):				\$450.00	

REMARKS:

Update #2: Sub-divide parcels N and M into O, N, and M. Minor revision to storm drain systems on Fox Hill Drive.

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

- Please note that HDPE storm drain pipes are not allowed in the public Right-of-Way.

In an effort to increase administrative efficiency, the City of Las Vegas Public Works will be requiring all soils report, drainage study 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 requirements will become effective on July 1, 2011. If there are any questions regarding these new requirements, please contact Rob Rick Schroder in Traffic Engineering at (702) 229-6311 or (702) 229-2177 or

NOTE: Please be advised that all land surface area and water way must submit to the Nevada Division

Post-it® Fax Note 7671		Date 6/27/11	# of pages 2
To Delta Yarnadika	From oh sang kwan		
Co./Dept. G.C. Wallace	Co. CW - Flood		
Phone # 804-2000	Phone # 229-1815		
Fax # 804-2299	Fax #		

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.

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/osk

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

Developed Condition HEC-1 Analysis

**UPDATE #2 TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 2 IMPROVEMENTS**

62023-112

JUNE 2011

Prepared For:

**Howard Hughes Properties, Inc.
A Nevada Corporation
10000 West Charleston Boulevard, Suite 200
Las Vegas, Nevada 89135
Tel: (702) 791-4000
Fax: (702) 791-4453**



C. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

Summerlin V23A Unit 2 Improvements					
Basin	Soil	Percent	Land Use	CN	WCN
O	155	85.6%	Residential (7,000 sq ft lot)	89.9	89.4
	502	14.4%		86.4	
N	155	93.3%	Residential (8,000 sq ft lot)	88.8	88.5
	502	6.7%		84.8	
M	155	46.2%	Residential (8,000 sq ft lot)	88.8	86.6
	502	53.8%		84.8	

ESPERANZA = PARCEL M

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1*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 13JUN11 TIME 12:56:46 *
*
*****

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

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

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HECIGS, 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 HAS 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

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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 * : UPDATE #2 TO THE TDS-REVISED TO REFLECT M, N, O REVISION : *
7 ID * :
8 ID * : RETURN PERIOD 10 & 100-YEAR : *
9 ID * : DISTRIBUTION 6-HOUR SDN3 : *
10 ID * : PROJECT NO 62023.112 : *
11 ID * : FILENAME 112-ULT.H1 : *
12 ID * : DATE 6/13/2011 : *
13 ID * : MODELED BY DY : *
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 .9106 .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

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1 HEC-1 INPUT PAGE 2

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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
*

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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 Flag 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 Flag 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 11.3 AC
95 KM Flag 10.65 MIN
96 KM CN 88.0
97 BA .0177
98 LS 0 88.0
99 UD .1065
*

100 KK WS-1
101 KM
102 KM COMMERCIAL SITE
103 KM
104 KM AREA 4.83 AC
105 KM Flag 8.11 MIN
106 KM CN 93.0
107 BA 0.0075
108 LS 0 93.0
109 UD .0811
*

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

113 KK NP-1
114 KM
115 KM PARK (GRASS-FAIR CONDITIONS)
116 KM
117 KM AREA 13.5 AC
118 KM Flag 14.35 MIN
119 KM CN 74.0
120 BA .0210
121 LS 0 74
122 UD .1435
*

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 10.55 MIN
151 KM CN 85
152 BA 0.0319
153 LS 0 85
154 UD .1055
*

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
*

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HEC-1 INPUT

PAGE 5

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
* START UNIT 2 UPDATE 2 REVISIONS

190 KK O
191 KM FUTURE PARCEL O DUE TO PARCEL SUBDIVISION
192 KM SINGLE FAMILY
193 KM
194 KM AREA 21.08 AC
195 KM Tlag 10.8 MIN
196 KM CN 89.4
197 BA .0329
198 LS 0 89.4
199 UD .108
*

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

203 KK N

```

204 KM FUTURE PARCEL N DUE TO PARCEL SUBDIVISION
 205 KM SINGLE FAMILY
 206 KM
 207 KM AREA 16.47 AC
 208 KM Tlag 11.1 MIN
 209 KM CN 88.5
 210 BA .0257
 211 LS 0 88.5
 212 UD .111
 *

HEC-1 INPUT

PAGE 6

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

213 KK M
 214 KM FUTURE PARCEL M DUE TO PARCEL SUBDIVISION
 215 KM SINGLE FAMILY
 216 KM
 217 KM AREA 22.71 AC
 218 KM Tlag 11.6 MIN
 219 KM CN 86.6
 220 BA .0355
 221 LS 0 86.6
 222 UD .116
 *

→ ESPERANZA

223 KK C-10
 224 KM COMBINE O, N, AND M
 225 HC 3
 * END UNIT 2 UPDATE 2 REVISIONS

226 KK RC-10
 227 KM ROUTE DOWNSTREAM OF M THROUGH SPINE ROAD
 228 RD 750 0.035 0.013 CIRC 5.0
 *

229 KK ST10
 230 KM
 231 KM SPINE ROAD
 232 KM
 233 KM AREA 7.0 AC
 234 KM Tlag 10.09 MIN
 235 KM CN 93
 236 BA .0109
 237 LS 0 93
 238 UD .1009
 *

239 KK C-11
 240 KM COMBINE C-11 AND SPINE ROAD
 241 HC 2
 *

242 KK RC-11
 243 KM ROUTE DOWNSTREAM OF WS-2 THROUGH LOOP ROAD "A"
 244 RD 900 0.021 0.013 CIRC 2.5
 *

245 KK ST18
 246 KM
 247 KM LOOP ROAD "A"
 248 KM
 249 KM AREA 2.2 AC
 250 KM Tlag 8.43 MIN
 251 KM CN 95
 252 BA 0.0035
 253 LS 0 95
 254 UD .0843
 *

HEC-1 INPUT

PAGE 7

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

255 KK C-13
 256 KM COMBINE C-10 AND C-11
 257 HC 2
 *

258 KK E
 259 KM
 260 KM SINGLE FAMILY: DENSITY = 6.3 UNITS/ACRE
 261 KM
 262 KM AREA 23.4 AC
 263 KM Tlag 13.20 MIN
 264 KM CN 88
 265 BA .0366
 266 LS 0 88
 267 UD .1320
 *

268 KK C-14
 269 KM COMBINE C-13 AND E
 270 HC 2
 *

271 KK RC-14
 272 KM ROUTE DOWNSTREAM OF E THROUGH SPINE ROAD
 273 RD 1200 0.025 0.013 CIRC 4.0
 *

274 KK F
 275 KM
 276 KM SINGLE FAMILY: DENSITY = 6.3 UNITS/ACRE

277 KM
 278 KM AREA 20.5 AC
 279 KM Tlag 10.90 MIN
 280 KM CN 88
 281 BA .0320
 282 LS 0 88
 283 UD .1090
 *
 284 KK C-15
 285 KM COMBINE C-14 AND F
 286 HC 2
 *
 287 KK RC-15
 288 KM ROUTE DOWNSTREAM OF F THROUGH SPINE ROAD
 289 RD 800 0.025 0.013 CIRC 4.5
 *

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HEC-1 INPUT

PAGE 8

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

290 KK COS-3
 291 KM
 292 KM OPEN SPACE AREA (DESERT LANDSCAPING)
 293 KM
 294 KM AREA 2.3 AC
 295 KM Tlag 8.14 MIN
 296 KM CN 81
 297 BA .0036
 298 LS 0 81
 299 UD .0814
 *
 300 KK C-15A
 301 KM COMBINE C-15 AND COS-3
 302 HC 2
 *
 303 KK G
 304 KM
 305 KM SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
 306 KM
 307 KM AREA 18.3 AC
 308 KM Tlag 14.29 MIN
 309 KM CN 86
 310 BA 0.0286
 311 LS 0 86
 312 UD .1429
 *
 313 KK C-16
 314 KM COMBINE C-15 AND G
 315 HC 2
 *
 316 KK RC-16
 317 KM ROUTE DOWNSTREAM OF F THROUGH SPINE ROAD
 318 RD 650 0.025 0.013 CIRC 5.5
 *

319 KK H
 320 KM
 321 KM SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
 322 KM
 323 KM AREA 19.7 AC
 324 KM Tlag 12.43 MIN
 325 KM CN 86
 326 BA .0308
 327 LS 0 86
 328 UD .1243
 *

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HEC-1 INPUT

PAGE 9

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

329 KK ST11
 330 KM
 331 KM SPINE ROAD (SOUTH)
 332 KM
 333 KM AREA 10.2 AC
 334 KM Tlag 13.78 MIN
 335 KM CN 95
 336 BA .0160
 337 LS 0 95
 338 UD .1378
 *
 339 KK C-17
 340 KM COMBINE H, C-16 AND SPINE ROAD
 341 HC 3
 *
 342 KK C-9A
 343 KM COMBINE C-17 AND C-9
 344 HC 2
 *
 345 KK RC-9A
 346 KM ROUTE DOWNSTREAM OF H THROUGH DESERT FOOTHILLS DRIVE
 347 RD 1000 0.029 0.013 CIRC 7.5
 *

```

346 KK ST2
349 KM
350 KM STREET "CDS"
351 KM
352 KM AREA 1.3 AC
353 KM Tlag 4.32 MIN
354 KM CN 93
355 BA .0021
356 LS 0 93
357 UD .0423
*

358 KK RST2
359 KM ROUTE DOWNSTREAM OF STREET "A" THROUGH B
360 RD 1200 0.025 0.013 CIRC 2.0
*

361 KK B
362 KM
363 KM MULTI-FAMILY: DENSITY = 18.3 UNITS/ACRE
364 KM
365 KM AREA 15.4 AC
366 KM Tlag 10.81 MIN
367 KM CN 90
368 BA .0241
369 LS 0 90
370 UD .1081
*

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HEC-1 INPUT

PAGE 10

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

```

371 KK C-18
372 KM COMBINE C-9A, ST2 AND B
373 HC 3
*

374 KK RC-18
375 KM ROUTE DOWNSTREAM OF B THROUGH DESERT FOOTHILLS DRIVE
376 RD 1000 0.029 0.013 CIRC 7.5
*

377 KK A
378 KM
379 KM MULTI-FAMILY: DENSITY = 18.3 UNITS/ACRE
380 KM
381 KM AREA 16.1 AC
382 KM Tlag 10.14 MIN
383 KM CN 90
384 BA .0252
385 LS 0 90
386 UD .1014
*

387 KK C-19
388 KM COMBINE C-18 AND A
389 HC 2
*

390 KK ST3
391 KM
392 KM DESERT FOOTHILLS DRIVE (SOUTH)
393 KM
394 KM AREA 17.0 AC
395 KM Tlag 17.14 MIN
396 KM CN 95
397 BA .0265
398 LS 0 95
399 UD .1714
*

400 KK C-20
401 KM COMBINE C-19 AND A
402 HC 2
*

403 KK ST7B
404 KM
405 KM COLLECTOR ROAD (SOUTH)
406 KM
407 KM AREA 6.5 AC
408 KM Tlag 7.94 MIN
409 KM CN 95
410 BA .0102
411 LS 0 95
412 UD .0794
*

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HEC-1 INPUT

PAGE 11

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

```

413 KK D
414 KM
415 KM SINGLE FAMILY: DENSITY = 5.1 UNITS/ACRE
416 KM
417 KM AREA 25.5 AC
418 KM Tlag 11.46 MIN
419 KM CN 86
420 BA .0398
421 LS 0 86
422 UD .1146
*

```

423 KK C-21
 424 KM COMBINE COLLECTOR ROAD AND D
 425 HC 2
 *
 426 KK RC-21
 427 KM ROUTE DOWNSTREAM OF D THROUGH CHARLESTON BLVD.
 428 RD 900 0.023 0.013 CIRC 4.0
 *
 429 KK C
 430 KM
 431 KM SINGLE FAMILY ATTACHED: DENSITY = 10.0 UNITS/ACRE
 432 KM
 433 KM AREA 17.4 AC
 434 KM Flag 10.09 MIN
 435 KM CN 90
 436 BA .0272
 437 LS 0 90
 438 UD .1009
 *
 439 KK C-22
 440 KM COMBINE C-21 AND C
 441 HC 2
 *
 442 KK RC-22
 443 KM ROUTE DOWNSTREAM OF C THROUGH CHARLESTON BLVD.
 444 RD 1100 0.017 0.013 CIRC 4.0
 *
 445 KK ST-1
 446 KM
 447 KM CHARLESTON BOULEVARD
 448 KM
 449 KM AREA 10.6 AC
 450 KM Flag 15.74 MIN
 451 KM CN 94
 452 BA .0165
 453 LS 0 94
 454 UD .1574
 *

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HEC-1 INPUT

PAGE 12

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

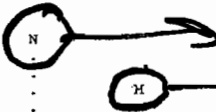
455 KK C-23
 456 KM COMBINE C-22 AND ST-1
 457 HC 2
 *
 458 KK CP-CH
 459 KM COMBINE C-23 AND C-9B
 460 HC 2
 *
 461 KK ST7A
 462 KM
 463 KM COLLECTOR ROAD ROUTED TO RED ROCK DETENTION BASIN
 464 KM
 465 KM AREA 9.4 AC
 466 KM Flag 10.97 MIN
 467 KM CN 95
 468 BA .0147
 469 LS 0 95
 470 UD .1097
 *
 471 KK ST8
 472 KM
 473 KM ALTA DRIVE
 474 KM
 475 KM AREA 12.9 AC
 476 KM Flag 13.55 MIN
 477 KM CN 94
 478 BA .0202
 479 LS 0 94
 480 UD .1355
 *
 481 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
 LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
 NO. (.) CONNECTOR {<---} RETURN OF DIVERTED OR PUMPED FLOW
 25 L
 .
 44 . COS-2
 .
 54 C-1.....
 V
 V
 57 RC-1
 .
 60 . J
 .
 70 C-2.....

73	V	
	V	
	RC-2	
76	.	ST12
	.	
86	C-3	
	.	
89	.	ES-1
	.	
100	.	WS-1
	.	
110	C-4	
	.	
113	.	NP-1
	.	
123	C-5	
	V	
	V	
126	RC-5	
	.	
129	.	ST13
	.	
139	C-6	
	.	
142	C-6A	
	.	
145	.	R
	.	
155	C-7	
	V	
	V	
158	RC-7	
	.	
161	.	I
	.	
171	C-8	
	.	
174	.	ST19
	.	
184	C-9	
	V	
	V	
187	R-C-9	
	.	
190	.	O
	.	V
	.	V
200	R-O	
	.	
203	.	
	.	
213	.	
	.	
223	C-10	
	V	
	V	
226	RC-10	
	.	
229	.	ST10
	.	
239	C-11	
	V	
	V	
242	RC-11	
	.	
245	.	ST18
	.	
255	C-13	
	.	
258	.	E
	.	
268	C-14	
	V	
	V	
271	RC-14	
	.	
274	.	F


 MASTER PLANNED DRAINAGE PATTERNS TO FOX HILL SD
 ESPERANZA

```

      .
      .
      .
284      .      C-15.....
      .      V
      .      V
287      .      RC-15
      .
      .
290      .      COS-3
      .
      .
300      .      C-15A.....
      .
      .
303      .      G
      .
      .
313      .      C-16.....
      .      V
      .      V
316      .      RC-16
      .
      .
319      .      H
      .
      .
329      .      ST11
      .
      .
339      .      C-17.....
      .
      .
342      .      C-9A.....
      .      V
      .      V
345      .      RC-9A
      .
      .
348      .      ST2
      .      V
      .      V
358      .      RST2
      .
      .
361      .      B
      .
      .
371      .      C-18.....
      .      V
      .      V
374      .      RC-18
      .
      .
377      .      A
      .
      .
387      .      C-19.....
      .
      .
390      .      ST3
      .
      .
400      .      C-20.....
      .
      .
403      .      ST7B
      .
      .
413      .      D
      .
      .
423      .      C-21.....
      .      V
      .      V
426      .      RC-21
      .
      .
429      .      C
      .
      .
439      .      C-22.....
      .      V
      .      V
442      .      RC-22
      .
      .
445      .      ST-1
      .
      .
455      .      C-23.....
      .
      .
458      .      CP-CH.....
      .
      .
461      .      ST7A
      .
      .
471      .      ST8

```

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
*

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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
*

```

* VERSION 4.1 *
 * RUN DATE 13JUN11 TIME 12:56:46 *
 * *****

* 609 SECOND STREET *
 * DAVIS, CALIFORNIA 95616 *
 * (916) 756-1104 *
 * *****

 * : SUMMERLIN VILLAGE 23A : *
 * : UNIT 2 IMPROVEMENTS : *
 * : DEVELOPED ONSITE : *
 * : UPDATE #2 TO THE TDS-REVISED TO REFLECT M, N, O REVISION : *
 * : : *
 * : RETURN PERIOD -- 10 & 100-YEAR : *
 * : DISTRIBUTION -- 6-HOUR SDN3 : *
 * : PROJECT NO -- 62023.112 : *
 * : FILENAME -- 112-ULT.H1 : *
 * : DATE -- 6/13/2011 : *
 * : MODELED BY -- DY : *
 * : : *
 * : DEPTH AREA REDUCTION FACTORS: : *
 * : AREA DARE : *
 * : 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 .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

JF MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 1.00 .98 .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 .98	RATIO 3 .56
HYDROGRAPH AT						
+	L	.03	1 FLOW TIME	57. 3.58	55. 3.58	24. 3.58
HYDROGRAPH AT						
+	COS-2	.00	1 FLOW TIME	5. 3.50	5. 3.50	2. 3.50
2 COMBINED AT						
+	C-1	.04	1 FLOW TIME	61. 3.58	59. 3.58	25. 3.58
ROUTED TO						
+	RC-1	.04	1 FLOW TIME	60. 3.58	59. 3.58	25. 3.58
HYDROGRAPH AT						
+	J	.03	1 FLOW TIME	53. 3.50	52. 3.50	21. 3.58
2 COMBINED AT						
+	C-2	.07	1 FLOW TIME	113. 3.58	110. 3.58	47. 3.58
ROUTED TO						
+	RC-2	.07	1 FLOW TIME	113. 3.58	110. 3.58	46. 3.58
HYDROGRAPH AT						
+	ST12	.01	1 FLOW TIME	19. 3.50	18. 3.50	9. 3.50

2 COMBINED AT							
+	C-3	.08	1	FLOW TIME	129. 3.58	126. 3.58	55. 3.58
HYDROGRAPH AT							
+	ES-1	.02	1	FLOW TIME	32. 3.50	31. 3.50	13. 3.58
HYDROGRAPH AT							
+	WS-1	.01	1	FLOW TIME	17. 3.50	17. 3.50	8. 3.50
2 COMBINED AT							
+	C-4	.03	1	FLOW TIME	49. 3.50	48. 3.50	22. 3.50
HYDROGRAPH AT							
+	NE-1	.02	1	FLOW TIME	20. 3.58	20. 3.58	5. 3.58
2 COMBINED AT							
+	C-5	.05	1	FLOW TIME	66. 3.50	64. 3.50	25. 3.58
ROUTED TO							
+	RC-5	.05	1	FLOW TIME	65. 3.58	63. 3.58	25. 3.58
HYDROGRAPH AT							
+	ST13	.01	1	FLOW TIME	12. 3.50	12. 3.50	6. 3.50
2 COMBINED AT							
+	C-6	.05	1	FLOW TIME	77. 3.58	74. 3.58	31. 3.58
2 COMBINED AT							
+	C-6A	.13	1	FLOW TIME	206. 3.58	200. 3.58	85. 3.58
HYDROGRAPH AT							
+	K	.03	1	FLOW TIME	52. 3.50	50. 3.50	20. 3.58
2 COMBINED AT							
+	C-7	.16	1	FLOW TIME	257. 3.58	250. 3.58	105. 3.58
ROUTED TO							
+	RC-7	.16	1	FLOW TIME	257. 3.58	249. 3.58	104. 3.58
HYDROGRAPH AT							
+	I	.04	1	FLOW TIME	61. 3.58	59. 3.58	24. 3.58
2 COMBINED AT							
+	C-8	.20	1	FLOW TIME	317. 3.58	308. 3.58	129. 3.58
HYDROGRAPH AT							
+	ST19	.00	1	FLOW TIME	8. 3.50	8. 3.50	4. 3.50
2 COMBINED AT							
+	C-9	.20	1	FLOW TIME	323. 3.58	314. 3.58	132. 3.58
ROUTED TO							
+	R-C-9	.20	1	FLOW TIME	321. 3.58	312. 3.58	130. 3.58
HYDROGRAPH AT							
+	O	.03	1	FLOW TIME	62. 3.50	60. 3.50	27. 3.58
ROUTED TO							
+	R-O	.03	1	FLOW TIME	61. 3.58	59. 3.58	27. 3.58
HYDROGRAPH AT							
+	N	.03	1	FLOW TIME	46. 3.50	45. 3.50	20. 3.58
HYDROGRAPH AT							
+	M	.04	1	FLOW TIME	60. 3.58	58. 3.58	25. 3.58
3 COMBINED AT							
+	C-10	.09	1	FLOW TIME	167. 3.58	163. 3.58	72. 3.58
ROUTED TO							
+	RC-10	.09	1	FLOW TIME	167. 3.58	162. 3.58	71. 3.58
HYDROGRAPH AT							
+	ST10	.01	1	FLOW TIME	23. 3.50	23. 3.50	11. 3.50
2 COMBINED AT							
+	C-11	.10	1	FLOW TIME	188. 3.58	183. 3.58	82. 3.58

ESPERANZA =
 $Q_{PROP.} = 59 \text{ cfs}$, $Q_{INT.} = 62 \text{ cfs}$

ROUTED TO							
+	RC-11	.10	1	FLOW TIME	187. 3.58	183. 3.58	81. 3.58
HYDROGRAPH AT							
+	ST18	.00	1	FLOW TIME	8. 3.50	8. 3.50	4. 3.50
2 COMBINED AT							
+	C-13	.11	1	FLOW TIME	194. 3.58	189. 3.58	85. 3.58
HYDROGRAPH AT							
+	E	.04	1	FLOW TIME	64. 3.58	63. 3.58	27. 3.58
2 COMBINED AT							
+	C-14	.15	1	FLOW TIME	259. 3.58	252. 3.58	112. 3.58
ROUTED TO							
+	RC-14	.15	1	FLOW TIME	257. 3.58	250. 3.58	110. 3.58
HYDROGRAPH AT							
+	F	.03	1	FLOW TIME	57. 3.50	56. 3.50	24. 3.58
2 COMBINED AT							
+	C-15	.18	1	FLOW TIME	314. 3.58	305. 3.58	135. 3.58
ROUTED TO							
+	RC-15	.18	1	FLOW TIME	311. 3.58	303. 3.58	133. 3.58
HYDROGRAPH AT							
+	COS-3	.00	1	FLOW TIME	6. 3.50	5. 3.50	2. 3.50
2 COMBINED AT							
+	C-15A	.18	1	FLOW TIME	316. 3.58	308. 3.58	135. 3.58
HYDROGRAPH AT							
+	G	.03	1	FLOW TIME	47. 3.58	45. 3.58	18. 3.58
2 COMBINED AT							
+	C-16	.21	1	FLOW TIME	363. 3.58	353. 3.58	153. 3.58
ROUTED TO							
+	RC-16	.21	1	FLOW TIME	361. 3.58	351. 3.58	151. 3.58
HYDROGRAPH AT							
+	H	.03	1	FLOW TIME	51. 3.58	50. 3.58	20. 3.58
HYDROGRAPH AT							
+	ST11	.02	1	FLOW TIME	34. 3.58	33. 3.58	17. 3.58
3 COMBINED AT							
+	C-17	.26	1	FLOW TIME	446. 3.58	434. 3.58	189. 3.58
2 COMBINED AT							
+	C-9A	.46	1	FLOW TIME	767. 3.58	746. 3.58	319. 3.58
ROUTED TO							
+	RC-9A	.46	1	FLOW TIME	762. 3.58	740. 3.58	315. 3.58
HYDROGRAPH AT							
+	ST2	.00	1	FLOW TIME	6. 3.50	5. 3.50	3. 3.50
ROUTED TO							
+	RST2	.00	1	FLOW TIME	5. 3.50	5. 3.50	2. 3.50
HYDROGRAPH AT							
+	B	.02	1	FLOW TIME	46. 3.50	45. 3.50	20. 3.58
3 COMBINED AT							
+	C-18	.48	1	FLOW TIME	811. 3.58	788. 3.58	338. 3.58
ROUTED TO							
+	RC-18	.48	1	FLOW TIME	805. 3.58	782. 3.58	334. 3.58
HYDROGRAPH AT							
+	A	.03	1	FLOW TIME	50. 3.50	48. 3.50	22. 3.50
2 COMBINED AT							
+	C-19	.51	1	FLOW TIME	852. 3.58	827. 3.58	355. 3.58
HYDROGRAPH AT							

+	ST3	.03	1	FLOW TIME	53. 3.58	52. 3.58	27. 3.58
2 COMBINED AT							
+	C-20	.53	1	FLOW TIME	905. 3.58	879. 3.58	382. 3.58
HYDROGRAPH AT							
+	ST7B	.01	1	FLOW TIME	25. 3.50	24. 3.50	13. 3.50
HYDROGRAPH AT							
+	D	.04	1	FLOW TIME	66. 3.58	64. 3.58	27. 3.58
2 COMBINED AT							
+	C-21	.05	1	FLOW TIME	89. 3.50	87. 3.50	38. 3.50
ROUTED TO							
+	RC-21	.05	1	FLOW TIME	86. 3.50	84. 3.50	37. 3.58
HYDROGRAPH AT							
+	C	.03	1	FLOW TIME	54. 3.50	52. 3.50	24. 3.50
2 COMBINED AT							
+	C-22	.08	1	FLOW TIME	140. 3.50	136. 3.50	60. 3.58
ROUTED TO							
+	RC-22	.08	1	FLOW TIME	137. 3.58	133. 3.58	60. 3.58
HYDROGRAPH AT							
+	ST-1	.02	1	FLOW TIME	33. 3.58	32. 3.58	17. 3.58
2 COMBINED AT							
+	C-23	.09	1	FLOW TIME	170. 3.58	166. 3.58	76. 3.58
2 COMBINED AT							
+	CP-CH	.63	1	FLOW TIME	1075. 3.58	1045. 3.58	458. 3.58
HYDROGRAPH AT							
+	ST7A	.01	1	FLOW TIME	32. 3.50	31. 3.50	16. 3.50
HYDROGRAPH AT							
+	ST8	.02	1	FLOW TIME	42. 3.58	41. 3.58	21. 3.58

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL			
						DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RC-1	MANE	.57	60.43	215.10	2.03	5.00	60.37	215.00	2.03
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3865E+01 EXCESS= .0000E+00 OUTFLOW= .3865E+01 BASIN STORAGE= .5234E-04 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
RC-1	MANE	.57	58.79	215.14	1.97	5.00	58.72	215.00	1.97
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3753E+01 EXCESS= .0000E+00 OUTFLOW= .3753E+01 BASIN STORAGE= .5239E-04 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
RC-1	MANE	.68	25.22	215.23	.81	5.00	25.12	215.00	.81
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1542E+01 EXCESS= .0000E+00 OUTFLOW= .1542E+01 BASIN STORAGE= .5073E-04 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
RC-2	MANE	.43	113.09	215.04	1.98	5.00	113.06	215.00	1.98
CONTINUITY SUMMARY (AC-FT) - INFLOW= .7134E+01 EXCESS= .0000E+00 OUTFLOW= .7134E+01 BASIN STORAGE= .4261E-04 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
RC-2	MANE	.43	109.93	214.95	1.92	5.00	109.92	215.00	1.92
CONTINUITY SUMMARY (AC-FT) - INFLOW= .6924E+01 EXCESS= .0000E+00 OUTFLOW= .6924E+01 BASIN STORAGE= .4378E-04 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
RC-2	MANE	.51	46.38	215.48	.77	5.00	46.21	215.00	.77
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2792E+01 EXCESS= .0000E+00 OUTFLOW= .2792E+01 BASIN STORAGE= .4446E-04 PERCENT ERROR= .0									

FOR PLAN = 1	RATIO=	.00							
RC-5	MANE	.92	66.03	211.38	1.71	5.00	65.47	215.00	1.71
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4204E+01 EXCESS= .0000E+00 OUTFLOW= .4204E+01 BASIN STORAGE= .8676E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-5	MANE	.92	64.23	211.76	1.65	5.00	63.42	215.00	1.65
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4073E+01 EXCESS= .0000E+00 OUTFLOW= .4073E+01 BASIN STORAGE= .8676E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-5	MANE	1.12	24.97	212.17	.64	5.00	24.81	215.00	.64
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1574E+01 EXCESS= .0000E+00 OUTFLOW= .1574E+01 BASIN STORAGE= .8291E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-7	MANE	.51	256.65	215.07	1.93	5.00	256.60	215.00	1.93
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1642E+02 EXCESS= .0000E+00 OUTFLOW= .1642E+02 BASIN STORAGE= .5915E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-7	MANE	.51	249.26	214.77	1.87	5.00	249.21	215.00	1.87
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1594E+02 EXCESS= .0000E+00 OUTFLOW= .1594E+02 BASIN STORAGE= .6197E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-7	MANE	.61	104.63	215.22	.76	5.00	104.45	215.00	.76
CONTINUITY SUMMARY (AC-FT) - INFLOW= .6467E+01 EXCESS= .0000E+00 OUTFLOW= .6467E+01 BASIN STORAGE= .6188E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
R-C-9	MANE	.78	321.59	215.17	1.94	5.00	321.36	215.00	1.94
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2064E+02 EXCESS= .0000E+00 OUTFLOW= .2064E+02 BASIN STORAGE= .1062E-03 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
R-C-9	MANE	.78	312.31	214.85	1.88	5.00	312.24	215.00	1.89
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2003E+02 EXCESS= .0000E+00 OUTFLOW= .2003E+02 BASIN STORAGE= .1047E-03 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
R-C-9	MANE	.93	130.71	215.43	.76	5.00	130.12	215.00	.77
CONTINUITY SUMMARY (AC-FT) - INFLOW= .8130E+01 EXCESS= .0000E+00 OUTFLOW= .8130E+01 BASIN STORAGE= .1054E-03 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
R-O	MANE	.80	61.94	211.46	2.20	5.00	60.55	215.00	2.20
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3856E+01 EXCESS= .0000E+00 OUTFLOW= .3856E+01 BASIN STORAGE= .7157E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
R-O	MANE	.81	60.20	210.97	2.14	5.00	59.12	215.00	2.14
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3752E+01 EXCESS= .0000E+00 OUTFLOW= .3752E+01 BASIN STORAGE= .7366E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
R-O	MANE	.95	27.02	211.74	.92	5.00	26.93	215.00	.92
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1620E+01 EXCESS= .0000E+00 OUTFLOW= .1620E+01 BASIN STORAGE= .7588E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-10	MANE	.47	166.54	214.68	2.09	5.00	166.50	215.00	2.09
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1048E+02 EXCESS= .0000E+00 OUTFLOW= .1048E+02 BASIN STORAGE= .4937E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-10	MANE	.47	162.30	214.86	2.03	5.00	162.21	215.00	2.03
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1019E+02 EXCESS= .0000E+00 OUTFLOW= .1019E+02 BASIN STORAGE= .5199E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-10	MANE	.56	71.33	215.26	.85	5.00	71.23	215.00	.85
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4257E+01 EXCESS= .0000E+00 OUTFLOW= .4257E+01 BASIN STORAGE= .4947E-04 PERCENT ERROR= .0									

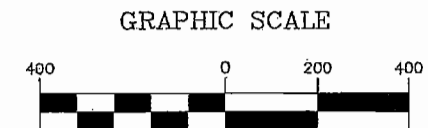
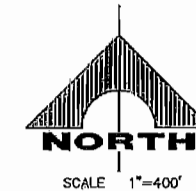
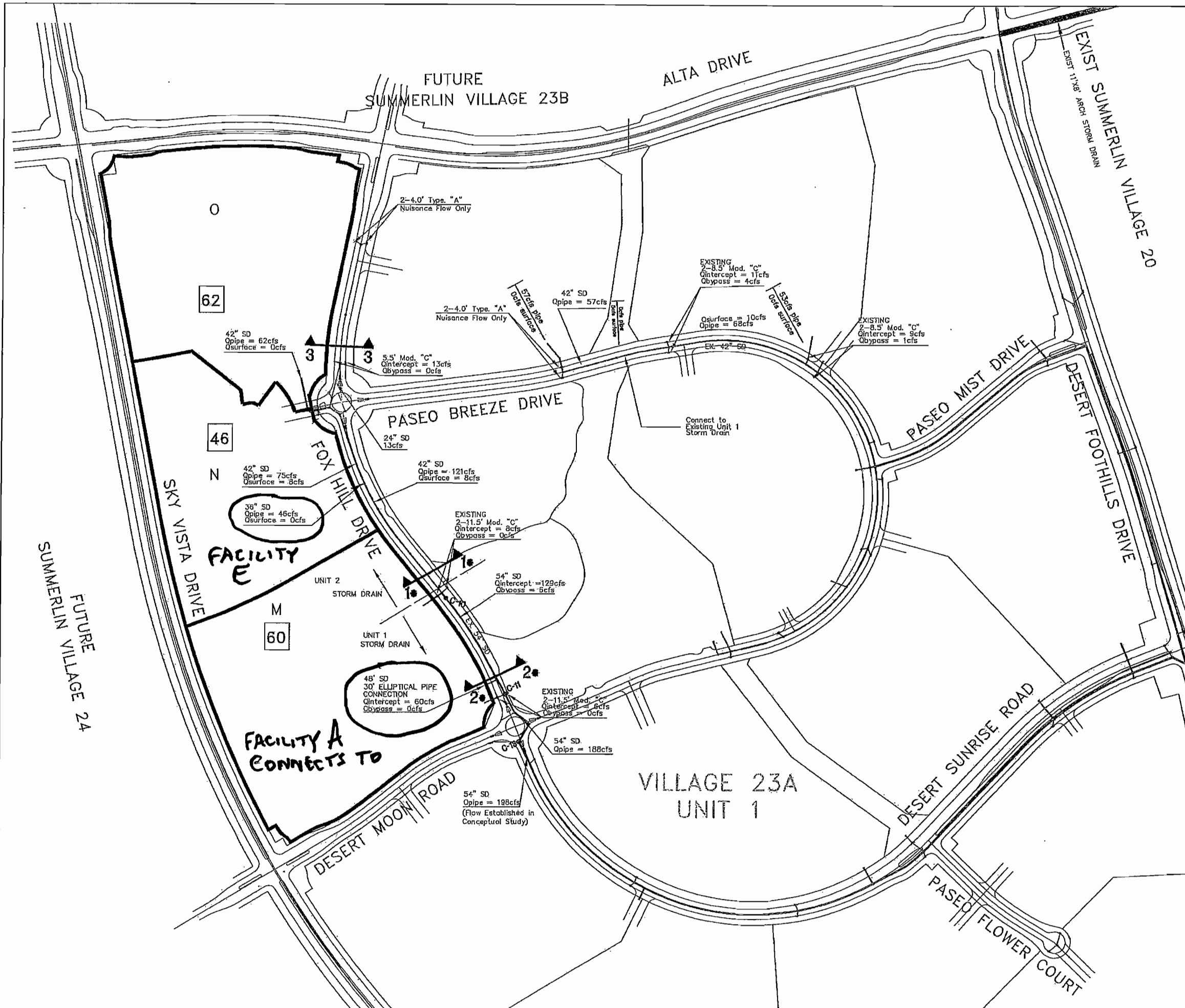
FOR PLAN = 1	RATIO= .00								
RC-11	MANE	.74	187.55	214.73	2.14	5.00	187.37	215.00	2.14
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1196E+02 EXCESS= .0000E+00 OUTFLOW= .1196E+02 BASIN STORAGE= .8569E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-11	MANE	.74	182.77	215.09	2.08	5.00	182.73	215.00	2.08
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1163E+02 EXCESS= .0000E+00 OUTFLOW= .1163E+02 BASIN STORAGE= .8675E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-11	MANE	.87	81.25	215.10	.88	5.00	81.16	215.00	.88
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4941E+01 EXCESS= .0000E+00 OUTFLOW= .4941E+01 BASIN STORAGE= .9200E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-14	MANE	.81	257.08	215.04	2.14	5.00	257.00	215.00	2.14
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1654E+02 EXCESS= .0000E+00 OUTFLOW= .1654E+02 BASIN STORAGE= .9417E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-14	MANE	.82	250.52	215.32	2.08	5.00	250.04	215.00	2.08
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1608E+02 EXCESS= .0000E+00 OUTFLOW= .1608E+02 BASIN STORAGE= .1018E-03 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-14	MANE	.96	111.26	215.82	.88	5.00	110.32	215.00	.88
CONTINUITY SUMMARY (AC-FT) - INFLOW= .6835E+01 EXCESS= .0000E+00 OUTFLOW= .6835E+01 BASIN STORAGE= .9734E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-15	MANE	.51	312.00	215.24	2.13	5.00	311.46	215.00	2.13
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2010E+02 EXCESS= .0000E+00 OUTFLOW= .2010E+02 BASIN STORAGE= .6734E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-15	MANE	.52	303.68	215.38	2.07	5.00	303.12	215.00	2.07
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1954E+02 EXCESS= .0000E+00 OUTFLOW= .1954E+02 BASIN STORAGE= .6480E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-15	MANE	.61	133.80	215.45	.88	5.00	133.00	215.00	.88
CONTINUITY SUMMARY (AC-FT) - INFLOW= .8275E+01 EXCESS= .0000E+00 OUTFLOW= .8275E+01 BASIN STORAGE= .6898E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-16	MANE	.39	361.56	215.37	2.09	5.00	360.73	215.00	2.09
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2333E+02 EXCESS= .0000E+00 OUTFLOW= .2333E+02 BASIN STORAGE= .5185E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-16	MANE	.40	351.77	215.37	2.03	5.00	350.92	215.00	2.03
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2267E+02 EXCESS= .0000E+00 OUTFLOW= .2267E+02 BASIN STORAGE= .5337E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-16	MANE	.47	152.09	215.22	.85	5.00	151.42	215.00	.85
CONTINUITY SUMMARY (AC-FT) - INFLOW= .9495E+01 EXCESS= .0000E+00 OUTFLOW= .9495E+01 BASIN STORAGE= .5068E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-9A	MANE	.47	763.90	215.49	2.04	5.00	762.12	215.00	2.04
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4948E+02 EXCESS= .0000E+00 OUTFLOW= .4948E+02 BASIN STORAGE= .6734E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-9A	MANE	.47	742.38	215.27	1.98	5.00	740.38	215.00	1.98
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4806E+02 EXCESS= .0000E+00 OUTFLOW= .4805E+02 BASIN STORAGE= .6797E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO= .00								
RC-9A	MANE	.56	317.17	215.74	.82	5.00	315.37	215.00	.82
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1998E+02 EXCESS= .0000E+00 OUTFLOW= .1998E+02 BASIN STORAGE= .6885E-04 PERCENT ERROR= .0									

FOR PLAN = 1	RATIO=	.00							
RST2	MANE	1.92	5.28	211.48	2.53	5.00	5.01	210.00	2.52
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2837E+00 EXCESS= .0000E+00 OUTFLOW= .2838E+00 BASIN STORAGE= .1523E-03 PERCENT ERROR= -.1									
FOR PLAN = 1	RATIO=	.00							
RST2	MANE	1.93	5.04	210.52	2.47	5.00	4.91	210.00	2.47
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2764E+00 EXCESS= .0000E+00 OUTFLOW= .2764E+00 BASIN STORAGE= .1567E-03 PERCENT ERROR= -.1									
FOR PLAN = 1	RATIO=	.00							
RST2	MANE	2.21	2.61	212.37	1.17	5.00	2.44	210.00	1.17
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1312E+00 EXCESS= .0000E+00 OUTFLOW= .1312E+00 BASIN STORAGE= .1036E-03 PERCENT ERROR= -.1									
FOR PLAN = 1	RATIO=	.00							
RC-18	MANE	.47	808.06	215.43	2.05	5.00	805.30	215.00	2.05
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5269E+02 EXCESS= .0000E+00 OUTFLOW= .5269E+02 BASIN STORAGE= .7509E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-18	MANE	.47	784.29	215.26	1.99	5.00	781.96	215.00	1.99
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5118E+02 EXCESS= .0000E+00 OUTFLOW= .5118E+02 BASIN STORAGE= .7422E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-18	MANE	.56	336.80	215.55	.83	5.00	333.74	215.00	.83
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2136E+02 EXCESS= .0000E+00 OUTFLOW= .2136E+02 BASIN STORAGE= .7361E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-21	MANE	.78	89.05	210.97	2.08	5.00	86.25	210.00	2.08
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5549E+01 EXCESS= .0000E+00 OUTFLOW= .5549E+01 BASIN STORAGE= .7352E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-21	MANE	.78	86.70	211.35	2.02	5.00	83.88	210.00	2.02
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5391E+01 EXCESS= .0000E+00 OUTFLOW= .5391E+01 BASIN STORAGE= .7463E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-21	MANE	.93	37.63	211.96	.85	5.00	36.84	215.00	.86
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2278E+01 EXCESS= .0000E+00 OUTFLOW= .2278E+01 BASIN STORAGE= .7562E-04 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-22	MANE	.98	139.78	212.02	2.14	5.00	136.72	215.00	2.15
CONTINUITY SUMMARY (AC-FT) - INFLOW= .8823E+01 EXCESS= .0000E+00 OUTFLOW= .8823E+01 BASIN STORAGE= .1026E-03 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-22	MANE	.99	135.75	211.20	2.08	5.00	133.05	215.00	2.08
CONTINUITY SUMMARY (AC-FT) - INFLOW= .8576E+01 EXCESS= .0000E+00 OUTFLOW= .8575E+01 BASIN STORAGE= .1176E-03 PERCENT ERROR= .0									
FOR PLAN = 1	RATIO=	.00							
RC-22	MANE	1.16	59.84	211.78	.89	5.00	59.61	215.00	.89
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3674E+01 EXCESS= .0000E+00 OUTFLOW= .3674E+01 BASIN STORAGE= .1085E-03 PERCENT ERROR= .0									

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

Fox Hill Storm Drain Hydraulic Analysis
& Drainage Facilities Exhibit

F:\Projects\600\62023-112\Division\Fetl\Figures\fig6.dwg 05-16-11 13:19:16 pkantchakov



(IN FEET)
1 inch = 400 ft.

LEGEND

— SUBBASIN BOUNDARY

A PARCEL NAME

— PROPOSED STORM DRAIN

42" SD
Q_{pipe} = 121cfs
Q_{surface} = 8cfs
PARCEL DISCHARGE

13 MAXIMUM COMBINED DISCHARGE FROM PARCEL

3 3 STREET CROSS SECTION LOCATION

— EXISTING STORM DRAIN

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

Summary of HEC-1 Model

Basin or Location	Q100 (cfs)	Q10 (cfs)
O	62	27
N	46	20
M	60	25
C-10	167	72
C-11	188	82
C-13	194	85

SUMMERLIN VILLAGE 23A
UNIT 2 IMPROVEMENTS
UPDATE # 2

FIGURE 6 (REVISED)

DRAINAGE FACILITIES MAP



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

Storm Drain Hydraulics Calculations

Fox Hill Drive Storm Drain (unit 2)

CONDUIT DATA										FLOW DATA										PIPE	ENERGY LOSS DATA															EGL & HGL				COMMENTS								
STATION		PIPE	BOX	IRREG		#	INVERT ELEV		L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet		Expansion/Outlet		Bend			Misc	CONDUIT		TRANSITION		FULL/										
FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD	D/S	U/S	(ft)	(%)	(ft²)	(cfs)	(ft/s)	(ft)	(ft/ft)	S _f	H _f	H _f	Θ	K _{mh}	H _{mh}	Θ	K _j	H _j	Inlet/ Cont	K _i	H _o	Θ	K _o	H _o	R _{bend}	Θ	K _b	H _b	H _m	Total	U/S EGL	U/S HGL	U/S EGL	U/S HGL	PART FLOW	CRTL					
	1000.00		42						219.18																																							
	1000.00		42					219.18	227.67	173.2	4.90%	9.62	0.0049	12.1	12.58	2.46	0.0144	0.0144	2.50		0	0.02	0.05														0.05	233.63	231.17	233.63	231.17	PART	D/S					
	1173.23		42					227.67	239.04	232.0	4.90%	9.62	0.0049	12.1	12.58	2.46	0.0144	0.0144	3.35		0	0.02	0.05													0.05	245.00	242.54	245.00	242.54	PART	D/S						
	1405.23		42					239.04	241.88	71.0	4.00%	9.62	0.0049	12.1	12.58	2.46	0.0144	0.0144	1.03																0.00	247.84	245.38			PART	D/S							
	1476.19		42	PARCEL N					241.88	242.08	5.0	4.00%	9.62	0.0049	7.5	7.80	0.94	0.0056	0.0100		0.05			90	0.25	2.22									2.27			250.11	249.16	FULL	U/S							
	1481.19		42					242.08	252.17	252.2	4.00%	9.62	0.0049	7.5	7.80	0.94	0.0056	0.0056	1.40		0	0.02	0.02												0.02	256.61	255.67	256.61	255.67	PART	D/S							
	1733.38		42					252.17	254.58	102.5	2.35%	9.62	0.0049	7.5	7.80	0.94	0.0056	0.0056	0.57		45	0.46	0.43											0.43	259.02	258.08	259.02	258.08	PART	D/S								
	1835.88		42					254.58	255.70	49.2	2.28%	9.62	0.0049	7.5	7.80	0.94	0.0056	0.0056	0.27															0.00	260.14	259.20			PART	D/S								
	1885.10		42					255.70	255.80	4.0	2.50%	9.62	0.0049	6.2	6.44	0.64	0.0038	0.0047		0.02	0	0.02	0.02	45	0.50	0.62								0.66			260.80	260.16	FULL	U/S								
	1889.10		42					255.80	257.17	45.6	3.00%	9.62	0.0049	6.2	6.44	0.64	0.0038	0.0038	0.17		0	0.02	0.01										0.01	261.31	260.67	261.31	260.67	FULL	D/S									
	1934.70		42					257.17	258.19	34.5	2.96%	9.62	0.0049	6.2	6.44	0.64	0.0038	0.0038	0.13														0.00	262.33	261.69			PART	D/S									
	1969.18		42					258.19	259.45	4.0	6.50%	9.62	0.0049	6.2	6.44	0.64	0.0038	0.0038		0.02	45	0.46	0.30										0.31			262.65	262.00	FULL	U/S									
	1973.18		42					258.45	259.02	6.0	9.50%	9.62	0.0049	6.2	6.44	0.64	0.0038	0.0038	0.02														0.00	263.16	262.52			FULL	D/S									
	1979.18		42					259.02	259.40	4.0	9.50%	9.62	0.0049	6.2	6.44	0.64	0.0038	0.0038		0.02	45	0.46	0.30										0.31			263.54	262.90	FULL	D/S									
	1983.18		42					259.40	272.50	138.0	9.49%	9.62	0.0049	6.2	6.44	0.64	0.0038	0.0038	0.52														0.00	276.64	276.00			PART	D/S									
	2121.18		42					272.50	272.50	0.0		9.62	0.0049	6.2	6.44	0.64	0.0038	0.0038	0.00							Ki=	0.25	0.16						0.16			276.81	276.81	FULL	U/S								

Fox Hill Drive Storm Drain (unit 1)

DATE: 06/16/11 FILE: SF6.xls

42 Date Printed: 6/16/2011 U1-SFGREV-dy.xls

Relevant Storm Drain Profile Sheets

SUMMERLIN



THE PASEOS VILLAGE 23A UNIT 2 IMPROVEMENTS

FOX HILL DRIVE FROM STA 140+00 TO 161+94.00
PASEO BREEZE DRIVE FROM STA 142+52.47 TO 158+81.64

APN # 137-34-210-001/002, 137-34-312-001/002/003,
AND 137-34-601-003
SID #808 PROJECTS 9 AND 10

2003

DEVELOPER

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, INC.
Engineers/Planners/Surveyors

1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
OFFICE: (702) 804-2000, FAX: (702) 804-2299
SUMMERLIN OFFICE 10000 CHARLESTON BLVD., STE. 130
OFFICE: (702) 804-2160, FAX: (702) 804-2295

*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.

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

Bert A. Hughes
BERT A. HUGHES R.P.E. 10259

1/16/04
DATE

THE HOWARD HUGHES CORPORATION,
a Delaware corporation

By: *Larry Brocato*
LARRY BROCATO

1/26/04
DATE

Title: EXECUTIVE VICE PRESIDENT, DEVELOPMENT

*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.
CHARLES KAJKOWSKI JR.; PE #4784
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

12-3-2004
DATE

CLV PLANNING DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS IF THE PLANNING AND DEVELOPMENT DEPARTMENT

Margo Wheeler
MARGO WHEELER, AICP, CURRENT PLANNING MANAGER

12/9/04
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. *Sandy Larsen*
REVIEWED BY: SANDY LARSEN 1-21-04
DATE

Las Vegas Valley Water District
LAS VEGAS VALLEY WATER DISTRICT
(SHEETS 1, 2, 5, 8-9, 11-13, 21-23) (PROJECT #4638)

Las Vegas Valley Water District
DATE 1/30/07

Las Vegas Valley Water District
DATE 1/26/04

Las Vegas Valley Water District
DATE 1/21/04

Las Vegas Valley Water District
DATE 1/21/04

Las Vegas Valley Water District
DATE 1/21/04

Las Vegas Valley Water District
DATE 1/21/04

Las Vegas Valley Water District
DATE 1/21/04

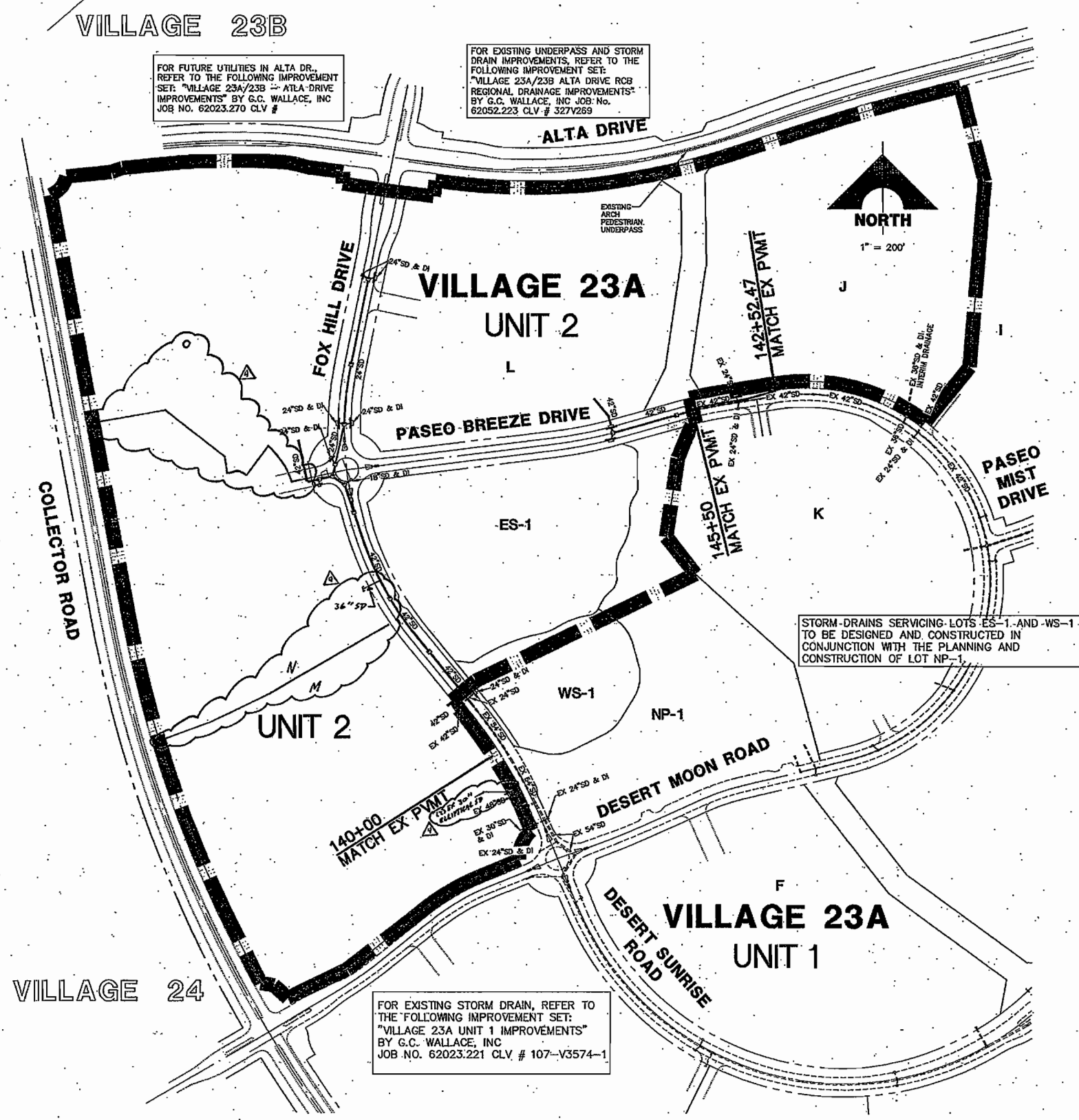
SHEET 1 OF 32

CLV DRAWING NO. 101V3574-2

SUMMERLIN
VILLAGE 23A UNIT 2 IMPROVEMENTS
COVER SHEET

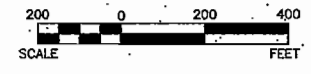
SHEET
1
1 OF 32 SHEETS

JOB NO. 82023222



STORM DRAIN ESTIMATED QUANTITIES (PUBLIC)	
18" STORM DRAIN CLASS III RCP	28 LF
24" STORM DRAIN CLASS III RCP	1,103 LF
42" STORM DRAIN CLASS III RCP	1,277 LF
42" STORM DRAIN HDPE	260 LF
MANHOLE - TYPE I	1 EA
MANHOLE - TYPE II	7 EA
MANHOLE - TYPE III	4 EA
MOD "C" DROP INLET (11.5')	1 EA
MOD "C" DROP INLET (8.5')	2 EA
MOD "C" DROP INLET (5.5')	7 EA
JENSEN PRECAST 36"x36" DROP INLET	1 EA

QUANTITIES ARE ESTIMATED ONLY. CONTRACTOR IS TO VERIFY DURING BIDDING PROCESS.



Call before you Dig.
1-800-227-2600
UNDERGROUND SERVICE ALERT (USA)



BENCHMARK			
CLV BM NO.	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
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.	3245.71 (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.N., AS SHOWN BY MAP ON FILE IN FILE 91, PAGE 28 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA

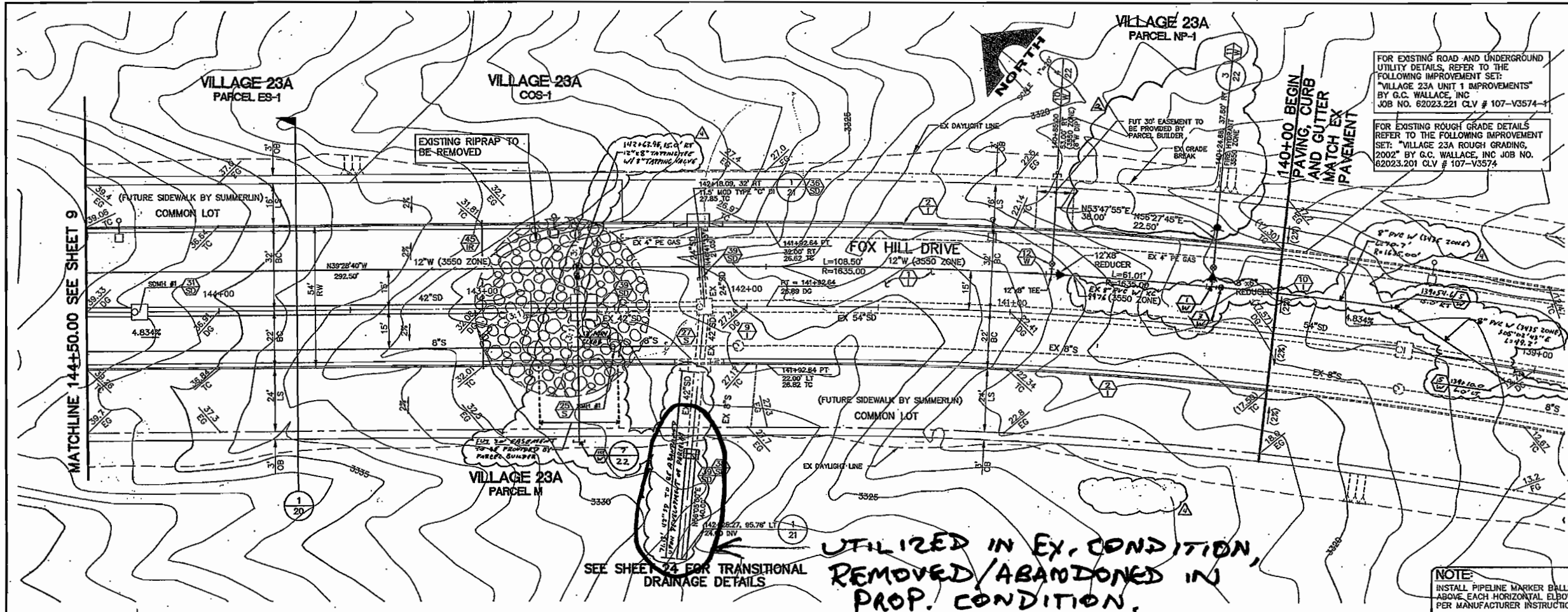
DESIGN: GSW/CTP
DRAWN: M/ATP
CHECK: BAH
ISSUE DATE: 05/23/11
ISSUE BY: GSW
PLOT DATE: 01-29-14
PLOT TIME: 08:30:00
REV 1 DATE: 05/23/11
REV 2 DATE: 01-29-14
REV 3 DATE: 01-29-14
REV 4 DATE: 01-29-14

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1255 SOUTH RANGOW BLVD., LAS VEGAS, NEVADA 89146
TELEPHONE (702) 864-3600 • FAX (702) 864-2299
E-MAIL: GSW@GFWALLACE.COM

SUMMERLIN
VILLAGE 23A UNIT 2 IMPROVEMENTS
STORM DRAIN MASTER PLAN

SHEET
7
7 OF 32 SHTS

JOB NO. 62023.222

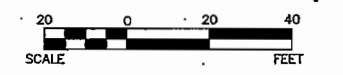


BENCHMARK			
CLV	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
0365 3	U.S.C. & G.S. BRASS DISC SET IN ROCK ON THE EAST SIDE OF CHARLESTON BOULEVARD AND SOUTH OF THE RED ROCK DETENTION BASIN.	3246.71 (FEET)	989.599 (METERS)

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

FOX HILL DRIVE (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'
REFER TO SHEET 2 FOR CONSTRUCTION NOTES



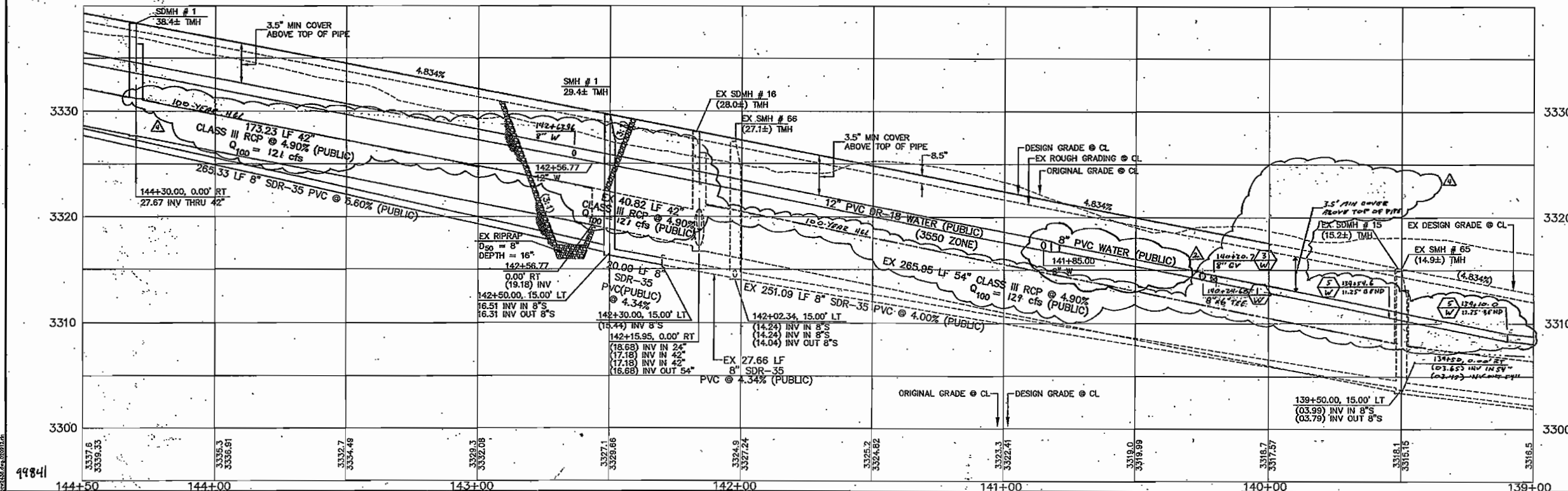
NOTE
THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

Call before you Dig.
1-800-227-2600
UNDERGROUND WORK ALERT (UWA)

CALL BEFORE YOU DO OVERHEAD
1-702-583-8111

NOTE:
INSTALL PIPELINE MARKER BALLS IN TRENCH ABOVE EACH HORIZONTAL ELBOW FITTING, PER MANUFACTURER INSTRUCTIONS.

APPROVAL:
[Signature]
LAS VEGAS VALLEY WATER DISTRICT
(PROJECT #96435)
DATE: 2-2-02

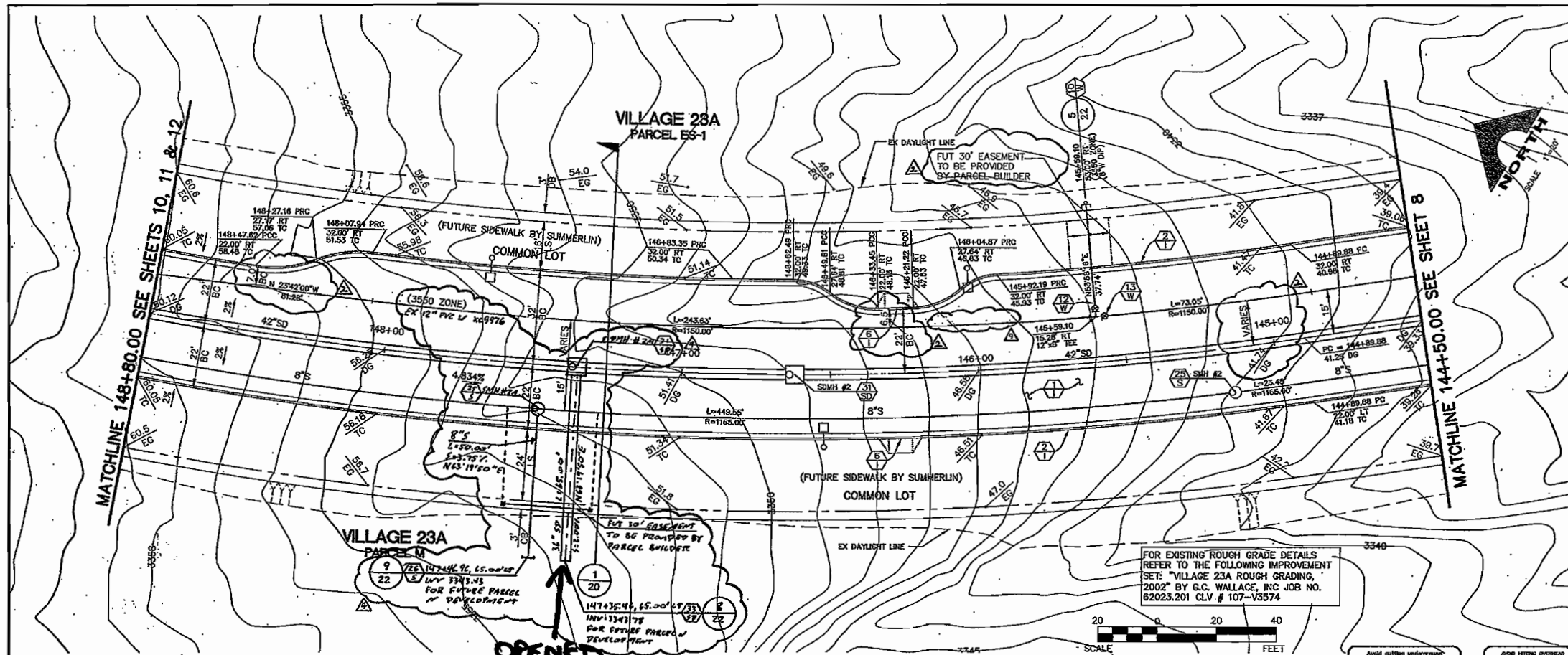


DATE: 2/1/02
DRAWN: JN/OT
CHECK: BAH
ISSUE DATE:
PLOT DATE: 01-28-07
PLOT TIME: 15:56:55

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1056 SOUTH RAINBOW BLVD., SUITE 200, LAS VEGAS, NEVADA 89146
(702) 800-8000 • FAX (702) 800-2289
LAS VEGAS VALLEY WATER DISTRICT PROJECT #96435

SUMMERLIN
VILLAGE 23A UNIT 2 IMPROVEMENTS
FOX HILL DRIVE PLAN AND PROFILE
FROM START 140+00 TO 144+50

8
SHEET
JOB NO. 62023222
CLV DRAWING NO. 10TV3574-2
8 OF 32 SHEETS



BENCHMARK	
CLV BM NO.	DESIGN
D368 3	U.S.C. & G.S. BRASS SET IN ROCK ON THE SOUTHWEST CORNER OF THE RED ROCK RESIDENTIAL BASIN.
NAVD 88 DATUM	NAVD 88 DATUM
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, TOWN 36S, RANGE 12E,
 39 EAST, M.D.M., AS SHOWN BY MAP ON FILE IN THE CLARK COUNTY
 CLARK COUNTY, NEVADA

FOX HILL DRIVE (PUBLIC)
 SCALE: HORIZ. 1" = 20'
 VERT. 1" = 5'

REFER TO SHEET 2 FOR
 CONSTRUCTION NOTES

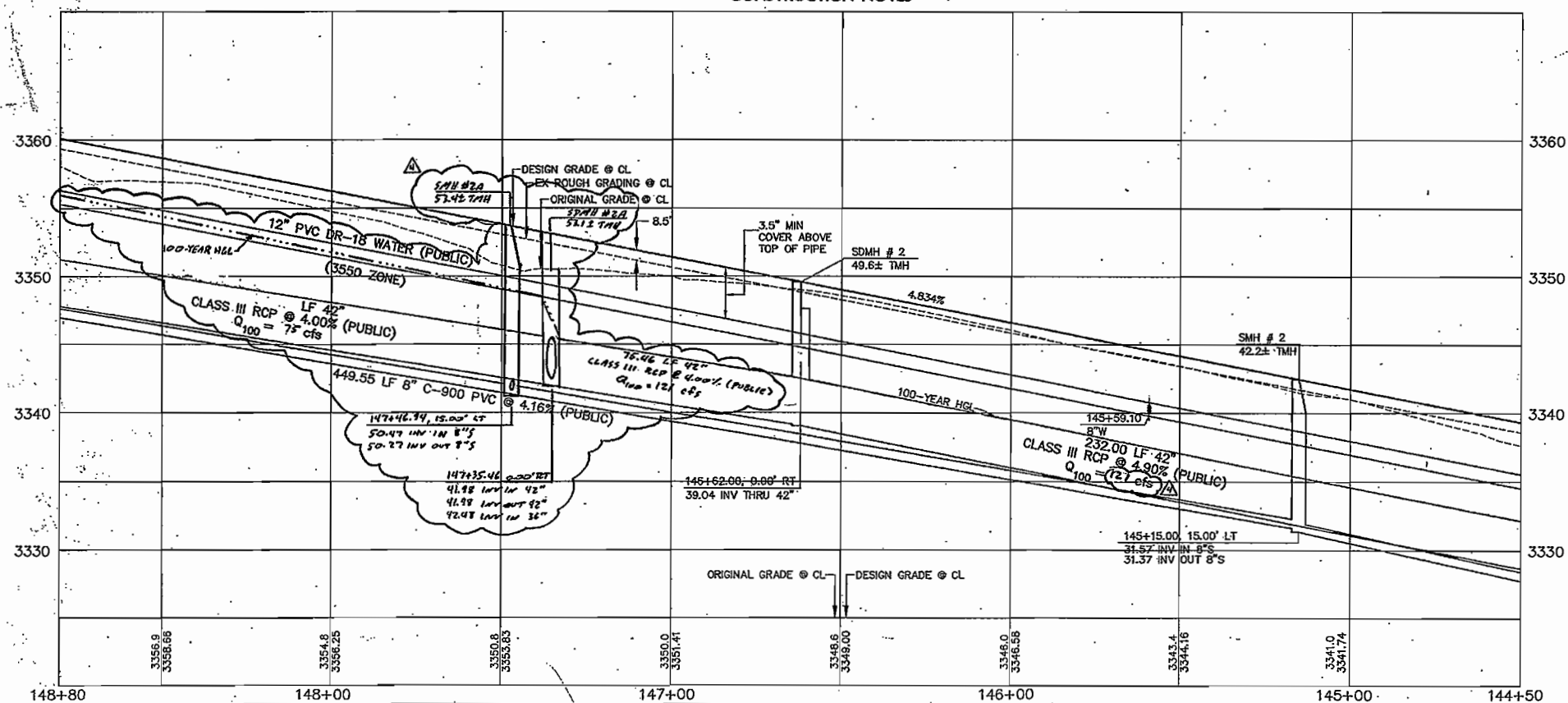
NOTE
 THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM.
 PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM.
 CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET
 OF DRAWINGS.

Call
 before you
 Dig.
 1-800-227-2600
 UNLICENSED BORING AGENT 000

CALL BEFORE
 YOU DO
 OVERHEAD
 CALL 1-702-593-6111

APPROVAL:
 [Signature]
 LAS VEGAS VALLEY WATER DISTRICT
 (PROJECT #96435)
 DATE 2-11-07

NOTE:
 INSTALL PIPELINE MARKER BALLS IN TRENCH
 ABOVE EACH HORIZONTAL ELBOW FITTING,
 PER MANUFACTURER INSTRUCTIONS.



99042

CLV DRAWING NO. 167V3574-2

For REV 4 only

DESIGN: G.W./D.P.	CHECK: BAH	DATE: 12/1/07
DRAWN: N.J./D.P.	ISSUE DATE: 12/1/07	
PLOT DATE: 01-28-07	PLOT TIME: 08:27:03	

G.C. WALLACE, INC.
 Engineers/Planners/Surveyors
 1555 SOUTH RANCHO BLVD., LAS VEGAS, NEVADA 89146
 TELEPHONE (702) 644-2000 FAX (702) 644-2280
 E-MAIL: gwallace@wallaceinc.com

SUMMERLIN
 VILLAGE 23A UNIT 2 IMPROVEMENTS
 FOX HILL DRIVE PLAN AND PROFILE
 STA 144+50 TO 148+80

SHEET
 9
 9 OF 32 SHTS

JOB NO. 62023222

APPENDIX H

Reference Material

Technical Drainage Study for Summerlin Village 23A Unit 2 Improvements

Approval Letters

CITY OF LAS VEGAS				DATE:		
INTER-OFFICE MEMORANDUM				October 23, 2003 <i>MS</i>		
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				CCRFC		
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. #	
1 st Submittal	8/8/2003	8/26/2003	Conditional Approval	\$250.00	109118: \$250	
CCRFC	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

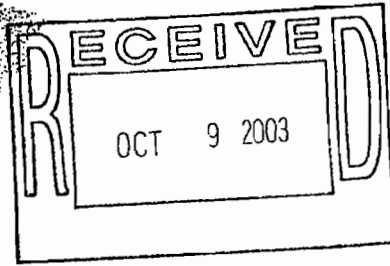
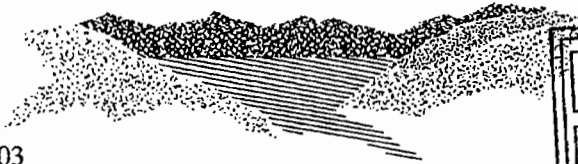
1. All the interim berms and storm drains are owned and to be maintained by Howard Hughes Corporation.

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

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



DS 3402

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

Shari Buck
City of North Las Vegas

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City of Boulder City

Mayor James Gibson
City of Henderson

Michael Mack
City of Las Vegas

Mayor Bill Nicholas
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

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

Dear Mr. Fultz:

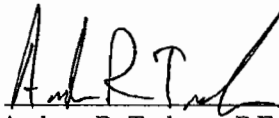
Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated September 5, 2003, for the above-mentioned project as submitted by G. C. Wallace, Inc. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated 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

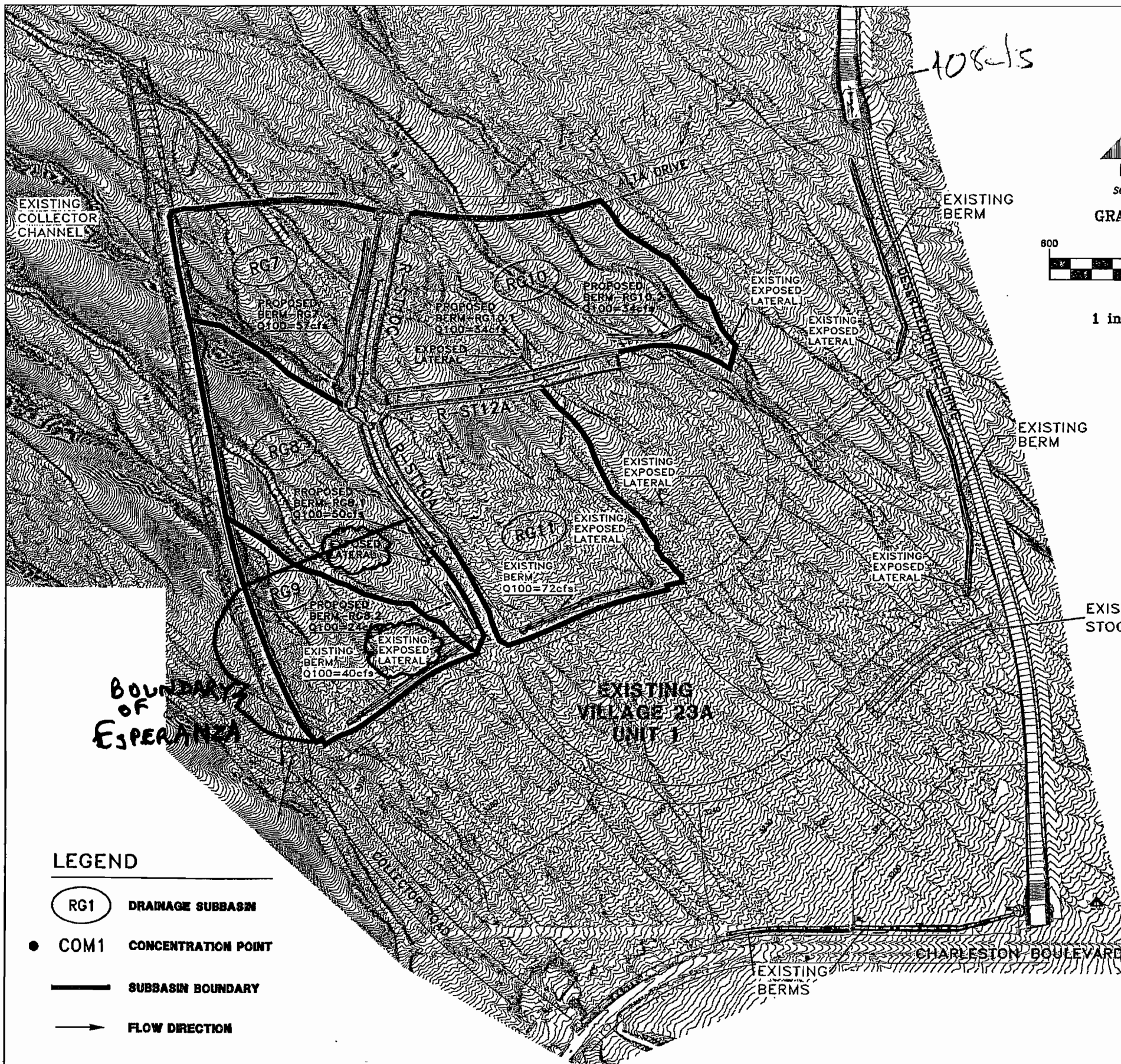
BY: 
Andrew R. Trelease, P.E.
Senior Civil Engineer

ART:css

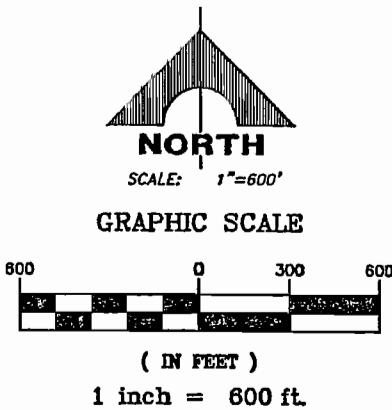
c: Randall K. Gremlich, P.E., G. C. Wallace, Inc.

File: 20-59-22.GCW

Interim Drainage Patterns Exhibit



CURRENT EXISTING
CONDITION OF
ESPERANZA SITE



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

LEGEND

- RG1 DRAINAGE SUBBASIN
- COM1 CONCENTRATION POINT
- SUBBASIN BOUNDARY
- FLOW DIRECTION

SUMMERLIN VILLAGE 23A
UNIT 2 IMPROVEMENTS

FIGURE 7
INTERIM CONDITIONS

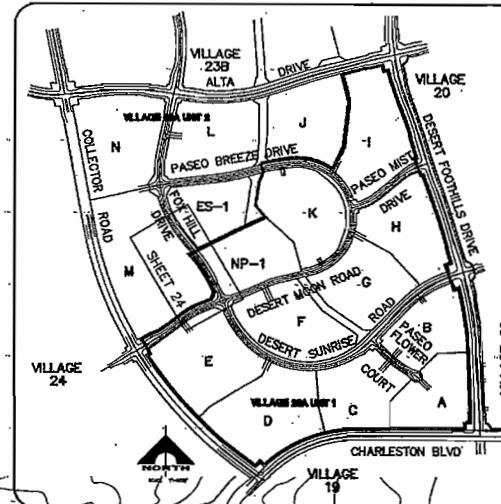
Transitional Drainage Plan Sheet

CITY OF LAS VEGAS GRADING NOTES

- IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
- CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OF FACILITIES AND/OR CAVING OF EXCAVATION.
- THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
- THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
- CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

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

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



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1-800-227-2600
UNDERGROUND SERVICE ALERT (USA)

CALL BEFORE YOU DIG
CALL 1-702-593-6111

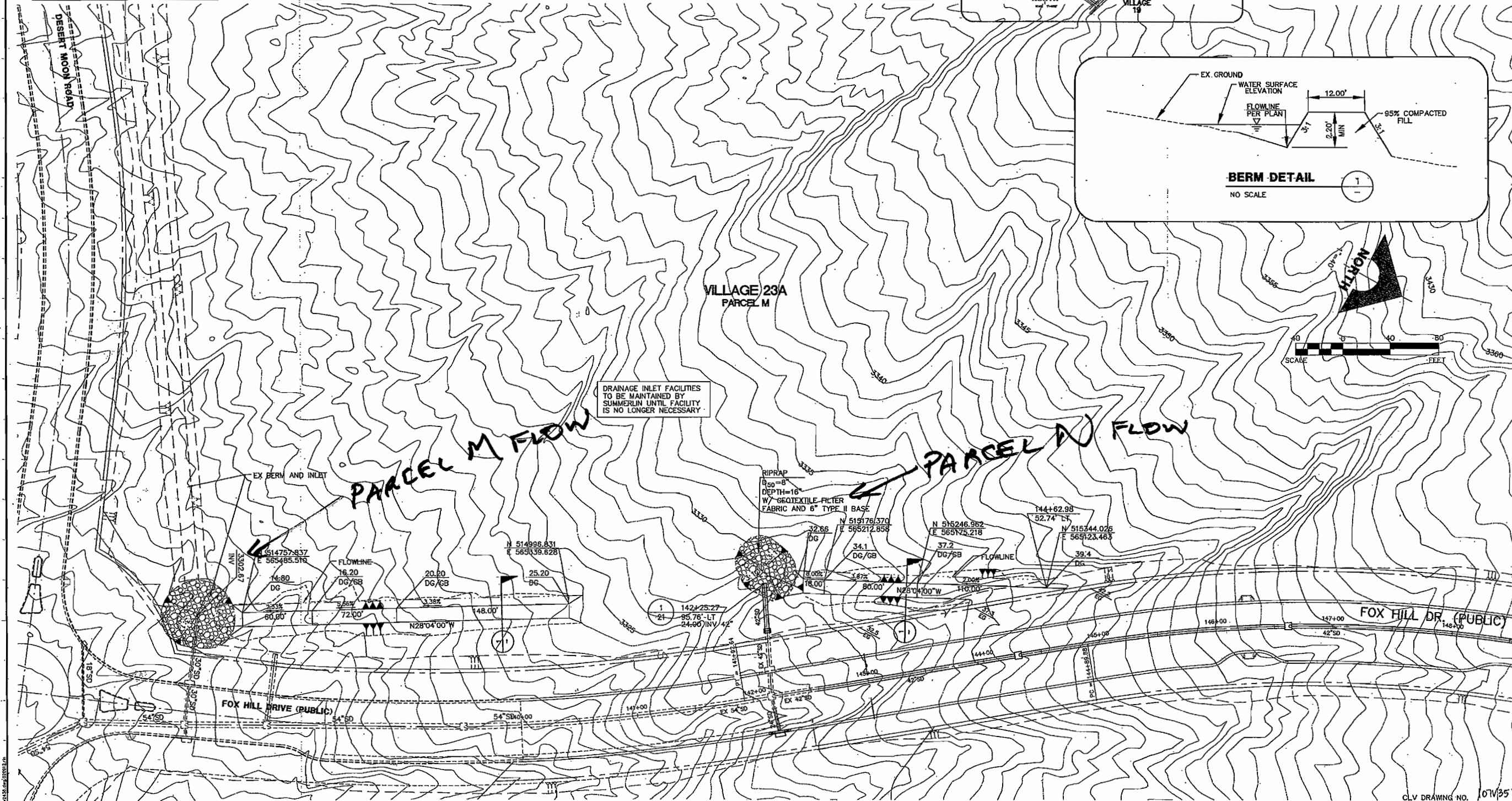
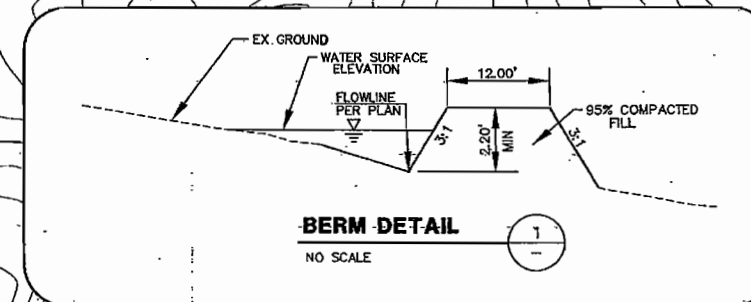


BENCHMARK

CLV BM NO.	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
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



DESIGN: G.W./J.P.
DRAWN: J.U./J.P.
CHECK: BAH
ISSUE DATE: 12/31/14
PLOT DATE: 01-28-04
PLOT TIME: 13:56:07

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1525 SOUTH RAINBOW BLVD., LAS VEGAS, NEVADA 89146
PHONE: (702) 804-2600 FAX: (702) 804-2295

SUMMERLIN
VILLAGE 23A UNIT 2 IMPROVEMENTS
TRANSITIONAL DRAINAGE PLAN I

SHEET
24
24 OF 32 SHEETS

CLV DRAWING NO. 07W3574-2

JOB NO. 62023.222

APPENDIX I

Reference Material

Technical Drainage Study for Summerlin Village 23A Unit 1 Improvements

Approval Letters

CITY OF LAS VEGAS			DATE:		
INTER-OFFICE MEMORANDUM			December 31, 2003		
TO: Land Development Services Department of Public Works			FROM: Albert J. Jankowiak, P.E. <i>aj</i> Flood Control Civil Engineer Department of Public Works		
SUBJECT:		Technical Drainage Study for:		COPIES TO:	
		Summerlin Village 23A - Unit 1 Improvements		G.C. Wallace, Inc.	
Cross Streets:		Charleston Blvd. & Desert Foothills Dr.		Howard Hughes Corporation	
FILE NO.		F:\Depot\DSMEMOS\DS3126F.doc		Bart Anderson, P.E. DevCo	
Parcel Number:		137-22-000-005			
Zoning Action:					
FEMA Flood Zone		YES	No	X	
Proposed Storm Drain		YES	No	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. #
1 st Submittal	5/6/2002	5/20/2002	Not Acceptable	\$250.00	----
2 nd Submittal	5/28/2002	6/7/2002	Accepted	\$250.00	----
3 rd Submittal	9/4/2002	9/18/2002	Accepted	\$250.00	91041: \$250
4 th Submittal	7/11/2003	7/24/2003	See Comments Below	\$250.00	107629: \$250
5 th Submittal	9/17/2003	10/6/2003	See Comments Below	\$250.00	111201: \$250
6 th Submittal	12/17/2003	12/31/2003	See Comments Below	\$400.00	116309: \$400
			TOTAL FEES (LDDRS):	\$1,650.00	Balance: \$500.00

REMARKS:

3rd Submittal: Update #1 for minor change of stub locations in Parcel NP-1

4th Submittal: Update #2 to address 100-yr flow depths in all perimeter street of village parcels being below top of curb.

5th Submittal: Update #3 to move Parcel WS-1, reduce the size of Parcels ES-1 and NP-1, add additional storm drain, and update the hydrology and hydraulic analyses accordingly

6th Submittal: Update #4 to revise the storm drain system due to existing electrical conduit, revised the hydraulic analysis accordingly

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. On profile sheet 17, revise the invert for the dual 30-inch equivalent reinforced concrete elliptical pipes to 98.40 in order to r hydraulic calculation.

2. On detail sheet 4 plans for the storm calculations and for processing.

Post-it® Fax Note 7671		Date 1-13	# of pages 2
To Randy Greenlich		From Al Jankowiak	
Co./Dept. GC Wallace		Co. CLV Flood	
Phone #		Phone #	
Fax # 804-2299		Fax #	

standard design. Structural de a soils report, structural ng plan to land development

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/ajj

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

Relevant Report Excerpts

PS 3126
K34
250.00
REC'D 5-28-02

**RESPONSE TO COMMENTS
ON THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS**

62023.221

May 2002

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4453**



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AFFILIATE OFFICE IN
SACRAMENTO, CA

62023.221

May 24, 2002

Albert Sung, P.E.
Flood Control Project Engineer
City of Las Vegas
Department of Public Works
731 South Fourth Street
Las Vegas, Nevada 89101

Subject: Technical Drainage Study for Summerlin Village 23A Unit 1 Improvements – DS3126A

Dear Mr. Sung:

The purpose of this letter is to address the comments from the City of Las Vegas, dated May 21, 2002, regarding the above-referenced study. The comments are individually addressed as follows:

Comment: "1. In comparing Figure 6 (Storm Drain Facilities Map) and the previously approved *Conceptual Storm Drain Map*, the following section of pipes are missing: a) A 30" storm drain in Loop "A" from half way between Collector road to Spine Road; b) an 18" to 36" storm drain between Parcel K and Parcel ES-1, NP-1 and c) An 18" storm drain from the end of CDS Street to Desert Foothills Drive. Address the discrepancies accordingly. Make sure the maximum spacing between drop inlets is 600'."

Response: a.) At the submittal meeting of Village 23A Unit 1 Improvements drainage study, it was discussed that the 30-inch storm drain in Loop "A" Road was eliminated due to the storm drain constraints from the roundabout at the intersection of Spine Road and Loop "A" Road. Parcel WS-1 discharges runoff into Loop "A" Road (as surface flow) where a 17.5-foot drop inlet that connects to the main line storm drain intercepts the flow.

Runoff from Parcel WS-2 is discharged directly into a 30-inch lateral connecting to the main line in Spine Road.

In the Conceptual Study, the 30-inch storm drain in Loop "A" Road intercepted the flow from Parcels WS-1 and WS-2 and then connected to the storm drain in Spine Road. The

REC'D 7-11-03
DS 3126
K-34
250.00

**ADDENDUM 3
TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS**

62023.221

July 2003

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4453**



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62023.050

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AFFILIATE OFFICE IN
SACRAMENTO, CA

July 11, 2003

Greg McDermott, P.E.
City of Las Vegas
731 South Fourth Street
Las Vegas, Nevada 89101

**Subject: Update to the Summerlin Village 23A Unit 1 Improvements
(DS 3126A)**

Dear Mr. McDermott:

There have been several discussions about options to protect lots in the Summerlin area with finished floor elevations below the top of curb of the offsite (arterial or collector street exterior to the residential subdivisions) streets. In the past the City has requested the use of cutoff walls, lowering the wall footing or landscape erosion protection. Additionally, grouting of the parcel wall above the offsite landscaping finished grade to an elevation 18 inches above the water surface elevation in the street has been requested to protect against runoff flowing through the joints of the wall. Our discussions noted that in the Summerlin area the criteria would be eliminated if a detailed analysis of the circumstances for each parcel showed a low risk of unforeseen flooding problems. Mitigating facilities to be considered in these analyses include the presence of storm drain, presence of median islands to prevent flows from reaching the low side of the offsite street, the size and permanency of the offsite drainage area, and the amount of freeboard in the curb. According to discussions with the City of Las Vegas, 0 inches of curb freeboard and only 0.5 feet of freeboard in the landscaping is not enough protection for the parcels located downstream of the offsite roadways.

The City of Las Vegas Public Works Department approved the technical drainage study for the subject project on June 7, 2002. The purpose of this letter is to serve as an amendment to the drainage study to provide hydraulic calculations to support a change in the design for the amount of allowable surface discharge for the parcels in Summerlin Village 23A.

In the original study the storm drain and drop inlets for the Unit 1 Study were designed for the worse case scenario. Each parcel was given the option to drain the entire generated parcel flow to the proposed lateral that was provided or an allotted amount of runoff as surface flow with the remaining flow discharged into the provided lateral. The revisions to the study will be to take away the parcels' option of being able to surface drain into the offsite streets and to only allow for the entire discharge of the parcel to be in the lateral that is provided, therefore, the only flow in the streets will be what is generated by the streets.



G. C. WALLACE, INC.

Engineers/Planners/Surveyors

City of Las Vegas

July 11, 2003

Page 2

62023.221

The drop inlets that were sized in the original study will remain the same. They will not be reduced due to the reduced amount of flow in the streets. Therefore, the storm flows in the streets will be completely intercepted by the drop inlets. A revised Figure 6 has been included to update the parcels individual surface flow and the amount of flow being intercepted by the drop inlets.

It should be noted that the only parcels that are allowed to surface drain into the street are Parcels E, WS-1, and COS-2. Parcel E has already been approved with 5 cfs allowed to discharge into Desert Sunrise Road (formally known as Spine Road), which, therefore, contributes to the drop inlet just downstream of Parcel E. The two 11.5-foot Modified Type "C" drop inlets intercept the entire 13 cfs [8 cfs (generated from the street) + 5 (discharged from Parcel E)]. Revised Figure 6 indicates the amount of flow in the street and how much flow the drop inlets intercept. Also attached are the revised cross sections and revised drop inlet calculations.

This study will supersede the Conceptual Study Update dated April 17, 2003 (DS 3077A). The following table lists the possible parcels that may have finished floors below the street grades and the corresponding street cross sections. Table 1 displays the maximum street flow at each parcel/street section. According to the table the depth of flow never overtops the curb. The sections demonstrate a depth of flow below the top of curb. It should be noted that the cross sections were taken right in front of the proposed drop inlets, therefore, this would be the most conservative scenario and the only flow in the street is what is generated by the street. Also note that Sections 7 and 8 have a median island, which limits flows from crossing the street centerline.

Table 1 Street Flow Calculations			
Section*	100-Year Flow (cfs)	Depth (ft)	Velocity (fps)
Section 4 (Parcel E)	13	0.35	5.1
Section 5 (Parcel D)	7	0.32	3.5
Section 6 (Parcel C)	6	0.37	2.1
Section 7 (Parcel B)**	11	0.43	2.4
Section 8 (Parcel B)**	8	0.40	2.2
Section 9 (Parcel F)	6	0.32	3.2
Section 10 (Parcel G)	6	0.38	1.8
Section 11 (Parcel H)	3	0.32	1.6
Section 12 (Parcel K)	15	0.40	4.1
Section 13 (Parcel K)	10	0.33	5.0
Section 15 (Parcel H)	8	0.36	3.0

*See attached Figure 6.

**Median island is proposed at these sections.

Rec'd 9/17/03

DS 3126

K 34

K - 250.00

**ADDENDUM 4
TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS**

62023.221

September 2003

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
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AFFILIATE OFFICE IN
SACRAMENTO, CA

62023.2215

September 17, 2003

Greg McDermott, P.E.
City of Las Vegas
731 South Fourth Street
Las Vegas, Nevada 89101

**Subject: Update #2 to the Summerlin Village 23A Unit 1 Improvements
(DS 3126A)**

Dear Mr. McDermott:

The City of Las Vegas Public Works Department approved the technical drainage study for the subject project on June 7, 2002. The purpose of this letter is to serve as an amendment to the drainage study to provide hydrologic and hydraulic calculations to support a change in the design for the amount of allowable surface discharge for the revised parcels in Summerlin Village 23A.

In the original study for Unit 1, Parcels WS-1 and WS-2 were proposed at the northwest corner of Desert Moon Road and Fox Hill Drive and were proposed to drain to the Fox Hill Drive storm drain. The Unit 2 Study (approved on August 27, 2003, DS3402A) updated the hydrology by removing Parcels WS-1 and WS-2 and extending Parcel M to Desert Moon Road. In this Unit 1 update, a 48-inch lateral is being constructed for the parcel discharge from Parcel M and the existing 42-inch and 30-inch laterals will be left in place. The 48-inch lateral will convey the entire 92 cfs generated from the revised Parcel M. It should be noted that the 42-inch and 30-inch laterals will remain for the interim conditions and will be removed upon the development of Parcel M.

With this update Parcel WS-1 is being moved from the intersection of Collector Road and Desert Moon Road to between Parcels NP-1 and ES-1. See attached, revised Figure 6. The areas for Parcels ES-1 and NP-1 are reduced to make room for Parcel WS-1. Parcel WS-1 will generate a maximum discharge of 17 cfs and will combine with the school site (Parcel ES-1) in a future 36-inch storm drain. The future 36-inch storm drain flow and the park site runoff (Parcel NP-1) will be combined in the existing 42-inch storm drain in Desert Moon Road. The Combination Point C-5 flow will only increase from 61 cfs to 66 cfs. According to the revised Standard Form 6 the existing storm drain in Desert Moon Road will be able to handle the increase of 5 cfs.

In order to balance out the increase from Parcel WS-1, Parcel K was revised to match the approved tentative map. According to the tentative map approximately 59 lots in 20 acres are proposed in Parcel K. That density is

Revised 12/17/03

DS 3126-4

K-34

\$100⁰⁰

**ADDENDUM 5
TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS**

62023.221

December 2003

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4453**



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Engineers/Planners/Surveyors



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 CHRISTOPHER W. ANDERSON, PE
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 E. ROBERT PETERSON
 SCOTT R. PLUMMER, PE
 BENJAMIN C. SMITH, PE
 EUGENE W. WRIGHT, PE
 THOMAS P. DYSON, PE
 DOUGLAS M. HANKEL
 BERT A. HUGHES, PE
 RICKEY D. HUNSAKER, PE, LC
 NOEL C. LAUGHLIN, PE
 MARVIN W. MAIZE
 DANNY S. McFADDEN, PE
 S. WILLIAM NEIGHBORS, PE
 THOMAS R. NICHOLS, PE
 FREDERICK W. ORBAN, PLS
 JERRY E. PRUITT, PE
 BRIAN L. SCHMIDT, PE
 JEFF W. STAYTON, PE
 JOHN R. TOBIN, PE, PTOE
 HOWARD K. VANDER MEER, PE, WRS
 G. IRA WALLACE, PE

JIM B. BANGKEDAH, PE
 JOSEPH A. BODROG, PLS
 ERIC J. GALVAN
 RANDALL K. GREMLICH, PE
 PASCAL HAYES, PE/SE
 J. P. HIGGINS, PLS, WRS
 DANNY E. HILL, PLS
 DAPHNE L. HOFFMAN
 DONALD L. HOTCHKISS JR., PE
 RANDY W. MROWICKI, PLS
 JOHNNIE R. PATE JR., PE, PTOE
 SALINDRA L. VANCE, CCS, CCA
 JOHN M. WALKER, PE
 CHRISTOPHER R. ZRINYI, PE

FAYSAI ARIDI, PE
 RYAN R. BELSICK, PE
 JOHN T. BROWN, PE
 PATRICK S. BYRD, PE
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 ROY D. CLARK, PE
 RICHARD G. CLARKE
 GLENN R. CURTIS, III, CMI
 HEIDI A. DEXHEIMER, PE
 IAIN DOLEMAN
 G. QUINCY EDWARDS, PE
 MARK A. FERDA, PE
 JOHN FITCH, PE
 PAUL F. FRITZ
 ERIC G. GILES, PE/SE
 NICHOLAS G. GOLZ, PE
 BRIJ M. GULATI, PE, PTOE
 KEITH HATTON, PE
 GERALD L. HOLTON, PLS
 BILL HUNTER, PE
 RUSSELL D. JAMISON, PLS
 JOSH JOHNSON, PE
 KAYANN JONGSMA, PE
 TODD N. KELLEY, PE
 DENNIS R. KETTERMAN
 FRED KHANBOLOUKI, PE
 SCOTT R. LANDERMAN, PLS
 PAUL R. LOHMAN, PE
 MICHAEL J. LUDWIG, PE
 CHRISTOPHER M. LUQUETTE, PE, CFM
 JEFFERY J. McBRIDE, PE
 WILLIAM METCALF
 MATTHEW D. MEYER, PE
 WILLIAM J. MEYER, PE
 RIMAH I. NAZZAL, PE/SE
 GIA D. NGUYEN, PE
 BRENT D. PARRISH
 CHRISTOPHER W. PLUTTE, PE
 RICK J. READ, PE
 BRADFORD G. ROCKWELL, PE
 CHRISTOPHER B. SMITH, PE
 DENNIS W. SOLANO, PLS
 S. TRACY STRATTON
 HUAGAO (HUGO) TAN, PE
 CHURAIRAT (ANN) TANAKUL, PE
 KEVIN L. TOMLINSON, PE
 JERRY TSUNETA
 F. EDUARDO VILLALOBOS, PE/SE
 PAUL J. VILLALUZ, PE
 KEVIN W. WALLACE, PLS
 GLENN B. WATANABE, PE
 STEPHEN L. WEATHERMAN, PE
 MANSON W. WONG, PE, PTOE

AFFILIATE OFFICE IN
 SACRAMENTO, CA

62023.221

December 17, 2003

Albert Sung, P.E.
 City of Las Vegas
 Land Development Services
 731 South Fourth Street
 Las Vegas, Nevada 89101

**Subject: Update #5 to the Summerlin Village 23A Unit 1 Improvements
 (DS 3126A)**

Dear Mr. Sung:

The City of Las Vegas Public Works Department approved the technical drainage study for the subject project on June 7, 2002. The purpose of this letter is to serve as an amendment to the drainage study to provide hydraulic calculations to support a change in the design for the lateral provided for Parcel M in Summerlin Village 23A.

In Addendum #4 for Unit 1, Parcel M was proposed to entirely drain to a 48-inch lateral. During construction of the lateral it was discovered that existing electrical conduits with concrete encasement cross the vertical profile of the proposed 48-inch lateral. Since the majority of the project has been constructed a solution to work around the encasement is necessary. It is still proposed to extend the 48-inch lateral to Parcel M. However, in order to avoid the concrete encasement the 48-inch lateral will be transitioned into two 30-inch equivalent, elliptical pipes. The two 30-inch equivalent elliptical pipes will go under the concrete encasement and connect to the existing 54-inch storm drain in Fox Hill Drive. With this update a Standard Form 6 has been included to demonstrate that no adverse impacts to the storm drain will occur. The criteria of providing 1-foot of freeboard is met for the storm drain model. Since the flows and location are consistent with the original approved Unit 1 Study no downstream facilities will be adversely impacted by this revision.

A revised storm drain lateral detail is attached. If you have any questions or require additional information, please contact us at 804-2000.

Very truly yours,

G. C. WALLACE, INC.

Amanda L. Gonzales, E. I.
 Senior Designer

RKG:ALG:jj

Enc.

pc: Bert Hughes, GCW
 David Fehlig, GCW

Randall K. Gremlich, P.E.
 Vice President
 Flood Control Division

G:\62023-221\admin\ltdv-UPDATE#5-SV23A-U1mp-alg-rkg.doc

Drainage Facilities Exhibit

Revised 12/17/03

DS3126-4

K-34

\$100⁰⁰

**ADDENDUM 5
TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS**

62023.221

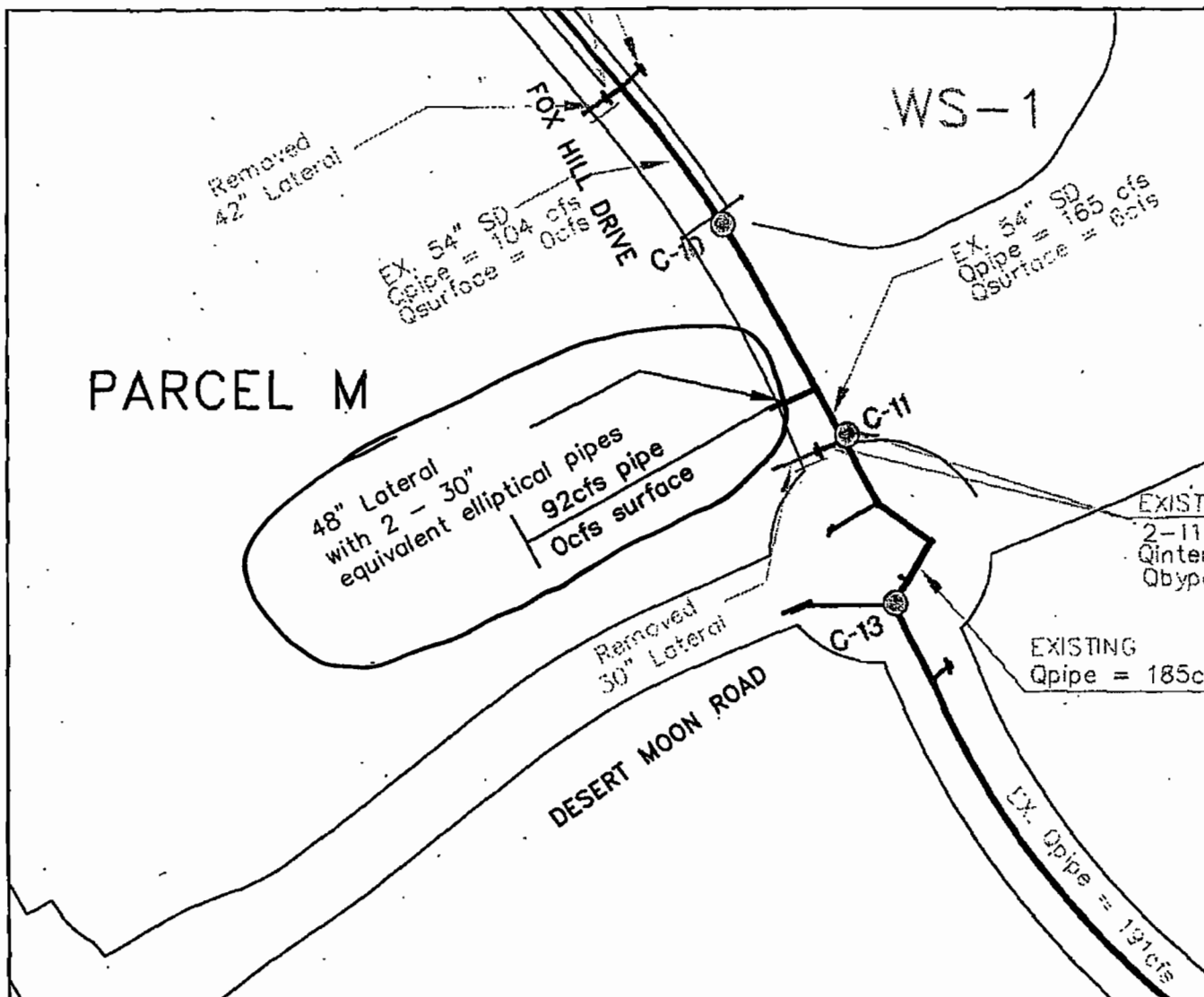
December 2003

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4453**

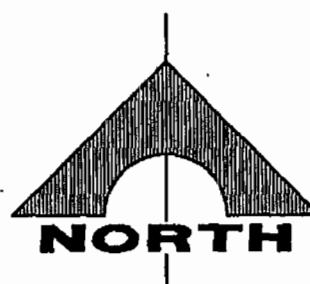


G. C. WALLACE, INC.
Engineers/Planners/Surveyors



LEGEND

- A PARCEL NAME
- PROPOSED STONE DRAIN
- MAXIMUM PIPE DISCHARGE
- MAXIMUM SURFACE DISCHARGE
- PARCEL DISCHARGE
- REVISED MAXIMUM COMBINED DISCHARGE FROM PARCEL
- 19 REVISED CONCENTRATION POINT



GRAPHIC SCALE



(IN FEET)

1 inch = 200 ft.

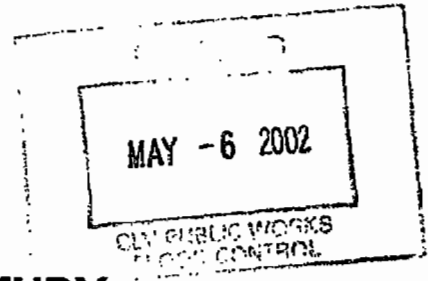
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS

EXHIBIT A DETAIL DRAWING



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

Street Drainage Basin & Hydraulic Section Exhibits



**TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS**

2176
KBY
4250

62023.221

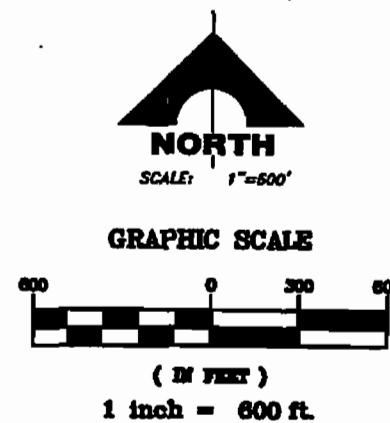
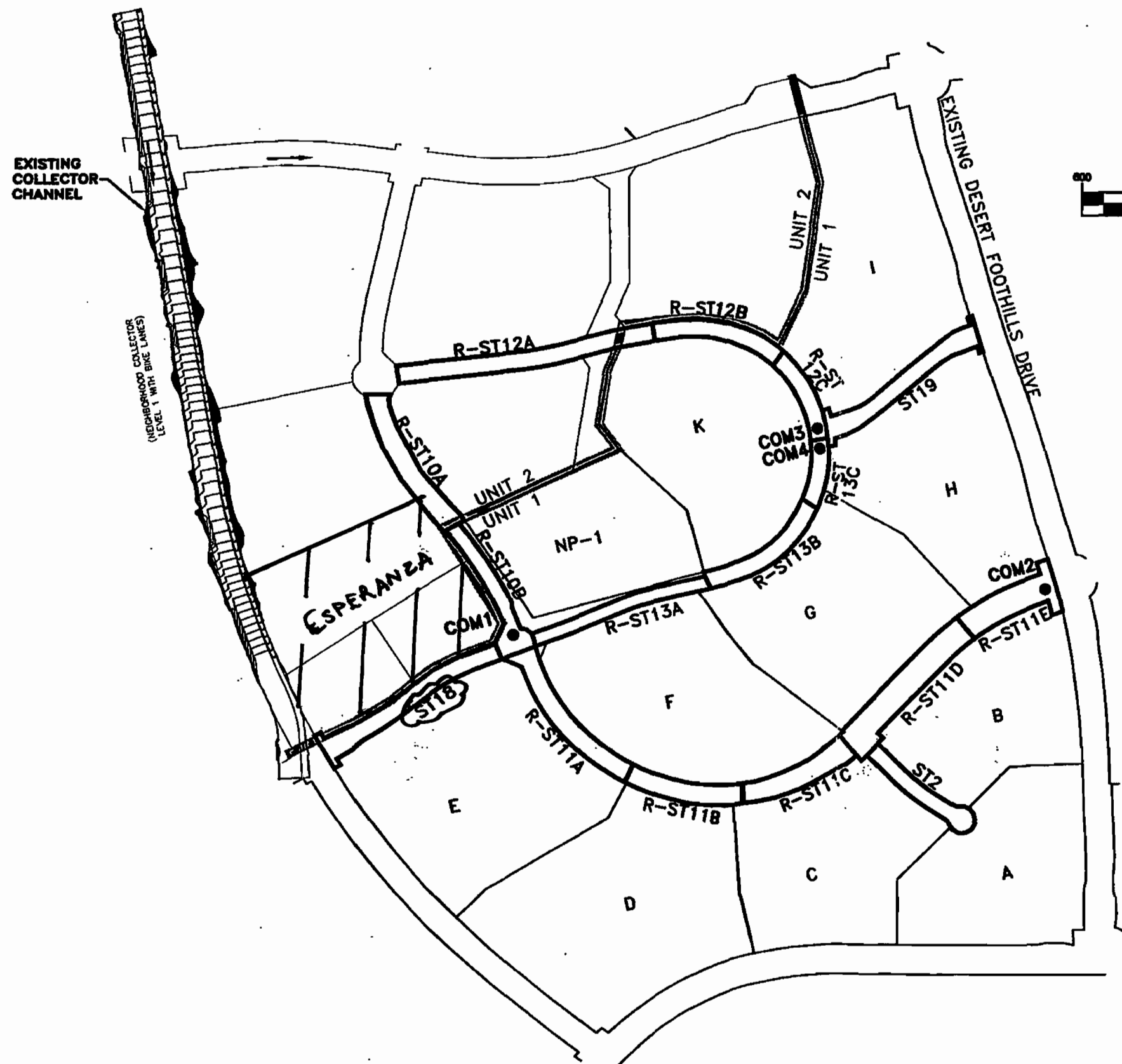
May 2002

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4453**



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



SUMMARY OF HEC-1 MODEL

BASIN OR LOC.	Q100 (CFS)	Q10 (CFS)
RST10A**	8	4
RST10B	6	3
COM1	14	7
RST11A	8	4
RST11B	6	3
RST11C	6	3
RST11D	11	6
RST11E	8	4
COM2	39	20
RST12A**	10	5
RST12B	6	3
RST12C	4	2
COM3	20	10
RST13A	6	3
RST13B	6	3
RST13C	3	2
COM4	14	7
ST2*	6	3
ST18*	8	4
ST19*	8	4

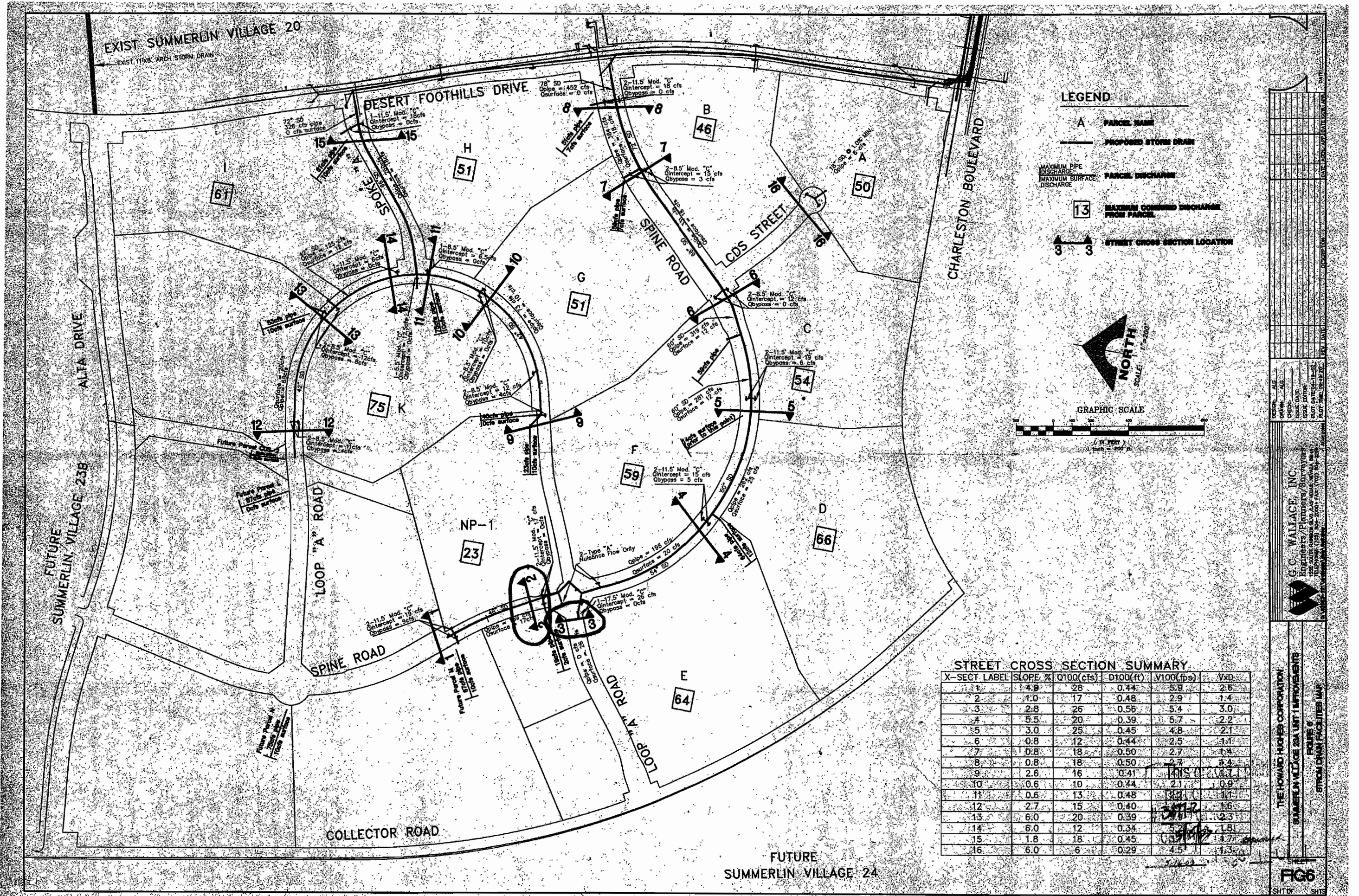
* TAKEN DIRECTLY FROM THE CONCEPTUAL STUDY
** WILL BE DEVELOPED IN FUTURE PHASES

PORTION OF SUBBASIN A(8cfs)
COMBINES W/ ST18(8cfs)
@ EX. 17.5' DROP INLET
LEGEND IN DESERT MOON

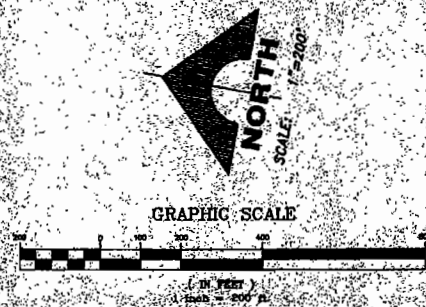
- R-ST11B REVISED DRAINAGE BASINS
- COM1 CONCENTRATION POINT
- SUBBASIN BOUNDARY
- UNIT BOUNDARY

SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS

FIGURE 5
DRAINAGE BASINS FOR
DROP INLET SIZES



- LEGEND**
- A PARCEL NAME
 - PROPOSED STORM DRAIN
 - MAXIMUM PIPE DISCHARGE
 - MAXIMUM SURFACE DISCHARGE
 - 13 MAXIMUM COMBINED DISCHARGE FROM PARCEL
 - 3 3 STREET CROSS SECTION LOCATION



STREET CROSS SECTION SUMMARY

X-SECT LABEL	SLOPE %	Q100(cfs)	D100(ft)	V100(fps)	VxD
1	4.8	28	0.44	5.8	2.6
2	1.0	17	0.48	2.9	1.4
3	2.8	26	0.56	5.4	3.0
4	5.5	20	0.39	5.7	2.2
5	3.0	25	0.45	4.8	2.1
6	0.8	12	0.44	2.5	1.1
7	0.8	18	0.50	2.7	1.3
8	0.8	18	0.50	2.7	1.3
9	2.6	16	0.41	2.5	1.1
10	0.6	10	0.44	2.1	0.9
11	0.6	13	0.48	2.2	1.1
12	2.7	15	0.40	2.2	1.0
13	6.0	20	0.39	5.7	2.3
14	6.0	12	0.34	5.2	1.8
15	1.8	18	0.45	3.9	1.7
16	6.0	6	0.29	4.5	1.3

DATE: 11/14/03

BY: JWC

CHECKED: JWC

SCALE: AS SHOWN

PROJECT: SUMMERLIN VILLAGE 24 UNIT IMPROVEMENTS

FIGURE 6

STORM DRAIN FACILITIES MAP

DATE: 11/14/03

BY: JWC

CHECKED: JWC

SCALE: AS SHOWN

PROJECT: SUMMERLIN VILLAGE 24 UNIT IMPROVEMENTS

FIGURE 6

STORM DRAIN FACILITIES MAP

THE HOWARD HUGHES CORPORATION

SUMMERLIN VILLAGE 24 UNIT IMPROVEMENTS

FIGURE 6

STORM DRAIN FACILITIES MAP

G. C. WALLACE, INC.

Engineers/Planners/Surveyors

200 South Main Street, Suite 200, Las Vegas, NV 89101

Telephone: (702) 399-5000 • Fax: (702) 399-5001

Internet: www.gcwallace.com

Fox Hill Street Section Computation

Rec'd 7-11-03
DS 3126
K-34
250.00

**ADDENDUM 3
TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS**

62023.221

July 2003

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4453**

Spine Road - Section 2

Worksheet for Irregular Channel

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

Input Data	
Slope	1.0 %
Discharge	6 cfs

BASIN R-ST10B

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	0.36 ft
Elevation Range	0.00 to 1.08
Flow Area	2.7 ft²
Wetted Perimeter	22.92 ft
Top Width	22.10 ft
Actual Depth	0.36 ft
Critical Elevation	0.37 ft
Critical Slope	0.8 %
Velocity	2.2 ft/s
Velocity Head	0.08 ft
Specific Energy	0.44 ft
Froude Number	1.13
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+40.0	1+10.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+40.0	0.50
0+40.5	0.50
0+40.5	0.00
0+42.0	0.13
0+42.0	0.17
0+62.7	0.58
0+62.7	1.08
0+87.3	1.08
0+87.3	0.58
1+08.0	0.17

Spine Road - Section 2
Worksheet for Irregular Channel

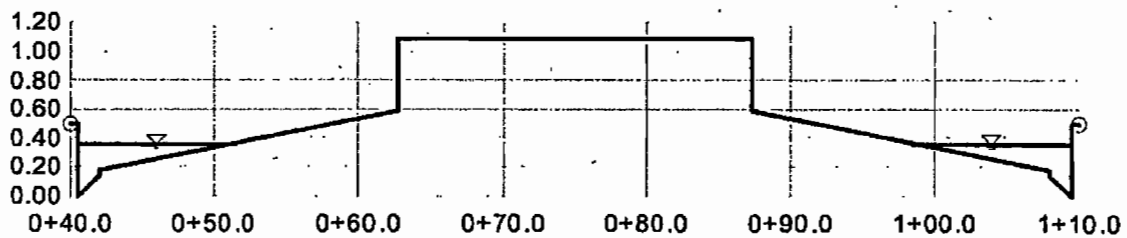
Natural Channel Points	
Station (ft)	Elevation (ft)
1+08.0	0.13
1+09.5	0.00
1+09.5	0.50
1+10.0	0.50

Section 2

Cross Section for Irregular Channel

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

Section Data	
Mannings Coefficient	0.016
Slope	1.0 %
Water Surface Elevation	0.36 ft
Elevation Range	0.00 to 1.08
Discharge	6 cfs



V:10.0
H:1
NTS

Desert Moon Street Section & Drop Inlet Computations

PS 3126
R34
250.00
REC'D 5-28-02

**RESPONSE TO COMMENTS
ON THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
UNIT 1 IMPROVEMENTS**

62023.221

May 2002

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4453**

Loop Road "A" - 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	2.75 %
Discharge	26.00 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	0.56 ft
Elevation Range	0.00 to 1.09
Flow Area	4.8 ft ²
Wetted Perimeter	23.42 ft
Top Width	22.81 ft
Actual Depth	0.56 ft
Critical Elevation	0.70 ft
Critical Slope	0.59 %
Velocity	5.38 ft/s
Velocity Head	0.45 ft
Specific Energy	1.01 ft
Froude Number	2.06
Flow Type	Supercritical

Calculation Messages:
Water elevation exceeds lowest end station by 0.60244135e-1 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+24.0	0+68.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+24.0	0.50
0+24.5	0.50
0+24.5	0.00
0+26.0	0.13
0+26.0	0.17
0+66.0	0.92
0+66.0	0.75
0+66.0	0.72
0+67.5	0.59
0+67.5	1.09

PROP. $Q_{100} = 16 \text{ CFS} < 26 \text{ CFS DESIGN}$

∴ DRAINAGE PATTERN TO ALLOW
FLOW DISCHARGE TO DESERT
MOON OK.

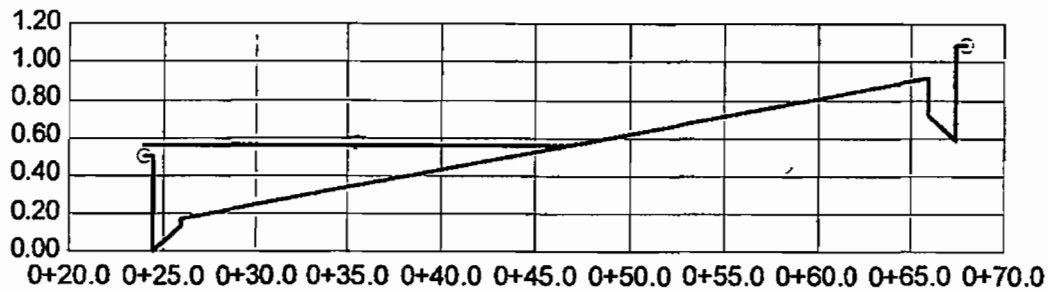
Loop Road "A" - Section 3
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+68.0	1.09

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	2.75 %
Water Surface Elevation	0.56 ft
Elevation Range	0.00 to 1.09
Discharge	26.00 cfs



V:10.0
H:1
NTS

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

17.5-ft Drop Inlet (Section 3)

Known:

Q_s =	Half Street flow (cfs)	26.0
S_o =	Longitudinal slope (ft/ft)	0.028
n =	Manning's roughness coef	0.016
V_s =	Flow velocity (fps)	5.4
D =	Flow depth (ft)	0.56
S_x =	Street transverse slope (ft/ft)	0.03
W =	Gutter Width (ft)	1.5
a =	Gutter Depression (in)	4.0
L_g =	Length of grate (ft)	18.0
L_c =	Length of curb opening (ft)	17.50
C_g =	Clogging factor for grate (%)	50
C_c =	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f = Frontal flow factor = $1 - 0.09 \cdot (V_s - V_o)$ if $V_s > V_o$; else $R_f = 1$	1.00
V_o = Splash over velocity = $p + q \cdot L_g \cdot r + s \cdot L_g^3$ (fps)	15.26
E_o = Grate flow ratio = Q_w / Q_s	0.16
Q_w = Frontal flow = $A_w \cdot V_o$	4.18
Q_s = Side flow = $Q_s - Q_w$ (cfs)	21.8
R_s = Side flow factor = $1 / (1 + (0.15 \cdot V_s^{1.8}) / (S_x \cdot L_g^{2.5}))$	0.63
Q_g = Flow intercepted = $[R_f \cdot E_o + R_s \cdot (1 - E_o)] \cdot Q_s$	18.0

* $p=1.76$; $q=3.12$; $r=0.45$; $s=0.03$ (based on Bar P 1-1/8 grate)

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x + S_o \cdot E_o$ (ft/ft)	0.071
S_w = Gutter cross slope = $(0.137 + a \cdot \text{feet}) / W$	0.230
L_i = Total interception $L_i = 0.60 \cdot Q_s^{0.42} \cdot S_o^{0.30} \cdot (1/n \cdot S_e)^{0.6}$ (ft)	46.89
Q_c = Flow intercepted = $(1 - (1 - L_i / L_g)^{1.8}) \cdot Q_s$ (cfs)	8.1

Total Inlet Calculations

Q_d = Total flow intercepted = $Q_w + Q_c$ (cfs)	26.0
Q_{bypass} = Flow bypass = $Q_s - Q_d$ (cfs)	0.00
q = Interception per unit ratio = Q_d / L_g (cfs/ft)	1.44
E_q = Efficiency = $(Q_d / Q_s) \cdot 100$	100%

Relevant Storm Drain Profile Sheets

SUMMERLIN



THE PASEOS VILLAGE 23A UNIT 1 IMPROVEMENTS

DESERT SUNRISE ROAD FROM STA 100+00 TO 111+80.96, FOX HILL DRIVE FROM STA 111+80.96 TO 142+46.77, PASEO FLOWER COURT
~~SPINE ROAD FROM STA 100+00 TO 142+46.77, CUL-DE-SAC "A",~~
DESERT MOON ROAD FROM STA 100+00 TO 132+48.53, PASEO BREEZE DRIVE FROM STA 132+48.53 TO STA 145+75, PASEO MIST DRIVE
~~LOOP "A" FROM STA 100+00 TO 145+75, SPOKE "A"~~

APN # 137-22-000-005

SID #XXX PROJECT NO.: YYY

2002

PROJECT NAME: Village 23A Unit 1
4-14-16-31-34-40-44-45
This project water plan complies with the Las Vegas Valley Water District's technical requirements. However, this water plan is
NOT APPROVED FOR CONSTRUCTION
at this time and this signature does not provide or imply a water commitment.
LVWWD #52: *[Signature]* 9/5/02 DATE

"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"

DEVELOPER

The Howard Hughes Corporation

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, INC.
Engineers/Planners/Surveyors

1555 SOUTH RAINBOW BLVD./LAS VEGAS, NEVADA 89146
OFFICE: (702) 804-2000, FAX: (702) 804-2299
SUMMERLIN OFFICE 10000 CHARLESTON BLVD., STE. 130
OFFICE: (702) 804-2160, FAX: (702) 804-2295

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
[Signature] 8/2/02
BERT A. HUGHES R.P.E. 10259 DATE

THE HOWARD HUGHES CORPORATION,
a Delaware corporation

By: *[Signature]* 8-28-02
JOHN T. POTTS DATE
Title: SENIOR VICE PRESIDENT, DEVELOPMENT

"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."

[Signature] 9-18-2002
CHARLES KAJKOWSKI JR., PE #4794 DATE
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

CLV PLANNING DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS IF THE PLANNING AND DEVELOPMENT DEPARTMENT
[Signature] 9-17-02
MARGO WHEELER, AICP, CURRENT PLANNING MANAGER 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. *[Signature]* 8-30-02
REVIEWED BY DATE

[Signature] 9/11/02
LAS VEGAS VALLEY WATER DISTRICT DATE
(SHEETS 1,2,6,9-14,16-31,34-40,44,45,42,43)

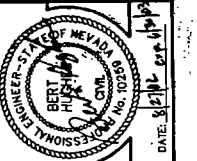
[Signature] 9-4-02
CLV FIRE DEPARTMENT DATE

[Signature] 08-30-02
SPRINT DATE

[Signature] 9-4-02
SOUTHWEST GAS CORP. DATE

CITY OF LAS VEGAS DRAWING NO. **SHEET 1 OF 61**

Contract Construction
SEWER AS-BUILT



DESIGN	DATE	REV	DATE	DESCRIPTION
DESIGN	8/2/02	1		DESIGN
CHECK	8/2/02	2		CHECK
INCH DATE	8/2/02	3		INCH DATE
PLAT DATE	8/2/02	4		PLAT DATE
PLAT TIME	18:20:11	5		PLAT TIME

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
10000 W. CHARLESTON BLVD., SUITE 200, LAS VEGAS, NV 89135
OFFICE: (702) 804-2000, FAX: (702) 804-2299
SUMMERLIN OFFICE 10000 CHARLESTON BLVD., STE. 130
OFFICE: (702) 804-2160, FAX: (702) 804-2295
E-MAIL: info@wallaceinc.com

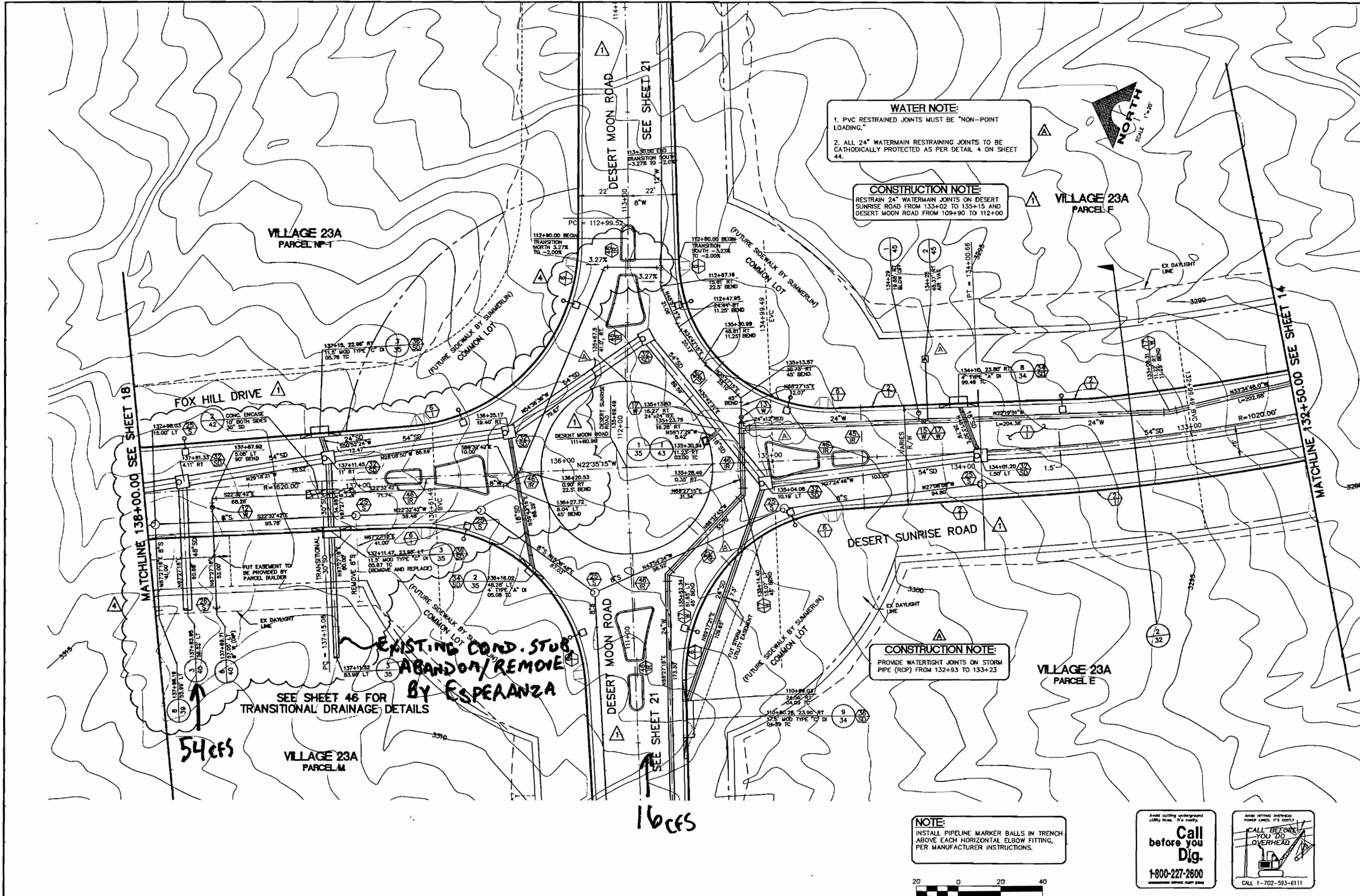
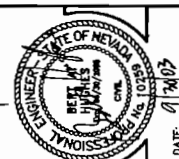
SUMMERLIN
VILLAGE 23A UNIT 1 IMPROVEMENTS
COVER SHEET

SHEET
1
1 OF 61 SHTS

05/19/03 ISSUE TO CONSTRUCT

-Sewer As-built-

JOB NO. 65023.221



WATER NOTE:
1. PVC RESTRAINED JOINTS MUST BE "NON-POINT LOADING."
2. ALL 24" WATERMAIN RESTRAINING JOINTS TO BE CATHODICALLY PROTECTED AS PER DETAIL 4 ON SHEET 44.

CONSTRUCTION NOTE:
RESTRAIN 24" WATERMAIN JOINTS ON DESERT SUNRISE ROAD FROM 133+02 TO 135+15 AND DESERT MOON ROAD FROM 109+90 TO 112+00

CONSTRUCTION NOTE:
PROVIDE WATERTIGHT JOINTS ON STORM PIPE (RCP) FROM 132+93 TO 133+23

NOTE:
INSTALL PIPELINE MARKER BALLS IN TRENCH ABOVE EACH HORIZONTAL ELBOW FITTING, PER MANUFACTURER INSTRUCTIONS.

Call before you Dig.
1-800-227-2600



APPROVAL:
First Approval 9/11/03
[Signature]
LAS VEGAS VALLEY WATER DISTRICT
DATE 9/30/03

BENCHMARK			
BM #	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
OLV09-345SE6	NOOT BRASS CAP, 50 FEET NORTH OF STATION 707+18.42 OF CHARLESTON BOULEVARD.	3209.81 (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

ROUNDAABOUT UTILITY PLAN

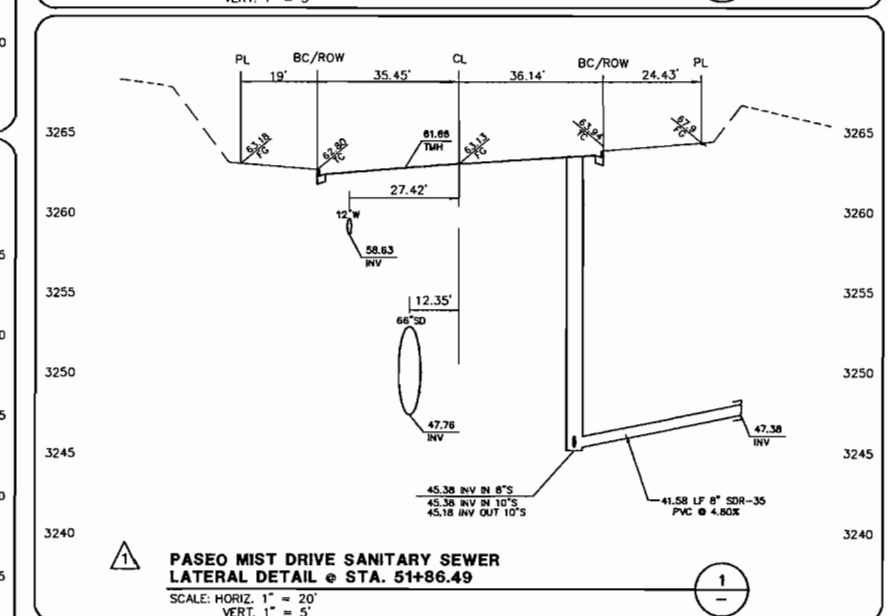
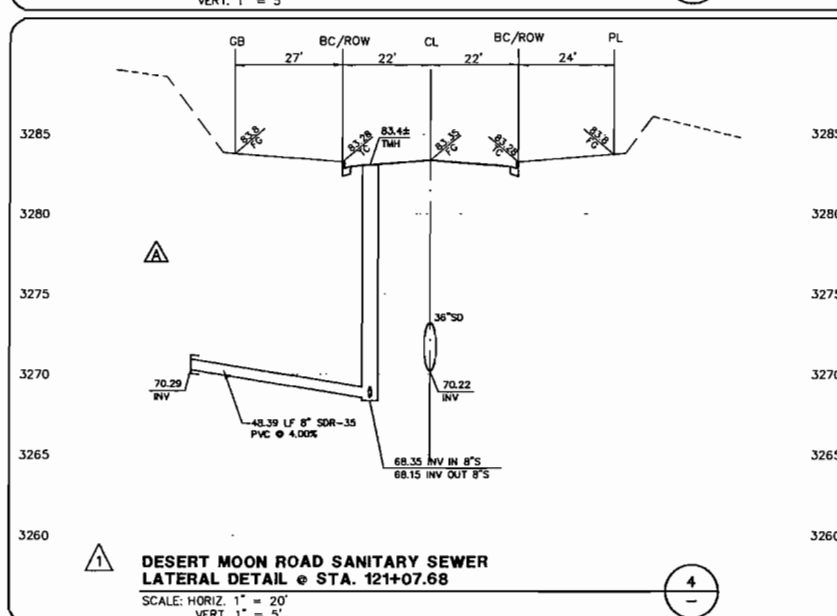
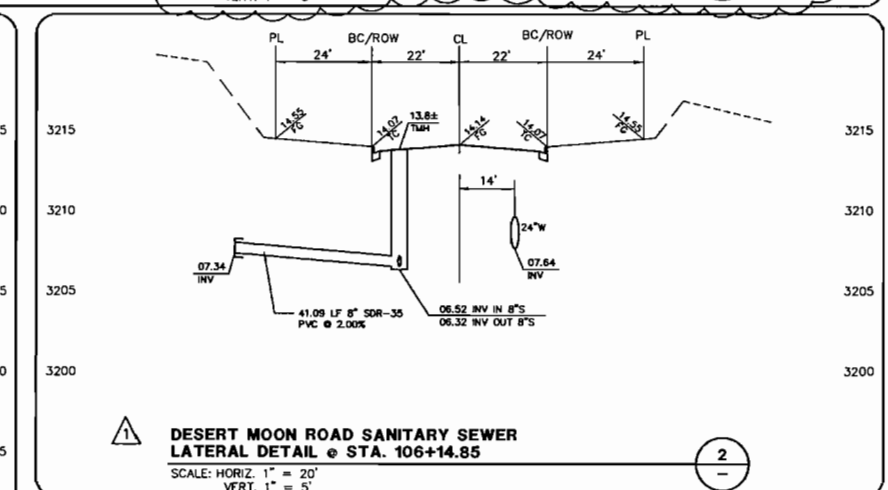
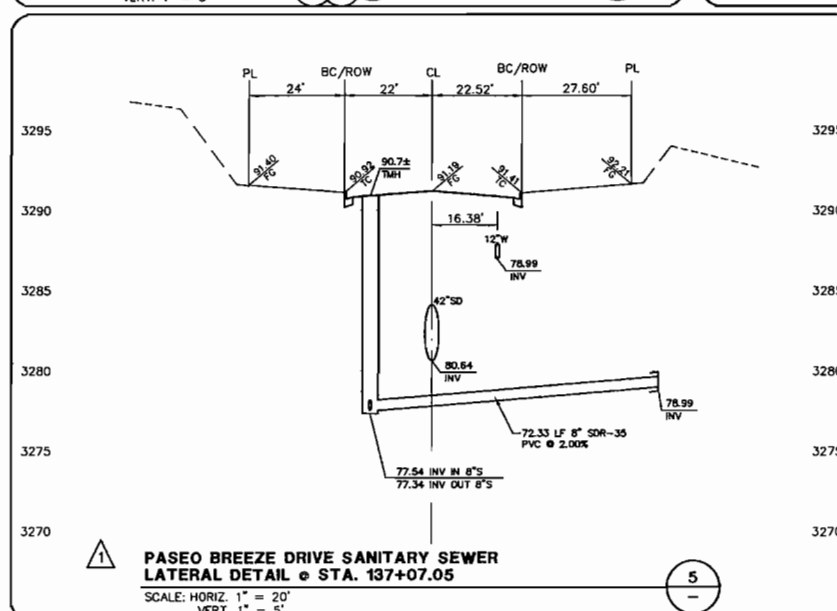
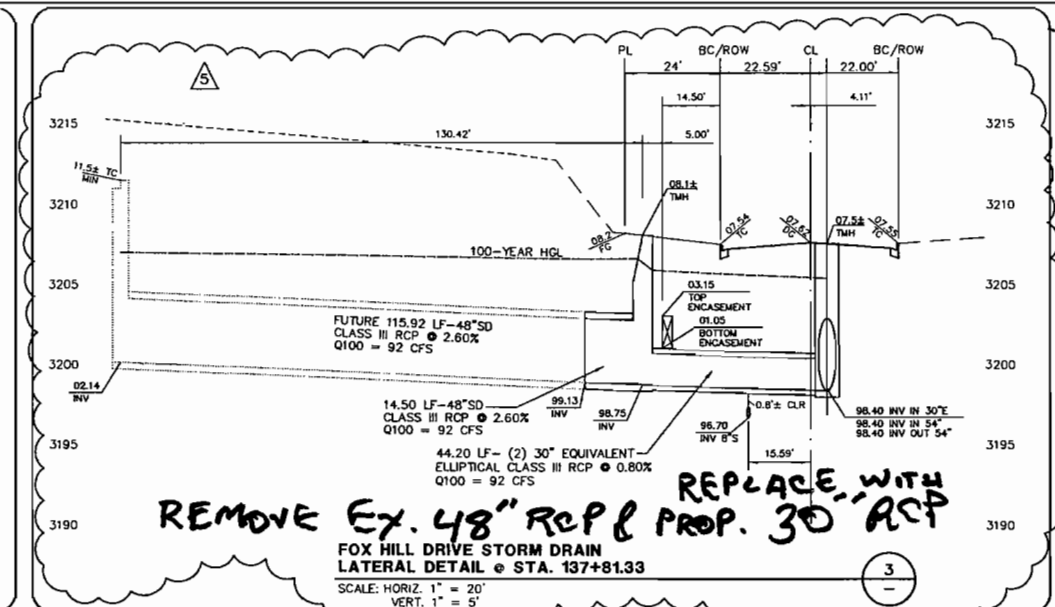
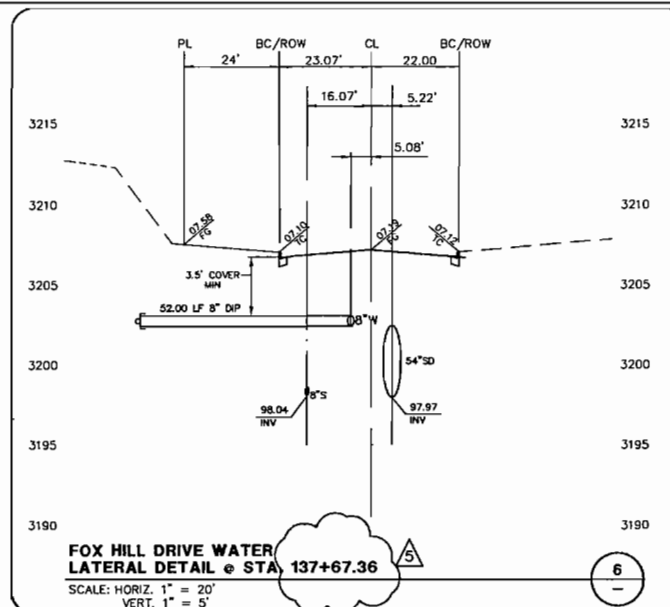
SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'
REFER TO SHEET 2 FOR CONSTRUCTION NOTES

DESIGN: G.C. WALLACE, INC.
DRAWN: G.C. WALLACE, INC.
CHECK: G.C. WALLACE, INC.
ISSUE DATE: 9/30/03
PLOT DATE: 09-04-03
PLOT TIME: 13:06:29

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
10000 CHARLESTON BLVD., STE. 130
LAS VEGAS, NV 89146
OFFICE: (702) 804-2000 FAX: (702) 804-2285
FAX: (702) 804-2180 FAX: (702) 804-2285

SUMNERLIN
VILLAGE 23A UNIT IMPROVEMENTS
ROUNDAABOUT UTILITY PLAN

SHEET 16
JOB NO. 62023221



APPROVAL:
FIRST APPROVAL 9/11/02
LAS VEGAS VALLEY WATER DISTRICT

2/10/04
DATE

DATE: 01/04/04

DESIGN: J.J.	DATE: 01/04/04
DRAWN: SOC	DATE: 01/04/04
CHECK: SOC	DATE: 01/04/04
ISSUE DATE: 01/04/04	DATE: 01/04/04
ISSUE EDITOR: SOC	DATE: 01/04/04
PLOT DATE: 02-09-04	DATE: 01/04/04
PLOT TIME: 08:27:04	DATE: 01/04/04

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH RANCHO BLVD., LAS VEGAS, NEVADA 89146
SUMMERLIN OFFICE: 10000 CHARLESTON BLVD., STE. 130
OFFICE: (702) 904-2100, FAX: (702) 904-2295
F:\V23\Unit 1\Draw\Wm3\23A1640.dwg

SUMMERLIN
VILLAGE 23A UNIT 1 IMPROVEMENTS
LATERAL PROFILES VII

SHEET
40
1074-5574-1

JOB NO. 62023221

APPENDIX J

Reference Material

Technical Drainage Study for Summerlin Village 23A Rough Grading

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: May 16, 2003 <i>MS</i>
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 – Update	
Cross Streets:	NWC Charleston and Desert Foothills	
FILE NO.:	F:\Depot\DSMEMOS\DS3077E.doc	
Parcel Number:	137-22-000-005	
Zoning Action:		
FEMA Flood Zone	YES	No X
Proposed Storm Drain	YES X	No
COPIES TO:		G. C. Wallace, Inc. Howard Hughes Corporation Bart Anderson, P.E., DEVCO CCRFGD

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. #
1 st Submittal	2/1/2002	2/15/2002	Conditional Acceptance	\$250.00	—
2 nd Submittal	2/28/2002	3/13/2002	Not Acceptable	\$250.00	—
3 rd Submittal	3/22/2002	4/5/2002	Acceptable	\$250.00	—
4 th Submittal	5/6/2002	5/16/2002	Acceptable	\$250.00	86133: \$1,000
5 th Submittal	4/17 & 5/15/2003	5/16/2003	See Comments Below	\$250.00	102770: \$250
TOTAL FEES (LDDRS):				\$1,250.00	—

REMARKS:

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

4th & 5th Submittals are Updates

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. This update is to address the 100-yr flow depths in all interior streets of *Village 23A* being at or below the top of curb; the onsite houses should be well protected even if they are below the corresponding street grade. This is true conceptually, however freeboard must also be considered for further protection. Curb height of 8" high and/or sidewalk with landscaping strip must be considered to provide the freeboard in lieu of the solid grouting of wall. This will be reviewed in a case by case situation upon individual parcel development.

The following comments are re-iterated until they are complete:

1. *Detail 1/43 for the berm along Charleston Boulevard must provide a layer of geotextile filter fabric beneath the riprap.*
2. *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.

3. *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

T/R/S: T20S/R59E/34
AREA K34

Relevant Report Excerpts

Rec'd 2-28-02
K34
DS 3077
250.00

**TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
ROUGH GRADING**

62023.201

February 2002

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89134
Phone: (702) 791-4300
Fax: (702) 791-4453**

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

Spoke "A" and Spine Road is proposed to be released in the Desert Foothills Channel as surface flow. To minimize erosion at these points, riprap (d_{50} = 12-inch, thickness = 24 inches) will be placed at these locations. Despite these measures, some erosion may occur during major storm events. However, the Desert Foothills Channel and the proposed rough graded interior streets will be privately owned and maintained. This temporary condition is expected to exist for approximately 6 months.

The street flow calculations are presented in Table 2. These street sections represent the rough graded streets. In some areas the rough graded street will have a velocity over 5 fps and some damage may occur in major storm events. However, because this is a temporary condition, no erosion protection is provided for the rough graded streets. The proposed grading site will be privately owned and maintained by the Howard Hughes Corporation.

Section	Slope %	Discharge (cfs)	Depth (ft)	Velocity (fps)	DxV
A	1.4	205	1.6	6.3	—
B	2.6	430	0.7	6.5	—
C	4.9	215	0.6	7.2	—
D	2.5	11	0.1	1.3	0.1
E	3.7	145	0.7	5.7	4.0
E2	4.0	145	0.5	5.8	2.9
F	5.3	57	0.5	5.1	1.8
G	0.6	94	0.8	3.2	2.6
H	1.8	167	0.8	4.8	4.0
K	6.0	70	0.5	5.8	2.9
J	5.5	174	0.7	6.8	4.8
L	2.7	198	0.8	5.6	4.5
M	3.0	215	0.8	5.8	4.6
N	0.8	243	1.1	4.2	4.9
P	3.0	87	0.3	3.1	0.9
S	2.6	430	1.2	8.8	—
R (berm extension)	0.3	2282	5.8	7.6	—

*See Figure 5.

In addition, small berms will be placed at the intersections of Spine Road and Alta Drive, Spine Road and Loop "A" Road (north), Spine Road and Loop "A" Road (south), and Spine Road and CDS "A" to maintain the ultimate drainage patterns for the Village. These berms were sized to contain the 100-year storm flows with

Rec'd 3-22-02
DS 3077
R-34
250:00

**RESPONSE TO COMMENTS
ON THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A – ROUGH GRADING**

62023.201

March 2002

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89134
Phone: (702) 791- 4300
Fax: (702) 791- 4453**



G. C. WALLACE, INC.

Engineers/Planners/Surveyors

City of Las Vegas
Land Development Services
Department of Public Works
March 21, 2002
Page 2

62023.201

Response: Noted. The Howard Hughes Corporation will be responsible for maintaining the rough graded interior streets.

Comment: "4. Show future island and relative grade in Section 4/38. Revise all pertinent sections that include islands."

Response: The future island and relative grades are provided in Section 4/38 on the attached grading plans.

Comment: "5. Sheet 10: Provide erosion protection (such as riprap) at the end of the rough graded Alta Drive at Station 201+40.00 to minimize the plugging of the existing downstream regional box. Provide a layer of geotextile filter fabric beneath the riprap in all pertinent sections."

Response: Existing riprap protection is provided at the entrance of the Alta Drive box opening. Additional riprap d50 = 8-inch, thickness = 16-inch will be provided for the rough graded Alta Drive at section 201+40.

Comment: "6. Sheets 13, 15 to 18: Show the design of the proposed collector channel adjacent to the collector road."

Response: Sheets 13, 15, and 18 are provided to show the future spot grades so that Collector Road may be rough graded properly. No street improvements are proposed at this time.

Comment: "7. Sheet 33 and Section 6/38 appear to show that the collector channel and collector road is a single structure but of dual use. This is not acceptable. Upon the final improvement of the collector road (such as sidewalk, curb & gutter, landscaping, bike lane, etc.), the channel will still be necessary for the protection of Village 23A. Revise accordingly."

Response: Collector Road is not intended for a dual use facility. For interim conditions Collector Road is going to be a rough graded channel to protect the development of Village 23A. The future development of Collector Road will be addressed in a technical drainage study. The technical study will address adequate protection of Collector Road and downstream properties and facilities.

Comment: "8. For the same reason as in Comment #7, the diversion berm/channel in Alta (Sheet 34) serves the protection from the flow originated north of the street. Berm/channel and the roadway must be two separate structures. Revise all related plans accordingly."

Response: This is a rough grading study, no street improvements are proposed at this time. The berm/channel in Alta Drive is intended for interim conditions

Drainage Plan & Interim Collector Channel Computations

REC'D 2-28-02
K34
DS 3077
250.00

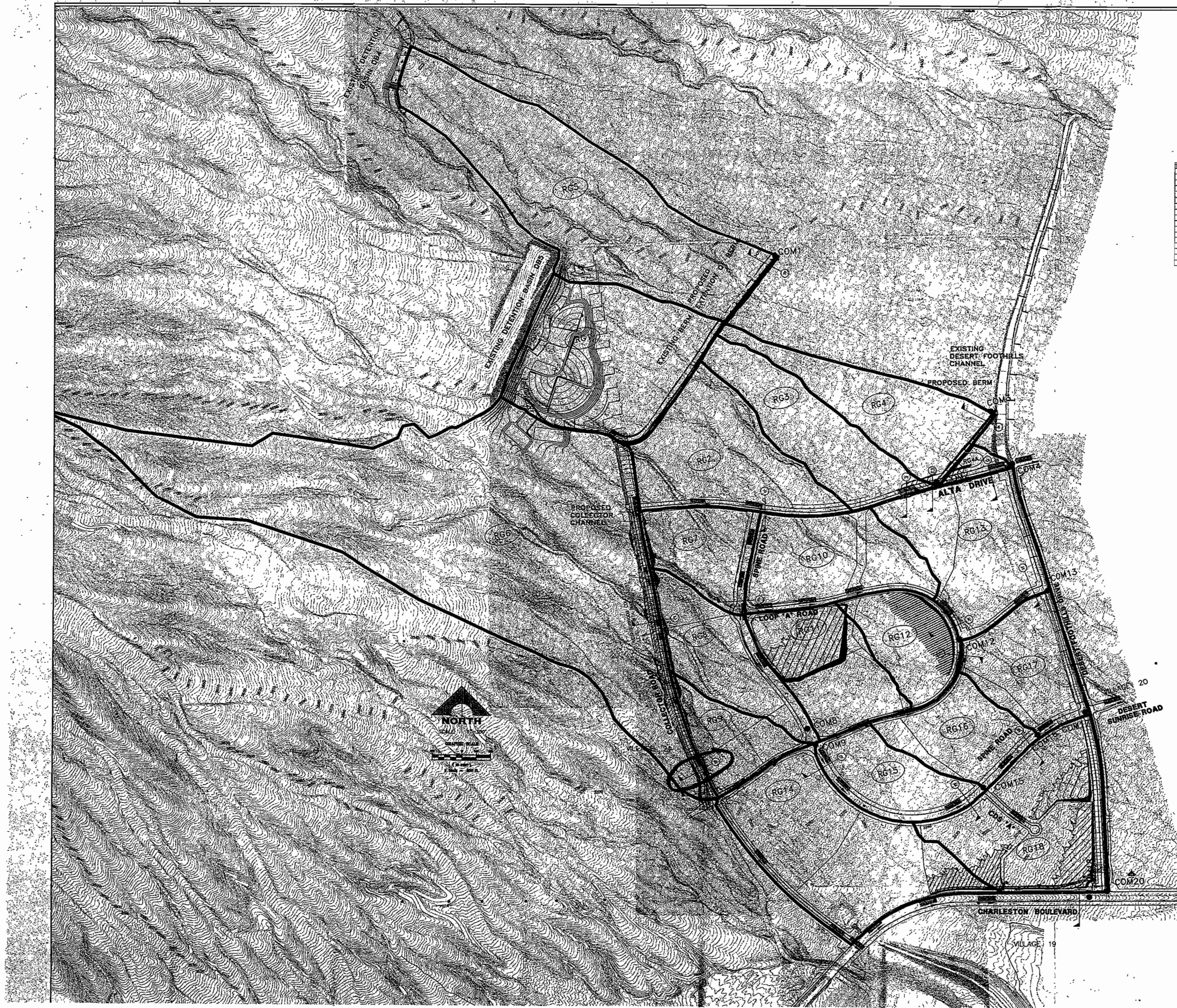
**TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23A
ROUGH GRADING**

62023.201

February 2002

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89134
Phone: (702) 791- 4300
Fax: (702) 791- 4453**



SUMMARY OF HEC-1 MODEL

SECTION	Q100(CFS)	Q100(F)	V100(F/3)	V10
A	205	1.3	8.3	-
B	430	0.7	8.3	-
C	215	0.6	7.2	-
D	11	0.1	1.3	0.1
E	145	0.7	5.7	4.6
F	145	0.5	5.1	5.7
G	57	0.5	3.5	1.9
H	119	0.5	3.5	3.1
I	180	0.8	5.0	4.1
J	174	0.7	6.8	4.6
K	70	0.5	1.5	2.7
L	157	0.7	4.7	5.1
M	215	0.8	5.9	4.7
N	243	1.1	4.8	4.9
P	87	0.3	3.1	1.3
R	2202	3.8	7.6	-
S	430	1.2	8.8	-

SUMMARY OF HEC-1 MODEL

BASIN OR LOC.	Q100 (CFS)	Q10 (CFS)
COM1	205	145
RG1	117	42
RG2	182	54
COM2	208	120
RG3	87	35
RG4	53	20
COM3	145	86
RG5	35	30
COM4	205	65
RG6	7	3
COM5	2331	1218
RG7	430	174
RG8	35	22
RG9	77	25
RG10	47	16
COM6	180	82
RG11	83	27
COM7	247	84
RG12	47	22
RG13	78	32
COM8	131	50
RG14	43	16
COM9	174	84
RG15	44	16
COM10	215	76
RG16	48	15
COM11	243	89
RG17	50	19
COM12	222	185
RG18	107	35
COM13	111	36
COM14	304	201
COM15	673	233

- LEGEND
- RG1 DRAINAGE SUBBASIN
 - PT1 CONCENTRATION POINT
 - STREET FLOW CALCULATION
 - SUBBASIN BOUNDARY
 - FLOW DIRECTION

DATE: 11/19/99

BY: [Signature]

CHECKED: [Signature]

DESIGNED: [Signature]

PROJECT: SUMMERLIN VILLAGE 20A - ROUGH GRADING

FIGURE 6: PROPOSED DRAINAGE PLAN

SHEET: FG5

G.C. WALLACE, INC.
Engineering/Architecture
1100 N. 20th St., Suite 200
Las Vegas, NV 89102
TEL: (702) 735-1100 FAX: (702) 735-1101

Summerlin Village 20A - Rough Grading
Figure 6: Proposed Drainage Plan
Sheet FG5

This grading plan is a part of drainage study # 3551 which was received on 4/2/94 and Revised on 4/9/94. Page 1 of 41

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	improved Lotter's Method
Open Channel Weighting Method	improved 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 ft ²
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

→ FLOW IS CONTAINED IN INTERIM
COLLECTOR CHANNEL.

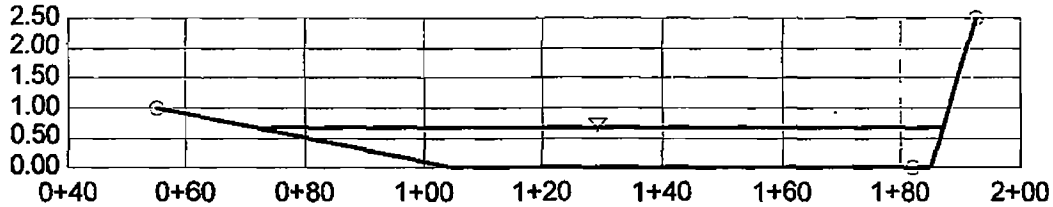
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+55	1+82	0.025
1+82	1+93	0.035

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



V:10.0
H:1
NTS

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

Collector Road Berm/Channel

INPUT VARIABLES:

FLOW (Q) 430 cfs

MANNING'S 'n' 0.039

SLOPE 5.2 % ← *most CONSERVATIVE SLOPE*

BOTTOM WIDTH 80 ft

SIDE SLOPE (Lt) 2 H:1V

SIDE SLOPE (Rt) 6 H:1V

SPECIFIC GRAVITY 2.5

OUTPUT VARIABLES:

VELOCITY 6.99 ft/sec

DEPTH 0.75 ft

FREEBOARD 1.16 ft

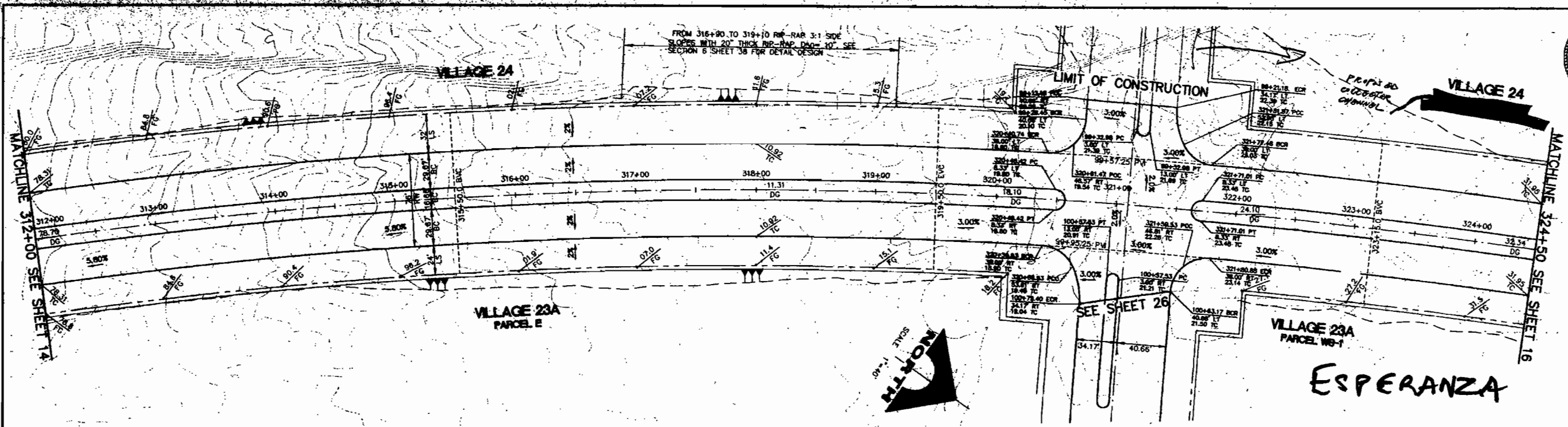
TOTAL DEPTH 1.91 ft

FROUD No. 1.45

d50 Rip RAP SIZE 10.6 in

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

Relevant Profile & Detail Sheets



BENCHMARK

NO.	DESC.	MARK	COORD.
1	WOOD BRASS CAP, 50 FEET	3208.01	478.351
2	IRON PIPE, 10 FEET	3208.01	478.351

BASIS OF BEARINGS

NORTH 89°45'00" EAST BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 36 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.

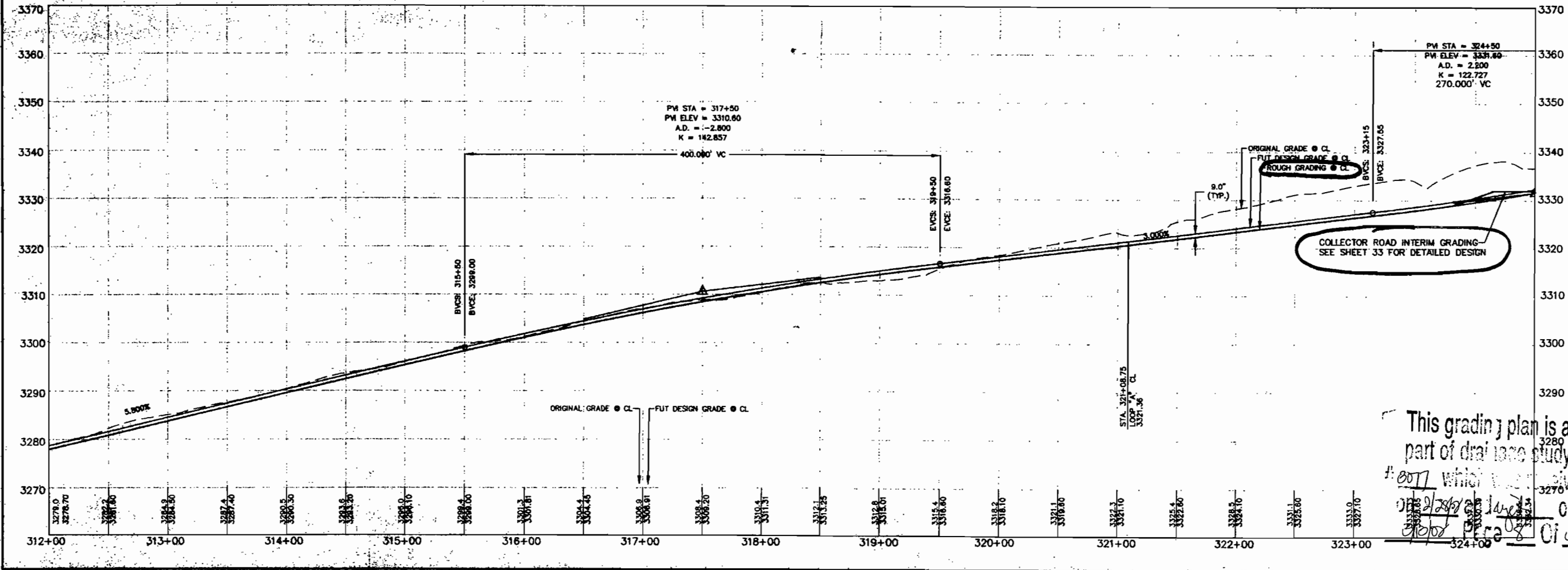
FUTURE COLLECTOR ROAD

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

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.

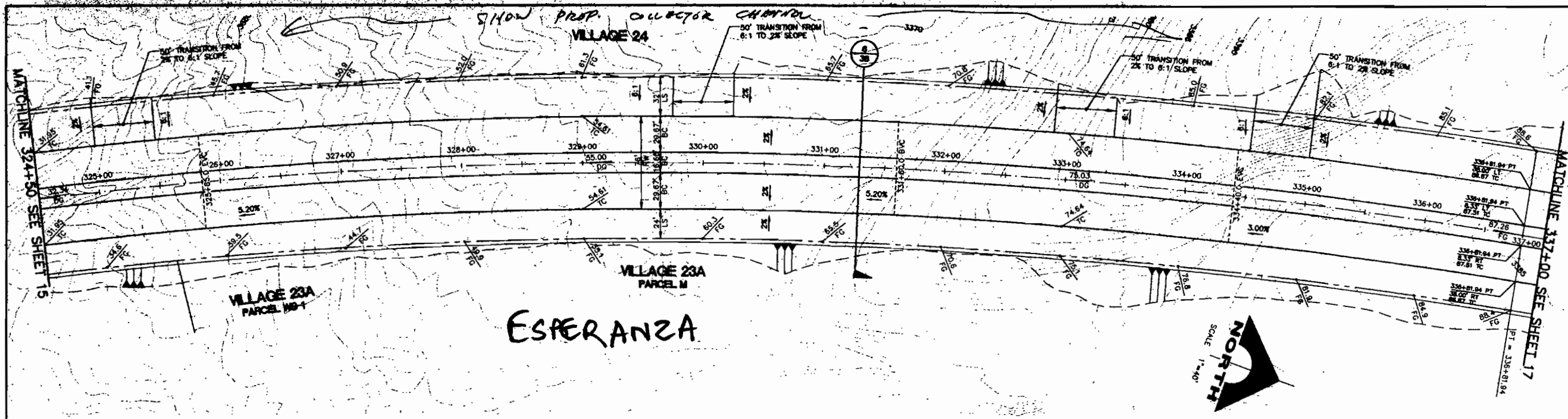
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G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 SOUTH PARSONS BLVD., LAS VEGAS, NEVADA 89146
OFFICE (702) 864-2000, FAX (702) 864-2298
SAMPLER OFFICE 10000 CHARLTON BLVD., STE. 130
OFFICE (702) 864-2000, FAX (702) 864-2298

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

This grading plan is a part of drainage study # 007 which was received on 2/28/02 at 1:00 PM on 9/10/02 Per 087 Ci 61

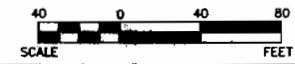


BENCHMARK			
BM #	DESC.	NAVD 83 ELEV.	NAVD 83 DIST.
2300	WOOD BRIDGE, CAP. 30 FEET NORTH OF STATION 324+50 OF CHARLES RIVER BRIDGE.	3308.81 (VERT.)	476.32 (HORIZ.)

BASIS OF BEARINGS
 NORTH 89°45'08" EAST BEARS THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 58 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

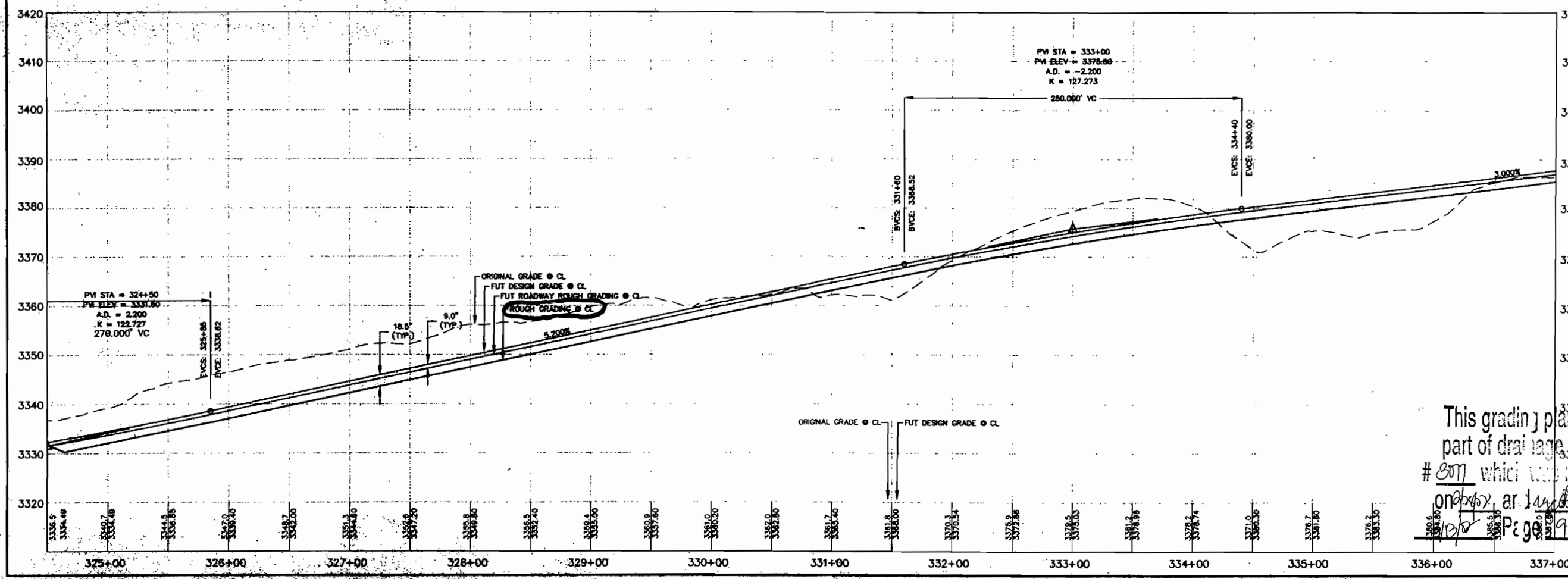
SCALE: HORIZ. 1" = 40'
 VERT. 1" = 10'



NOTE
 THIS SET OF DRAWINGS IS BASED UPON NAVD 83 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

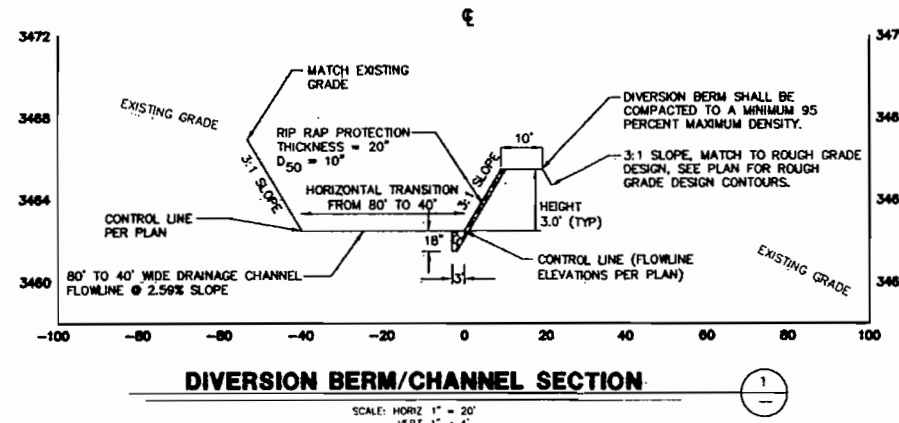
Call before you Dig.
 1-800-227-2800

CALL BEFORE YOU DIG
 CALL 1-702-583-6111

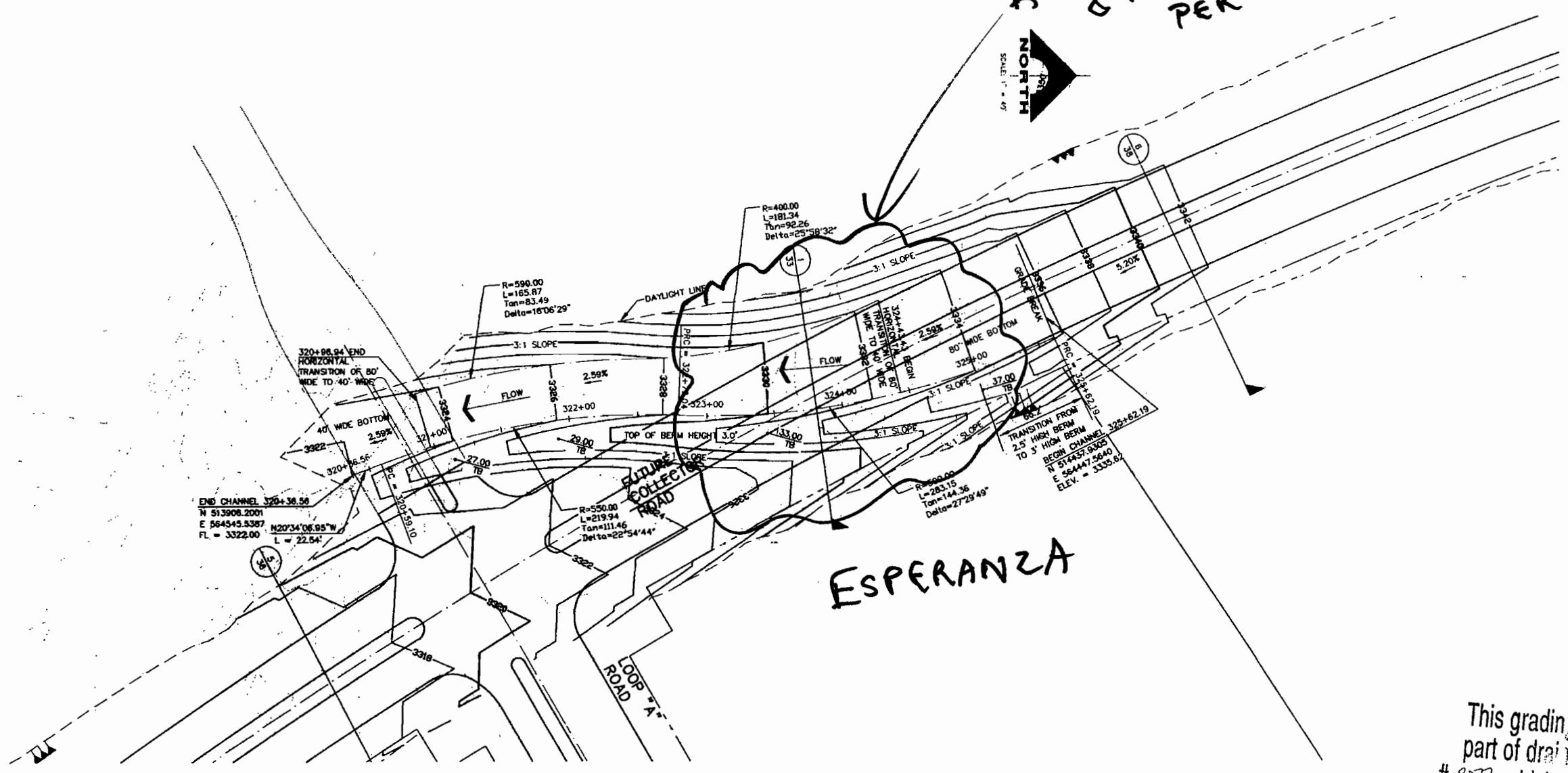


This grading plan is a part of drainage study # 807 which was received on 10/12/07 at 11/14/07 on 11/12/07 Page 9 of 9

DESIGN: G.C.W.	CHECK: G.C.W.	DATE: 02-28-02	PLOT DATE: 11-28-07	DATE: 02-28-02
G.C. WALLACE, INC. Engineers/Planners/Surveyors 1550 SOUTH WILLOW BLVD./LAS VEGAS, NEVADA 89148 OFFICE: (702) 804-2000, FAX: (702) 804-2299 CELL: (702) 804-1000, PAGER: (702) 804-1000 E-MAIL: GWallace@GWallaceInc.com				
SUMMIT VILLAGE 23A ROUGH GRADING PLANS ROUGH GRADING IMPROVEMENTS PLAN AND PROFILE				
SHEET 16 OF 40 SHEETS				



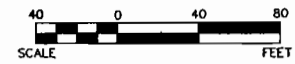
REPLACED WITH STORM DRAIN
& INTERIM SUMP OPENING,
PER V24 UNIT 1 STUDY.



ESPERANZA

FUTURE COLLECTOR ROAD INTERIM GRADING PLAN

SCALE: HORIZ. 1" = 40'



NOTE
THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM.
PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM.
CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET
OF DRAWINGS.

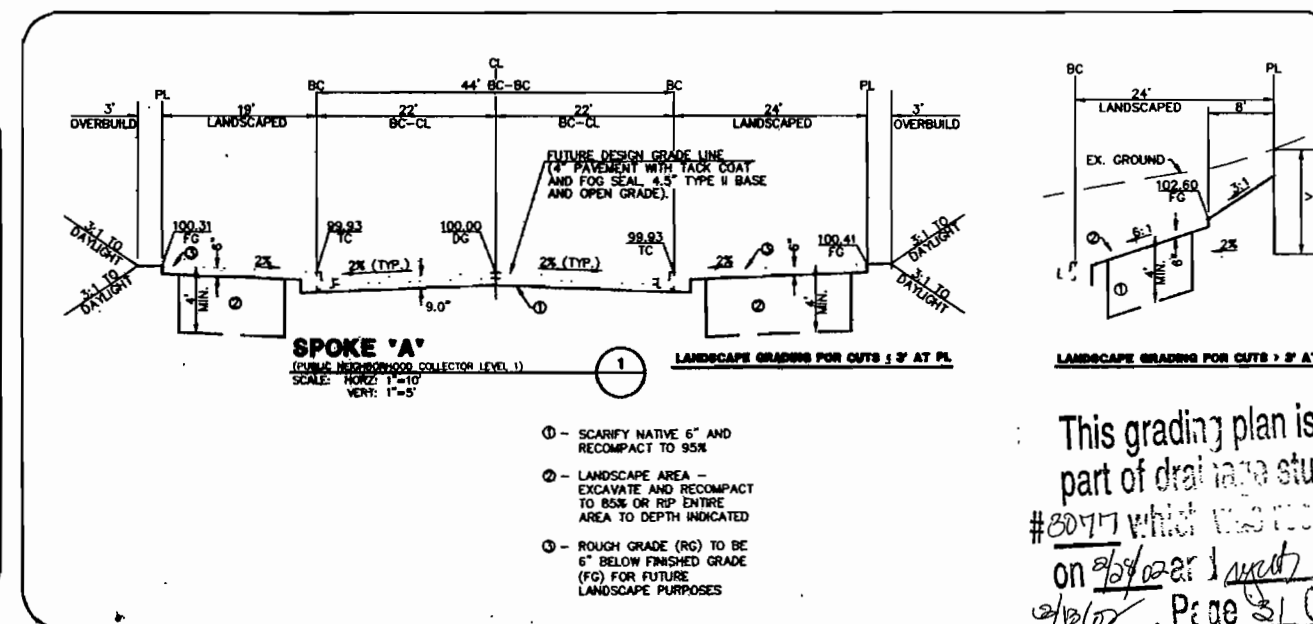
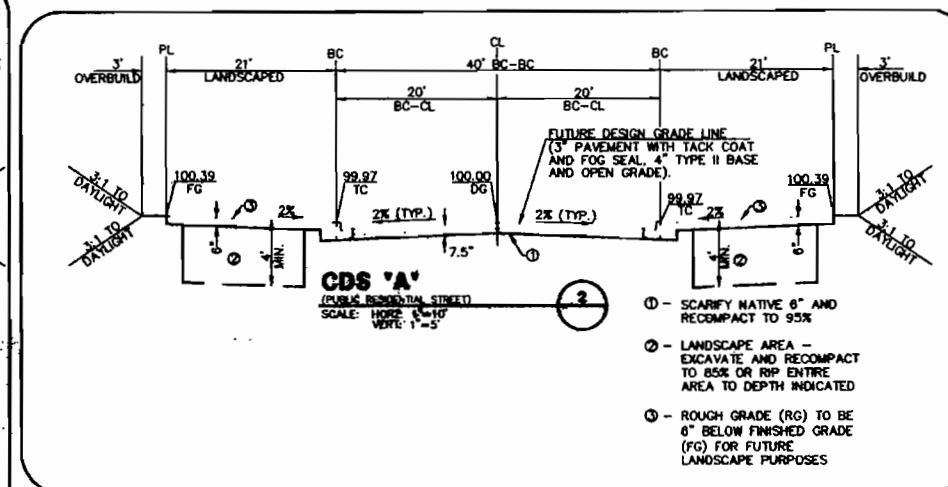
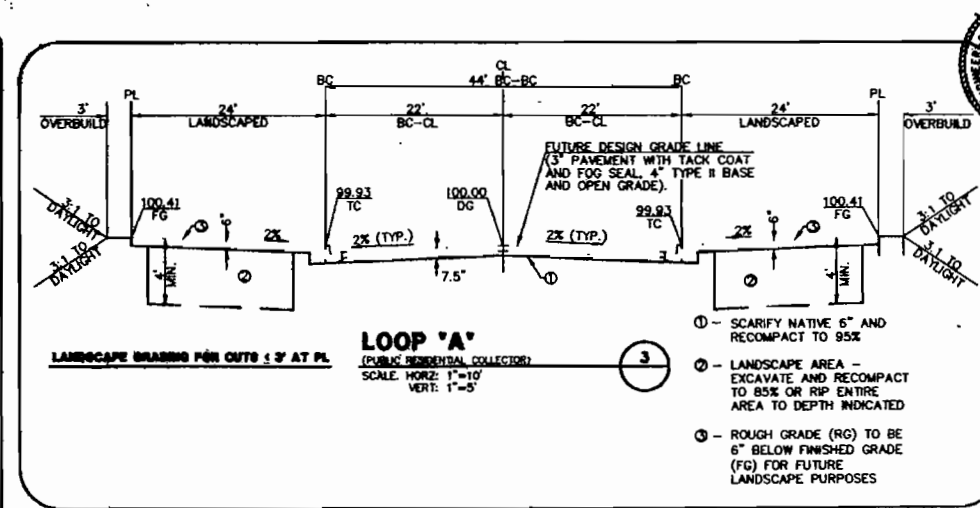
Call before you Dig.
1-800-227-2600

This grading plan is part of drainage study # 307 which was received on 1/26/02. Page 2 of 27

BENCHMARK		NAVD 88	NAVD 88
B.M. #	DESC.	DATUM	DATUM
CLH9-34558	WOOD BRASS CAP, 50 FEET NORTH OF STATION 787+18.42 OF CHARLESTON BOULEVARD.	3209.81 (FEET)	978.331 (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, N.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.

DESIGN: G.C.W.	CHECK: G.C.W.	DATE: 2/22/02	REVISION
G.C. WALLACE, INC. Engineers/Planners/Surveyors 2545 SOUTH RANCHO BLVD., 4TH FLOOR, LAS VEGAS, NEVADA 89146 OFFICE: (702) 804-2000, FAX: (702) 804-2288 SUMMIT OFFICE: 10000 CHARLESTON BLVD., STE. 130 SUMMIT: (702) 804-2180, FAX: (702) 804-2285 E-MAIL: GOWALL@GOWALL.COM			
BLANKET PLAN VILLAGE 28A ROUGH GRADING PLANS ROUGH GRADING IMPROVEMENTS PLAN AND PROFILE			
ISSUE DATE: 2/22/02 ISSUE FOR AGENCY REVIEW - NOT FOR CONSTRUCTION			SHEET 33 33 OF 40 SHTS



This grading plan is a part of drainage study # 80417 which was recorded on 2/2/02 at 1:45 PM on 2/2/02. Page 21 of 21

APPENDIX K

Reference Material

Technical Drainage Study for Summerlin Village 24 Unit 1 Improvements

Approval Letters

CITY OF LAS VEGAS		DATE:	
INTER-OFFICE MEMORANDUM		August 16, 2004	
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: SMRLN V24 Unit 1 Improvements including Parcels A & B Mass Grading		COPIES TO: G.C. Wallace, Inc.	
Gross Streets:	NWC of Sky Vista Dr. & Charleston Blvd.	Howard Hughes Corp.	
File Number:	F:\Depot\DSMEMOS\DS3551C.doc	Bart Anderson, P.E., DevCo	
Parcel Number:	137-34-000-010	CCRFC	
Zoning Action:			
FEMA Flood Zone	YES	NO	X
Proposed Storm Drain	YES	X	NO

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. No
1 st Submittal	4/5/2004	4/19/2004	Not Approved	\$400.00	122481: \$400
2 nd Submittal	5/27 & 6/18/2004	6/21/2004	Conditional Approval	\$400.00	126058: \$400
CCRFC	8/6/2004	8/16/2004	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.

1. The plan and profile sheets show that street improvements, storm drain, earthen berms and channels are to be constructed. The flood control facilities will be considered interim until the full improvements for Crossbridge Drive are constructed. The Howard Hughes Corporation is required to maintain the interim drainage facilities until the improvements are accepted by the City of Las Vegas. The City does not accept interim facilities for maintenance.
2. The proposed Berm 1 and Berm 2 (Figure 7) must be bonded for construction. Prior to final plan approval the developer must complete a *Maintenance and Liability Agreement* for the interim drainage improvements (off-site berms) and post a minimum maintenance bond of **\$25,000.00**. Once the drainage study is conditionally approved, the engineer should contact the City's Land Development Section (229-6371) to begin the agreement process.
3. All proposed public drainage easements (privately maintained) must be dedicated in the Unit 1 improvements final map.
4. Pad elevations will be reviewed upon submittal of individual parcel improvement plans.

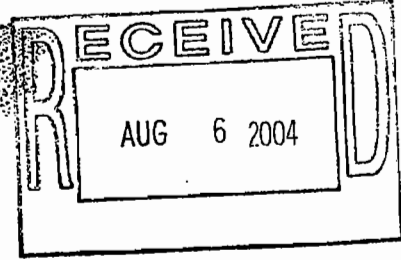
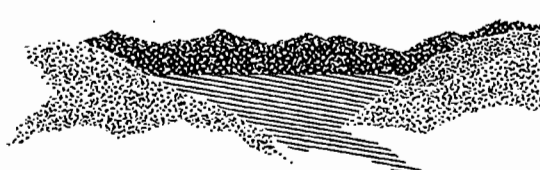
NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on 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.

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/34
AREA K-34

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



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

BOARD OF DIRECTORS

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Bruce L. Woodbury
Clark County

July 30, 2004

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

**DISTRICT CONCURRENCE: SUMMERLIN VILLAGE 24 – UNIT 1 IMPROVEMENTS
(DS3551) (RFCD NO. 04-4)**

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated April 2, 2004 and Addendum No. 1 dated May 27, 2004, 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 June 21, 2004.

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: ART
Andrew R. Trelease, P.E.
Senior Civil Engineer

ART:css

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

File: 20-59-33.GCW

DS 3551
K-34
N/C

Relevant Report Excerpts

Revised: 9/2/09

DS 3551

K-0237

\$400

B & H

CCRP²CD

CCPW

**TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 24
UNIT 1 IMPROVEMENTS
INCLUDING
PARCELS "A" & "B" MASS GRADING**

62A.24.211

April 2004

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791- 4300
Fax: (702) 791- 4453**



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

Sky Vista Drive (84-inch Storm Drain)

Approximately 270 feet of the 84-inch storm drain in Sky Vista Drive will be constructed with this project. The 84-inch storm drain will be stubbed out north in Sky Vista Drive and will be extended upon the future development of the Sky Vista Drive Improvements. However, with this project all that is being constructed is the small portion of 84-inch in Sky Vista Drive that will turn west and continue in Desert Moon Road where it will connect to the 8-foot by 8-foot RCB. According to the revised HEC-1 analysis the design flow for the 84-inch in Sky Vista Drive is 540 cfs (Concentration Point CP11).

At design point 2, the 100-year street flow is 5 cfs from Basin SB4. One 5.5-foot Modified Type "C" drop inlet located on the north side of Desert Moon Road and one 8.5-foot Modified Type "C" drop inlet located on the south side of Desert Moon Road will intercept a the total street flow of 5 cfs. The design flow for the 84-inch main line is 545 cfs [540 (Concentration Point CP11) + 5 cfs (Basin SB4)].

Desert Moon Road (8'x8' RCB)

At design point 3, the 100-year flow in the drainage corridor COS-2 is 622 cfs (Concentration Point CP13 in the HEC-1 analysis). A 7-foot by 7-foot improved inlet will be constructed in order to intercept the entire flow of 622 cfs. The improved inlet will reduce in size to a 6-foot by 5-foot RCB that will turn and continue in Desert Moon Road. The design flow for the 6-foot by 5-foot RCB is 622 cfs.

At design point 4 the 84-inch storm drain (from design point 2) will combine with the 6-foot by 5-foot RCB (from design point 3). At this point the 6-foot by 5-foot RCB will increase to an 8-foot by 8-foot RCB. The design flow for the 8-foot by 8-foot RCB is 1095 cfs (Concentration Point CP14 in the HEC-1 model).

At design point 5, a 48-inch lateral is provided to allow Parcel D to discharge a maximum of 99 cfs into the main line RCB. The design flow for the 8-foot by 8-foot RCB is 1178 cfs (Concentration Point CP15 in the HEC-1 model).

At design point 6, a total 100-year surface flow at this point is 7 cfs (1/2 of Basin SB3). A total of 5 cfs will be intercepted by two 5.5-foot Modified Type "C" drop inlets; therefore, 2 cfs will bypass as surface flow. The total design flow for the 8-foot by 8-foot RCB main line is 1183 cfs (1178 cfs from design point 5 + 5 cfs intercepted by drop inlets).

At design point 7, a 36-inch lateral is provided to allow Parcel NP-1 to discharge a

**RESPONSE TO COMMENTS
ON THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 24
UNIT 1 IMPROVEMENTS
INCLUDING
PARCELS "A" & "B" MASS GRADING**

62A.24.211

May 2004

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4453**



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



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

G. C. WALLACE, PE/SE, PLS
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CHRISTOPHER W. ANDERSON, PE
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DEBRA M. YAMACHIKA, PE
DERICK D.J. YORO, PE

AFFILIATE OFFICE IN
SACRAMENTO, CA

62A.24.211

May 27, 2004

Albert Sung, P.E.
City of Las Vegas
Land Development Services
731 South Fourth Street
Las Vegas, Nevada 89101

**Subject: Technical Drainage Study for Summerlin Village 24 Unit 1
Improvements Including Parcels A & B Mass Grading
(DS3551A)**

Dear Mr. Sung:

The purpose of this letter is to address the comments from the City of Las Vegas (CLV), dated April 23, 2004, regarding the above-referenced project.

In addition to the response to comments, five separate modifications to the proposed improvements were made. The first revision to Village 24 is the proposed drainage pattern for Parcel C. In the original study a 42-inch lateral was provided in Sky Vista Drive for Parcel C drainage. After reviewing the preliminary site layouts for Parcel C, it has been decided to drain Parcel C to the adjacent wash (COS-2) located west of Parcel C instead of the 84-inch storm drain in Sky Vista Drive. The HEC-1 model and hydraulic models have been revised due to this change and are included with this submittal.

Due to the removal of Parcel C, the 84-inch in Sky Vista was reduced to a 78-inch storm drain with a 100-year flow of 468 cfs (Concentration Point CP11 in the updated HEC-1 analysis).

The exposed RCB (located at the south end of COS-2) has been slightly revised in order to provide adequate ponding for the new flow of 668 cfs (Concentration Point CP10 in the revised HEC-1 model). A Standard Form 6 for the proposed RCB has been revised in order to match the new design and revised flows.

The second revision to the improvement plans is the proposed 48-inch storm drain west of the RCB, which has been slightly modified. This 48-inch lateral for Parcel E has been moved approximately 200 feet west; therefore, the Standard Form 6 model has been revised to reflect the new design.

All of the proposed storm drain revisions still meet the all CCRFCD and CLV criteria. Adequate freeboard requirements for all storm drain and laterals are provided. Revised hydraulic models for the mainlines and laterals are attached with this submittal.

Drainage Facility Exhibits

**UPDATE #2
TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 24
UNIT 1 IMPROVEMENTS
INCLUDING
PARCELS "A" & "B" MASS GRADING**

Rec'd: 12/8/04
DS 3551-1
K-34
\$100

62A.24.211

December 2004

Prepared for:

**The Howard Hughes Corporation
a Delaware Corporation
10000 West Charleston Blvd., Ste. 200
Las Vegas, Nevada 89135
Phone: (702) 791- 4300
Fax: (702) 791- 4453**



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

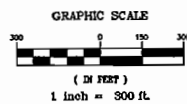
SUMMARY OF HEC-1 MODEL

BASIN/ CONCENTRATION POINT	Q100 (CFS)
OFF2	31
OFF3	118
OFF4	30
CP1	147
CP2	175
L	50
CP3	191
M*	63
CP4	241
K	91
CP5	320
ST4	31
CP6	339
ST6	6
CP7	342
M*	63
ES-1	40
CP8	101
CP9	440
ST2	33
CP11	468
OFF5	615
COS-1	9
CP12	619
COS-2	6
CP13	622
C	74
CP10	658
CP14	1095
D	99
CP15	1178
NP-1	22
CP16	1195
E	97
ST5	47
CP17	144
CP18	1318
B	96
COS-5	3
CP19	1343
COS4	1900

M* Represents 2/3 of the flow generated by Parcel M that is allowed to discharge to the future laterals.

**It should be noted that flows and facilities shown are designed for ultimate conditions only. All flows except for Basins OFF2, OFF3, and OFF4 are referenced from the Conceptual Study for Village 24.

CROSS SECTION	DISCHARGE (cfs)	ACTUAL DEPTH (ft)	VELOCITY (ft/s)	SCOUR PROTECTION REQUIRED
CH1	1900	0.9	9.2	Gabions/5-foot cutoff wall
CH2	1900	1.2	11.2	Gabions/5-foot cutoff wall
CH3	1900	0.8	8.9	Gabions/5-foot cutoff wall



LEGEND

- CONSTRUCTION LIMITS
- PROPOSED STORM DRAIN LAYOUT
- ST1 SUBBASIN DESIGNATION
- 22 STORM DRAIN DESIGN POINT
- FLOW DIRECTION
- CP17 CONCENTRATION POINT
- FUTURE STORMDRAIN
- EXISTING STORMDRAIN

ALTA DRIVE

OFF2

OFF3

OFF4

*OFF5

615 CFS

VILLAGE 24
BOUNDARY LINE

K

COS-1

PUBLIC DRAINAGE EASEMENT
TO BE PRIVATELY MAINTAINED

615 CFS

CP12

CP5

CP6

CP7

CP8

CP9

CP10

CP11

CP13

CP14

CP15

CP16

CP17

CP18

CP19

CP20

CP21

CP22

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CP220

CP221

CP222

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CP225

CP226

CP227

CP228

CP229

CP230

CP231

CP232

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CP234

CP235

CP236

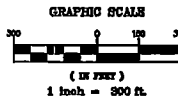
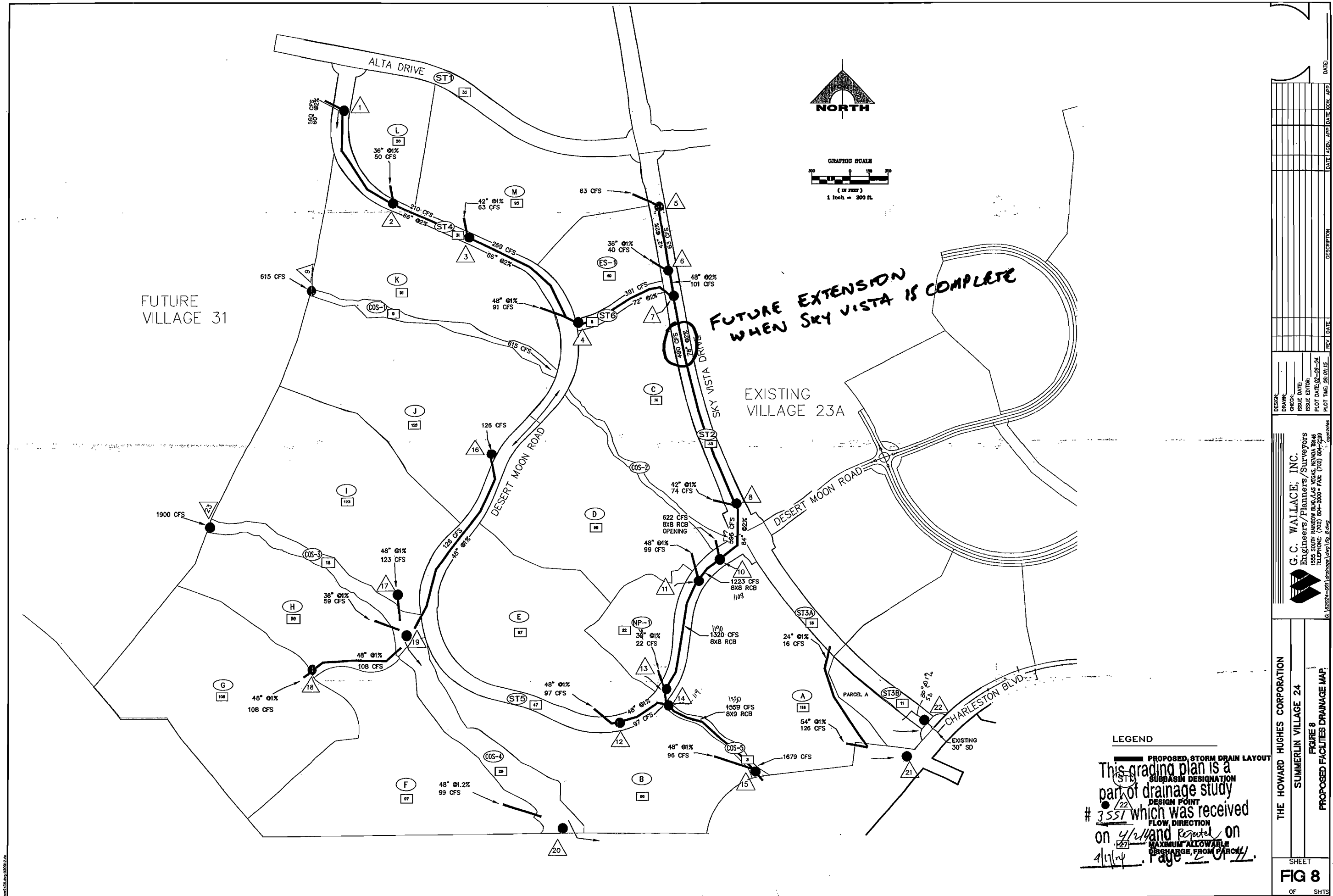
CP237

CP238

CP239

CP240

CP241

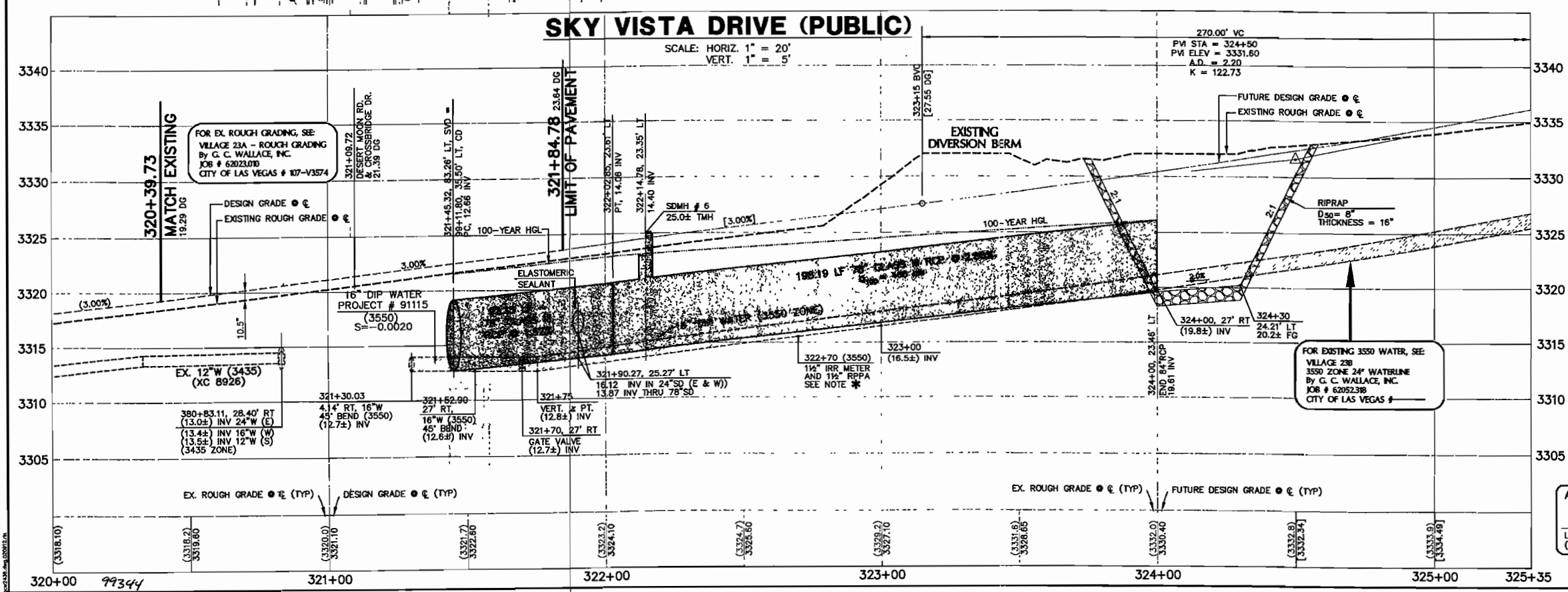
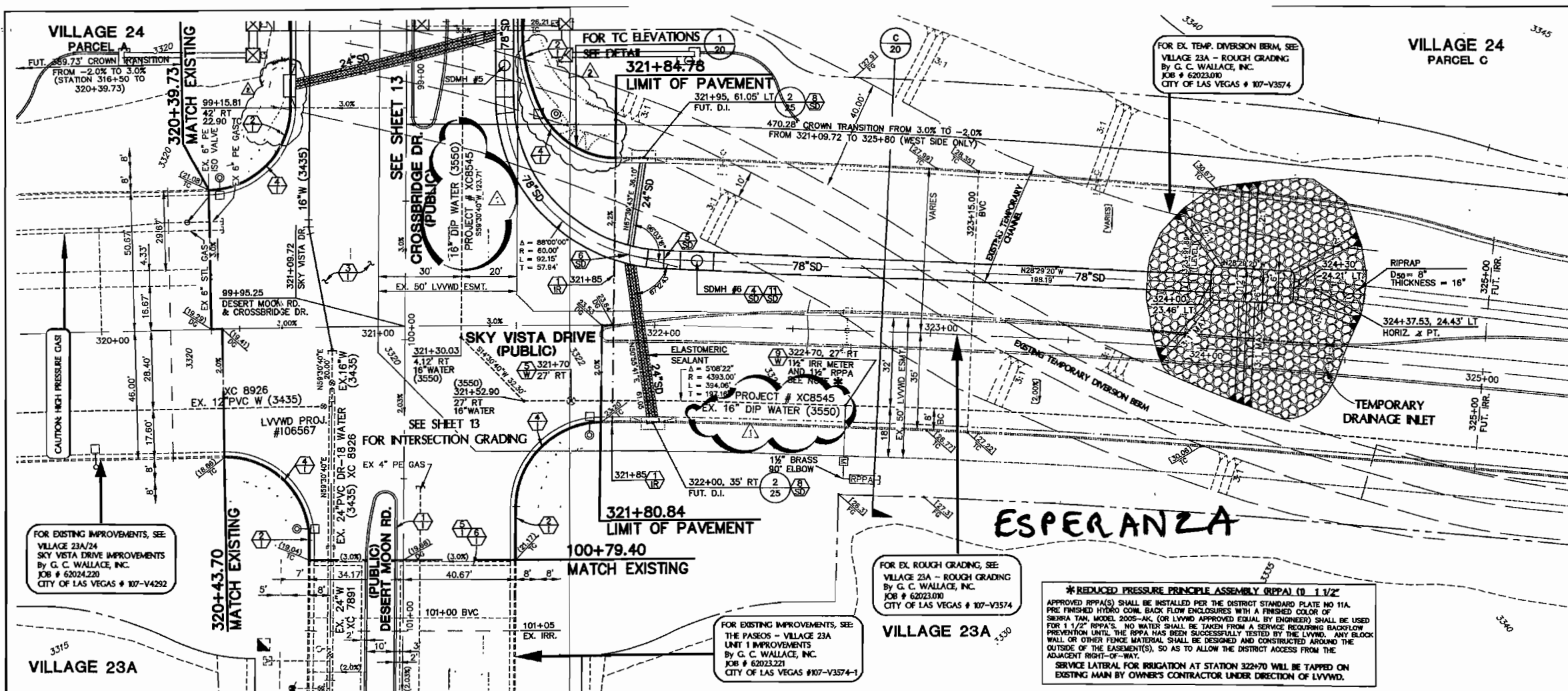


DESIGN: _____
 CHECK: _____
 ISSUE DATE: _____
 PLOT DATE: 02-06-24
 PLOT TIME: 08:07:15

G. C. WALLACE, INC.
 Engineers/Planners/Surveyors
 1555 SOUTH RAINBOW BLVD. LAS VEGAS, NEVADA 89146
 TELEPHONE: (702) 804-3000 • FAX: (702) 804-2009
 E-MAIL: gwallace@wallaceinc.com

THE HOWARD HUGHES CORPORATION
 SUMMERLIN VILLAGE 24
 FIGURE 8
 PROPOSED FACILITIES DRAINAGE MAP

Relevant Storm Drain Profile Sheets



SCALE 20 0 20 40 FEET

SHEET INDEX MAP

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.

BENCHMARK

BM #	DESC.	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. 0388 3	U.S.C.A. BRASS DISC SET IN ROCK ON THE EAST SIDE OF CHARLESTON BOULEVARD AND SOUTH OF THE RED ROCK DETENTION BASIN.	3248.71 (FEET)	989.599 (METERS)

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 #1, PAGE 28 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA

Call before you Dig.

1-800-227-2800

UNDERGROUND SERVICE (USA)

APPROVED FOR CONSTRUCTION 1ST APP'D 8-16-06

[Signature] 10-20-06 DATE

LAS VEGAS VALLEY WATER DISTRICT (PROJECT #106984)

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

SUMMERLIN
 VILLAGE 24 UNIT IMPROVEMENTS
 SKY VISTA DRIVE
 PLAN AND PROFILE

SHEET **14**
 14 OF 46 SHTS

CLV DRAWING NO. **107Y4932**

APPENDIX L

Grading Plan, Storm Drain Profile and Detail Sheets

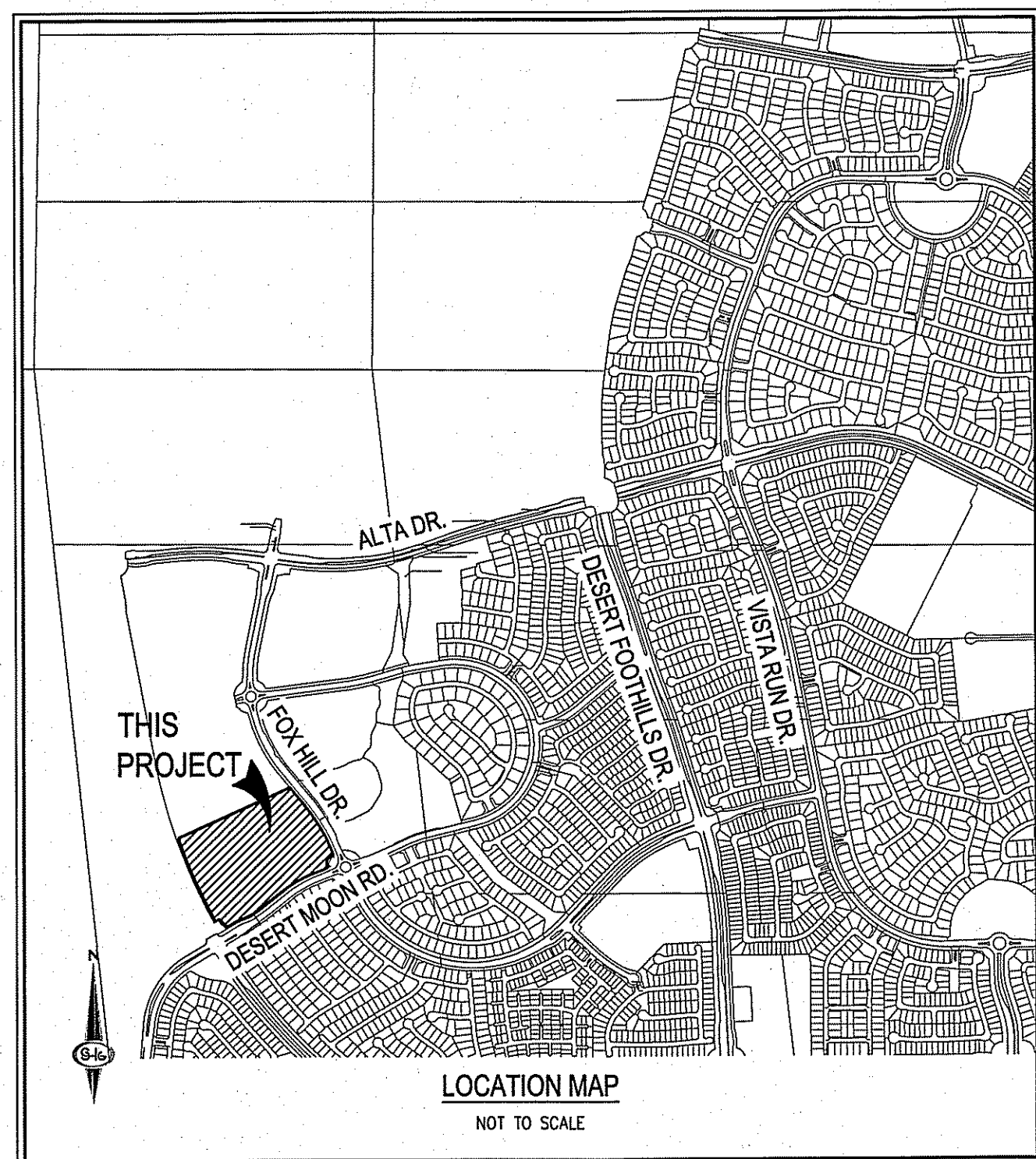
PHASE 1

F:\len1201-000\sum\43\parcel m.dwg\improv\phase 1\len1201-000\phase1-cv.dwg 5/14/2012 8:48 AM Brian Chapman

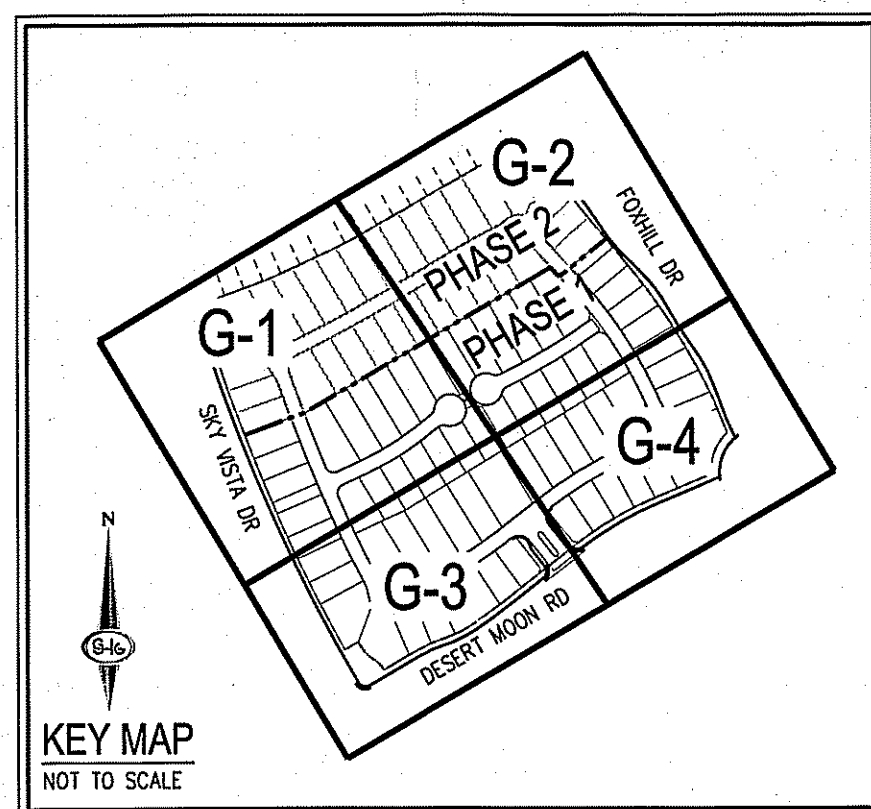
LENNAR

ESPERANZA PHASE 1

A SINGLE FAMILY DETACHED
RESIDENTIAL COMMUNITY
A PORTION OF APN 137-34-313-002



SHEET INDEX		
SHEET NUMBER	SHEET DESCRIPTION	SHEET TITLE
1	C-1	COVER SHEET
2	C-2	NOTES SHEET
3	G-1	GRADING PLAN I
4	G-2	GRADING PLAN II
5	G-3	GRADING PLAN III
6	G-4	GRADING PLAN IV
7	D-1	GRADING SECTIONS AND DETAILS
8	P-1	PLAN AND PROFILE I
9	P-2	PLAN AND PROFILE II



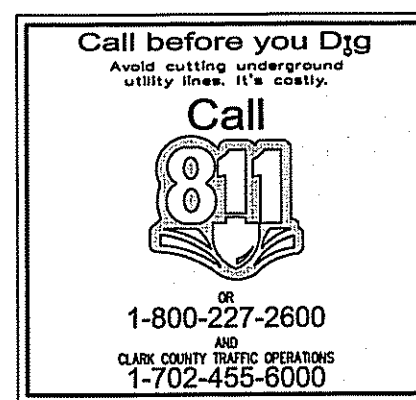
LEGAL DESCRIPTION
LOCATED WITHIN PARCEL M AS SHOWN ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA, LYING WITHIN SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST M.D.M., CLARK COUNTY, NEVADA.
BENCHMARK
FOUND N001 BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, CLV09-3455E
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.

APPROVALS	
ACTING CITY ENGINEER-DAVID BOWERS PE, PTOE #16736	DATE
APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OF RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FORM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.	
CLV FIRE MARSHALL	DATE
DOUG RANKIN, AICP PLANNING MANAGER	DATE
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING AND DEVELOPMENT DEPARTMENT.	
CENTURYLINK	DATE
THE AFFIXED EMBARGO 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.	
APPROVED FOR CONSTRUCTION	
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER PROJECT NO. 112426 DATE: _____ SHEET: _____	
APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM LAS VEGAS VALLEY WATER DISTRICT.	
NV ENERGY	DATE
NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.	
SOUTHWEST GAS	DATE
COX COMMUNICATIONS LAS VEGAS, INC.	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.	

OWNER	PROJECT INFORMATION
HOWARD HUGHES COMPANY, LLC ROUSE CO P.O. BOX 833 COLUMBIA, MD 21044 PH (702) 791-4000	APN: 137-34-313-002 NET ACREAGE 15.63 AC RESIDENTIAL LOTS 64 COMMON ELEMENTS 6 DENSITY 4.09 - DU/AC TYPICAL LOT SIZE 4,950 SF (45'x110') 6,050 SF (55'x110')
DEVELOPER	ZONING
LENNAR COMMUNITIES NEVADA, LLC 2490 PASEO VERDE PARKWAY SUITE 120 HENDERSON, NV 89074 PH (702) 458-7700 FX (702) 889-0801	P-C
ENGINEER	EARTHWORK SUMMARY (ADJUSTED)
SLATER HANFAN GROUP 5740 S. ARVILLE ST SUITE 216 LAS VEGAS, NV 89118 PH (702) 284-5300 FX (702) 284-5399	CUT - CY FILL - CY SITE IMPORT - CY

NOTE
NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE:
[HTTP://WWW.STATE.NV.US/BWPC/STORM01.HTM](http://www.state.nv.us/bwpc/storm01.htm) PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. INVR00000 ALONG WITH THE APPROPRIATE FILING FEE.



SLATER HANFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

LENNAR
ESPERANZA PHASE 1
COVER SHEET

DATE: 05/14/12
DRAFTER: BCC
DESIGNER: BCC
CHECKED: STS
PROJECT NO.
LEN1201.000

JERRY A. SLATER
Exp: 05/30/2012
CIVIL
Professional Engineer No. 14167

C-1
SHEET 1 OF 9

2.1 CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST EDITION; THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS FOR WORK IN THE SUMMERLIN AREA, AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY, THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".

2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CIVIL PLANS ARE APPROXIMATE, AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY, THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".

3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORILY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.

4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.

5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS, MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.

6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.

7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTENDED-TYPE CURB.

8. AC PAVEMENT TO BE ONE-AND-ONE-HALF (1 1/2") ABOVE TOP OF ALL CUTTERS AFTER CONSTRUCTION, EXCEPT AT SIDEWALK RAMPS AND CROSS OUTTERS.

9. CURB AND CUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.

10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY CITY INSPECTOR.

11. CONSTRUCTION SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.

12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY GEOTEK, REPORT #2942-LVS, JUNE 4, 2010 APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.

13. EXACT LOCATION OF ALL SAWJUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER OR LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONSTRUCTION REQUIRES RELOCATIONS.

14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.

15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS OUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER. ALL ABOVE GROUND UTILITY APPEARANCES SHALL CONFORM TO THE REQUIREMENTS OF 1512.040.

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF DETERMINING GRADING RELATIONSHIPS, FLOOD CONTROL, AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.

17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.

18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.

20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.

21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE OFFSITE INSPECTION AND TESTING SECTION PRIOR TO PROJECT ACCEPTANCE. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXITS THE PUBLIC RIGHT-OF-WAY. THE LOCATION SHALL BE DESCRIBED BY STATE PLANE COORDINATES WHICH SHALL BE BASED ON THE "NEVADA COORDINATE SYSTEM OF 1983, EAST ZONE" AS DEFINED BY THE NEVADA REVISED STATUTES CHAPTER 337, AND TIED TO THE CITY OF LAS VEGAS VERTICAL CONTROL, BENCHMARK NETWORK. COORDINATES MUST BE CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTANTIES OF +/- 0.1 METER (1/4" +/- 0.3 FEET). A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).

22. SANITARY SEWER SERVICE LATERALS REQUIRE THE INSTALLATION OF A MARKER BALL AT THE CONNECTION OF THE SEWER SERVICE LATERAL TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERAL EXITS THE PUBLIC RIGHT-OF-WAY. STORM DRAIN LATERALS REQUIRE THE INSTALLATION OF A MARKER BALL AT THE CONNECTION OF THE STORM DRAIN LATERAL TO THE STORM DRAIN MAIN AND WHERE THE STORM DRAIN LATERAL EXITS THE PUBLIC RIGHT-OF-WAY OR WHERE THE STORM DRAIN LATERAL CONNECTS TO A DROP INLET. THE MARKER BALL SHALL BE 3/4" 4" MARKER BALL 1404-XR OR APPROVED EQUIV.

23. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.

24. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

2.2 CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.

2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.

3. CHSSEL "S" OR "C" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.

4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.

5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.

6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" S SHALL BE USED ON LINES THIRTY INCHES (12") OR ABOVE.

7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.

8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.

9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE, WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.

10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

2.3 CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.

2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.

3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.

4. WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCLOSED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF THE THAT CHILDREN ARE LIKELY TO BE PRESENT.

5. IF THE IMPROVEMENTS NECESSITATE THE OBSTRUCTION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LINE MATERIALS TO THE SATISFACTION OF THE CITY ENGINEER AND APPROVED BY THE CITY ENGINEER.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL BE FABRICATED WITH DIAMOND GRADE, VP CLASS 6 REFLECTIVE SHEETING OR APPROVED EQUAL, ALL NEW TRAFFIC SIGNS, EXCEPT STREET NAME AND SCHOOL SPEED LIMIT SIGNS, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIV. ANTI-GRAFFITI OVERLAY FILM. SCHOOL ZONE SIGNS SHALL HAVE 3M SERIES 1150 ANTI-GRAFFITI OVERLAY FILM. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.

7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNALIZED INTERSECTION, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.

8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC INTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HEREON. REGARDLESS OF THE STATUS OF COMPLETION OF PAYING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.

9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.

10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATTESA OR OTHER QUALIFIED PERSON OR HIGH WALK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.

11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.

13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.

14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT OFFSITE INSPECTOR PRIOR TO INITIATING PLANNED TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MAINTAIN ROADWAY SEGMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPENDING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNING. ANY CHANGES TO THE ORIGINAL DESIGN, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SHALL BE IN ACCORDANCE WITH THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DIVISION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.

16. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

17. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT OFFSITE INSPECTOR PRIOR TO INITIATING PLANNED TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MAINTAIN ROADWAY SEGMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPENDING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNING. ANY CHANGES TO THE ORIGINAL DESIGN, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SHALL BE IN ACCORDANCE WITH THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DIVISION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.

18. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

19. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT OFFSITE INSPECTOR PRIOR TO INITIATING PLANNED TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MAINTAIN ROADWAY SEGMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPENDING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNING. ANY CHANGES TO THE ORIGINAL DESIGN, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SHALL BE IN ACCORDANCE WITH THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DIVISION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.

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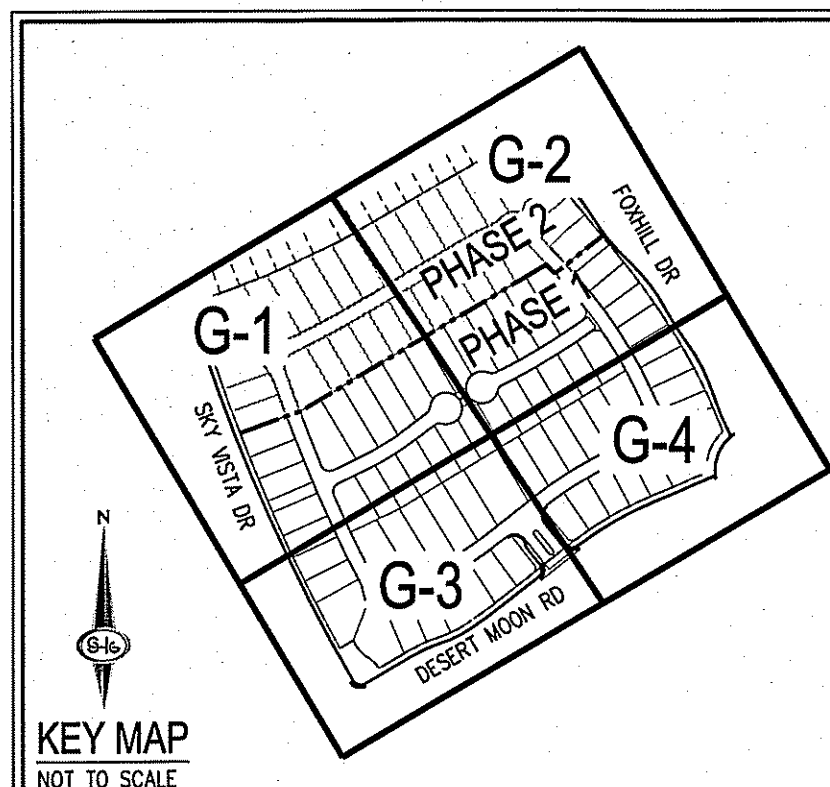
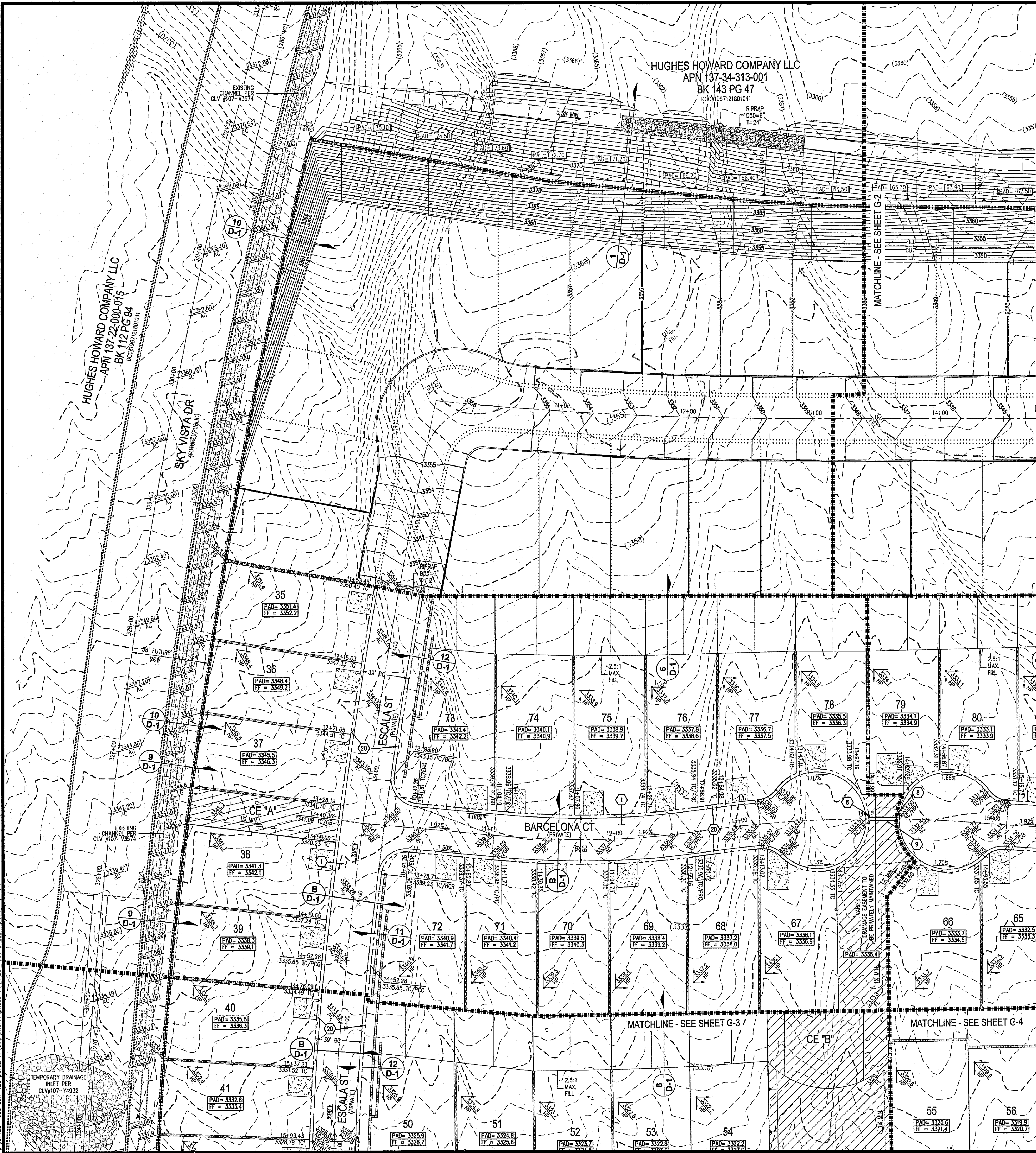
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PHASE I DRAINAGE QUANTITIES			
1.	7.5' MOD TYPE "CM" DROP INLET	EA	2
2.	10.0' MOD TYPE "CM" DROP INLET	EA	2
3.	18" CLASS III RCP STORM DRAIN	LF	212
4.	24" CLASS III RCP STORM DRAIN	LF	21
5.	36" CLASS III RCP STORM DRAIN	LF	74
6.	48" TYPE I SDMH	EA	2
7.	60" TYPE II SDMH	EA	1
8.			
9.			

- ### STORMWATER RUNOFF MANAGEMENT
- (REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))
- 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.
 - 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.
 - 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 II.A.5.
 - 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 II.A.12.
 - 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
- SEE SHEETS 9-13 FOR WALL PLAN.
 - SEE PLAN AND PROFILE SHEETS FOR CENTERLINE AND BACK OF CURB CURVE DATA.
 - FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2006, SECTION 2304.11.2.2.
 - THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
 - ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWEEP.
 - MINIMUM/ANNUAL SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
 - SEE DETAIL SHEETS FOR STREET SECTIONS AND DETAILS.
 - ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
 - CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL.
 - 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 COMMENCEMENT.
 - 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 EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.
 - ALL ELEVATIONS SHOWN, WITH EXCEPTION TO PAD AND FINISHED FLOOR ELEVATIONS, ARE THE VALUE SHOWN PLUS 3300'.

PERIMETER SIDEWALKS

PERIMETER SIDEWALK DISPLAYED FOR CONCEPTUAL PURPOSES ONLY. MASTER DEVELOPER TO PROVIDE DESIGN AND CONSTRUCTION FOR ON-SITE PEDESTRIAN ACCESS.

BENCHMARK

FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, OLVOB-345566
NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

BASIS OF BEARING

NORTH 05°56'55" 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 THEREON ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

LEGAL DESCRIPTION

PARCEL M 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 (AREA OUTSIDE THE 500-YEAR FLOOD PLAN) PER FIRM PLAN 32003C2150C, DATED SEPTEMBER 27, 2002.

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.

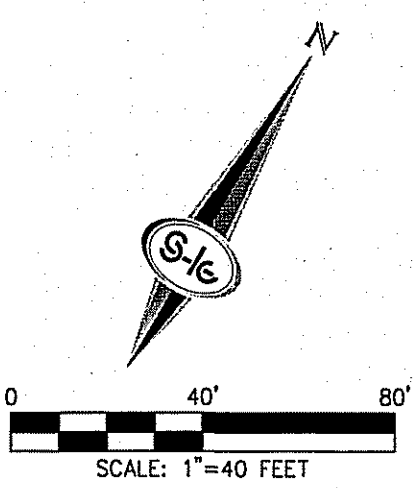
FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY _____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.
JERRY J. SLATER, P.E. 14167 _____ DATE: _____

Call before you Dig
Avoid hitting underground utility lines. It's costly.
Call 811
1-800-227-2600
CLARK COUNTY PUBLIC WORKS
1-702-455-6000

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY.
Call before you do UnderGround
1-702-455-6000
CLARK COUNTY TRAFFIC OPERATIONS
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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



SLATER HANFAN GROUP

CONSULTING ENGINEERS & PLANNERS

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118

PHONE (702) 284-5300 FAX (702) 284-5399

DATE: 05/14/12

DRAFTER: BCC

DESIGNER: BCC

CHECKED: STS

PROJECT NO. LEN1201.000

PROFESSIONAL ENGINEER - STATE OF NEVADA

JERRY J. SLATER

Exp. 06/30/2012

CIVIL

14167

G-1

SHEET 3 OF 9

HUGHES HOWARD COMPANY LLC
APN 137-22-000-015
BK T12 PG 94

137-22-000-015 parcel map showing proposed grading plan for the project. The map shows the project area bounded by Sky Vista Dr to the north, Desert Moon Rd to the south, and Palomar at the Paseos to the east. The map includes lot numbers, elevations, and proposed grading lines. A north arrow and scale bar are also present.



Call before you Dig
Call
1-800-227-2600
CLARK COUNTY TRAFFIC DEPARTMENT
1-702-455-6000

Call before you do Underground
1-702-455-6000
CLARK COUNTY TRAFFIC DEPARTMENT
1-702-432-5900

Call before you dig
1-702-227-2929

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 AND CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED 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 NVW100000, SECTION 11.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 DISBURSEMENTS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL 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 NVW100000, SECTION 11.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. SEE SHEETS 9-13 FOR WALL PLAN.
2. SEE PLAN AND PROFILE SHEETS FOR CENTERLINE AND BACK OF CURB CURVE DATA.
3. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2006, SECTION 2304.11.2.2.
4. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
5. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
6. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
7. SEE DETAIL SHEETS FOR STREET SECTIONS AND DETAILS.
8. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
9. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL.
10. 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/REPLACE EXISTING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
11. 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 EXISTS) WITHIN THE SIGHT TRIANGLE ZONE.
12. ALL ELEVATIONS SHOWN, WITH EXCEPTION TO PAD AND FINISHED FLOOR ELEVATIONS, ARE THE VALUE SHOWN PLUS 3300.

PERIMETER SIDEWALKS
PERIMETER SIDEWALK DISPLAYED FOR CONCEPTUAL PURPOSES ONLY. MASTER DEVELOPER TO PROVIDE DESIGN AND CONNECTIONS FOR ONSITE PEDESTRIAN ACCESS.

BENCHMARK
FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON BLVD, OLVO9-34556
NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

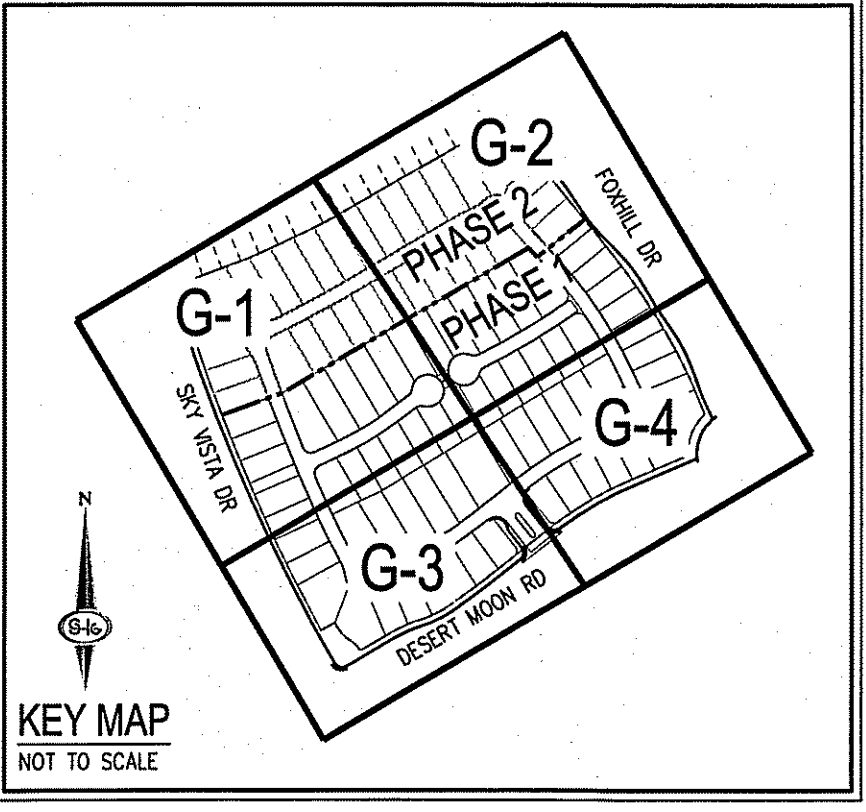
BASIS OF BEARING
NORTH 05°50'55" WEST, BEING THE BEARING OF THE WEST LINE OF SECTION 34, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 143, PAGE 47 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

LEGAL DESCRIPTION
PARCEL M 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 (AREA OUTSIDE THE 500-YEAR FLOOD PLAIN) PER FIRM PANEL 3200322150E, DATED SEPTEMBER 27, 2002.

SUMMERLIN
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FLOOD CERTIFICATION
I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY _____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.
JERRY J. SLATER, P.E. 14167 _____ DATE _____



SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5390
FAX (702) 284-5399

DATE	BY	APP.	DATE	DESCRIPTION
05/14/12	BCC			
	BCC			
	STS			

PROJECT NO.
LEN1201.000

JERRY J. SLATER
P.E. 14167
CIVIL
STATE OF NEVADA
EXPIRATION DATE 06/30/2017

G-3
SHEET 5 OF 9



NOT TO SCALE



NOT TO SCALE



NOT TO SCALE



NOT TO SCALE



NOT TO SCALE



PERIMETER SECTION WITH PAD BELOW STREET



PERIMETER SECTION WITH DUAL RETAINING WALLS



PERIMETER SECTION WITH RAD ABOVE STREET WITHOUT RETAINING WALL



PERIMETER SECTION WITH PAD ABOVE STREET WITH RETAINING WALL



NOT TO SCALE



REAR YARD WALL DETAIL



NOT TO SCALE



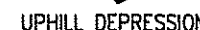
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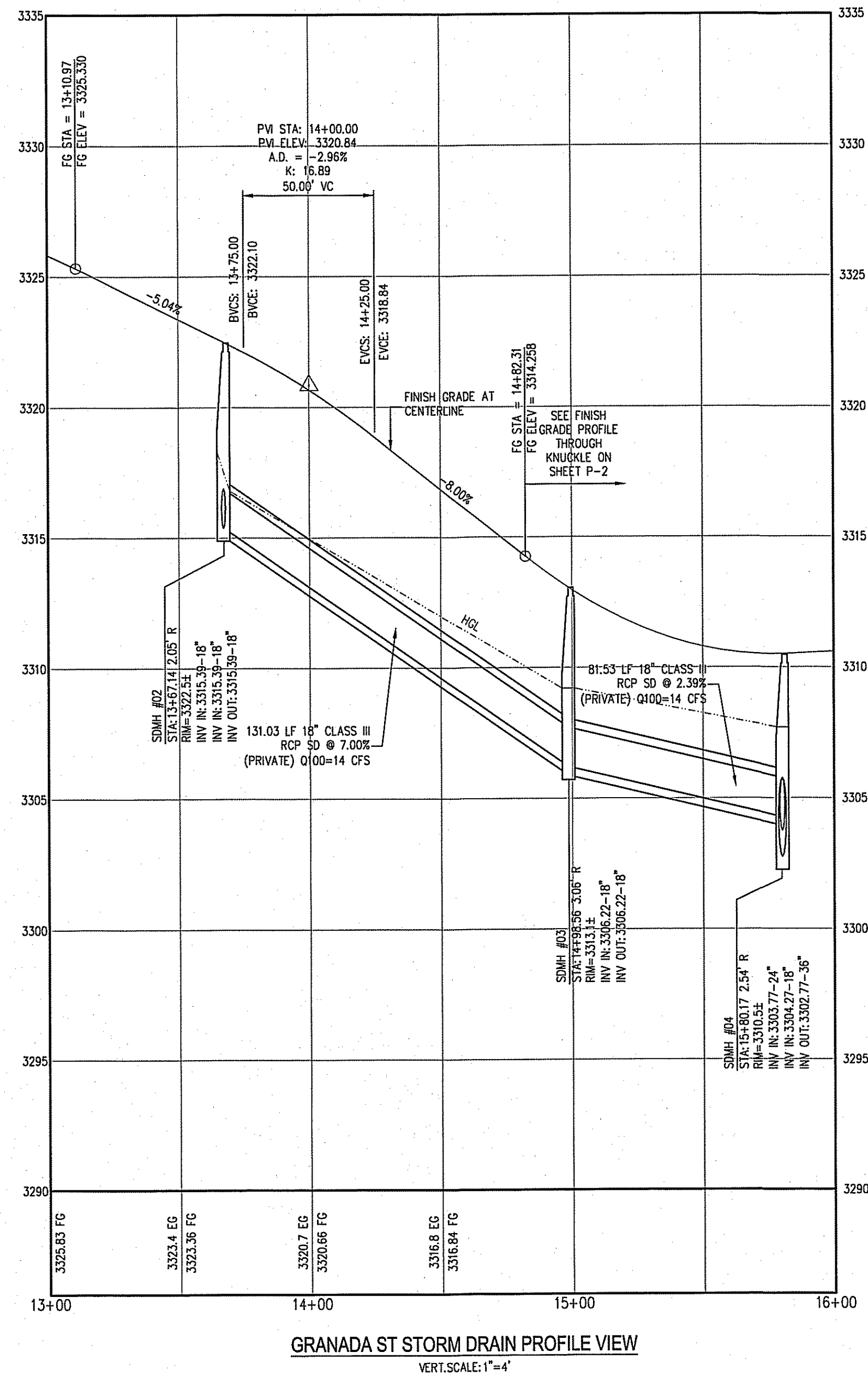
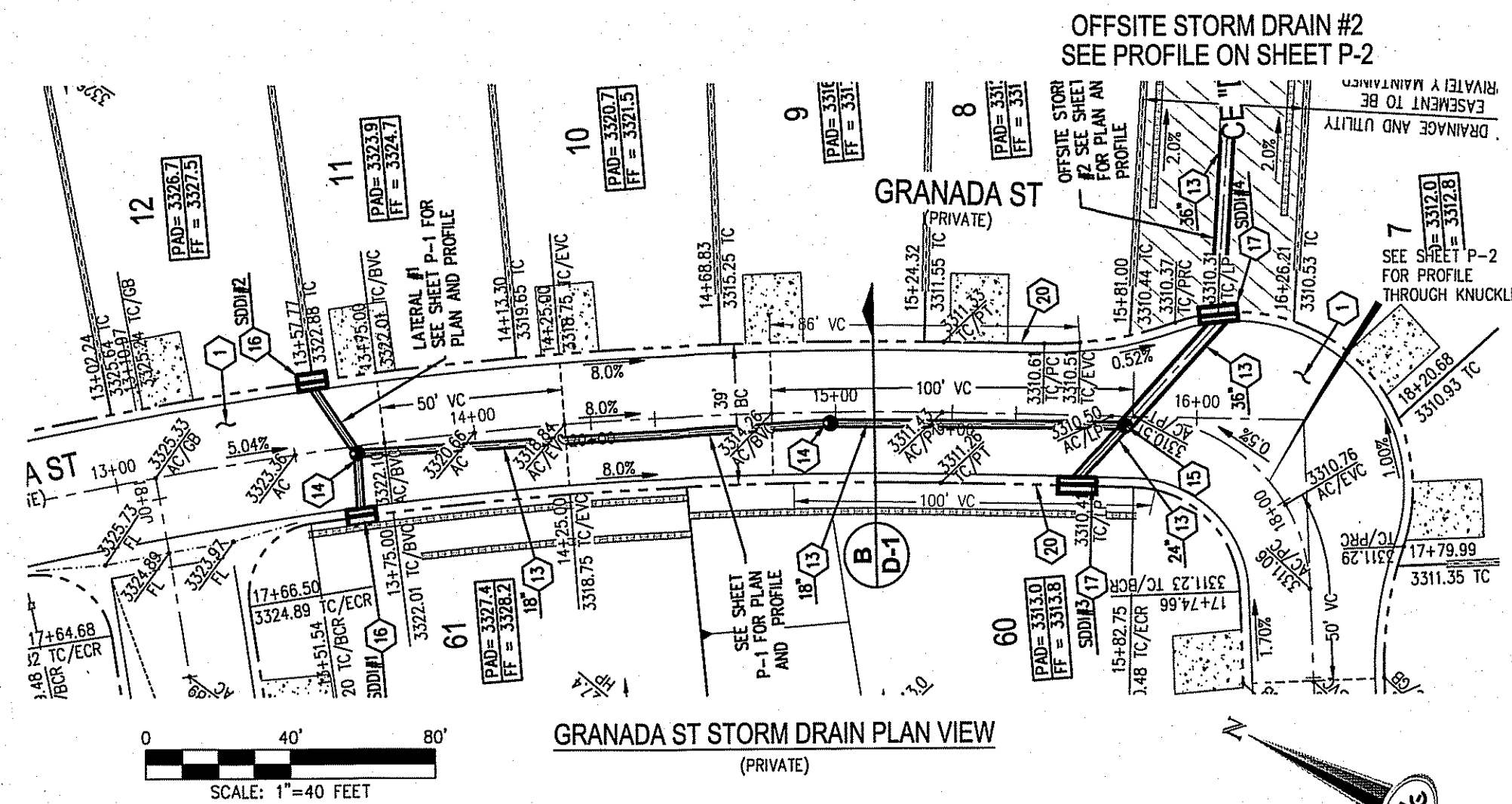
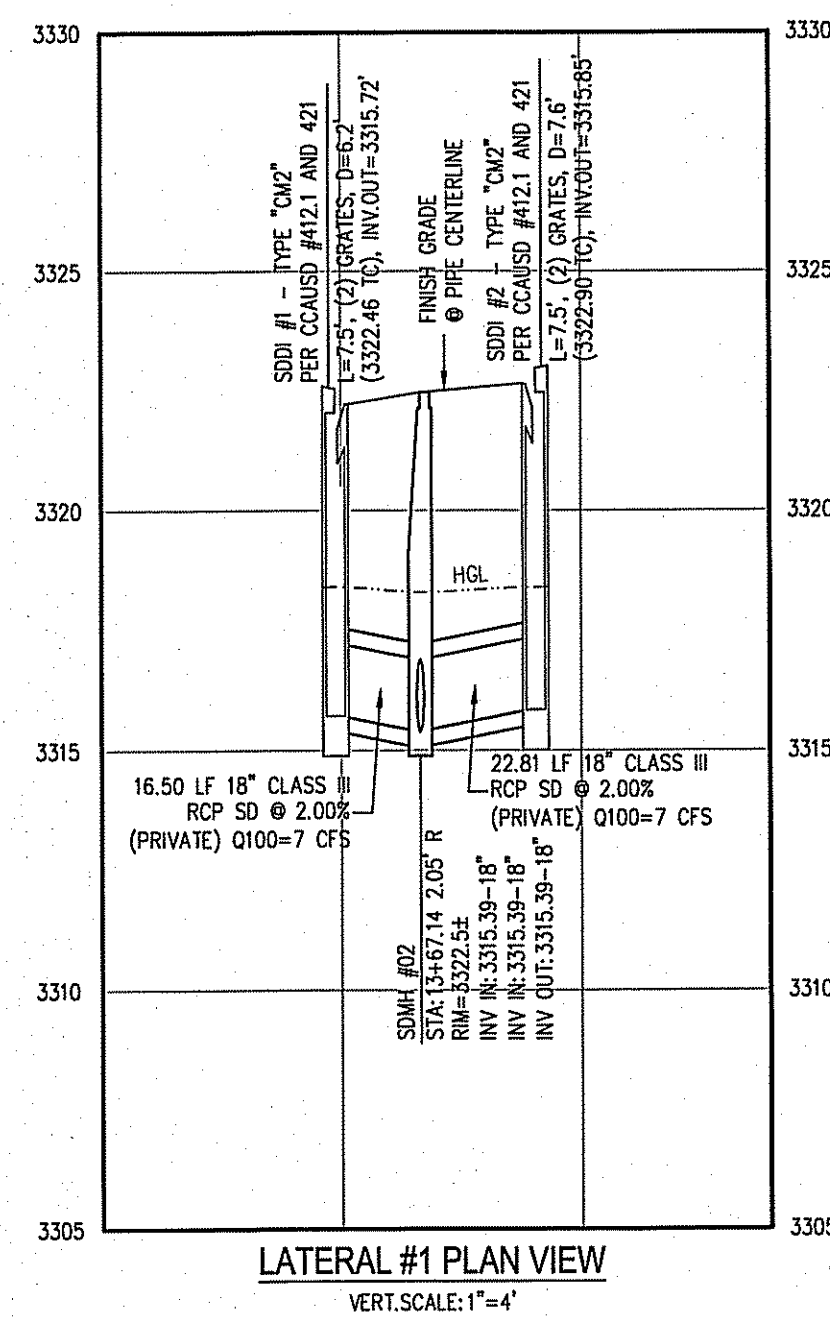
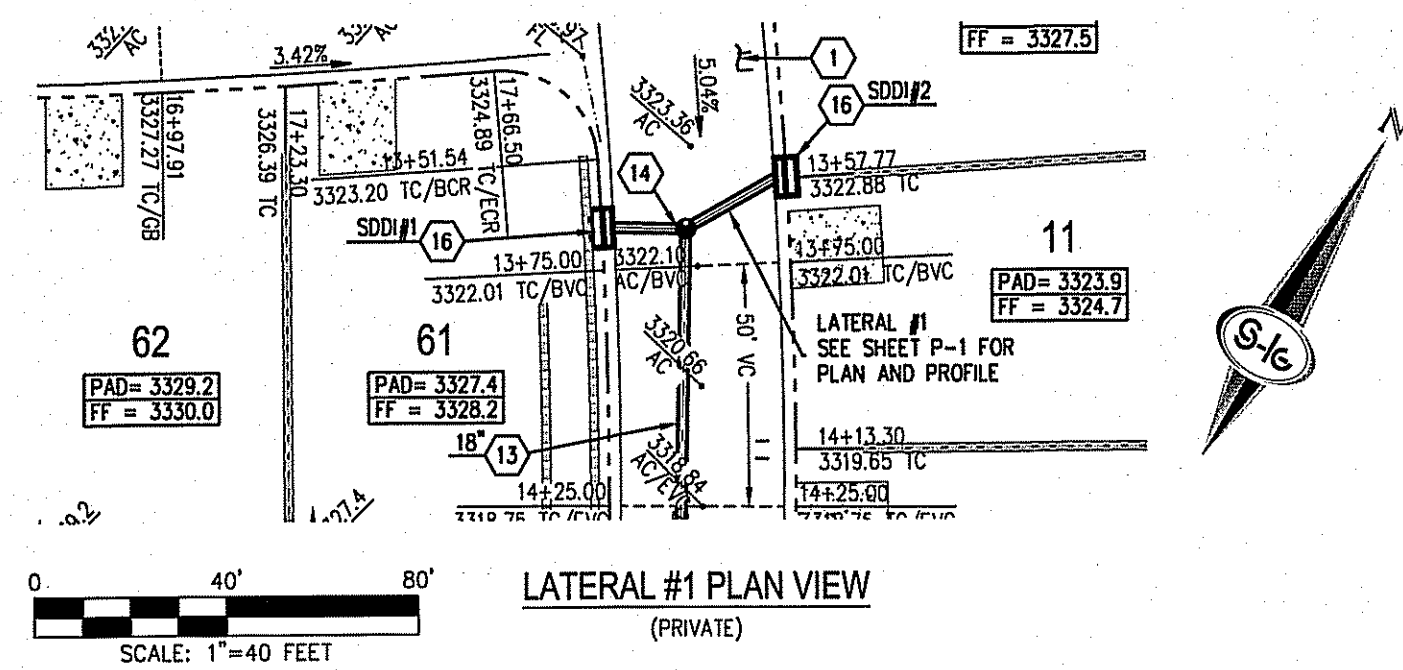


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SLATER
HANIFAN
GROUP

CONSULTING ENGINEERS & PLANNERS

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89116

PHONE (702) 284-5300 FAX (702) 284-5399

LENNAR

LAS VEGAS, NEVADA

ESPERANZA PHASE 1

PLAN AND PROFILE I

DATE: 05/14/12

DRAFTER: BCC

DESIGNER: BCC

CHECKED: STS

PROJECT NO. LEN1201.000

PROFESSIONAL ENGINEER SEAL

JERRY L. SLATER

No. 06/16/2012

CIVIL

No. 14167

LENNAR

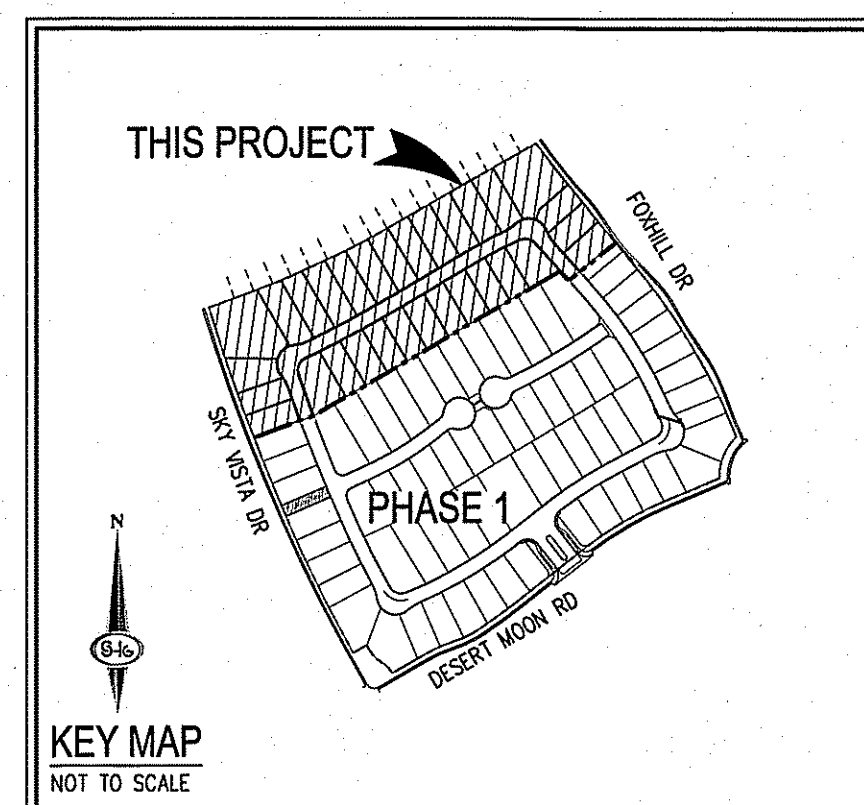
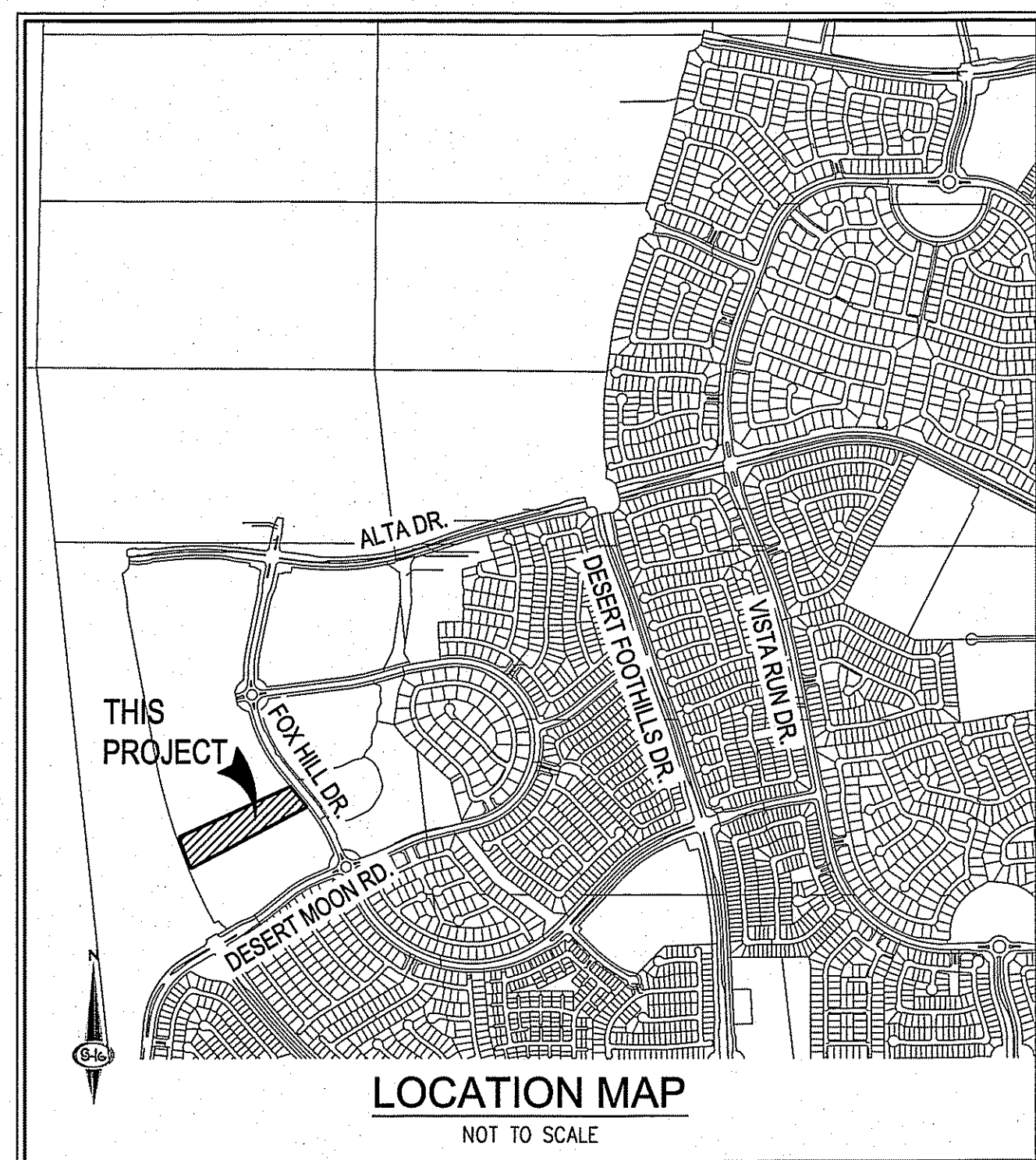
P-1

SHEET 8 OF 9

PHASE 2

ESPERANZA PHASE 2

A SINGLE FAMILY DETACHED
RESIDENTIAL COMMUNITY
A PORTION OF APN 137-34-212-001



LEGAL DESCRIPTION

LOCATED WITHIN PARCEL M 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.

BENCHMARK

FOUND NDOT BRASS CAP, 50 FEET NORTH OF STATION 787+19.42 OF CHARLESTON
BLVD, OLVO9-34SSE6
NAVD 88 ELEVATION = 978.351 METERS = 3209.81 FEET

BASIS OF BEARING	
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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.

APPROVALS

ACTING CITY ENGINEER-DAVID BOWERS PE, PTOE #16736	DATE
APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OF RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS, THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FROM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.	

CLV FIRE MARSHALL	DATE
-------------------	------

DOUG RANKIN, AICP
PLANNING MANAGER

DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING AND DEVELOPMENT DEPARTMENT.

CENTURY INK DATE

THE AFFIXED EMBARGO 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.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. 117426 DATE: _____
SHEETS: _____

APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM LAS VEGAS VALLEY WATER DISTRICT.

NV ENERGY	DATE
-----------	------

NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

SOUTHWEST GAS	DATE
---------------	------

COX COMMUNICATIONS LAS VEGAS, INC. 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.

OWNER

HOWARD HUGHES COMPANY, LLC
ROUSE CO
P.O. BOX 833
COLUMBIA, MD 21044
PH (702) 791-4000

DEVELOPER

LENNAR COMMUNITIES NEVADA, LLC
2490 PASEO VERDE PARKWAY
SUITE 120
HENDERSON, NV 89074
PH (702) 458-7700
FX (702) 889-0801

ENGINEER

SLATER HANIFAN GROUP
5740 S. ARVILLE ST SUITE 216
LAS VEGAS, NV 89118
PH (702) 284-5300
FX (702) 284-5399

PROJECT INFORMATION

APN: 137-34-212-001	
NET ACREAGE	7.08 AC
RESIDENTIAL LOTS	31
COMMON ELEMENTS	0
DENSITY	4.38 - DU/AC
TYPICAL LOT SIZE	4,050 SF (45'x110') 6,050 SF (55'x110')
ZONING	P-C
EARTHWORK SUMMARY (ADJUSTED)	
CUT	- CY
FILL	- CY
SITE IMPORT	- CY

NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE:
[HTTP://WWW.STATE.NV.US/BMPC/STORM01.HTM](http://www.state.nv.us/bmpc/storm01.htm) PROJECTS THAT DISTURB MORE THEN ONE ACRE MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH THE APPROPRIATE FILLING FEE.

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**
1-702-455-6000
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-432-5300
CITYWAY AND ADJACENT JURISDICTIONS

Call before you Dig
Avoid cutting underground
utility lines. It's costly.

Call
811

OR
1-800-227-2600

AND
CLARK COUNTY TRAFFIC OPERATIONS
702-455-6000

SLATER
HANFAN
GROUP
CONSULTING ENGINEERS & PLANNERS
3010 PARKWAY DRIVE
S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5309

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LENNAR®

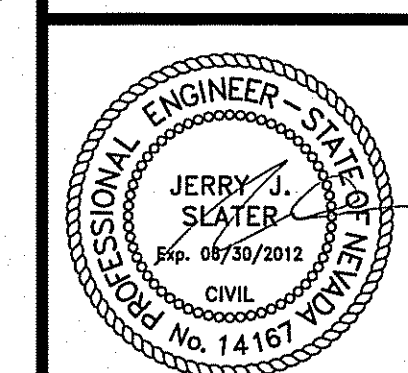
ESPERANZA PHASE 2

COVER SHEET

S34
T20
R59

DATE:	05/14/12
DRAFTER:	BCC
DESIGNER:	BCC
CHECKED:	STS

PROJECT NO.
LEN1201.000



5.1412

C-1

SHEET 1 OF 4

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2.1 CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN UNIFORM STANDARD FOR WORK IN THE SUMMERLIN AREA AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE "UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".

2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CIVIL PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.

3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.

4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.

5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.

6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSURANCES REQUIRED FOR THIS CONSTRUCTION.

7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.

8. AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE TOP OF ALL CUTTERS AFTER CONSTRUCTION, EXCEPT AT SIDEWALK RAMPS AND CROSS UTTERS.

9. CURB AND CUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.

10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.

11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.

12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY GEOTEK, REPORT #29342-LVB, JUNE 4, 2010 APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.

13. EXACT LOCATION OF ALL SAWJUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.

14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.

15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS CUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER. ALL ABOVE GROUND UTILITY APPEARANCES SHALL CONFORM TO THE REQUIREMENTS OF 15.12.040.

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS, FLOOD CONTROL, AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.

17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.

18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.

20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.

21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE OFFSITE INSPECTION AND TESTING SECTION PRIOR TO PROJECT ACCEPTANCE. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXITS THE PUBLIC RIGHT-OF-WAY. THE LOCATION SHALL BE DESCRIBED BY STATE PLANE COORDINATES WHICH SHALL BE BASED ON THE "NEVADA COORDINATE SYSTEM OF 1983, EAST ZONE" AS DEFINED BY THE NEVADA REVISED STATUTES CHAPTER 327, AND TIED TO THE CITY OF LAS VEGAS VERTICAL CONTROL. BENCHMARK NETWORK COORDINATES MUST BE CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINITIES OF +/- 0.1 METER (1/5 - 0.3 FEET). A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).

22. SANITARY SEWER SERVICE LATERALS REQUIRE THE INSTALLATION OF A MARKER BALL AT THE CONNECTION OF THE SEWER SERVICE LATERAL TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERAL EXITS THE PUBLIC RIGHT-OF-WAY. STORM DRAIN LATERALS REQUIRE THE INSTALLATION OF A MARKER BALL AT THE CONNECTION OF THE STORM DRAIN LATERAL TO THE STORM DRAIN MAIN AND WHERE THE STORM DRAIN LATERAL EXITS THE PUBLIC RIGHT-OF-WAY OR WHERE THE STORM DRAIN LATERAL CONNECTS TO A DROP INLET. THE MARKER BALL SHALL BE 3M 4" MARKER BALL 1404-XR OR APPROVED EQUAL.

23. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.

24. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

2.2 CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.

2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.

3. CHISEL "S" OR "O" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.

4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.

5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE REKITOFF IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.

6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "S" SHALL BE IN LINE TWELVE INCHES (12") OR ABOVE.

7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.

8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.

9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1') OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.

10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

2.3 CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.

2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.

3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN S&D SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.

4. WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCRACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF THE THAT CHILDREN ARE LIKELY TO BE PRESENT.

5. IF THE IMPROVEMENTS NECESSITATE THE QUANTIFICATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL BE FABRICATED WITH DIAMOND GRADE, VP CLASS 6 REFLECTIVE SHEETING OR APPROVED EQUAL, ALL NEW TRAFFIC SIGNS, EXCEPT STREET NAME AND SCHOOL SPEED LIMIT SIGNS, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIVALENT ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. SCHOOL ZONE SIGNS SHALL HAVE 3M SERIES 1150 ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. STREET NAME SIGNS SHALL CONFORM IN THEIR DURABILITY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.

7. WHEN A PROPOSED STREET LIGHT STATION IS LOCATED WITHIN FIVE (5) FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON SIGNS, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.

8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ON THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER. REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER CITY IMPROVEMENTS CALLED FOR BY THESE PLANS.

9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.

10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATESA TRAFFIC CONTROL TECHNICIAN OR NEA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.

11. WORK IN PUBLIC STREETS, ONCE BEGIN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.

13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 228-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.

14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECTS OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH EXISTING PAVEMENT SEGMENTS. THE CONTRACTOR SHALL PROVIDE THE DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNING, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

2.4 CITY OF LAS VEGAS STREETLIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST REVISION, AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST REVISION, AND ANY ADOPTED SPECIAL AREA SPECIFICATIONS.

2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS (E.T.C.) LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF TRAFFIC ENGINEERING AND THE CITY ENGINEER.

3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.

4. ALL STREET LIGHTING CONDUITS SUB SHALL HAVE AT LEAST ONE GREEN #8 THW WIRE INSTALLED, AS TRUCK WIRE. WHEN "EMPTY" CONDUIT IS COMPLETELY INSTALLED, IT SHALL BE TIED TO PB. IT SHALL HAVE MINIMUM OF 2 #4 AND 1 #8 THW WIRE WITH THE ENDS TAPED OR "SAFE OFF" PRIOR TO FINAL INSPECTION.

5. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM CLEARANCE IN ACCORDANCE WITH THE UTO NO. 320A.

6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE DESIGNED PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.

7. SERVICE POINT SHALL BE COORDINATED WITH HV ENERGY COMPANY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE CIVIL PLANS.

8. IT SHALL BE ASSUMED THAT IN THE ABSENCE OF AN EXISTING, WORKABLE CIRCUIT TO ATTACH TO, ALL INSTALLATIONS SHALL REQUIRE A NEW SERVICE FOR OPERATION OF THE CIRCUIT.

9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED, AT NO EXPENSE TO THE CITY OF LAS VEGAS, BEFORE STREETLIGHT BASES ARE INSTALLED.

10. THE CONTRACTOR SHALL FURNISH COMPLETE SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON PLANS.

11. THE DEVELOPER/OWNER WILL BE REQUIRED TO SUPPLY POWER TO ALL NEW PUBLIC STREET LIGHTS INSTALLED UNDER THIS DESIGN PRIOR TO ANY RELEASED OR PROJECT COMPLETION. THE DEVELOPER/OWNER WILL BE RESPONSIBLE FOR ALL ITEMS ASSOCIATED WITH THE INSTALLATION, CONSTRUCTION, ENERGIZING, MAINTENANCE AND OPERATIONAL COST OF S&D STREET LIGHTS PRIOR TO PROJECT COMPLETION. REF: TO THE PLAN FOR ANY NEW SERVICE REQUIREMENTS. THE TRANSFER OF OWNERSHIP FROM THE DEVELOPER/OWNER TO THE CITY OF LAS VEGAS FOR ALL NEW PUBLIC STREET LIGHTS AND/OR SERVICE IS INSTALLED UNDER THIS PLAN DESIGN WILL BE IN CONJUNCTION WITH THIS PROJECT COMPLETION. COORDINATE ALL MAINTENANCE AND OPERATIONAL TRANSFERS WITH THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DEPARTMENT (TEFO) AT (702) 228-6331.

2.5 CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.

2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.

3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.

4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED FOR THE PROJECT FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.

5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.

6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

A. PAVEMENT AREA SUBGRADE 0.1+ VERTICAL COMPACTION +0.0' TO -0.1' SEE SOILS REPORT

B. ENGINEERED FILL 0.5+ VERTICAL COMPACTION +0.1' TO -0.1' SEE SOILS REPORT

REPORT COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.

11. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.

8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.

9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPLILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC, SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.

10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERM, ROAD SIGNS AND BARRICADES, ETC.

CITY OF LAS VEGAS FIRE AND RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE CITY OF LAS VEGAS FIRE DEPARTMENT'S ORDINANCE # 5667, "HYDRANT SPECIFICATIONS", AND "HYDRANT INSTALLATION SPECIFICATION".

2. AUTHORIZED FIRE HYDRANTS FOR THIS PROJECT ARE:
A. KENNEDY - GUARDIAN MODELS KB1A AND KB1D
B. MUELLER - SUPER CENTURION 250 MODEL A-423
C. CLOW - MEDALLION MODEL F-2445/DV
D. TROY VALVE - PATRIOT MODEL PITBOON NEVADA HYDRANT
E. U.S. PIPE - METROFLOW/M-03

3. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS FIRE HYDRANTS SHALL BE INSTALLED AND FIRE SERVICE ACCESS ROADS SHALL BE MAINTAINED BEFORE CONSTRUCTION OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW.

4. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF STREET ADJACENT TO THE FIRE HYDRANTS AS REQUIRED BY ORDINANCE # 5667.

5. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES SHALL BE CONDUCTED BEFORE COVERING THE LINES. CALL THE CITY OF LAS VEGAS INSPECTION HOT-LINE AT 228-2071 TO REQUEST AN INSPECTION BY THE CITY OF LAS VEGAS FIRE DEPARTMENT.

6. PAINTING OF THE CURBS AND FIRE HYDRANTS AND ALL OTHER WORK NECESSARY AS REQUIRED BY ORDINANCE # 5667, FOR THE PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, SHALL BE COMPLETED BEFORE APPROVAL BY THE CITY OF LAS VEGAS FIRE DEPARTMENT.

7. A PERMIT IS REQUIRED FROM THE CITY OF LAS VEGAS FIRE DEPARTMENT FOR THE ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK.

8. PRIVATE FIRE HYDRANTS SHALL BE PAINTED RED.

9. PRIOR TO THE FINAL OCCUPANCY, A FLOW TEST MUST BE WITNESSED BY THE CITY OF LAS VEGAS FIRE DEPARTMENT TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW.

10. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A. APPROVED, AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE.

11. FIRE HYDRANTS SPACING SHALL BE:
RESIDENTIAL - 500 FEET UNSPRINKLERED; 600 FEET SPRINKLERED.
COMMERCIAL - 300 FEET UNSPRINKLERED; 400 FEET SPRINKLERED.

12. WHERE NEW WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT MAXIMUM 100 FOOT SPACING, TO PROVIDE FOR PROTECTION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FEET ON AN ALTERNATING BASIS.

13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE REQUIRED RADIUS OF A CUL-DE-SAC OR WITHIN 20 FEET OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.

14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FEET OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION.

15. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FEET, AS MEASURED BY AN APPROVED ROUTE.

16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FEET, AS MEASURED BY AN APPROVED ROUTE.

17. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FEET.

18. TWO SOURCES OF SUPPLY ARE REQUIRED WHEREVER THERE ARE 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN.

19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPROVED LOADS OF THE FIRE APPARATUS. CONCRETE 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

20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 60° PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%.

21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FEET OUTSIDE AND 28 FEET INSIDE TURNING RADIUS.

22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL BE NOT LESS THAN 13 FEET 6 INCHES.

23. FIRE DEPARTMENT ACCESS ROADS IN ALL RESIDENTIAL DEVELOPMENTS (EXCEPT FOR THE APARTMENT BUILDINGS) SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 36 FEET FLOW LINE TO THE FLOW LINE (THIS WIDTH MAY BE REDUCED TO 24 FEET, IF ALL BUILDINGS FRONTING THE STREET ARE SPRINKLERED) AND MAIN RESIDENTIAL STREETS WITH PARKING PERMITTED ON BOTH SIDES OF THE STREET. PRIVATE DRIVE ALLEYS, DRIVEWAYS, ETC. SHALL BE ALLOWED TO BE REDUCED TO A MINIMUM WIDTH OF 24 FEET. MINIMUM FLOW LINE TO THE FLOW LINE WHEN SERVING NO MORE THAN 6 RESIDENCES, AND WHEN ON STREET PARKING IS ISOLATED.

24. ALL FIRE APPARATUS ACCESS ROADS IN COMMERCIAL DEVELOPMENTS AND APARTMENT COMPLEXES SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 24 FEET (FLOW LINE TO THE FLOW LINE). PROVIDED NO PARKING IS ALLOWED ON EITHER SIDE, 32 FEET (FLOW LINE TO THE FLOW LINE), IF PARALLEL PARKING IS ALLOWED ON ONE SIDE ONLY, AND 40 FEET (FLOW LINE TO THE FLOW LINE), IF PARALLEL PARKING IS ALLOWED ON BOTH SIDES. THESE WIDTHS MAY BE REDUCED BY 4 FEET IF ALL BUILDINGS ARE SPRINKLERED.

25. A FIRE DEPARTMENT ACCESS ROAD SHALL EXTEND TO WITHIN 50 FEET OF A SINGLE EXTERIOR DOOR PROVIDING ACCESS TO THE INTERIOR OF THE BUILDING.

26. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FEET FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FEET IF THE BUILDING IS SPRINKLERED.

27. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FEET, AND FOR ALL COMMERCIAL, INDUSTRIAL, AND MULTI-FAMILY RESIDENTIAL DEVELOPMENTS.

28. ALL DEAD-END FIRE APPARATUS ACCESS ROADS AND OR FIRE LINES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FEET IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND AREA HAVING A MINIMUM DIAMETER OF 91 FEET.

29. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE STREET LIGHTING CIRCUITS AND/OR POLES. THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED, AT NO EXPENSE TO THE CITY OF LAS VEGAS, BEFORE STREETLIGHT BASES ARE INSTALLED.

30. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE CITY OF LAS VEGAS GUIDELINES FOR AUTOMATIC EMERGENCY VEHICLE ACCESS GATES.

LAS VEGAS VALLEY WATER DISTRICT (LVVWD) STANDARD NOTES

LVVWD PROJECT #XXXXXX

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.

2. ALL WORK SHALL CONFORM TO LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.

3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.

4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.

5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.

6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.

7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB CUTTERS.

8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSEINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.

9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED, AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD DISTRIBUTION SYSTEM.

10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.

11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.

12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVWD PRE-APPROVED MATERIALS AND MANUFACTURER'S LISTING FOR NEW FACILITIES. LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.

13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.

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 AND 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.

