DS #: 4084-2

APN: 137-22-000-015

PROJECT: Summerlin Village

SUBMITTAL: 5th

SCANNED BY/DATE: _____

CHECKED BY/DATE: _____

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: July 2, 2013
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 23B – Far Hills Avenue Improvements** **- Update for Roadway Impr. Phase 1 (Desert Foothill to Fox Hill)**			**COPIES TO:** G.C. Wallace, Inc.
Cross Streets:	Far Hills Ave from Desert Foothills to Sky Vista			Howard Hughes Corporation
File Number:	F:\Depot\DSMemos\DS4084F.doc			Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-015			CCRFCD
Zoning Action:	N/A			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	10/5/2006	10/25/2006	Not Approved	$400.00	55426: $400
2nd Submittal	11/13/2006	12/1/2006	Conditional Approval	$400.00	57514: $400
CCRFCD	4/13/2007	4/23/2007	Concurrence	N/C	N/C
3rd Submittal	4/15/2013	4/29/2013	Not Approved	$100.00	316351: $100
4th Submittal	5/20/2013 & 6/5/2013	6/6/2013	Conditional Approval	$400.00	320342: $400
5th Submittal	6/18/2013	7/2/2013	See Comments Below	$100.00	323569: $100
			TOTAL FEES (LDDRS):	**$1,400.00**	**----**

REMARKS:

5th Submittal: Update for Far Hills Avenue Roadway Improvements Phase 1 (Desert Foothill Drive to Fox Hill Drive)

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

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

1. **This drainage study is acceptable in concept**; however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District* (CCRFCD) has issued a letter of concurrence. The Engineer should contact the CCRFCD to confirm that they have begun their review.

2. All the interim facilities such as but not limited to the openings, berms/channels and stubs etc. are to be owned and privately 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.

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

END OF REMARKS

ays

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

****
*** FAX TX REPORT ***
****

TRANSMISSION OK

JOB NO.	1858
DESTINATION ADDRESS	8042299
PSWD/SUBADDRESS	
DESTINATION ID	
ST. TIME	07/02 17:17
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PGS.	2
RESULT	OK

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			**DATE:** July 2, 2013
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 23B – Far Hills Avenue Improvements - Update for Roadway Impr. Phase 1 (Desert Foothill to Fox Hill)**		**COPIES TO:** G.C. Wallace, Inc.
Cross Streets:	Far Hills Ave from Desert Foothills to Sky Vista		Howard Hughes Corporation
File Number:	F:\Depot\DSMemos\DS4084F.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-015		CCRFCD
Zoning Action:	N/A		
FEMA Flood Zone	YES	NO **X**	
Proposed Storm Drain	YES	NO **X**	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	10/5/2006	10/25/2006	Not Approved	$400.00	55426: $400
2nd Submittal	11/13/2006	12/1/2006	Conditional Approval	$400.00	57514: $400
CCRFCD	4/13/2007	4/23/2007	Concurrence	N/C	N/C
3rd Submittal	4/15/2013	4/29/2013	Not Approved	$100.00	316351: $100
4th Submittal	5/20/2013 & 6/5/2013	6/6/2013	Conditional Approval	$400.00	320342: $400
5th Submittal	6/18/2013	7/2/2013	See Comments Below	$100.00	323569: $100
			TOTAL FEES (LDDRS):	**$1,400.00**	-----

REMARKS:

5th Submittal: Update for Far Hills Avenue Roadway Improvements Phase 1 (Desert Foothill Drive to Fox Hill Drive)

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

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

1. **This drainage study is acceptable in concept**; however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District* (CCRFCD) has issued a letter of concurrence. The Engineer should contact the CCRFCD to confirm that they have begun their review.

UPDATE #2 TO THE TECHNICAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23B FAR HILLS AVENUE IMPROVEMENTS (FAR HILLS AVENUE ROADWAY IMPROVEMENTS PHASE 1)

62023B-205

June 2013

Prepared for:

The Howard Hughes Company, LLC
10801 W. Charleston Blvd., 3rd Floor
Las Vegas, Nevada 89135
Phone: (702) 791-4200
Fax: (702) 791-4450

62023B-205

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Update #2 to the TDS Summerlin Village 23B Far Hills Avenue Improvements (Far Hills Avenue Roadway Improvements Phase 1) Date: June 2013

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

East/West: Far Hills Avenue

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

c) APN: 137-22-000-015

Name of Owner: Howard Hughes Company LLC

Telephone No.: (702) 791-4200 Fax No. (702) 791-4450 E-Mail Address: Not available

Address: 10801 W. Charleston Blvd, 3rd Floor; Las Vegas, Nevada 89135

Contact Person-Name: James Monroe **Telephone No.:** (702) 804-2133

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

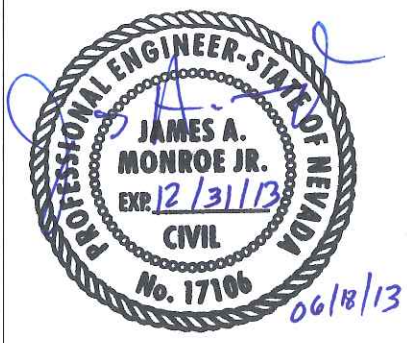
Firm: G. C. WALLACE COMPANIES

Address: 1555 S. Rainbow Blvd; Las Vegas, NV 89146

Type of Land Development/Land Disturbance

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

1. Total Owned Land Area: At Site: +/- 2,700 acres Being Developed/Disturbed: +/- 6.43 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ **Yes**** ☒ **No**
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ **Yes**** ☐ **No**
4. Proposed type of development (Residential, Commercial, Etc.): Roadway Improvements
5. Approximate upstream land area which drains to the subject site: +/- 160 acres
6. Has the site drainage been evaluated in the past? ☒ **Yes** ☐ **No** If yes, please identify documentation: Update to the *Technical Drainage Study for Summerlin Village 23B Rough Grading (GCW); Conceptual Drainage Study for Summerline Village 23B (GCW); Summerlin Village 23B Far Hills Avenue Improvements, (GCW), Update to Summerlin Village 23B Far Hills Avenue Improvements.*
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Existing Far Hills Avenue RCB near Desert Foothills Drive.
8. Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

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

*New Required Field

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

Local Entity File No.

Revision	Date

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

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	
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
x		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.

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.
	N/A	All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
x		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.

II. GRADING PLAN INFORMATION		
Yes	No	
	N/A	Back of lot elevations and lot drainage pattern for all lots including common lots.
	N/A	Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
x		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
	N/A	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
	N/A	Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

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

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

- Following the acceptance of the Drainage Study (meeting the minimum acceptable information above), there will be a charge of $250 for each Drainage Study review submittal. These fees are payable at the time the Grading Permit is obtained.
- The Drainage Study must be accepted prior to submitting grading plans to the Land Development Section for review.

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

F:\Projects\600\62023B-227\Admin\Forms\130104-CHKLIST7-TDS_UP3-mmc.doc
17-Jun-13

UPDATE #2 TO THE TECHNICAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23B FAR HILLS AVENUE IMPROVEMENTS (FAR HILLS AVENUE ROADWAY IMPROVEMENTS PHASE 1)

62023B-205

June 2013

Prepared for:

The Howard Hughes Companies, LLC
10801 W. Charleston Blvd., 3rd Floor
Las Vegas, Nevada 89135
Phone: (702) 791-4200
Fax: (702) 791-4450

Prepared by:

G. C. Wallace Companies
1555 S. Rainbow Blvd.
Las Vegas, Nevada 89146
Phone: (702) 804-2000
Fax: (702) 804-2299

62023B-205

June 18, 2013

702.804.2133

Albert Y. Sung, PE
Flood Control Project Manager
City of Las Vegas - Land Development Services
Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Re: Update #2 to the Technical Drainage Study for Summerlin Village 23B Far Hills Avenue Improvements (Far Hills Avenue Roadway Improvements Phase 1)

Dear Mr. Sung:

The purpose of this letter is to serve as the second update to the *Technical Drainage Study for Summerlin Village 23B Far Hills Avenue Improvements* (hereinafter referred to as the Far Hills Avenue Study). This study was originally approved by the City of Las Vegas Flood Control (CLV) on December 1, 2006, with concurrence from the Clark County Regional Flood Control District (CCRFCD) on January 2, 2007. The Far Hills Avenue Study included construction of full street improvements and storm drain within Far Hills Avenue between Desert Foothills Drive and Sky Vista Drive.

The *Update to the Technical Drainage Study for Summerlin Village 23B Far Hills Avenue Improvements (Far Hills Avenue RCB Improvements,* hereinafter referred to as Update #1, was approved by CLV on June 6, 2013 and is currently under CCRFCD review. Update #1 separates the Far Hills Avenue full street improvements from the proposed mainline RCB storm drain improvements. Additionally, Update #1 addresses the proposed "initial phase" which includes the construction of the RCB storm drain improvements and rough grade.

The "final phase" improvements will be constructed in two phases. This report addresses the 1st phase of the "final phase" improvements which includes construction of the Far Hills Avenue roadway improvements between Desert Foothills Drive and Fox Hill Drive. The 2nd phase of the "final phase" improvements will be addressed in a future technical drainage study update. The 2nd phase will include construction of Far Hills Avenue roadway improvements between Fox Hill Drive and Sky Vista Drive. The proposed drainage improvements to be constructed during the "final phase" include street improvements storm drain lateral extensions, roadway drop inlets, storm drain stubs for future storm drain connections, and roadside swales. The roadway improvements were originally addressed in the Far Hills Avenue Study. This report addresses plan changes that have occurred since the approval of the Far Hills Avenue Study.

Proposed Conditions

The proposed conditions onsite and offsite hydrologic analyses have been referenced from the Far Hills Avenue Study and Update #1 respectively. Proposed conditions drainage patterns and flow rates are depicted on Figure 5BU2. During proposed conditions Desert Foothills Drive Improvements, Far Hills Avenue RCB Improvements, and Far Hills Avenue roadway improvements between Desert Foothills Drive and Fox Hill Drive are constructed. Far Hills Avenue west of Fox Hill Drive is rough graded during proposed conditions. Ditches and berms proposed with the Far Hills RCB Improvements will protect the Phase 1 roadway improvements during proposed conditions.

Ultimate Conditions

Ultimate conditions onsite and offsite hydrologic analyses have been referenced from the Far Hills Avenue Study and Update #1 respectively. Ultimate conditions drainage pattern and flow rates are depicted on Figure 6BU2. The flow conveyed within Far Hills Avenue during ultimate conditions will be less than during interim conditions.

Street Hydraulics

In general, proposed street flow rates, street sections, street grades, and drop inlet locations are consistent with the previously approved Far Hills Avenue Study. Some drop inlets have moved slightly (less than 10 feet) from the locations shown in the Far Hills Avenue Study. However, the revised locations match up well with the onsite subbasins and a revised street flow analysis is not warranted. See revised Figures 5BU2 and 6BU2. Pertinent referenced material from the Far Hills Avenue Study has been included in the Appendix.

The callouts for the proposed drop inlets have been revised to Clark County Uniform Standard Drawing (CCUSD) Type "C" Modified Drop Inlet (AKA Type "CM2" Drop Inlet), therefore the callout lengths are 2 feet longer than the previously approved Modified Type "CM" drop inlet. The grate lengths for the proposed drop inlets will match and the curb opening lengths will be 2 feet longer than the previously approved drop inlets. The curb opening length shown for the Type "C" Modified Drop Inlet in CCUSD Drawing 412.1, extends 2 feet upstream beyond the grate length. The proposed drop inlet grate lengths and the curb opening lengths are greater than or equal to the previous approved drop inlets. Therefore, drop inlet efficiencies for the proposed drop inlets will meet or exceed the previously approved drop inlets. The drop inlet calculations for the proposed drop inlets are referenced from the approved study and have not been revised with this report. The street flow and drop inlet summary tables are shown on Figures 5BU2 and 6BU2.

Storm Drain Facilities

Lateral storm drain stubs proposed with the Far Hills Avenue RCB Improvements will be extended and connected to the proposed roadway drop inlets.

The 42-inch RCP stub within the Fox Hill Drive and Far Hills Avenue intersection will be extended north in Fox Hill Drive and plugged and capped for a future connection.

As discussed in the approved *Update #3 to the Technical Drainage Study for Summerlin Village 23B Desert Foothills Drive Improvements*, the previously shown 42-inch RCP stub shown within the Desert Foothills Improvement Plans at Station 202+35 has been relocated west to be within the limits of the Far Hills Avenue RCB Improvements. The 42-inch RCP stub is now included with the Far Hills Avenue RCB Improvements and will be extended as part of this project for the Far Hills Avenue Roadway Improvements Phase 1. The storm drain will be extended to connect to the proposed drop inlet at Station 203+67. Additionally, a plugged and capped 42-inch RCP stub will be provided on the northern side of the proposed drop inlet for a future connection.

Hydraulic calculations for the proposed storm drain improvements are provided in the Appendix.

If you have any questions or require additional information, please contact our office at 804-2000.

Cordially,

G. C. WALLACE, INC.

James A. Monroe Jr., PE
Project Manager
Flood Control Division

jam/vlr
c: Chris Anderson, THHC
Calvin Black, GCW
Ryan Belsick, GCW
Mark Fakler, GCW
Josh Johnson, GCW
Grant Tokumi, GCW
Michelle Castell, GCW

UPDATE #2 TO THE TECHNICAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23B FAR HILLS AVENUE IMPROVEMENTS (FAR HILLS AVENUE RCB IMPROVEMENTS) APPENDIX LAYOUT

Appendix A. Hydrologic Calculations and Information

1. Figure 5BU2 - Prorated Flows Drainage Map - Interim Conditions
2. Figure 6BU2 - Onsite Drainage Map - Ultimate Conditions

Appendix B. Hydraulic Calculations and Information

1. Standard Form 6 Calculations

Appendix C. Referenced Materials

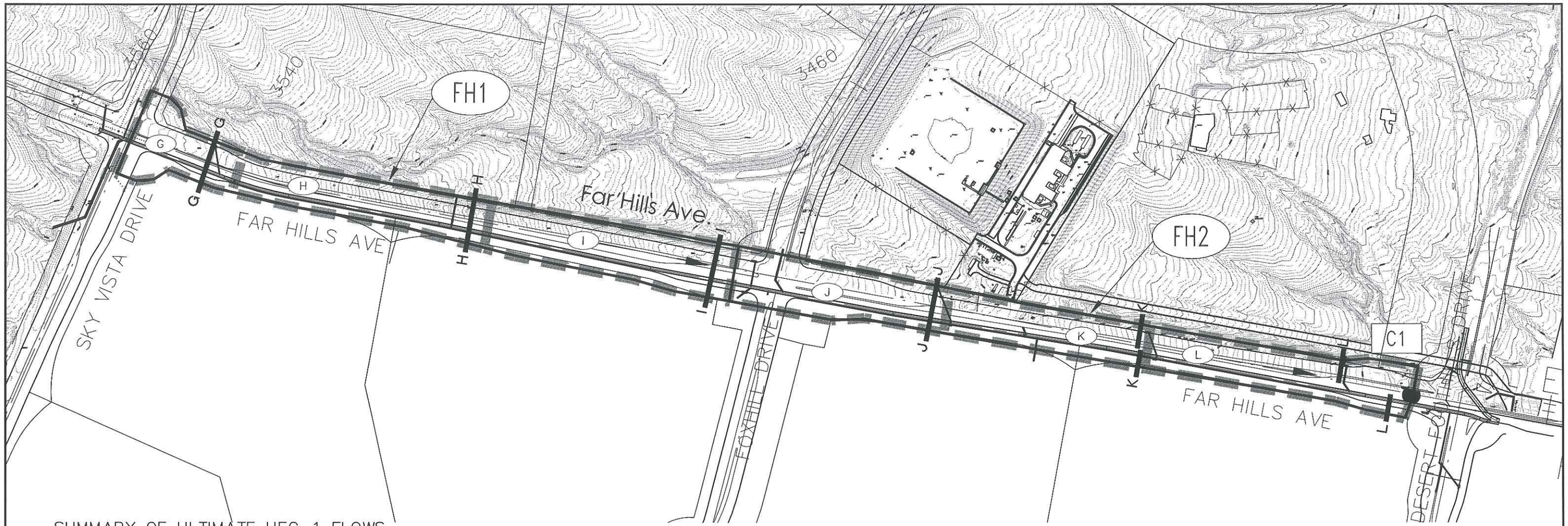
1. Summerlin Village 23B Far Hills Avenue Improvements
    a) CLV Approval Letter
    b) CCRFCD Concurrence Letter
    c) Figure 5B – Interim Conditions Prorated Flows Drainage Map
    d) Figure 6B – Ultimate Conditions Onsite Drainage Map
    e) Interim Street Flow Calculations (10-Year and 100-Year)
    f) Interim Drop Inlet Calculations (10-Year and 100-Year)
    g) Ultimate Street Flow Calculations (10-Year and 100-Year)
    h) Ultimate Drop Inlet Calculations (10-Year and 100-Year)

2. Update to Summerlin Village 23B Far Hills Avenue Improvements (Far Hills Avenue RCB Improvements)
    a) CLV Approval Letter
    b) Figure 5AU – Interim Conditions Drainage Map
    c) Figure 6AU – Ultimate Conditions Drainage Map
    d) Standard Form 4 (Interim Conditions)
    e) HEC-1 model (Interim Conditions)
    f) Standard Form 4 (Ultimate Conditions)
    g) HEC-1 model (Ultimate Conditions)
    h) Standard Form 6 Calculation (Main line Interim Conditions)
    i) Standard Form 6 Calculation (Main line Ultimate Conditions)

3. Update #3 to the Technical Drainage Study for Summerlin Village 23B Desert Foothills Drive Improvements (Alta Drive to Far Hills Avenue)
    a) CLV Approval Letter
    b) Excerpt from text
    c) Figure 5BU3 – Ultimate Conditions Drainage Map

APPENDIX A

Hydrologic Calculations



SUMMARY OF ULTIMATE HEC–1 FLOWS

BASIN	AREA (AC.)	Q100 (cfs)	Q10 (cfs)
FH1	6.4	24	12
FH2	6.8	25	13
C1	-	47	24

PRORATED FLOW CALCULATIONS

BASIN	AREA (AC.)	Q100 (cfs)	UNIT FLOW (CFS/AC)
FH1	6.4	24	3.75
FH2	6.8	25	3.68

PRORATED SUBBASINS

BASIN	AREA (AC.)	UNIT FLOW (CFS/AC)	Q100 (cfs)
G	1.47	3.75	5
H	2.30	3.75	9
I	2.77	3.75	10
J	2.35	3.68	9
K	1.87	3.68	7
L	2.54	3.68	9

100–YEAR STREET FLOW CALCULATIONS

Section	Q100 (CFS)	SLOPE (%)	Depth (ft)	Velocity (fps)	DxV
G	5	3.0	0.30	3.3	0.99
H	10	7.7	0.32	5.5	1.76
I	14	7.7	0.34	6.0	2.04
J	10	5.6	0.33	4.9	1.62
K NORTH	5.5	5.6	0.34	5.0	1.70
K SOUTH	5.5	5.6	0.34	5.0	1.70
L NORTH	5.0	5.6	0.33	4.9	1.62
L SOUTH	6.5	3.6	0.37	4.4	1.63

100–YEAR DROP INLET CALCULATIONS

Section	Q100 TOTAL (CFS)	Q100 INTERCEPT (CFS)	Q100 BYPASS (CFS)	Description of Drop Inlets
G	5	4	1	2–7.5' TYPE CM2
H	10	6	4	2–7.5' TYPE CM2
I	14	13	1	2–17.5' TYPE CM2
J	10	6	4	2–7.5' TYPE CM2
K NORTH	5.5	5	0.5	1–15.0' TYPE CM2
K SOUTH	5.5	3.5	2	1–10.0' TYPE CM2
L NORTH	5.0	5	0	1–17.5' TYPE CM2
L SOUTH	6.5	6.5	0	1–17.5' TYPE CM2

LEGEND

- SUBBASIN BOUNDARY
- FH1 — SUBBASIN DESIGNATION
- PRORATED SUBBASIN BOUNDARY
- G — PRORATED SUBBASIN DESIGNATION
- FLOW DIRECTION
- J — J CROSS SECTION

NORTH

GRAPHIC SCALE

300 0 150 300

(IN FEET)

1 inch = 300 ft.

SUMMERLIN VILLAGE 23B

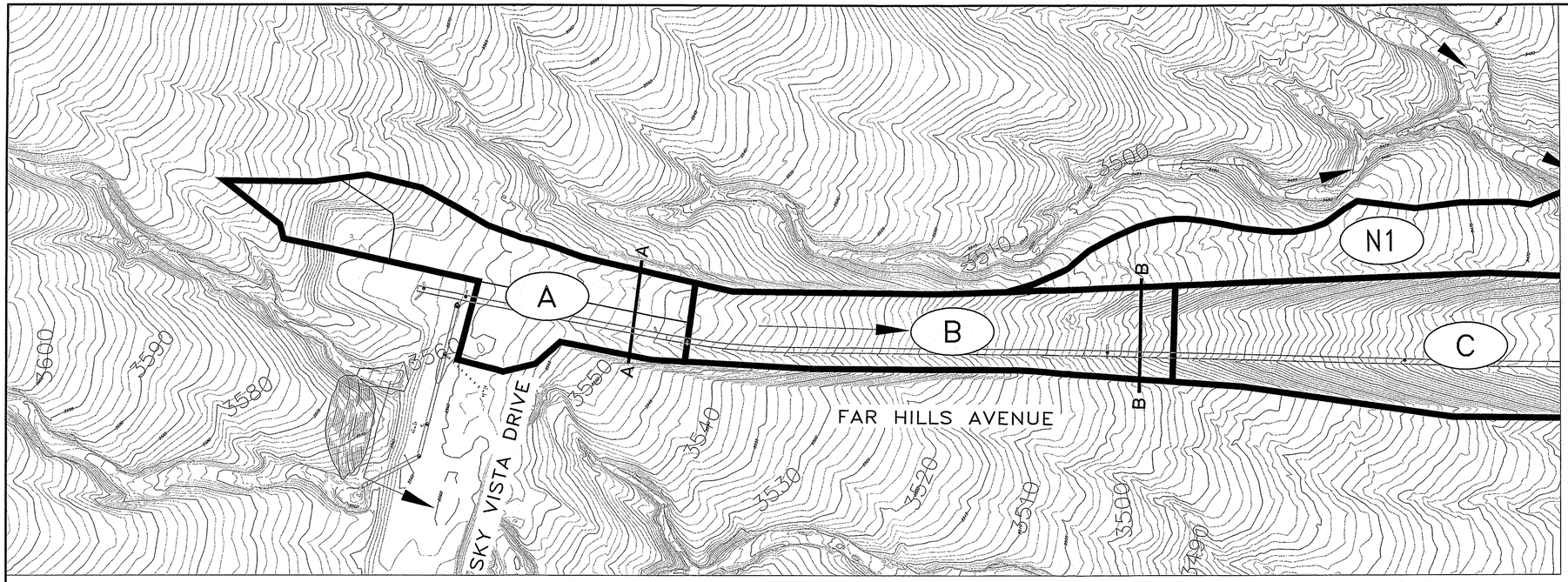
FAR HILLS AVENUE IMPROVMENTS

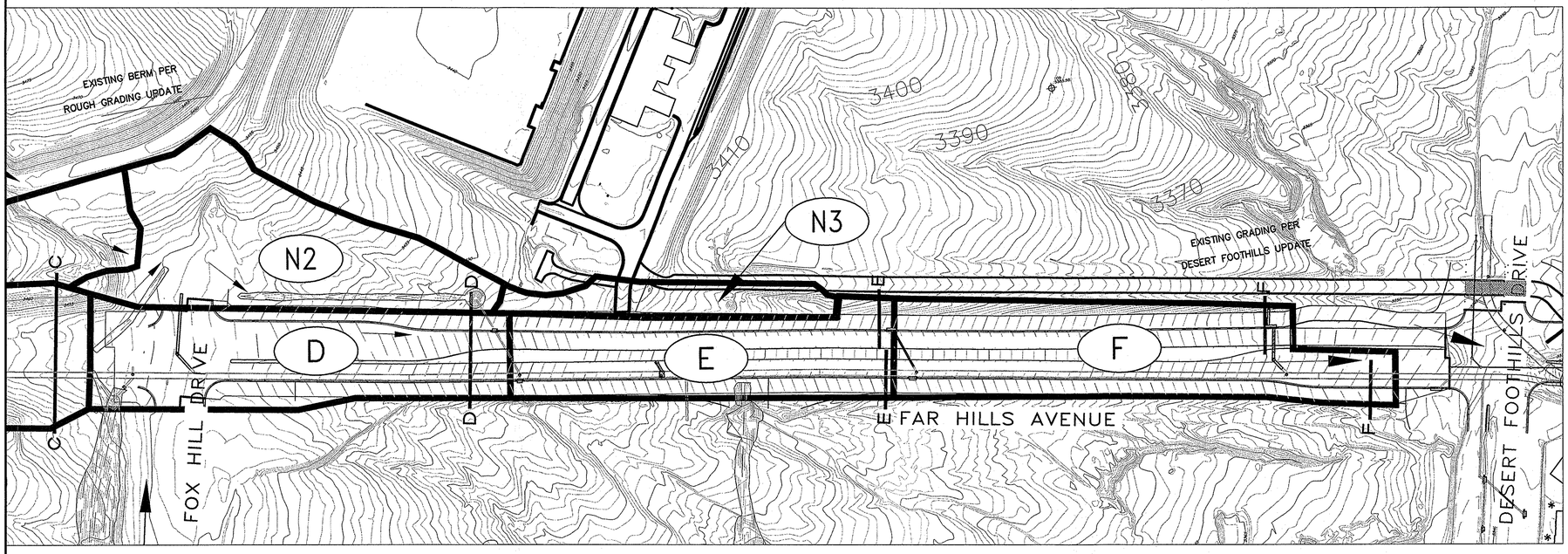
FIGURE 6BU2

ONSITE DRAINAGE MAP

ULTIMATE CONDITIONS

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM





100 Year Runoff			
Basin	Area (ac)	Q_{100} (cfs)	Unit Flow (cfs/ac)
FHI1	8.2	28	3.43
FHI2	6.8	25	3.67
I3	5.7	18	3.15
Prorated Flows			
Basin	Area (ac)	Unit Flow (cfs/ac)	Q_{100} (cfs)
A	2.28	3.43	8
B	2.31	3.43	8
C	3.56	3.43	12
D	2.36	3.67	9
E	1.92	3.67	7
F	2.56	3.67	9
N1	2.58	3.15	8
N2	2.49	3.15	8
N3	0.64	3.15	2

10 Year Runoff			
Basin	Area (ac)	Q_{10} (cfs)	Unit Flow (cfs/ac)
FHI1	8.2	14	1.72
FHI2	6.8	13	1.91
I3	5.7	8	1.40
Prorated Flows			
Basin	Area (ac)	Unit Flow (cfs/ac)	Q_{10} (cfs)
A	2.28	1.72	4
B	2.31	1.72	4
C	3.56	1.72	6
D	2.36	1.91	5
E	1.92	1.91	4
F	2.56	1.91	5
N1	2.58	1.40	4
N2	2.49	1.40	3
N3	0.64	1.40	1

STREET FLOW (100 Year)					
Section	Q_{100} Total (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	D*V
A-A	8	3.00	0.34	3.65	1.24
B-B	11	7.70	0.32	5.64	1.80
C-C	17	7.70	0.36	6.22	2.24
D-D	12	5.55	0.34	4.98	1.69
E-E North	8.5	5.55	0.38	5.49	2.09
E-E South	6.5	5.55	0.35	5.16	1.81
F-F North	6.5	5.55	0.35	5.16	1.81
F-F South	7	3.57	0.38	4.45	1.69

STREET FLOW (10 Year)					
Section	Q_{10} Total (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	D*V
A-A	4	3.00	0.28	3.14	0.88
B-B	4	7.70	0.25	4.60	1.15
C-C	6	7.70	0.28	4.96	1.39
D-D	5	5.55	0.28	4.11	1.15
E-E North	3.5	5.55	0.30	4.49	1.35
E-E South	2.5	5.55	0.28	4.19	1.17
F-F North	2.5	5.55	0.28	4.19	1.17
F-F South	2.5	3.57	0.29	3.53	1.02

DROP INLET CALCULATIONS (100 Year)						
Section	Depth (ft)	Slope (%)	Q_{100} Total (cfs)	Q_{100} Intercept (cfs)	Q_{100} Bypass (cfs)	Description of DI
A-A	0.34	3.00	8	5	3	2 - 7.5' Type "CM2"
B-B	0.32	7.70	11	6	5	2 - 7.5' Type "CM2"
C-C	0.36	7.70	17	14	3	2 - 17.5' Type "CM2"
D-D	0.34	5.55	12	6	6	2 - 7.5' Type "CM2"
E-E North	0.38	5.55	8.5	6.5	2	1 - 15' Type "CM2"
E-E South	0.35	5.55	6.5	4	2.5	1 - 10' Type "CM2"
F-F North	0.35	5.55	6.5	6.5	0	1 - 17.5' Type "CM2"
F-F South	0.38	3.57	7	7	0	1 - 17.5' Type "CM2"

DROP INLET CALCULATIONS (10 Year)						
Section	Depth (ft)	Slope (%)	Q_{10} Total (cfs)	Q_{10} Intercept (cfs)	Q_{10} Bypass (cfs)	Description of DI
A-A	0.28	3.00	4	4	0	2 - 7.5' Type "CM2"
B-B	0.25	7.70	4	4	0	2 - 7.5' Type "CM2"
C-C	0.28	7.70	6	6	0	2 - 17.5' Type "CM2"
D-D	0.28	5.55	5	4	1	2 - 7.5' Type "CM2"
E-E North	0.30	5.55	3.5	3.5	0	1 - 15' Type "CM2"
E-E South	0.28	5.55	2.5	2.5	0	1 - 10' Type "CM2"
F-F North	0.28	5.55	2.5	2.5	0	1 - 17.5' Type "CM2"
F-F South	0.29	3.57	2.5	2.5	0	1 - 17.5' Type "CM2"

NORTH

100 0 100 200

SCALE FEET

LEGEND

D **PRORATED SUBBASIN**

SUBBASIN BOUNDARY

FLOW DIRECTION

A — A **STREET SECTION**

DESIGN: MM
DRAWN: MM
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 08-17-13
PLOT TIME: 13:30:42

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	CCW. APP

DATE:

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2099 GCWALLACE.COM

F:\Projects\600\62023b-20S\Division\Civil\Figures\Fig_5B.dwg, mcastell

FAR HILLS AVENUE IMPROVEMENTS
SUMMERLIN VILLAGE 23B

FIGURE 5BU2

INTERIM CONDITIONS

PRORATED FLOWS DRAINAGE MAP

DRAWING
FIG5BU2
1 OF SHTS

APPENDIX B

Hydraulic Calculations

Storm Drain Hydraulics Calculations

G.C. Wallace, Inc.

Hydraulic Calculations for Station 215+74 North - FAR HILLS AVENUE Drop Inlet #6 Interim Condition

DATE: 06/10/13 FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 Inlet Structure Type or K_i= K Projecting Entrance:Square Edge (RCP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																								EGL & HGL				COMMENTS	
																				PIPE	TRANSITION																												
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	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									S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	H_f (ft)	(ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW	
1		1000.00		24							9.55																			Outlet K_o=		1.0												17.98	17.41		
2	1000.00	1026.75	R	24					1	9.55	17.58	26.8	30.02%	3.14	0.0049	19.0	6.05	0.57	0.0070	0.0070	0.19																			0.00	20.15	19.58			PART	D/S
3	1026.75	1076.75	R	24					1	17.58	18.76	50.0	2.36%	3.14	0.0049	19.0	6.05	0.57	0.0070	0.0070	0.35																			0.00	21.33	20.76			PART	D/S
4	1076.75	1081.75	T	24					1	18.76	18.88	5.0	2.36%	3.14	0.0049	16.0	5.09	0.40	0.0050	0.0060		0.03	0	0.02	0.01	45	0.50	0.37													0.41			21.74	21.33	FULL	U/S
5	1081.75	1091.75	R	24					1	18.88	19.11	10.0	2.32%	3.14	0.0049	16.0	5.09	0.40	0.0050	0.0050	0.05																			0.00	21.79	21.38			FULL	U/S
6	1091.75	1091.75	R	24					1	19.11	19.11	0.0		3.14	0.0049	16.0	5.09	0.40	0.0050	0.0050	0.00								Ki=	0.5	0.20									0.20			21.99	21.99	FULL	U/S
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Summary of Results

					(Optional)			HGL with respect	Pressure Gasket
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION	to FG	Required?
1000.00	9.55	11.55	17.98	17.41	20.40			OK	YES
1026.75	17.58	19.58	20.15	19.58	21.00			OK	NO
1076.75	18.76	20.76	21.33	20.76	23.10			OK	NO
1081.75	18.878	20.88	21.74	21.33	23.10			OK	NO
1091.75	19.11	21.11	21.79	21.38	23.10			OK	NO
1091.75	19.11	21.11	21.99	21.99	23.10			OK	NO

Storm Drain Hydraulics Calculations

G.C. Wallace, Inc. | Hydraulic Calculations for FAR HILLS AVENUE Drop Inlet #5 Interim Condition | DATE: 06/05/13 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= A | Headwall: Grooved Edge

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																								EGL & HGL				COMMENTS	
																				PIPE	TRANSITION																														
	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									S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW	
1		1000.00		24							15.41																		Outlet K_o=		1.0												17.42	17.41		
2	1000.00	1006.50	R	24					1	15.41	15.54	6.5	2.00%	3.14	0.0049	3.0	0.95	0.01	0.0002	0.0002	0.00																			0.00	17.55	17.54			FULL	D/S
3	1006.50	1006.50	R	24					1	15.54	15.54	0.0		3.14	0.0049	3.0	0.95	0.01	0.0002	0.0002	0.00								Ki=	0.2	0.00									0.00			17.56	17.56	FULL	U/S
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Summary of Results

					(Optional)			HGL with respect	Pressure Gasket
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION	to FG	Required?
1000.00	15.41	17.41	17.42	17.41	20.37			OK	NO
1006.50	15.54	17.54	17.55	17.54	20.34			OK	NO
1006.50	15.54	17.54	17.56	17.56	20.34			OK	NO

Storm Drain Hydraulics Calculations

G.C. Wallace, Inc. | Hydraulic Calculations for Station 221+25 North - 42" RCP to NW Corner of Fox Hill/Far Hills Intersection Ultimate Condition | DATE: 06/05/13 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= A | Headwall: Grooved Edge

CONDUIT DATA											FLOW DATA									ENERGY LOSS DATA																								EGL & HGL				COMMENTS	
																				PIPE	TRANSITION																												
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 (ft)	TO (ft)	T/R	D (in)	SPAN (ft)	RISE (ft)	AREA (ft^2)	HYD RAD (ft)		D/S (ft)	U/S (ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	S_f (ft/ft)	H_f (ft)	H_f (ft)	Θ (deg)	K_{mh}	H_{mh} (ft)	Θ (deg)	K_j	H_j (ft)	Inlet/ Cont	K_j	H_c (ft)	Θ (deg)	K_o	H_o (ft)	R_{bend} (ft)	Θ (deg)	K_b	H_b (ft)	H_m (ft)	Total (ft)	U/S EGL	U/S HGL	U/S EGL	U/S HGL	PART FLOW	CRTL
	1000.00		42							28.74																																39.12	38.05		
1000.00	1039.50	R	42					1	28.74	29.33	39.5	1.50%	9.62	0.0049	80	8.32	1.07	0.0063	0.0063	0.25																			0.00	39.37	38.30			FULL	U/S
1039.50	1044.50	T	42					1	29.33	29.41	5.0	1.50%	9.62	0.0049	80	8.32	1.07	0.0063	0.0063		0.03	45	0.46	0.49															0.53			39.90	38.82	FULL	U/S
1044.50	1138.30	R	42					1	29.41	30.82	93.8	1.51%	9.62	0.0049	80	8.32	1.07	0.0063	0.0063	0.59																			0.00	40.49	39.42			FULL	U/S
1138.30									30.82																																				

Summary of Results for 36" to NW Corner of Fox Hill/Far Hills Intersection Ultimate Condition

					(Optional)					HGL	Pressure Gasket
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION	Freeboard	Cover	wrt FG	Required?
1000.00	28.74	32.24	39.12	38.05	43.40			5.35	11.16	OK	YES
1039.50	29.33	32.83	39.37	38.30	43.53			5.23	10.70	OK	YES
1044.50	29.41	32.91	39.90	38.82	43.53			4.71	10.62	OK	YES
1138.30	30.82	34.32	40.49	39.42	43.53			4.11	9.21	OK	YES

Storm Drain Hydraulics Calculations

G.C. Wallace, Inc. | Hydraulic Calculations for FAR HILLS AVENUE Drop Inlet #4 Interim Condition | DATE: 06/05/13 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= A | Headwall: Grooved Edge

	CONDUIT DATA											FLOW DATA									ENERGY LOSS DATA																					EGL & HGL				COMMENTS	
																					PIPE	TRANSITION																									
	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									S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW	
1		1000.00		24							72.60																		Outlet K_o=		1.0												82.62	82.55		
2	1000.00	1072.20	R	24					1	72.60	82.93	72.2	14.31%	3.14	0.0049	6.5	2.07	0.07	0.0008	0.0008	0.06																		0.00	85.00	84.93			PART	D/S
3	1072.20	1072.20	R	24					1	82.93	82.93	0.0		3.14	0.0049	6.5	2.07	0.07	0.0008	0.0008	0.00								Ki=	0.2	0.01									0.01			85.01	85.01	FULL	U/S
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Summary of Results

					(Optional)			HGL with respect	Pressure Gasket
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION	to FG	Required?
1000.00	72.6	74.60	82.62	82.55	87.80			OK	YES
1072.20	82.93	84.93	85.00	84.93	89.55			OK	NO
1072.20	82.93	84.93	85.01	85.01	89.55			OK	NO

Storm Drain Hydraulics Calculations

G.C. Wallace, Inc. | Hydraulic Calculations for FAR HILLS AVENUE Drop Inlet #3 Interim Condition | DATE: 06/05/13 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= A | Headwall: Grooved Edge

	CONDUIT DATA											FLOW DATA									ENERGY LOSS DATA																					EGL & HGL				COMMENTS	
																					PIPE	TRANSITION																									
	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/	CRTL
	FROM (ft)	TO (ft)	T/R	D (in)	SPAN (ft)	RISE (ft)	AREA (ft^2)	HYD RAD (ft)		D/S (ft)	U/S (ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	S_f (ft/ft)	H_f (ft)	H_f (ft)	Θ (deg)	K_{mh}	H_{mh} (ft)	Θ (deg)	K_j	H_j (ft)	Inlet/ Cont	K_i	H_c (ft)	Θ (deg)	K_o	H_o (ft)	R_{bend} (ft)	Θ (deg)	K_b	H_b (ft)	H_m (ft)	Total (ft)	U/S EGL	U/S HGL	U/S EGL	U/S HGL	PART FLOW	
1		1000.00		24							80.55																		Outlet K_o=			1.0											82.58	82.55		
2	1000.00	1008.00	R	24					1	80.55	80.71	8.0	2.00%	3.14	0.0049	4.0	1.27	0.03	0.0003	0.0003	0.00																		0.00	82.74	82.71			FULL	D/S
3	1008.00	1008.00	R	24					1	80.71	80.71	0.0		3.14	0.0049	4.0	1.27	0.03	0.0003	0.0003	0.00							Ki=	0.2	0.01										0.01			82.74	82.74	FULL	U/S
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Summary of Results

					(Optional)			HGL with respect	Pressure Gasket
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION	to FG	Required?
1000.00	80.55	82.55	82.58	82.55	85.70			OK	NO
1008.00	80.71	82.71	82.74	82.71	85.70			OK	NO
1008.00	80.71	82.71	82.74	82.74	85.70			OK	NO

Storm Drain Hydraulics Calculations

G.C. Wallace, Inc. | Hydraulic Calculations for Lateral @ Station 203+41.25 | DATE: 06/05/13 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= A | Headwall: Grooved Edge

CONDUIT DATA											FLOW DATA									ENERGY LOSS DATA																								EGL & HGL				COMMENTS	
																						TRANSITION																											
STATION			PIPE	BOX		IRREG		#	INVERT ELEV		L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	PIPE 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										H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_i	H_i	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL
(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW	
	1000.00		42							36.56																			Outlet K_o=		1.0											45.40	44.06		
1000.00	1027.50	R	42					1	36.56	42.36	27.5	21.10%	9.62	0.0049	89.5	9.30	1.34	0.0079	0.0079	0.22																					0.00	47.21	45.86			PART	D/S
1027.50	1032.50	T	42					1	42.36	44.13	5.0	35.41%	9.62	0.0049	89.5	9.30	1.34	0.0079	0.0079		0.04	45	0.46	0.62																0.66			48.98	47.63	PART	D/S
1032.50	1077.90	R	42					1	44.13	48.55	45.4	9.72%	9.62	0.0049	89.5	9.30	1.34	0.0079	0.0079	0.36																					0.00	53.39	52.05			PART	D/S
1077.90	1082.90	T	42					1	48.55	48.84	5.0	5.86%	9.62	0.0049	83.0	8.63	1.16	0.0068	0.0074		0.04	0	0.02	0.03	45	0.50	0.77														0.83			54.22	53.06	FULL	U/S
1082.90	1106.90	R	42					1	48.84	49.32	24.0	2.00%	9.62	0.0049	83.0	8.63	1.16	0.0068	0.0068	0.16																					0.00	54.38	53.23			FULL	U/S
1106.90								1	49.32																																					

Job No. 62A-23-230 | 203+41N-SF6_Ult .xls | Date Printed 6/5/2013

Summary of Results for 36" into Village 29 Ultimate Conditions

					(Optional)					HGL	Pressure Gasket
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION	Freeboard	Cover	wrt to FG	Required?
1000.00	36.56	40.06	45.40	44.06	52.90			8.84	12.84	OK	NO
1027.50	42.3628	45.86	47.21	45.86	54.40			8.54	8.54	OK	NO
1032.50	44.133	47.63	48.98	47.63	54.40			6.77	6.77	OK	NO
1077.90	48.547	52.05	53.39	52.05	54.30			2.25	2.25	OK	NO
1082.90	48.84	52.34	54.22	53.06	54.30			1.24	1.96	OK	NO
1106.90	49.32	52.82	54.38	53.23	55.00			1.77	2.18	OK	NO

UPDATE TO THE TECHNICAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23B FAR HILLS AVENUE IMPROVEMENTS (FAR HILLS AVENUE RCB IMPROVEMENTS)

62023B-227

April 2013

Prepared for:

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

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: June 6, 2013
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 23B – Far Hills Avenue Improvements - Update for Far Hills Avenue RCB Improvements**			**COPIES TO:** G.C. Wallace, Inc.
Cross Streets:	Far Hills Ave from Desert Foothills to Sky Vista			Howard Hughes Corporation
File Number:	F:\Depot\DSMemos\DS4084E.doc			Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-015			CCRFCD
Zoning Action:	N/A			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	10/5/2006	10/25/2006	Not Approved	$400.00	55426: $400
2nd Submittal	11/13/2006	12/1/2006	Conditional Approval	$400.00	57514: $400
CCRFCD	4/13/2007	4/23/2007	Concurrence	N/C	N/C
3rd Submittal	4/15/2013	4/29/2013	Not Approved	$100.00	316351: $100
4th Submittal	5/20/2013 & 6/5/2013	6/6/2013	See Comments Below	$400.00	320342: $400
			TOTAL FEES (LDDRS):	**$1,300.00**	-----

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:
	must be resubmitted or supplemented including the following:
X	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

1. **This drainage study is acceptable in concept**; however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District* (CCRFCD) has issued a letter of concurrence. The Engineer should contact the CCRFCD to confirm that they have begun their review.

2. The final approval of this Update is only for the "*Initial Phase*" which includes the main storm drain RCB and the associated stubs for interim flows collected from the side swales in *Far Hills Avenue* between *Desert Foothill Drive* and *Sky Vista Drive* and the rough grading of the roadway.

   The full street improvements such as paving, curb & gutter, sidewalk and drop inlets will be addressed in the "*Final Phase*" and a future drainage study update will be required.

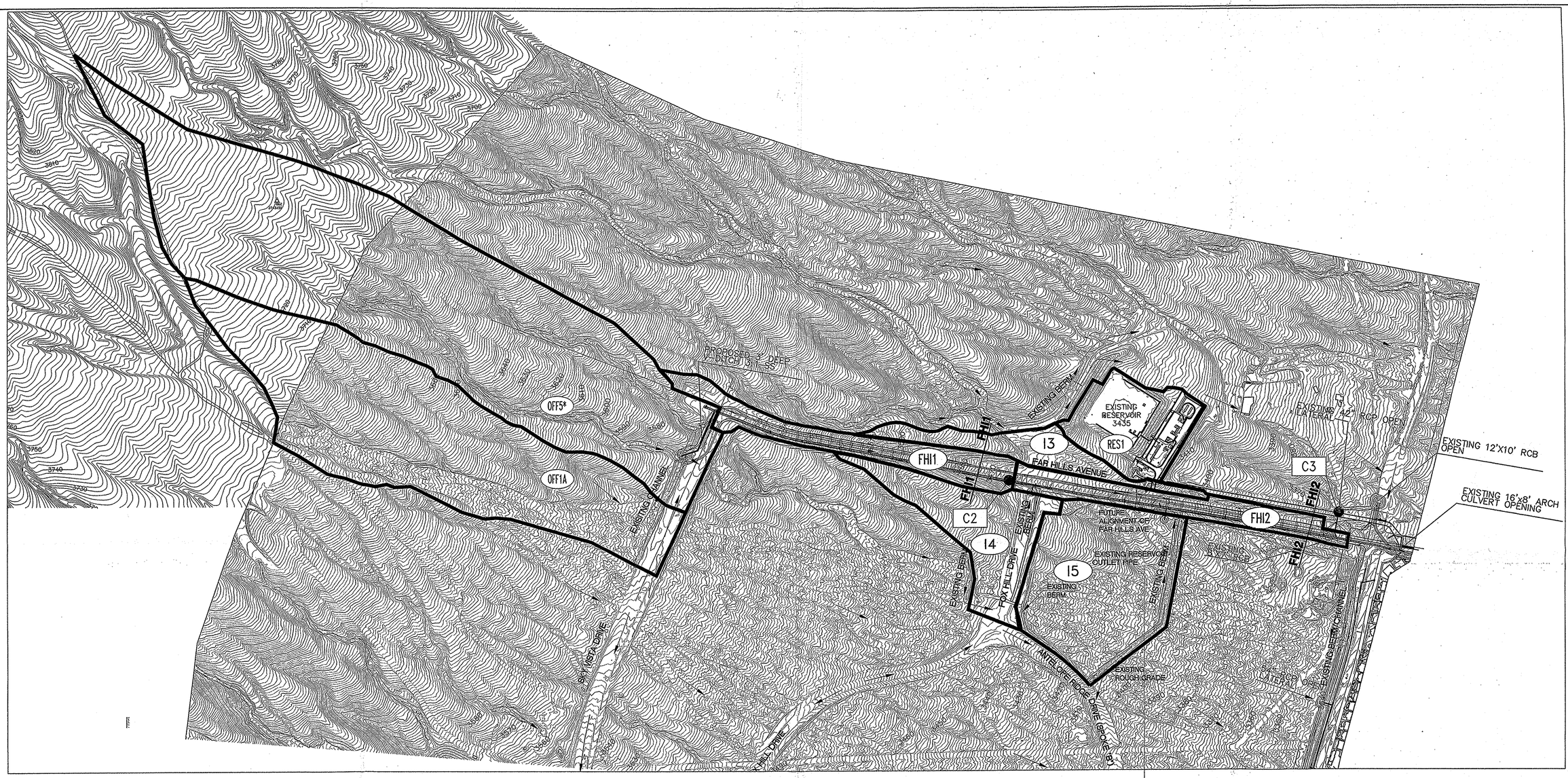
3. All the interim facilities such as but not limited to the openings, berms/channels and stubs etc. are to be owned and privately maintained by *Howard Hughes Corporation*.

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.

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

END OF REMARKS
ays

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



INTERIM CONDITION			
Basin	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
OFF1A	43.7	123	53
OFF5	74.2	196	84
C1	-	320	137
FHI1	8.2	28	14
C2	-	333	142
I3	5.7	18	8
FHI2	6.8	24	12
I4	10.7	33	15
RES1	8.5	32	16
I5	19.6	53	22
C3	-	469	202

INTERIM CONDITIONS 100-YEAR CROSS SECTIONS SUMMARY				
Ditch	Q_{100} (cfs)	Slope (%)	Depth of Flow (ft)	Velocity (ft/s)
FHI1	28	5.1	0.35	4.16
FHI2	24	6.1	0.32	4.34

NORTH

SCALE 1"=300'

GRAPHIC SCALE

300 0 150 300

(IN FEET)

1 inch = 300 ft.

LEGEND

- NDFH1 DRAINAGE SUBBASIN
- CPOINT3 CONCENTRATION POINT
- SUBBASIN BOUNDARY
- FLOW DIRECTION

REV	DATE	DESCRIPTION	DATE	AGEN. APP.	DATE	GCW. APP.	DATE:

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 01-14-13
PLOT TIME: 16:51:10

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

F:\Projects\600\62023B-227\Division\Fctl\Figures\Fig5AU.dwg mcastell

SUMMERLIN VILLAGE 23B

FAR HILLS AVENUE IMPROVEMENTS UPDATE

FIGURE 5AU

DRAINAGE MAP - INTERIM CONDITIONS

DRAWING

FIG5AU

SHT OF SHTS

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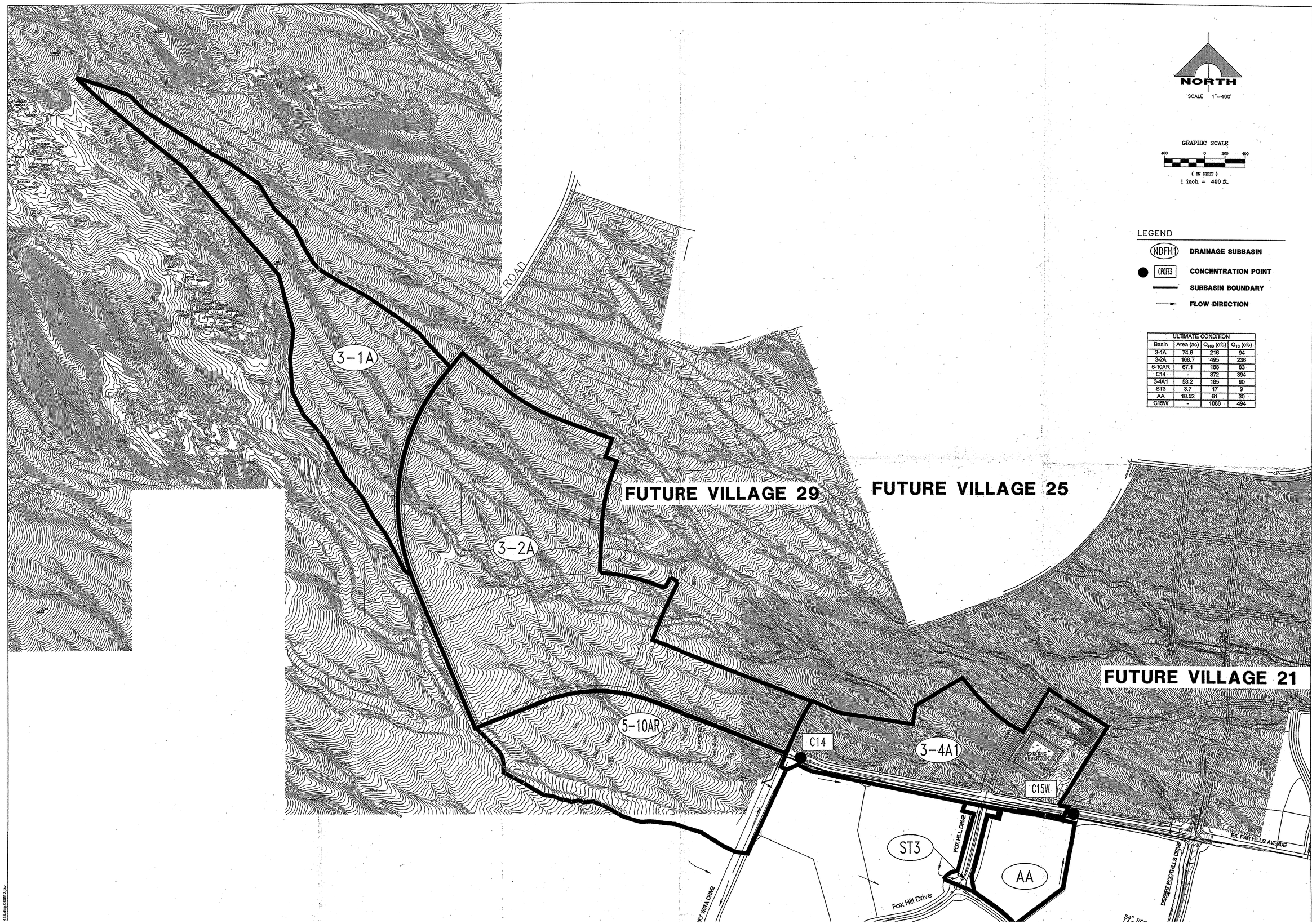

ULTIMATE CONDITION			
Basin	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
3-1A	74.6	216	94
3-2A	168.7	495	236
5-10AR	67.1	188	83
C14	-	872	394
3-4A1	58.2	185	90
ST3	3.7	17	9
AA	18.52	61	30
C15W	-	1088	494

REV	DATE	DESCRIPTION	DATE	AGEN. APP.	DATE	GCW. APP.	DATE:

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 01-14-13
PLOT TIME: 16:43:02

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SUMMERLIN VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS UPDATE
FIGURE 6AU
DRAINAGE MAP - ULTIMATE CONDITIONS

DRAWING
FIG6AU

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

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

Far Hills Avenue RCB Improvements
Interim Conditions

Project No: 62023B.227
Date: 11/20/2012
Calculated by: MMC

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Sq Mi	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY fps	V2 VELOCITY fps	Tt Min	TOTAL LENGTH Feet	Tc = (L/180)+10 Min	Min	Tlag = 0.6Tc/60 Hours	Rainfall 100-Yr Remarks:
(1)		(16)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)	(13)	(14)	(15)	
Precipitation referenced from the *Conceptual Drainage Study for Summerlin Village 23B*																		
FHI1	D	94.0	0.8508	8.2	0.0127	500	6.5	5.4	1800	6.5	5.2	7.8	4.4	2300	22.8	9.8	0.098	3.29
FHI2	D	94.0	0.8508	6.8	0.0106	80	2.0	3.2	2075	5.6	4.8	7.2	5.4	2155	22.0	8.6	0.086	3.29
Precipitation referenced from the *Technical Drainage Study for Summerlin Village 25 3435 Reservoir*																		
I3	E	89.2	0.7874	5.7	0.0089	420	7.6	5.9	805	4.1	3.0	6.0	3.6	1225	N/A	9.5	0.100	3.40
Modified from subbasin EX1-1 in the *Update to the Technical Drainage Study for Summerlin Village 23B Rough Grading* (includes ST1-2 from the *Update.*)																		
I4	E	90.1	0.7993	10.7	0.0168	430	4.2	7.0	910	5.2	3.4	6.7	3.5	1340	N/A	10.5	0.105	3.29
The delineation for Basin I5 is referenced from Basin EX1-3AR in the *Update #2 to The Technical Drainage Study for Summerlin Village 23B Desert Foothills Drive Improvements.*																		
I5	E	88.0	0.7716	19.6	0.0306	100	1.0	5.9	1375	2.6	2.4	4.7	6.6	1475	N/A	12.5	0.125	3.29
Curve number and precipitation referenced from the *Technical Drainage Study for Summerlin Village 25 3435 Reservoir*																		
RES1	D	93.0	0.8376	8.5	0.0133	50	0.7	3.8	400	0.7	1.7	2.6	3.9	450	12.5	7.7	0.077	3.40
Lag time, CN and precipitation referenced from the *Update to the Technical Drainage Study for Summerlin Village 23B Rough Grading;* areas have been revised.																		
OFF5	E	88.0	0.7716	74.2	0.1160	500	10.0	6.1	4290	5.0	3.3	6.6	12.1	4790	N/A	18.3	0.183	3.46
Modified from subbasin OFF1 in the *Update to the Technical Drainage Study for Summerlin Village 23B Rough Grading.*																		
OFF1A	E	88.0	0.7716	43.7	0.0683	500	10.0	6.1	3360	5.7	3.5	7.0	9.1	3660	N/A	15.3	0.153	3.46

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

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

$K = 0.0132\ (CN) - 0.39$

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

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

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

REFERENCE:

STANDARD FORM 4

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*            VERSION 4.1                *
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*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*         609 SECOND STREET             *
*      DAVIS, CALIFORNIA 95616          *
*          (916) 756-1104               *
*                                       *
*****************************************
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X     X  XXXXXXX  XXXXX          X
X     X  X       X     X        XX
X     X  X       X              X
XXXXXXX  XXXX    X       XXXXX  X
X     X  X       X              X
X     X  X       X     X        X
X     X  XXXXXXX  XXXXX         XXX
```

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

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

1 HEC-1 INPUT PAGE 1

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

            *DIAGRAM
  1         ID   ***************************************************************
  2         ID   * ..............................................................  *
  3         ID   * :              FAR HILLS AVENUE IMPROVEMENTS                 : *
  4         ID   * :                TECHNICAL DRAINAGE STUDY                    : *
  5         ID   * :          OFFSITE RUNOFF ONTO FAR HILLS AVENUE              : *
  6         ID   * :            AND RUNOFF FROM FAR HILLS AVENUE                : *
  7         ID   * :          INTERIM DEVELOPMENT DRAINAGE CONDITION            : *
  8         ID   * :..............................................................: *
  9         ID   * :          CLIENT_ _ _ _ _ _ _ THE HOWARD HUGHES CORP.       : *
 10         ID   * :          RETURN PERIOD_ _ _ _100-YEAR                      : *
 11         ID   * :          DISTRIBUTUION_ _ _ _6-HOUR SDN3                   : *
 12         ID   * :          PROJECT NO_ _ _ _ _ 62023B.227                    : *
 13         ID   * :          FILENAME_ _ _ _ _ _ FHINT.H1                      : *
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 15         ID   * :                                                            : *
 16         ID   * : DARF'S REFERENCED FROM THE 2006 SUMMERLIN WEST PLANNING    : *
 17         ID   * :      AREA FLOOD CONTROL MASTER PLAN UPDATE                 : *
 18         ID   * :                                                            : *
 19         ID   * :                  AREA        DARF                          : *
 20         ID   * :                (sq.mi.)                                    : *
 21         ID   * :                                                            : *
 22         ID   * :                  0 - .05     1.000                         : *
 23         ID   * :                0.1 - .50     0.990                         : *
 24         ID   * :..............................................................: *
 25         ID   ***************************************************************
 26         ID
 27         IT       5       0       0     300
 28         IO       5
 29         IN       5       0       0
 30         JR    PREC       1   0.990   0.560
            *

 31         KK   OFF1A
 32         BA   .0683
 33         PB    3.46
 34         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
 35         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
 36         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
 37         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
 38         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
 39         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
 40         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
 41         PC    .998    .999    1.00
 42         LS       0    88.0
 43         UD   0.153
            *

 44         KK    OFF5
 45         BA   .1160
 46         PB    3.46
 47         LS       0    88.0
 48         UD   0.183
            *
```

1 HEC-1 INPUT PAGE 2

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

 49         KK      C1
 50         KM   "COMBINE OFF1 AND OFF5 AT SKY VISTA"
 51         HC       2
            *

 52         KK     C1r
 53         KM   "ROUTE TO FOX HILL"
 54         RD    2165    .065    .013            RECT       8       7
            *
```

```
                *
 55             KK    FHI1
                * PRECIPITATION REFERENCED FROM THE CONCEPTUAL DRAINAGE STUDY
                * FOR SUMMERLIN VILLAGE 23B
 56             KM   FAR HILLS BETWEEN SKY VISTA AND FOX HILL DRIVE
 57             BA   .0127
 58             PB    3.29
 59             LS       0     94.0
 60             UD   0.098
                *
                *
 61             KK      C2
 62             KM   "COMBINE C1r AND FHI1 AT FOX HILL AND FAR HILLS"
 63             HC       2
                *
 64             KK     C2r
 65             KM   "ROUTE TO C3 AT FAR HILLS AND DESERT FOOTHILLS"
 66             RD    2285    .065    .013            RECT       8       7
                *
 67             KK      I3
 68             KM   OFFSITE AREA NORTH OF FAR HILLS BY PUMP STATION
 69             BA   .0089
 70             PB    3.40
 71             LS       0     89.2
 72             UD   0.100
                *
 73             KK     I3r
 74             KM   "ROUTE TO C2 AT FAR HILLS AND DESERT FOOTHILLS"
 75             RD    1365     .06    .013            RECT      10       8
                *
 76             KK    FHI2
                * PRECIPITATION REFERENCED FROM THE CONCEPTUAL DRAINAGE STUDY
                * FOR SUMMERLIN VILLAGE 23B
 77             KM   FAR HILLS BETWEEN FOX HILL AND DESERT FOOTHILLS
 78             BA   .0106
 79             PB    3.29
 80             LS       0      94
 81             UD   0.086
                *
1                                          HEC-1 INPUT                                                    PAGE  3
LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 82             KK      I4
 83             BA   .0168
 84             PB    3.29
 85             LS       0     90.1
 86             UD   0.105
                *
 87             KK     I4r
 88             KM   "ROUTE TO C2 AT FAR HILLS AND DESERT FOOTHILLS"
 89             RD    2015     .06    .013            RECT      10       8
                *
 90             KK    RES1
 91             BA   .0133
 92             PB    3.40
 93             LS       0     93.0
 94             UD   0.077
                *
 95             KK   RES1r
 96             KM   "ROUTE TO C3 NEAR THE INTERSECTION OF FAR HILLS AND DESERT FOOTHILLS"
 97             RD    1130    .055    .030            TRAP      14       2
                *
 98             KK      I5
 99             BA   .0306
100             PB    3.29
101             LS       0     88.0
102             UD   0.125
                *
103             KK     I5r
104             KM   "ROUTE TO C3 NEAR THE INTERSECTION OF FAR HILLS AND DESERT FOOTHILLS"
105             RD    1130    .055    .030            TRAP      14       2
                *
106             KK      C3
107             KM   "COMBINE C2r, I3r, FHI2, I4r, RES1r, and I5r at FAR HILLS AND DESERT FOOTHILL
108             HC       6
                *
                * END FILE
                *
109             ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  31       OFF1A
              .
              .
  44          .        OFF5
              .          .
              .          .
```

```
 49        C1............
            V
            V
 52        C1r
            .
            .
 55         .        FHI1
            .          .
            .          .
 61        C2............
            V
            V
 64        C2r
            .
            .
 67         .         I3
            .          V
            .          V
 73         .        I3r
            .          .
            .          .
 76         .          .        FHI2
            .          .          .
            .          .          .
 82         .          .          .         I4
            .          .          .          V
            .          .          .          V
 87         .          .          .        I4r
            .          .          .          .
            .          .          .          .
 90         .          .          .          .        RES1
            .          .          .          .          V
            .          .          .          .          V
 95         .          .          .          .       RES1r
            .          .          .          .          .
            .          .          .          .          .
 98         .          .          .          .          .        I5
            .          .          .          .          .         V
            .          .          .          .          .         V
103         .          .          .          .          .       I5r
            .          .          .          .          .         .
            .          .          .          .          .         .
106        C3.........................................................
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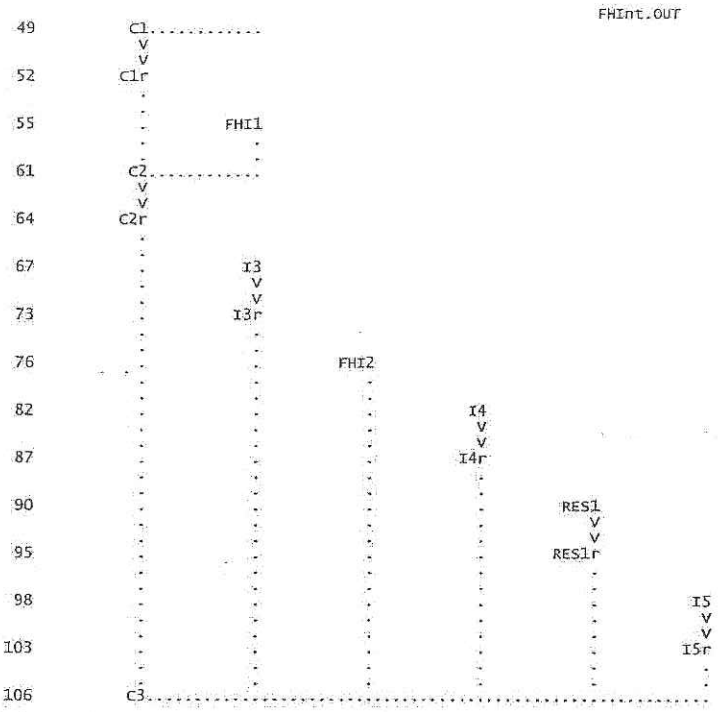

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   20NOV12  TIME  16:44:27   *
*                                       *
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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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*****************************************************************
*                                                               *
*                FAR HILLS AVENUE IMPROVEMENTS                  *
*                  TECHNICAL DRAINAGE STUDY                     *
*            OFFSITE RUNOFF ONTO FAR HILLS AVENUE               *
*              AND RUNOFF FROM FAR HILLS AVENUE                 *
*            INTERIM DEVELOPMENT DRAINAGE CONDITION             *
*                                                               *
*            CLIENT_ _ _ _ _ _ _ THE HOWARD HUGHES CORP.        *
*            RETURN PERIOD_ _ _ _100-YEAR                       *
*            DISTRIBUTUION_ _ _ _6-HOUR SDN3                    *
*            PROJECT NO_ _ _ _ _ 62023B.227                     *
*            FILENAME_ _ _ _ _ _ FHINT.H1                       *
*            DATE_ _ _ _ _ _ _ _ 11/20/12                       *
*                                                               *
*  DARF'S REFERENCED FROM THE 2006 SUMMERLIN WEST PLANNING      *
*       AREA FLOOD CONTROL MASTER PLAN UPDATE                   *
*                                                               *
*                   AREA        DARF                            *
*                 (sq.mi.)                                      *
*                                                               *
*                  0 - .05     1.000                            *
*                 0.1 - .50    0.990                            *
*                                                               *
*****************************************************************
```

```
28 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 .99 .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 .99	RATIO 3 .56
HYDROGRAPH AT							
+	OFF1A	.07	1	FLOW	125.	123.	53.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	OFF5	.12	1	FLOW	199.	196.	84.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	C1	.18	1	FLOW	324.	320.	137.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	C1r	.18	1	FLOW	311.	307.	130.
				TIME	3.58	3.58	3.67
HYDROGRAPH AT							
+	FHI1	.01	1	FLOW	28.	28.	14.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	C2	.20	1	FLOW	337.	333.	142.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	C2r	.20	1	FLOW	322.	318.	140.
				TIME	3.58	3.58	3.67
HYDROGRAPH AT							
+	I3	.01	1	FLOW	18.	18.	8.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	I3r	.01	1	FLOW	17.	17.	8.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	FHI2	.01	1	FLOW	24.	24.	12.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	I4	.02	1	FLOW	33.	32.	15.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	I4r	.02	1	FLOW	32.	32.	14.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	RES1	.01	1	FLOW	32.	32.	16.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	RES1r	.01	1	FLOW	29.	29.	15.
				TIME	3.50	3.50	3.58
HYDROGRAPH AT							
+	I5	.03	1	FLOW	54.	53.	23.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	I5r	.03	1	FLOW	53.	52.	22.
				TIME	3.58	3.58	3.58
6 COMBINED AT							
+	C3	.28	1	FLOW	474.	469.	202.
				TIME	3.58	3.58	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									
C1r	MANE	1.47	320.21	217.03	2.23	5.00	311.40	215.00	2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2194E+02 EXCESS= .0000E+00 OUTFLOW= .2194E+02 BASIN STORAGE= .4384E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
C1r MANE 1.47 317.67 216.34 2.20 5.00 307.34 215.00 2.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2163E+02 EXCESS= .0000E+00 OUTFLOW= .2163E+02 BASIN STORAGE= .4347E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
C1r MANE 1.84 136.36 217.46 .92 5.00 130.42 220.00 .92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8997E+01 EXCESS= .0000E+00 OUTFLOW= .8997E+01 BASIN STORAGE= .3764E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
C2r MANE 1.53 333.76 217.52 2.26 5.00 322.05 215.00 2.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2374E+02 EXCESS= .0000E+00 OUTFLOW= .2374E+02 BASIN STORAGE= .4853E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
C2r MANE 1.54 331.49 216.73 2.23 5.00 318.27 215.00 2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2341E+02 EXCESS= .0000E+00 OUTFLOW= .2341E+02 BASIN STORAGE= .3839E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
C2r MANE 1.93 142.28 217.88 .94 5.00 139.89 220.00 .94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9840E+01 EXCESS= .0000E+00 OUTFLOW= .9841E+01 BASIN STORAGE= .4118E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
I3r MANE 2.16 17.71 213.40 2.28 5.00 17.12 215.00 2.28

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1083E+01 EXCESS= .0000E+00 OUTFLOW= .1083E+01 BASIN STORAGE= .3317E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
I3r MANE 2.16 17.47 211.99 2.25 5.00 16.95 215.00 2.25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1069E+01 EXCESS= .0000E+00 OUTFLOW= .1069E+01 BASIN STORAGE= .2738E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
I3r MANE 2.69 7.80 215.23 .96 5.00 7.80 215.00 .96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4569E+00 EXCESS= .0000E+00 OUTFLOW= .4570E+00 BASIN STORAGE= .3047E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
I4r MANE 2.71 32.53 213.96 2.26 5.00 31.99 215.00 2.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2024E+01 EXCESS= .0000E+00 OUTFLOW= .2025E+01 BASIN STORAGE= .4603E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
I4r MANE 2.72 32.11 214.69 2.23 5.00 31.87 215.00 2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1998E+01 EXCESS= .0000E+00 OUTFLOW= .1999E+01 BASIN STORAGE= .3791E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
I4r MANE 3.37 14.57 215.46 .97 5.00 14.45 215.00 .97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8668E+00 EXCESS= .0000E+00 OUTFLOW= .8671E+00 BASIN STORAGE= .5166E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RES1r MANE 2.68 30.84 211.83 2.64 5.00 28.99 210.00 2.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1870E+01 EXCESS= .0000E+00 OUTFLOW= .1872E+01 BASIN STORAGE= .6317E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RES1r MANE 2.69 31.11 212.61 2.61 5.00 28.90 210.00 2.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1851E+01 EXCESS= .0000E+00 OUTFLOW= .1852E+01 BASIN STORAGE= .7729E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RES1r MANE 3.37 14.85 212.10 1.23 5.00 14.53 215.00 1.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8696E+00 EXCESS= .0000E+00 OUTFLOW= .8707E+00 BASIN STORAGE= .7892E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00
I5r MANE 2.27 53.36 215.40 2.08 5.00 53.19 215.00 2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3391E+01 EXCESS= .0000E+00 OUTFLOW= .3392E+01 BASIN STORAGE= .6113E-03 PERCENT ERROR= -.1

```
          FOR PLAN = 1  RATIO=  .00
               ISr  MANE          2.28     52.43    214.05      2.05      5.00     52.33    215.00         2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3342E+01 EXCESS= .0000E+00 OUTFLOW= .3343E+01 BASIN STORAGE= .6541E-03 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .00
               ISr  MANE          2.98     22.47    217.69       .84      5.00     22.27    215.00          .84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1371E+01 EXCESS= .0000E+00 OUTFLOW= .1372E+01 BASIN STORAGE= .7179E-03 PERCENT ERROR=   -.1


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

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

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

Far Hills Avenue RCB Improvements
Ultimate Conditions

Project No: 62023B.227
Date: 11/21/2012
Calculated by: MMC

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Sq Mi	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY fps	V2 VELOCITY fps	Tt Min	TOTAL LENGTH Feet	Tc = (L/180)+10 Min	Min	Tlag = 0.6Tc/60 Hours	Rainfall 100-Yr Remarks:
(1)		(16)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)	(13)	(14)	(15)	
Referenced from 2006 Summerlin West Planning Area Flood Control Master Plan Update.																		
3-1A	D	88.1	0.7729	74.6	0.1166	200	2.0	6.6	4706	8.0	5.7	8.7	9.6	4906	37.3	16.2	0.162	3.56
3-2A	D	91.8	0.8218	168.7	0.2636	200	2.0	5.6	6400	7.0	5.3	8.1	13.7	6600	46.7	19.3	0.193	3.50
Adapted from 2006 Summerlin West Planning Area Flood Control Master Plan Update; areas and lag times modified as needed.																		
3-4A1	D	92.2	0.8270	58.2	0.0909	200	2.0	5.5	3000	4.7	4.4	6.6	8.2	3200	27.8	13.7	0.137	3.41
5-10AR	D	88.8	0.7822	67.1	0.1049	200	2.0	6.4	3560	4.4	4.2	6.4	10.0	3760	30.9	16.4	0.164	3.43
*Referenced from Conceptual Drainage Study for Summerlin Village 23B Update																		
*AA	D	93.8	0.8482	18.5	0.0289	100	1.0	4.5	1375	2.6	3.3	4.9	5.5	1475	18.2	10.0	0.100	3.29
*ST3	D	95.3	0.8680	4.1	0.0064	21	2.0	1.5	830	3.6	3.8	5.8	3.1	851	14.7	4.6	0.050	3.29
Drainage areas on Far Hills: for the drop inlet flows																		
FH1	D	95	0.8640	6.4	0.0100	160	2.0	4.3	1675	7.6	5.6	8.4	3.8	1835	20.2	8.1	0.081	3.29
FH2	D	95	0.8640	6.8	0.0106	80	2.0	3.0	2075	5.6	4.8	7.2	5.4	2155	22.0	8.4	0.084	3.29

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

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

$K = 0.0132\ (CN) - 0.39$

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

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

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

REFERENCE: STANDARD FORM 4

```
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1)*
*         JUN  1998                 *
*        VERSION 4.1                *
*                                   *
*  RUN DATE  21NOV12  TIME  10:13:45*
*                                   *
*************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID   ********************************************************************
    2         ID   * ..................................................................  *
    3         ID   * :              FAR HILLS AVENUE RCB IMPROVEMENTS                :  *
    4         ID   * :                TECHNICAL DRAINAGE STUDY                       :  *
    5         ID   * :           OFFSITE RUNOFF TO FAR HILLS BOX CULVERT             :  *
    6         ID   * :         AND RUNOFF TO FAR HILLS AVENUE DROP INLETS            :  *
    7         ID   * :          ULTIMATE DEVELOPMENT DRAINAGE CONDITION              :  *
    8         ID   * :..............................................................  :  *
    9         ID   * :          CLIENT_ _ _ _ _ _ _ THE HOWARD HUGHES CORP.         :  *
   10         ID   * :          RETURN PERIOD_ _ _ _100-YEAR                        :  *
   11         ID   * :          DISTRIBUTUION_ _ _ _6-HOUR SDN3                     :  *
   12         ID   * :          PROJECT NO_ _ _ _ _ 62023B.227                      :  *
   13         ID   * :          FILENAME_ _ _ _ _ _ FHULT.H1                        :  *
   14         ID   * :          DATE_ _ _ _ _ _ _ _ 11/21/2012                      :  *
   15         ID   * :..............................................................  :  *
   16         ID   * :                                                              :  *
   17         ID   * : DARF'S REFERENCED FROM THE 2006 SUMMERLIN WEST PLANNING      :  *
   18         ID   * :    AREA FLOOD CONTROL MASTER PLAN UPDATE (SUPPLEMENT)        :  *
   19         ID   * :                                                              :  *
   20         ID   * :                    AREA        DARF                      :  *
   21         ID   * :                  (sq.mi.)                                  :  *
   22         ID   * :                                                              :  *
   23         ID   * :                  0 to 0.05    1.000                        :  *
   24         ID   * :                0.05 to 0.49   0.990                        :  *
   25         ID   * :                0.50 to 0.99   0.975                        :  *
   26         ID   * :..............................................................  :  *
   27         ID   ********************************************************************
   28         ID
   29         IT       5       0       0     300
   30         IO       5
   31         IN       5       0       0
   32         JR    PREC       1   0.990   0.975   0.560
              *
              * DRAINAGE AREAS TRIBUTARY TO PROPOSED FAR HILLS BOX CULVERT
              * SEE FIGURE 6
              *

   33         KK    3-1A
              * REFERENCED FROM THE 2006 SUMMERLIN WEST PLANNING AREA FLOOD CONTROL MASTER
              * PLAN UPDATE (SUPPLEMENT)
   34         BA    .1166
   35         PB    3.56
   36         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   37         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   38         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   39         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   40         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   41         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   42         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   43         PC    .998    .999   1.00
   44         LS       0   88.1
   45         UD    .162
              *
```

1 HEC-1 INPUT PAGE 2

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

   46         KK   R3-1A
              * REFERENCED FROM THE 2006 SUMMERLIN WEST PLANNING AREA FLOOD CONTROL MASTER
              * PLAN UPDATE
   47         KM   "ROUTE THROUGH 3-2A TO C14"
   48         RD    5810   .0533    .013            RECT       8       7
              *

   49         KK    3-2A
              * REFERENCED FROM THE 2006 SUMMERLIN WEST PLANNING AREA FLOOD CONTROL MASTER
```

```
                 * PLAN UPDATE
 50              BA   .2636
 51              PB    3.50
 52              LS       0     91.8
 53              UD   0.193
                 *

 54              KK  5-10AR
                 * REFERENCED FROM THE 2006 SUMMERLIN WEST PLANNING AREA FLOOD CONTROL MASTER
                 * PLAN UPDATE - A PORTION OF SUBBASIN 5-10A
 55              BA   .1049
 56              PB    3.43
 57              LS       0     88.8
 58              UD    .164
                 *

 59              KK     C14
 60              KM   "COMBINE 3-1A AND 3-2A AND OFF5R"
 61              HC       3
                 *

 62              KK    RC14
 63              KM   "ROUTE C14 TO C15W"
 64              RD    2720    .076    .013            RECT       8       7
                 *

 65              KK   3-4A1
                 * REFERENCED FROM THE CONCEPTUAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23B
                 * A PORTION OF SUBBASIN 3-4A
 66              KM   AREA NORTH OF FAR HILLS BETWEEN SKY VISTA AND EXISTING RESERVOIR - INCLUDES F
 67              BA   .0909
 68              PB    3.41
 69              LS       0     92.2
 70              UD   0.137
                 *

 71              KK     ST3
                 * REFERENCED FROM THE CONCEPTUAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23B UPDATE
 72              KM   ENTRYWAY VILLAGE 23B (FOX HILL DRIVE)
 73              BA   .0064
 74              PB    3.29
 75              LS       0      95.3
 76              UD   0.050
                 *
                 * DO NOT ROUTE
                 *
1                                                HEC-1 INPUT                                                PAGE  3

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

 77              KK      AA
                 * REFERENCED FROM THE CONCEPTUAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23B UPDATE
 78              BA   .0289
 79              PB    3.29
 80              LS       0      93.8
 81              UD   0.100
                 *

 82              KK    C15W
 83              KM   "COMBINE RC14, 3-4A1, ST3 AND AA"
 84              HC       4
                 *
                 * END FLOWS TO PROPOSED BOX CULVERT
                 * BEGIN SURFACE FLOWS TO PROPOSED DROP INLETS ON FAR HILLS AVENUE
                 * SEE FIGURE 5
                 *

 85              KK     FH1
                 * PRECIPITATION REFERENCED FROM THE CONCEPTUAL DRAINAGE STUDY
                 * FOR SUMMERLIN VILLAGE 23B
 86              KM   SEE FIGURE 5
 87              BA   .0100
 88              PB    3.29
 89              LS       0      95
 90              UD   0.081
                 *

 91              KK    RFH1
 92              KM   "ROUTE TO C1 AT DESERT FOOTHILLS"
 93              RD    2075     .06    .013            RECT      10       8
                 *

 94              KK     FH2
                 * PRECIPITATION REFERENCED FROM THE CONCEPTUAL DRAINAGE STUDY
                 * FOR SUMMERLIN VILLAGE 23B
 95              KM   SEE FIGURE 5
 96              BA   .0106
 97              PB    3.29
 98              LS       0      95
 99              UD   0.084
                 *

100              KK      C1
101              KM   "COMBINE FH1 AND FH2 AT DESERT FOOTHILLS"
102              HC       2
                 *
                 * END SURFACE FLOWS TO FAR HILLS
                 * END FILE
                 *
103              ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
```

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

 33        3-1A
              V
              V
 46       R3-1A
              .
              .
 49           .        3-2A
              .           .
              .           .
 54           .           .      5-10AR
              .           .           .
              .           .           .
 59         C14.........................
              V
              V
 62        RC14
              .
              .
 65           .       3-4A1
              .           .
              .           .
 71           .           .         ST3
              .           .           .
              .           .           .
 77           .           .           .          AA
              .           .           .           .
              .           .           .           .
 82        C15W.....................................
              .
              .
 85           .         FH1
              .           V
              .           V
 91           .        RFH1
              .           .
              .           .
 94           .           .         FH2
              .           .           .
              .           .           .
100           .          C1............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   21NOV12  TIME  10:13:45   *
*                                       *
*****************************************
```

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

```
*****************************************************************
* :                                                           : *
* :              FAR HILLS AVENUE RCB IMPROVEMENTS            : *
* :                TECHNICAL DRAINAGE STUDY                   : *
* :          OFFSITE RUNOFF TO FAR HILLS BOX CULVERT          : *
* :        AND RUNOFF TO FAR HILLS AVENUE DROP INLETS         : *
* :         ULTIMATE DEVELOPMENT DRAINAGE CONDITION           : *
* :                                                           : *
* :          CLIENT_ _ _ _ _ _ _ THE HOWARD HUGHES CORP.      : *
* :          RETURN PERIOD_ _ _ _100-YEAR                     : *
* :          DISTRIBUTUION_ _ _ _6-HOUR SDN3                  : *
* :          PROJECT NO_ _ _ _ _ 62023B.227                   : *
* :          FILENAME_ _ _ _ _ _ FHULT.H1                     : *
* :          DATE_ _ _ _ _ _ _ _ 11/21/2012                   : *
* :                                                           : *
* :                                                           : *
* : DARF'S REFERENCED FROM THE 2006 SUMMERLIN WEST PLANNING   : *
* :    AREA FLOOD CONTROL MASTER PLAN UPDATE (SUPPLEMENT)     : *
* :                                                           : *
* :                   AREA        DARF                        : *
* :                 (sq.mi.)                                  : *
* :                                                           : *
* :                 0 to 0.05    1.000                        : *
* :              0.05 to 0.49    0.990                        : *
* :              0.50 to 0.99    0.975                        : *
* :                                                           : *
*****************************************************************
```

```
30 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 .99 .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 .99	RATIO 3 .98	RATIO 4 .56
HYDROGRAPH AT								
+	3-1A	.12	1	FLOW	219.	216.	212.	94.
				TIME	3.58	3.58	3.58	3.58
ROUTED TO								
+	R3-1A	.12	1	FLOW	208.	205.	201.	89.
				TIME	3.67	3.67	3.67	3.67
HYDROGRAPH AT								
+	3-2A	.26	1	FLOW	501.	495.	486.	236.
				TIME	3.58	3.58	3.58	3.58
HYDROGRAPH AT								
+	5-10AR	.10	1	FLOW	191.	188.	185.	83.
				TIME	3.58	3.58	3.58	3.58
3 COMBINED AT								
+	C14	.49	1	FLOW	883.	872.	855.	394.
				TIME	3.58	3.58	3.58	3.58
ROUTED TO								
+	RC14	.49	1	FLOW	859.	847.	832.	391.
				TIME	3.67	3.67	3.67	3.67
HYDROGRAPH AT								
+	3-4A1	.09	1	FLOW	187.	185.	182.	90.
				TIME	3.58	3.58	3.58	3.58
HYDROGRAPH AT								
+	ST3	.01	1	FLOW	17.	17.	17.	9.
				TIME	3.50	3.50	3.50	3.50
HYDROGRAPH AT								
+	AA	.03	1	FLOW	62.	61.	60.	30.
				TIME	3.50	3.50	3.50	3.50
4 COMBINED AT								
+	C15W	.61	1	FLOW	1100.	1088.	1068.	494.
				TIME	3.58	3.58	3.58	3.58
HYDROGRAPH AT								
+	FH1	.01	1	FLOW	24.	24.	23.	12.
				TIME	3.50	3.50	3.50	3.50
ROUTED TO								
+	RFH1	.01	1	FLOW	22.	22.	22.	12.
				TIME	3.58	3.58	3.58	3.58
HYDROGRAPH AT								
+	FH2	.01	1	FLOW	25.	25.	24.	13.
				TIME	3.50	3.50	3.50	3.50
2 COMBINED AT								
+	C1	.02	1	FLOW	47.	46.	45.	24.
				TIME	3.50	3.50	3.50	3.50

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
R3-1A	MANE	4.25	209.18	221.00	2.33	5.00	208.11	220.00	2.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1448E+02 EXCESS= .0000E+00 OUTFLOW= .1449E+02 BASIN STORAGE= .1133E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
R3-1A	MANE	4.25	206.50	221.00	2.30	5.00	205.39	220.00	2.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1428E+02 EXCESS= .0000E+00 OUTFLOW= .1429E+02 BASIN STORAGE= .1125E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
R3-1A	MANE	4.25	202.46	221.00	2.25	5.00	201.32	220.00	2.25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1398E+02 EXCESS= .0000E+00 OUTFLOW= .1399E+02 BASIN STORAGE= .1113E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R3-1A	MANE	4.75	89.55	223.25	.97	5.00	89.21	220.00	.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6004E+01 EXCESS= .0000E+00 OUTFLOW= .6009E+01 BASIN STORAGE= .1147E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RC14	MANE	1.33	880.77	217.20	2.47	5.00	859.18	220.00	2.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6401E+02 EXCESS= .0000E+00 OUTFLOW= .6401E+02 BASIN STORAGE= .5519E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC14	MANE	1.34	869.76	216.60	2.44	5.00	847.12	220.00	2.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6316E+02 EXCESS= .0000E+00 OUTFLOW= .6317E+02 BASIN STORAGE= .5393E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC14	MANE	1.34	853.48	216.38	2.39	5.00	832.48	220.00	2.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6190E+02 EXCESS= .0000E+00 OUTFLOW= .6190E+02 BASIN STORAGE= .4472E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC14	MANE	1.65	396.74	217.96	1.08	5.00	391.25	220.00	1.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2800E+02 EXCESS= .0000E+00 OUTFLOW= .2800E+02 BASIN STORAGE= .4636E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RFH1	MANE	3.00	23.51	213.00	2.74	5.00	22.19	215.00	2.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1460E+01 EXCESS= .0000E+00 OUTFLOW= .1461E+01 BASIN STORAGE= .5353E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RFH1	MANE	3.00	23.25	213.00	2.71	5.00	21.96	215.00	2.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1443E+01 EXCESS= .0000E+00 OUTFLOW= .1443E+01 BASIN STORAGE= .5317E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RFH1	MANE	3.00	22.86	213.00	2.66	5.00	21.61	215.00	2.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1417E+01 EXCESS= .0000E+00 OUTFLOW= .1418E+01 BASIN STORAGE= .5264E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RFH1	MANE	3.50	12.10	213.50	1.34	5.00	11.63	215.00	1.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7125E+00 EXCESS= .0000E+00 OUTFLOW= .7131E+00 BASIN STORAGE= .6092E-03 PERCENT ERROR= -.2

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

Storm Drain Hydraulics Calculations

G.C. Wallace, Inc.

Hydraulic Calculations for FAR HILLS AVENUE Interim Condition

DATE: 03/27/13 FILE: SF6.xls

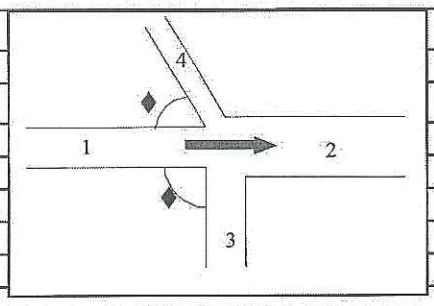
Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= A | Headwall: Grooved Edge

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																						EGL & HGL				COMMENTS	
																					TRANSITION																											
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	PIPE 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									S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_i	H_i	Inlet/ Cont	K_i	H_c	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
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)				(deg)		(ft)	(ft)	(deg)			(ft)	(deg)			(ft)	(ft)						
1		250.00			8	6					333.81																				Outlet K_o=		1.0															
2	250.00	255.00	T		8	6			1	333.81	334.84	5.0	20.52%	48.00	0.0049	469	9.77	1.48	0.0036	0.0036		0.02																		0.02			342.32	340.84	FULL	D/S
3	255.00	1057.24	R		8	6			1	334.84	379.20	802.2	5.53%	48.00	0.0049	469	9.77	1.48	0.0036	0.0036	2.86																		0.00	386.68	385.20			PART	D/S
4	1057.24	1271.10	R		8	6			1	379.20	390.90	213.9	5.47%	48.00	0.0049	469	9.77	1.48	0.0036	0.0036	0.76																		0.00	398.38	396.90			PART	D/S
5	1271.10	1276.10	T		8	6			1	390.90	391.17	5.0	5.47%	48.00	0.0049	386	8.04	1.00	0.0024	0.0030		0.01																	0.93	0.94			399.33	398.32	FULL	U/S
6	1276.10	1717.54	R		8	6			1	391.17	415.30	441.4	5.47%	48.00	0.0049	386	8.04	1.00	0.0024	0.0024	1.07																		0.00	422.30	421.30			PART	D/S
7	1717.54	2087.82	R		8	6			1	415.30	428.19	370.3	3.48%	48.00	0.0049	386	8.04	1.00	0.0024	0.0024	0.89																		0.00	435.19	434.19			PART	D/S
8	2087.82	2092.82	T		8	6			1	428.19	428.36	5.0	3.48%	48.00	0.0049	320	6.67	0.69	0.0017	0.0020		0.01																		0.01			435.20	434.51	FULL	U/S
9	2092.82	2155.65	R		8	6			1	428.36	430.55	62.8	3.48%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017	0.10																		0.00	437.24	436.55			PART	D/S
10	2155.65	2160.65	T		8	6			1	430.55	430.72	5.0	3.48%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017		0.01																	0.63	0.64			437.87	437.18	FULL	U/S
11	2160.65	2471.14	R		8	6			1	430.72	441.50	310.5	3.47%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017	0.52		1	0.02	0.01														0.01	448.19	447.50	448.19	447.50	PART	D/S
12	2471.14	3091.62	R		8	6			1	441.50	487.73	620.5	7.45%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017	1.03																		0.00	494.42	493.73			PART	D/S
13	3091.62	3096.62	T		8	6			1	487.73	488.10	5.0	7.45%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017		0.01																		0.01			494.79	494.10	FULL	D/S
14	3096.62	3131.44	R		8	6			1	488.10	490.70	34.8	7.47%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017	0.06		1	0.02	0.01														0.01	497.39	496.70	497.39	496.70	PART	D/S
15	3131.44	3601.52	R		8	6			1	490.70	525.80	470.1	7.47%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017	0.78															1130	10	0.08	0.06		0.06	532.49	531.80	532.49	531.80	PART	D/S
16	3601.52	3807.72	R		8	6			1	525.80	535.70	206.2	4.80%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017	0.34																		0.00	542.39	541.70			PART	D/S
17	3807.72	4144.08	R		8	6			1	535.70	545.96	336.4	3.05%	48.00	0.0049	320	6.67	0.69	0.0017	0.0017	0.56																		0.00	552.65	551.96			PART	D/S
18	4144.08	4149.08	T		8	6			1	545.96	546.11	5.0	3.05%	48.00	0.0049	0	0.00	0.00	0.0000	0.0008		0.00	0	0.02	0.01	45	0.50	0.69												0.71			553.36	553.36	FULL	U/S
19	4149.08	4220.79	R		8	6			1	546.11	546.30	71.7	3.05%	48.00	0.0049	0	0.00	0.00	0.0000	0.0000	0.00																		0.00	554.30	554.30			FULL	D/S

Junction Head Loss Calculation

Sta 221+25.16

Known	
Diameter of Pipe 1 (in)	93.8
Diameter of Pipe 2 (in)	93.8
Diameter of Pipe 3 (in)	24.0
Diameter of Pipe 4 (in)*	24.0
Flow in Pipe 1 (cfs)	320
Flow in Pipe 2 (cfs)	386
Flow in Pipe 3 (cfs)	47
Flow in Pipe 4 (cfs)*	14
Angle of Pipe 3	90
Angle of Pipe 4*	90



*Optional

Headloss is applied at Entrance to Junction
Insert Loss in Misc. Loss Column and
leave Junction Loss Column Blank

Solve For	
Area of Pipe 1 (ft^2)	47.99
Area of Pipe 2 (ft^2)	47.99
Area of Pipe 3 (ft^2)	3.14
Area of Pipe 4 (ft^2)	3.14
Head Loss at Junction (ft)	**0.63**

Equation Used:

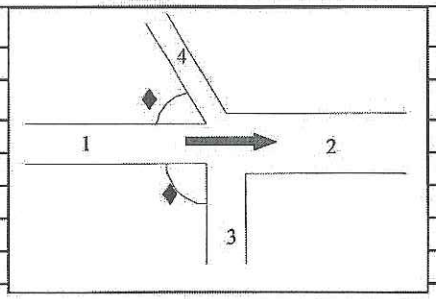
Incorporates Pressure plus Momentum Laws

$$Hj=((Q_2^2/A_{2*g}-Q_1^2/A_{1*g}-Q_3^2*\cos(Ang3)/A_{3*g}-Q_4^2*\cos(Ang4)/A_{4*g})*2/(A_1+A_2)-D_1+D_2)$$

Junction Head Loss Calculation

Sta 213+44.08

Known	
Diameter of Pipe 1 (in)	93.8
Diameter of Pipe 2 (in)	93.8
Diameter of Pipe 3 (in)	36.0
Diameter of Pipe 4 (in)*	42.0
Flow in Pipe 1 (cfs)	386
Flow in Pipe 2 (cfs)	469
Flow in Pipe 3 (cfs)	53
Flow in Pipe 4 (cfs)*	30
Angle of Pipe 3	90
Angle of Pipe 4*	60



*Optional

Headloss is applied at Entrance to Junction

Insert Loss in Misc. Loss Column and leave Junction Loss Column Blank

Solve For	
Area of Pipe 1 (ft^2)	47.99
Area of Pipe 2 (ft^2)	47.99
Area of Pipe 3 (ft^2)	7.07
Area of Pipe 4 (ft^2)	9.62
Head Loss at Junction (ft)	**0.93**

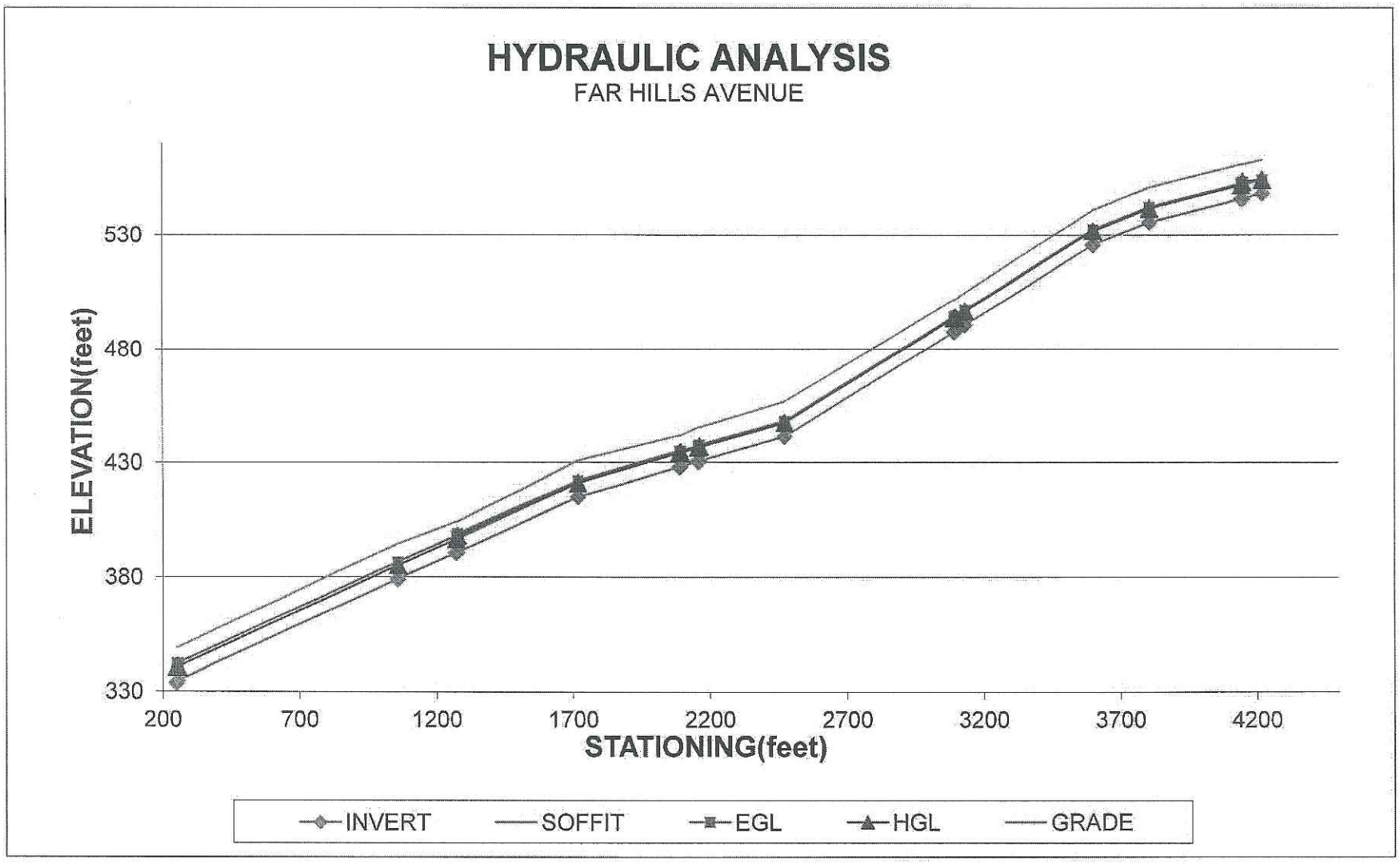
Equation Used:

Incorporates Pressure plus Momentum Laws

$$Hj=((Q_2^2/A_{2*g}-Q_1^2/A_{1*g}-Q_3^2*\cos(Ang3)/A_{3*g}-Q_4^2*\cos(Ang4)/A_{4*g})*2/(A_1+A_2)-D_1+D_2)$$

Summary of Results for FAR HILLS Interim Conditions

					(Optional)					HGL	Pressure Gasket
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION	Freeboard	Cover	wrt FG	Required?
250.00	333.81	339.81	342.29	340.81	349.22		Connect to ex. RCB	8.41	9.41	OK	NO
255.00	334.84	340.84	342.32	340.84	349.22		Transition to ex. RCB	8.38	8.38	OK	NO
1057.24	379.20	385.20	386.68	385.20	394.86		Grade break	9.66	9.66	OK	NO
1271.10	390.90	396.90	398.38	396.90	404.55		36" lateral at Parcel T	7.65	7.65	OK	NO
1276.10	391.17	397.17	399.33	398.32	404.55		36" lateral at Parcel T	6.23	7.38	OK	NO
1717.54	415.30	421.30	422.30	421.30	431.00		Grade break	9.70	9.70	OK	NO
2087.82	428.19	434.19	435.19	434.19	442.00		36" pipe at Fox Hill	7.81	7.81	OK	NO
2092.82	428.36	434.36	435.20	434.51	442.00		36" pipe at Fox Hill	7.49	7.64	OK	NO
2155.65	430.55	436.55	437.24	436.55	445.60		24" pipe at Fox Hill	9.05	9.05	OK	NO
2160.65	430.72	436.72	437.87	437.18	445.60		24" pipe at Fox Hill	8.42	8.88	OK	NO
2471.14	441.50	447.50	448.19	447.50	456.90		Grade break	9.40	9.40	OK	NO
3091.62	487.73	493.73	494.42	493.73	502.00		36" to Village 25	8.27	8.27	OK	NO
3096.62	488.10	494.10	494.79	494.10	502.00		36" to Village 25	7.90	7.90	OK	NO
3131.44	490.70	496.70	497.39	496.70	505.00		Grade break	8.30	8.30	OK	NO
3601.52	525.80	531.80	532.49	531.80	541.00		Grade break	9.20	9.20	OK	NO
3807.72	535.70	541.70	542.39	541.70	551.00		Grade break	9.30	9.30	OK	NO
4144.08	545.959	551.96	552.65	551.96	560.90		66" at Sky Vista	8.94	8.94	OK	NO
4149.08	546.1115	552.11	553.36	553.36	560.90		66" at Sky Vista	7.54	8.79	OK	NO
4220.79	548.3	554.30	554.30	554.30	563.00		Inlet	8.70	8.70	OK	NO


HYDRAULIC ANALYSIS
FAR HILLS AVENUE
ELEVATION(feet)
530
480
430
380
330
200
700
1200
1700
2200
2700
3200
3700
4200
STATIONING(feet)
INVERT
SOFFIT
EGL
HGL
GRADE

Storm Drain Hydraulics Calculations

G.C. Wallace, Inc. | Hydraulic Calculations for FAR HILLS AVENUE Ultimate Condition | DATE: 05/16/13 | FILE: SF6.xls

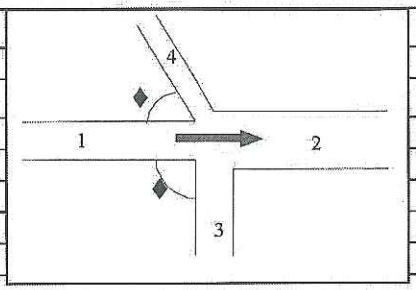
Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= A | Headwall: Grooved Edge

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																						EGL & HGL				COMMENTS	
																				PIPE	TRANSITION																										
	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									S_f	H_f	H_r	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_j	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)			(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)			(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW	
1		250.00			8	7					333.81																																347.01	340.81		
2	250.00	298.75	R		8	7			1	333.81	336.43	48.8	5.37%	56.00	0.0049	1119	19.98	6.20	0.0133	0.0133	0.65																					0.00	349.63	343.43			PART	D/S
3	298.75	303.75	T		8	6			1	336.43	337.79	5.0	27.25%	48.00	0.0049	1088	22.67	7.98	0.0192	0.0162		0.08	0	0.02	0.12	45	0.50	2.21													2.42			352.04	344.06	FULL	U/S
4	303.75	1054.78	R		8	6			1	337.79	379.20	751.0	5.51%	48.00	0.0049	1088	22.67	7.98	0.0192	0.0192	14.41																					0.00	393.18	385.20			PART	D/S
5	1054.78	1268.64	R		8	6			1	379.20	390.90	213.9	5.47%	48.00	0.0049	1088	22.67	7.98	0.0192	0.0192	4.10																					0.00	404.88	396.90			PART	D/S
6	1268.64	1273.64	T		8	6			1	390.90	391.17	5.0	5.47%	48.00	0.0049	1014	21.13	6.93	0.0167	0.0179		0.09																			1.98	2.07			406.95	400.02	FULL	U/S
7	1273.64	1715.08	R		8	6			1	391.17	415.30	441.4	5.47%	48.00	0.0049	1014	21.13	6.93	0.0167	0.0167	7.36																					0.00	428.23	421.30			PART	D/S
8	1715.08	2085.36	R		8	6			1	415.30	428.19	370.3	3.48%	48.00	0.0049	1014	21.13	6.93	0.0167	0.0167	6.17																					0.00	441.12	434.19			PART	D/S
9	2085.36	2090.36	T		8	6			1	428.19	428.36	5.0	3.48%	48.00	0.0049	917	19.10	5.67	0.0136	0.0151		0.08																			2.53	2.61			443.72	438.05	FULL	U/S
10	2090.36	2468.68	R		8	6			1	428.36	441.50	378.3	3.47%	48.00	0.0049	917	19.10	5.67	0.0136	0.0136	5.16		1	0.02	0.11																0.11	453.17	447.50	453.17	447.50	PART	D/S
11	2468.68	3089.16	R		8	6			1	441.50	487.73	620.5	7.45%	48.00	0.0049	917	19.10	5.67	0.0136	0.0136	8.46																					0.00	499.39	493.73			PART	D/S
12	3089.16	3094.16	T		8	6			1	487.73	488.19	5.0	7.45%	48.00	0.0049	872	18.17	5.12	0.0123	0.0130		0.06																			1.09	1.15			500.55	495.42	FULL	U/S
13	3094.16	3128.98	R		8	6			1	488.10	490.70	34.8	7.47%	48.00	0.0049	872	18.17	5.12	0.0123	0.0123	0.43		1	0.02	0.10																0.10	501.82	496.70	501.82	496.70	FULL	D/S
14	3128.98	3599.06	R		8	6			1	490.70	525.80	470.1	7.47%	48.00	0.0049	872	18.17	5.12	0.0123	0.0123	5.79															1130	10	0.08	0.43		0.43	536.92	531.80	536.92	531.80	PART	D/S
15	3599.06	3805.26	R		8	6			1	525.80	535.70	206.2	4.80%	48.00	0.0049	872	18.17	5.12	0.0123	0.0123	2.54																					0.00	546.82	541.70			PART	D/S
16	3805.26	4141.62	R		8	6			1	535.70	545.96	336.4	3.05%	48.00	0.0049	872	18.17	5.12	0.0123	0.0123	4.14					45	0.50	2.56													2.56	557.08	551.96	557.08	551.96	PART	D/S
17	4141.62	4146.62	T		8	6			1	545.96	546.11	5.0	3.05%	48.00	0.0049	711	14.81	3.41	0.0082	0.0103		0.05	0	0.02	0.10															0.15			557.24	553.83	FULL	U/S
18	4146.62	4216.33	R		8	6			1	546.11	546.30	71.7	3.05%	48.00	0.0049	711	14.81	3.41	0.0082	0.0082	0.59																					0.00	557.82	554.42			FULL	U/S
19	4218.33		R		8	6			1	546.30																																			

Junction Head Loss Calculation

Sta 231+28.97

Known	
Diameter of Pipe 1 (in)	93.8
Diameter of Pipe 2 (in)	93.8
Diameter of Pipe 3 (in)	36.0
Diameter of Pipe 4 (in)*	
Flow in Pipe 1 (cfs)	872
Flow in Pipe 2 (cfs)	917
Flow in Pipe 3 (cfs)	45
Flow in Pipe 4 (cfs)*	
Angle of Pipe 3	90
Angle of Pipe 4*	



*Optional

Headloss is applied at Entrance to Junction

Solve For		Insert Loss in Misc. Loss Column and
Area of Pipe 1 (ft^2)	47.99	leave Junction Loss Column Blank
Area of Pipe 2 (ft^2)	47.99	
Area of Pipe 3 (ft^2)	7.07	
Area of Pipe 4 (ft^2)		
Head Loss at Junction (ft)	**1.09**	

Equation Used:

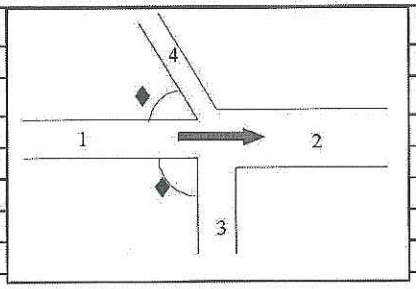
Incorporates Pressure plus Momentum Laws

$$Hj=((Q_2^2/A_{2*g}-Q_1^2/A_{1*g}-Q_3^{2*}\cos(Ang3)/A_{3*g}-Q_4^{2*}\cos(Ang4)/A_{4*g})*2/(A_1+A_2)-D_1+D_2)$$

Junction Head Loss Calculation

Sta 221+25.16

Known	
Diameter of Pipe 1 (in)	93.8
Diameter of Pipe 2 (in)	93.8
Diameter of Pipe 3 (in)	24.0
Diameter of Pipe 4 (in)*	42.0
Flow in Pipe 1 (cfs)	917
Flow in Pipe 2 (cfs)	1014
Flow in Pipe 3 (cfs)	17
Flow in Pipe 4 (cfs)*	80
Angle of Pipe 3	90
Angle of Pipe 4*	90



*Optional

Headloss is applied at Entrance to Junction
Insert Loss in Misc. Loss Column and
leave Junction Loss Column Blank

Solve For	
Area of Pipe 1 (ft^2)	47.99
Area of Pipe 2 (ft^2)	47.99
Area of Pipe 3 (ft^2)	3.14
Area of Pipe 4 (ft^2)	9.62
Head Loss at Junction (ft)	**2.53**

Equation Used:

Incorporates Pressure plus Momentum Laws

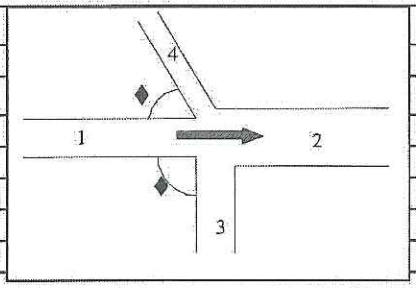
$$Hj=((Q_2^2/A_{2*g}-Q_1^2/A_{1*g}-Q_3^{2*}\cos(Ang3)/A_{3*g}-Q_4^{2*}\cos(Ang4)/A_{4*g})*2/(A_1+A_2)-D_1+D_2)$$

Junction Head Loss Calculation

Sta 213+44.08

Known	
Diameter of Pipe 1 (in)	93.8
Diameter of Pipe 2 (in)	93.8
Diameter of Pipe 3 (in)	36.0
Diameter of Pipe 4 (in)*	42.0
Flow in Pipe 1 (cfs)	1014
Flow in Pipe 2 (cfs)	1088
Flow in Pipe 3 (cfs)	14
Flow in Pipe 4 (cfs)*	60
Angle of Pipe 3	90
Angle of Pipe 4*	60

*Optional



Headloss is applied at Entrance to Junction

Insert Loss in Misc. Loss Column and leave Junction Loss Column Blank

Solve For	
Area of Pipe 1 (ft^2)	47.99
Area of Pipe 2 (ft^2)	47.99
Area of Pipe 3 (ft^2)	7.07
Area of Pipe 4 (ft^2)	9.62

Head Loss at Junction (ft)	**1.98**

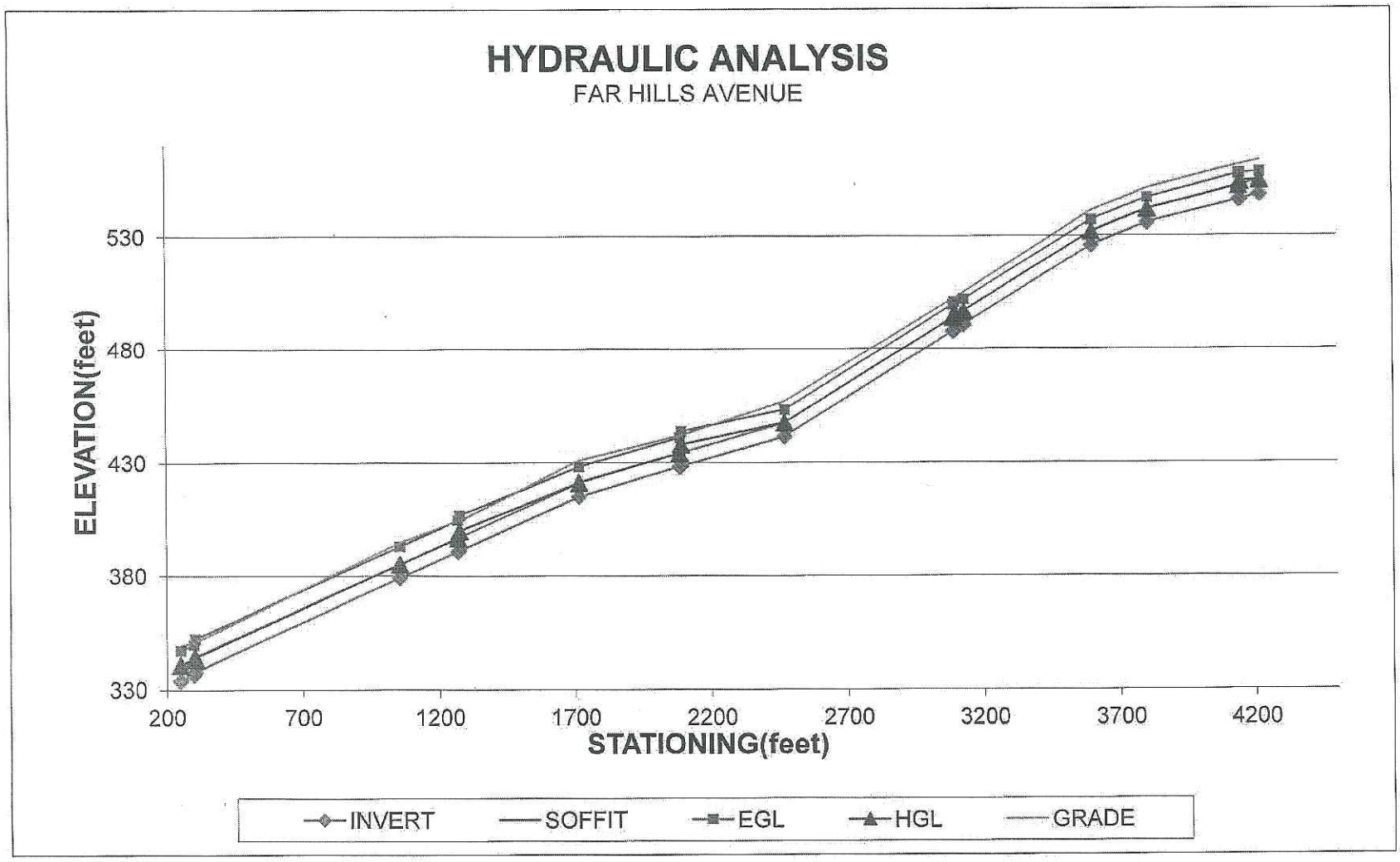
Equation Used:

Incorporates Pressure plus Momentum Laws

$$Hj=((Q_2^2/A_{2*g}-Q_1^2/A_{1*g}-Q_3^2*\cos(Ang3)/A_{3*g}-Q_4^2*\cos(Ang4)/A_{4*g})*2/(A_1+A_2)-D_1+D_2)$$

Summary of Results for FAR HILLS Ultimate Conditions

					(Optional)					HGL	Pressure Gasket
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION	Freeboard	Cover	wrt FG	Required?
250.00	333.81	340.81	347.01	340.81	349.22		Connect to ex. RCB	8.41	8.41	OK	NO
298.75	336.43	343.43	349.63	343.43	350.50			7.07	7.07	OK	NO
303.75	337.79	343.79	352.04	344.06	350.50		Transition to ex. RCB	6.44	6.71	OK	NO
1054.78	379.20	385.20	393.18	385.20	394.86		Grade break	9.66	9.66	OK	NO
1268.64	390.90	396.90	404.88	396.90	404.55		36" lateral at Parcel T	7.65	7.65	OK	NO
1273.64	391.17	397.17	406.95	400.02	404.55		36" lateral at Parcel T	4.53	7.38	OK	NO
1715.08	415.30	421.30	428.23	421.30	431.00		Grade break	9.70	9.70	OK	NO
2085.36	428.19	434.19	441.12	434.19	442.00		36" pipe at Fox Hill	7.81	7.81	OK	NO
2090.36	428.36	434.36	443.72	438.05	442.00		36" pipe at Fox Hill	3.95	7.64	OK	NO
2468.68	441.50	447.50	453.17	447.50	456.90		Grade break	9.40	9.40	OK	NO
3089.16	487.73	493.73	499.39	493.73	502.00		36" to Village 25	8.27	8.27	OK	NO
3094.16	488.10	494.10	500.55	495.42	502.00		36" to Village 25	6.58	7.90	OK	NO
3128.98	490.70	496.70	501.82	496.70	505.00		Grade break	8.30	8.30	OK	NO
3599.06	525.80	531.80	536.92	531.80	541.00		Grade break	9.20	9.20	OK	NO
3805.26	535.70	541.70	546.82	541.70	551.00		Grade break	9.30	9.30	OK	NO
4141.62	545.96	551.96	557.08	551.96	560.90		66" at Sky Vista	8.94	8.94	OK	NO
4146.62	546.1115	552.11	557.24	553.83	560.90		66" at Sky Vista	7.07	8.79	OK	NO
4218.33	548.3	554.30	557.82	554.42	563.00		Inlet		8.70	OK	NO


HYDRAULIC ANALYSIS
FAR HILLS AVENUE
ELEVATION(feet)
530
480
430
380
330
200
700
1200
1700
2200
2700
3200
3700
4200
STATIONING(feet)
INVERT
SOFFIT
EGL
HGL
GRADE

UPDATE #3 TO THE TECHNICAL DRAINAGE STUDY FOR SUMMERLIN VILLAGE 23B DESERT FOOTHILLS DRIVE IMPROVEMENTS (ALTA DRIVE TO FAR HILLS AVENUE)

62023B-201

May 2013

Prepared for:

The Howard Hughes Company, LLC
10801 W. Charleston Blvd., Suite 300
Las Vegas, Nevada 89135
Phone: (702) 791-4200
Fax: (702) 791-4450

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

62023B-201

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: May 20, 2013
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: **Desert Foothills Drive Improvements – Summerlin V23B Update #3 – From Alta to Far Hills**		**COPIES TO:** G.C. Wallace, Inc.
Cross Streets:	Desert Foothills Dr. between Alta & Far Hills		Howard Hughes Corporation
File Number:	F:\Depot\DSMemos\DS4062G.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-015		CCRFCD
Zoning Action:	N/A		
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES X	NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	8/28/2006	9/14/2006	Not Approved	$400.00	52653: $400
2nd Submittal	11/14/2006	12/1/2006	Conditional Approval	$400.00	57535: $400
CCRFCD	4/13/2007	4/23/2007	Concurrence	N/C	N/C
3rd Submittal	9/11/2012	9/20/2012	Not Approved	$100.00	295589: $100
4th Submittal	10/4/2012	10/17/2012	Conditional Approval	$400.00	297879: $400
CCRFCD	2/21/2013	2/28/2013	Concurrence Recv'd	N/C	N/C
5th Submittal	5/6/2013	5/20/2013	See Comments Below	$100.00	318776: $100
			TOTAL FEES (LDDRS):	**$1,400.00**	----

REMARKS:

5th Submittal: Update #3 for storm drain revision in *Desert Foothills Drive* from *Alta* to *Far Hills*

3rd & 4th Submittals: Update #2 & Addendum to improve *Desert Foothills Dr.* from *Alta* to *Far Hills*

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.

The following conditions are repeated until they are complete:

1. All the interim facilities such as but not limited to the openings, berms/channels and laterals etc. are to be owned and privately maintained by *Howard Hughes Corporation*.
2. 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*).

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

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

END OF REMARKS
ays

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

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

G. C. WALLACE, INC.

Writer's Contact Information:

702.804.2248

62023B-201

May 3, 2013

Albert Y. Sung, PE
Flood Control Project Manager
City of Las Vegas - Land Development Services
Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Re: Technical Drainage Study for Summerlin Village 23B Desert Foothills Drive Improvements (Desert Foothills Drive to Far Hills Avenue)

Dear Mr. Sung:

The purpose of this letter is to serve as the third update to the Technical Drainage Study for the subject project. The *Technical Drainage Study for Desert Foothills Drive Improvements – Alta Drive to Far Hills* (hereinafter referred to as the Desert Foothills Study), was originally approved by the City of Las Vegas Public Works Department (CLV) on June 9, 2004, with concurrence from the Clark County Regional Flood Control District (CCRFCD) on July 7, 2004. The first update to the Desert Foothills Study was approved by the CLV on December 6, 2006 with concurrence from the CCRFCD on January 9, 2007. The second update to the Desert Foothills Study was approved by the CLV on October 17, 2012 with concurrence from the CCRFCD on October 30, 2012. A second update to the *Conceptual Drainage Study for Summerlin Village 23B* (hereinafter referred to as the Conceptual Study), was approved by the CLV on February 11, 2013. The Conceptual Study presented ultimate conditions onsite drainage patterns and major storm drain facilities within the exterior and interior roadways. Desert Foothills Drive lies on the eastern border of Village 23B and was included as part of the Conceptual Study. Changes to the storm drain, offsite grading and construction limits have occurred since approval of the Second Update to the Desert Foothills Study. However, the site plan and drainage design flow patterns for the roadway are consistent with the previously approved Desert Foothills and Conceptual Studies. The calculations and grading plans provided herewith serve to provide an interim and ultimate condition for Desert Foothills Drive and serve to update the previously approved study. Pertinent reference materials from the Desert Foothills Study have been included in Appendix C. The methodologies and calculations presented in this report are in compliance with the *CCRFCD Hydrologic Criteria and Drainage Design Manual* (Manual). Copies of the approval letters have been included in Appendix C. Descriptions of the changes are as follows:

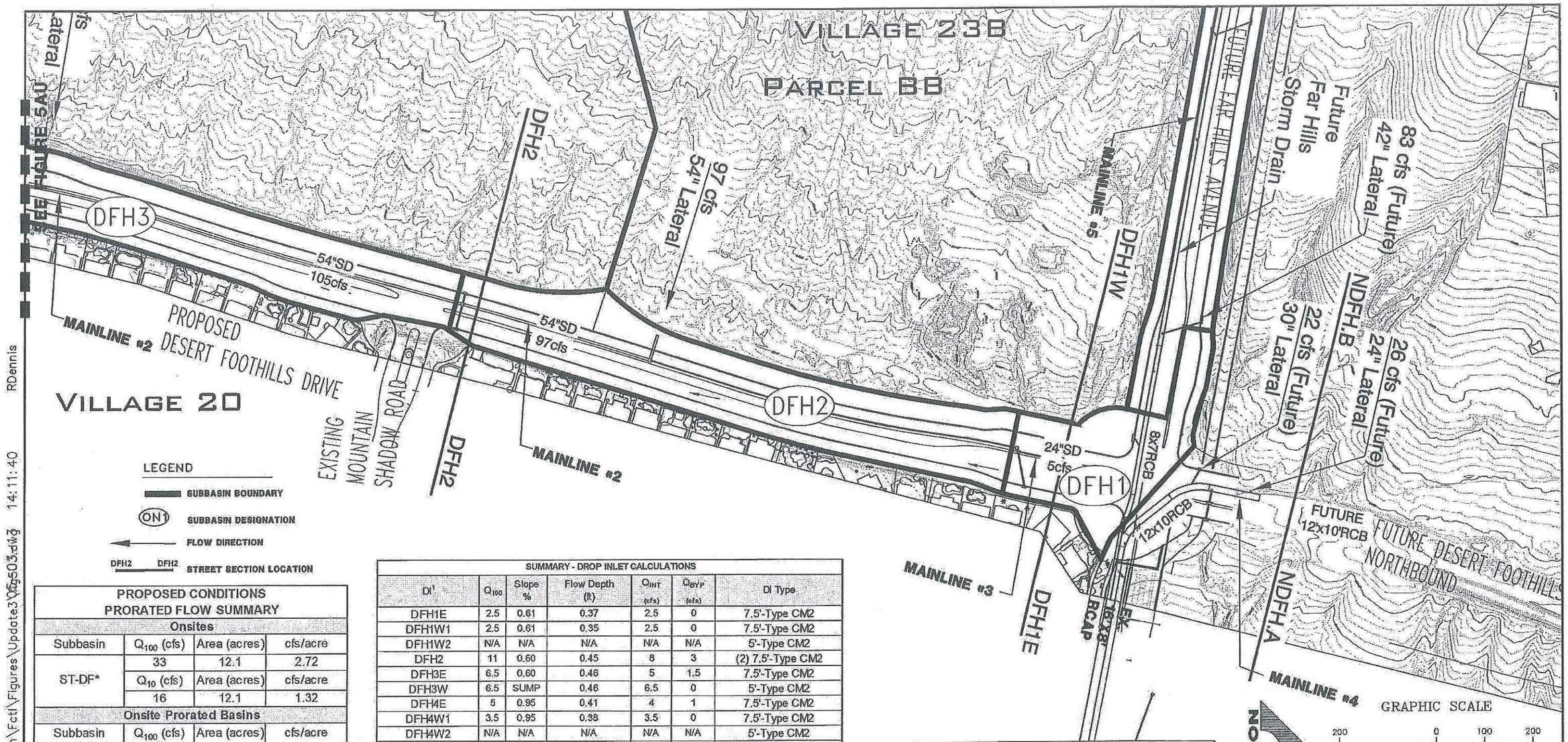
Per the *2006 Summerlin West Planning Area Flood Control Master Plan Update* (hereinafter referred to as the 2006 Summerlin West MP), the offsite area northwest of the intersection of Desert Foothills Drive and Far Hills Avenue will discharge into the Desert Foothills and Far Hills Strom drain systems during ultimate conditions. Future Developed Subbasins 21-16 (83 cfs) and 21-17 (22 cfs) as shown on the 2006 Summerlin West MP referenced Figure 11R, will discharge into the Desert Foothills and Far Hills Storm drain systems during ultimate conditions. Pertinent reference material

has been included in Appendix C. Previously, a 42-inch RCP extended north from Far Hills Avenue just west of the intersection with Desert Foothills Drive to collect interim and future offsite developed flows at Station 202+50. Due to existing utility conflicts and the 2006 Summerlin West MP, the 42-inch RCP has been removed with this package. The 42-inch RCP will be moved west to service the future 2006 Summerlin West MP Subbasin 21-16 and will be included with future Far Hills Avenue improvement packages. Since the 42-inch RCP has been moved, the offsite interim grading at this location was revised to direct flows east into the existing 12-foot wide by 10-foot high RCB. Since the interim conditions flows are less than the ultimate conditions flows at this location, the revised drainage pattern will not have an adverse impact on the proposed and existing downstream facilities or properties. Copies of the normal depth and inlet control calculations for the proposed ditch and sump have been provided in Appendix. Additional storm drain modeling has not been included since the impacts to the proposed 8-foot wide by 7-foot high RCB are minimal.

Additional changes have occurred at the intersection of Far Hills Avenue and Desert Foothills. The limits of pavement and curb have been reduced at the intersection. Since the pavement and back of curb has been reduced, the stubs servicing the future drop inlets will not be constructed with this package. The future drop inlets will be constructed with the future Far Hills Avenue roadway improvements. The stub located at Station 185+25 has been upsized from a 24-inch RCP to a 30-inch RCP to convey the referenced 2006 Summerlin West MP Subbasin 21-17 (22 cfs). Additional storm drain modeling has not been included since the impacts to the proposed 12-foot wide by 10-foot high RCB are minimal.

The 24-inch RCP Mainline #3 (5 cfs) has been revised to convey flows north into the Far Hills Avenue 8-foot wide by 7-foot high RCB storm drain system and reduce construction costs. The proposed flood control facilities for the Mainline #3 storm drain includes, storm drain laterals and drop inlets. Although the Mainline #3 has changed, the drop inlet sizes and locations remain unchanged. Additional storm drain modeling for the Far Hills Avenue Storm Drain has not been included since the impacts to the proposed 8-foot wide by 7-foot high RCB are minimal. The starting HGL of 36.00 feet for Mainline #3 has been referenced from the Desert Foothills Study Mainline #5. Pertinent reference material has been included in Appendix C. Additional storm drain modeling for the Desert Foothills Drive Mainline #1 has not been included since the impacts are minimal. The Standard Form 6 model for Mainline #2 has been updated due to the revised 54-inch RCP stub extension at Parcel BB. All proposed flood control facilities have been shown on Figures 5AU3 and 5BU3 and on the plans included herewith. Standard Form 6 models of the proposed Mainline #3 storm drain has been included in Appendix B. Please refer to Figures 5AU3 and 5BU3 for facility sizes, flowrates and drop inlet interception.

The offsite interim grading adjacent to Desert Foothills Drive has been revised and moved west of the roadway improvements to provide room for dry utility placement. The onsite storm drain and stub locations have been designed to convey the interim offsite flows generated west of the roadway. Facility names for the proposed berm/ditches in the calculations correspond with the tributary basin and the facility location. Flows tributary to the proposed ditches have been referenced and prorated from the Rough Grade Study and the Desert Foothills Study Interim Drainage Conditions Figure 6U3. Normal depth calculations for the ditches have been included in tables on Figure 6U3 and Appendix B. Pertinent reference materials have been included in Appendix C. The proposed ditches will have a minimum freeboard of 1 foot above the calculated water surface



LEGEND

- SUBBASIN BOUNDARY
- (ON1) SUBBASIN DESIGNATION
- FLOW DIRECTION
- DFH2 DFH2 STREET SECTION LOCATION

PROPOSED CONDITIONS PRORATED FLOW SUMMARY			
Onsites			
Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
ST-DF*	33	12.1	2.72
	Q_{10} (cfs)	Area (acres)	cfs/acre
	16	12.1	1.32
Onsite Prorated Basins			
Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
DFH1	5	1.9	2.72
DFH2	11	4.0	2.72
DFH3	10	3.7	2.72
DFH4	7	2.7	2.72
DFH5	3	1.2	2.72
TOTAL**	**37**	**13.5**	**NA**
Subbasin	Q_{10} (cfs)	Area (acres)	cfs/acre
DFH1	2	1.9	1.32
DFH2	5	4.0	1.32
DFH3	5	3.7	1.32
DFH4	4	2.7	1.32
DFH5	2	1.2	1.32
TOTAL**	**18**	**13.5**	**NA**

*Referenced from Conceptual Study.
**Increase from add'l area at Far Hills and Antelope Ridge

SUMMARY - DROP INLET CALCULATIONS						
DI[1]	Q_{100}	Slope %	Flow Depth (ft)	Q_{INT} (cfs)	Q_{BYP} (cfs)	DI Type
DFH1E	2.5	0.61	0.37	2.5	0	7.5'-Type CM2
DFH1W1	2.5	0.61	0.35	2.5	0	7.5'-Type CM2
DFH1W2	N/A	N/A	N/A	N/A	N/A	5'-Type CM2
DFH2	11	0.60	0.45	8	3	(2) 7.5'-Type CM2
DFH3E	6.5	0.60	0.46	5	1.5	7.5'-Type CM2
DFH3W	6.5	SUMP	0.46	6.5	0	5'-Type CM2
DFH4E	5	0.95	0.41	4	1	7.5'-Type CM2
DFH4W1	3.5	0.95	0.38	3.5	0	7.5'-Type CM2
DFH4W2	N/A	N/A	N/A	N/A	N/A	5'-Type CM2
DFH5E	2.5	2.72	0.30	2.5	0	7.5'-Type CM2
DFH5W1	1.5	2.72	0.27	1.5	0	5'-Type CM2
DFH5W2	N/A	N/A	N/A	N/A	N/A	5'-Type CM2
ALTA8N[3]	1	2.50	0.24	1	0	5'-Type CM2
ALTA7S[3]	5	2.50	0.39	5	0	10'-Type CM2
FARHN	N/A	N/A	N/A	N/A	0	Future DI
FARHS[4]	7	N/A	N/A	7	0	15'-Type CM2
NDFHA[2]	3	1.70	0.35	3	0	10'-Type CM2
NDFHB2[2]	N/A	N/A	N/A	N/A	N/A	5'-Type CM2
NDFHB1[2]	3	1.70	0.35	3	0	10'-Type CM2
SB7[5]	9	3.00	N/A	9	0	(2) Future DIs

[1]See Figures 5AU & 5BU.
[2]Referenced from Desert Foothills Study.
[3]Assumed flows from future Alta Drive Study.
[4]Referenced flows and DI size from Far Hills Study.
[5]Assumed flows from future Antelope Ridge Drive Study.

ONSITE STREET FLOW CHARACTERISTICS ULTIMATE CONDITIONS					
Location[1]	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (ft/s)	D*V
DFH1W	0.61	2.5	0.35	1.67	0.6
DFH1E	0.61	2.5	0.37	1.77	0.7
DFH2	0.60	11	0.45	2.12	1.0
DFH3	0.60	13	0.48	2.21	1.1
DFH4W	0.95	3.5	0.38	2.27	0.9
DFH4E	0.95	5	0.41	2.47	1.0
DFH5E	2.72	2.5	0.30	3.16	0.9
DFH5W	2.72	1.5	0.27	2.99	0.8
ALTA8N	2.50	1	0.24	2.81	0.7
ALTA7S	2.50	5	0.39	3.92	1.5
NDFH.A[2]	1.70	3	0.35	3.00	1.1
NDFH.B[2]	1.70	3	0.35	3.00	1.1

[1] See Figures 5AU & 5BU.
[2] Referenced from the Desert Foothills Study.

SUMMERLIN VILLAGE 23B

DESERT FOOTHILLS AT FAR HILLS AVE

DRAINAGE MAP
FIGURE 5BU3
ULTIMATE CONDITIONS

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APPENDIX C

Reference Materials

TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 23B
FAR HILLS AVENUE
IMPROVEMENTS

62A-23-230

October 2006

Prepared for:

Howard Hughes Corporation, Inc.
a Delaware Corporation
10000 West Charleston Boulevard, Suite 200
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4450

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

DATE: April 23, 2007

TO:
Land Development Services
Department of Public Works

FROM:
Albert Sung, P.E.
Flood Control Project Engineer
Department of Public Works

SUBJECT:	Drainage Study for: **Summerlin Village 23B – Far Hills Avenue Improvements**		**COPIES TO:** G.C. Wallace, Inc.
Cross Streets:	Far Hills Ave from Desert Foothills to Sky Vista		Howard Hughes Corporation
File Number:	F:\Depot\DSMemos\DS4084C.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-015		CCRFCD
Zoning Action:	N/A		
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES	NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	10/5/2006	10/25/2006	Not Approved	$400.00	55426: $400
2nd Submittal	11/13/2006	12/1/2006	Conditional Approval	$400.00	57514: $400
CCRFCD	4/13/2007	4/23/2007	Concurrence	N/C	N/C
			TOTAL FEES (LDDRS):	**$800.00**	—

REMARKS:

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

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

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

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

END OF REMARKS

ays

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

REGIONAL FLOOD CONTROL DISTRICT

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

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Bruce L. Woodbury
Clark County

January 2, 2007

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

DISTRICT CONCURRENCE: SUMMERLIN VILLAGE 23B - FAR HILLS AVENUE IMPROVEMENTS (DS4084) (RFCD No. 06-7092)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated December 6, 2006, and Addendum No. 1 dated December 6, 2006, for above-mentioned project as submitted by G. C. WALLACE, INC. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated December 5, 2006.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by G. C. WALLACE, INC., may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER, II, P.E.
General Manager/Chief Engineer

BY: _____
Abigail Mayfena, P.E.
Associate Engineer

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

AM:ART:jb

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

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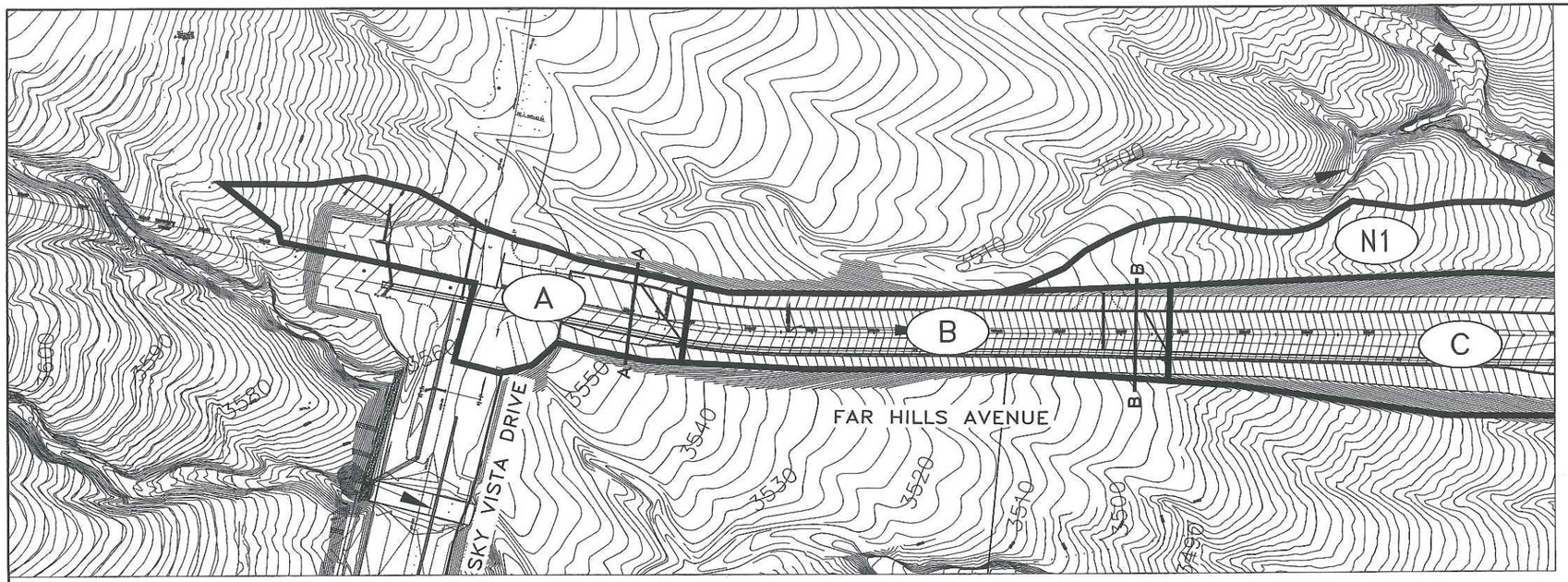
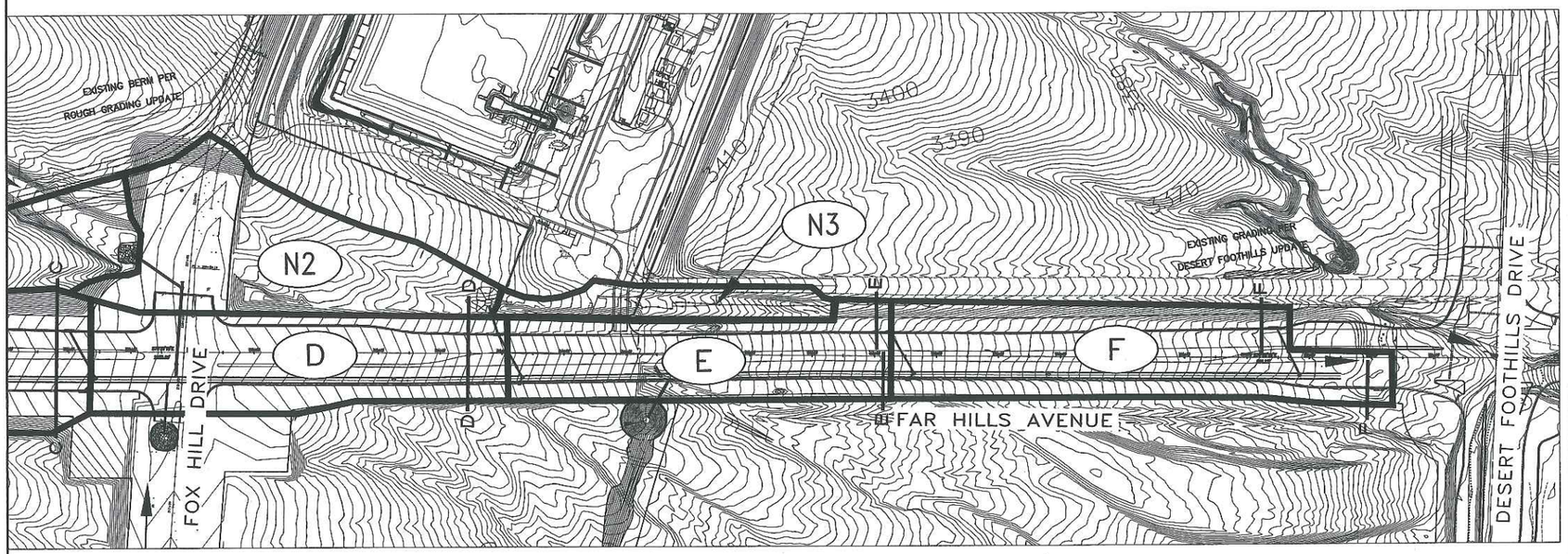
600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: *http://www.regionalflood.org*





100 Year Runoff			
Basin	Area (ac)	Q_{100} (cfs)	Unit Flow (cfs/ac)
FHI1	8.2	28	3.43
FHI2	6.8	25	3.67
I3	5.7	18	3.15
Prorated Flows			
Basin	Area (ac)	Unit Flow (cfs/ac)	Q_{100} (cfs)
A	2.28	3.43	8
B	2.31	3.43	8
C	3.56	3.43	12
D	2.36	3.67	9
E	1.92	3.67	7
F	2.56	3.67	9
N1	2.58	3.15	8
N2	2.49	3.15	8
N3	0.64	3.15	2

10 Year Runoff			
Basin	Area (ac)	Q_{10} (cfs)	Unit Flow (cfs/ac)
FHI1	8.2	14	1.72
FHI2	6.8	13	1.91
I3	5.7	8	1.40
Prorated Flows			
Basin	Area (ac)	Unit Flow (cfs/ac)	Q_{10} (cfs)
A	2.28	1.72	4
B	2.31	1.72	4
C	3.56	1.72	6
D	2.36	1.91	5
E	1.92	1.91	4
F	2.56	1.91	5
N1	2.58	1.40	4
N2	2.49	1.40	3
N3	0.64	1.40	1

STREET FLOW (100 Year)					
Section	Q_{100} Total (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	D*V
A-A	8	3.00	0.34	3.65	1.24
B-B	11	7.70	0.32	5.64	1.80
C-C	17	7.70	0.36	6.22	2.24
D-D	12	5.55	0.34	4.98	1.69
E-E North	8.5	5.55	0.38	5.49	2.09
E-E South	6.5	5.55	0.35	5.16	1.81
F-F North	6.5	5.55	0.35	5.16	1.81
F-F South	7	3.57	0.38	4.45	1.69

STREET FLOW (10 Year)					
Section	Q_{10} Total (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	D*V
A-A	4	3.00	0.28	3.14	0.88
B-B	4	7.70	0.25	4.60	1.15
C-C	6	7.70	0.28	4.96	1.39
D-D	5	5.55	0.28	4.11	1.15
E-E North	3.5	5.55	0.30	4.49	1.35
E-E South	2.5	5.55	0.28	4.19	1.17
F-F North	2.5	5.55	0.28	4.19	1.17
F-F South	2.5	3.57	0.29	3.53	1.02

DROP INLET CALCULATIONS (100 Year)						
Section	Depth (ft)	Slope (%)	Q_{100} Total (cfs)	Q_{100} Intercept (cfs)	Q_{100} Bypass (cfs)	Description of DI
A-A	0.34	3.00	8	5	3	2 - 5' Type "CM"
B-B	0.32	7.70	11	6	5	2 - 5' Type "CM"
C-C	0.36	7.70	17	14	3	2 - 15' Type "CM"
D-D	0.34	5.55	12	6	6	2 - 5' Type "CM"
E-E North	0.38	5.55	8.5	6.5	2	1 - 12.5' Type "CM"
E-E South	0.35	5.55	6.5	4	2.5	1 - 7.5' Type "CM"
F-F North	0.35	5.55	6.5	6.5	0	1 - 15' Type "CM"
F-F South	0.38	3.57	7	7	0	1 - 15' Type "CM"

DROP INLET CALCULATIONS (10 Year)						
Section	Depth (ft)	Slope (%)	Q_{10} Total (cfs)	Q_{10} Intercept (cfs)	Q_{10} Bypass (cfs)	Description of DI
A-A	0.28	3.00	4	4	0	2 - 5' Type "CM"
B-B	0.25	7.70	4	4	0	2 - 5' Type "CM"
C-C	0.28	7.70	6	6	0	2 - 15' Type "CM"
D-D	0.28	5.55	5	4	1	2 - 5' Type "CM"
E-E North	0.30	5.55	3.5	3.5	0	1 - 12.5' Type "CM"
E-E South	0.28	5.55	2.5	2.5	0	1 - 7.5' Type "CM"
F-F North	0.28	5.55	2.5	2.5	0	1 - 15' Type "CM"
F-F South	0.29	3.57	2.5	2.5	0	1 - 15' Type "CM"

NORTH

100 0 100 200
SCALE FEET

LEGEND

D PRORATED SUBBASIN

SUBBASIN BOUNDARY

FLOW DIRECTION

A — A STREET SECTION

DESIGN: MM
DRAWN: MM
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE:10-06-08
PLOT TIME: 08:00:44

REV	DATE	DESCRIPTION	DATE	AGEN.	APP	DATE	GCW	APP

G.C. WALLACE COMPANIES
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1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
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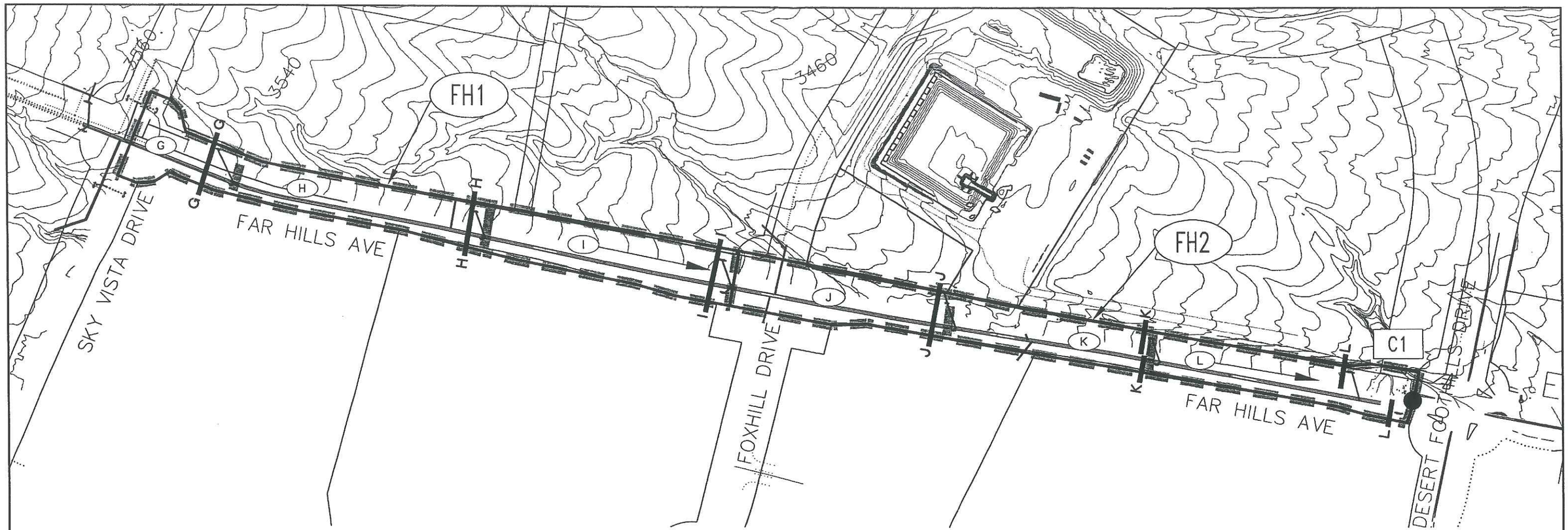
FAR HILLS AVENUE IMPROVEMENTS
SUMMERLIN VILLAGE 23B
FIGURE 5B
INTERIM CONDITIONS
PRORATED FLOWS DRAINAGE MAP

DRAWING
FIG 5B
1 OF SHTS



SUMMARY OF ULTIMATE HEC-1 FLOWS

FH1	6.4	24	12
FH2	6.8	25	13
C1	-	47	24

PRORATED FLOW CALCULATIONS

BASIN	AREA (AC.)	Q100 (cfs)	UNIT FLOW (CFS/AC)
FH1	6.4	24	3.75
FH2	6.8	25	3.68

PRORATED SUBBASINS

BASIN	AREA (AC.)	UNIT FLOW (CFS/AC)	Q100 (cfs)
G	1.47	3.75	5
H	2.30	3.75	9
I	2.77	3.75	10
J	2.35	3.68	9
K	1.87	3.68	7
L	2.54	3.68	9

100-YEAR STREET FLOW CALCULATIONS

Section	Q100 (CFS)	SLOPE (%)	Depth (ft)	Velocity (fps)	DxV
G	5	3.0	0.30	3.3	0.99
H	10	7.7	0.32	5.5	1.76
I	14	7.7	0.34	6.0	2.04
J	10	5.6	0.33	4.9	1.62
K NORTH	5.5	5.6	0.34	5.0	1.70
K SOUTH	5.5	5.6	0.34	5.0	1.70
L NORTH	5.0	5.6	0.33	4.9	1.62
L SOUTH	6.5	3.6	0.37	4.4	1.63

100-YEAR DROP INLET CALCULATIONS

Section	Q100 TOTAL (CFS)	Q100 INTERCEPT (CFS)	Q100 BYPASS (CFS)	Description of Drop Inlets
G	5	4	1	2-5.0' TYPE CM
H	10	6	4	2-5.0' TYPE CM
I	14	13	1	2-15.0' TYPE CM
J	10	6	4	2-5.0' TYPE CM
K NORTH	5.5	5	0.5	1-12.5' TYPE CM
K SOUTH	5.5	3.5	2	1-7.5' TYPE CM
L NORTH	5.0	5	0	1-15.0' TYPE CM
L SOUTH	6.5	6.5	0	1-15.0' TYPE CM

LEGEND

- SUBBASIN BOUNDARY
- FH1 — SUBBASIN DESIGNATION
- PRORATED SUBBASIN BOUNDARY
- G — PRORATED SUBBASIN DESIGNATION
- FLOW DIRECTION
- J — J — CROSS SECTION

NORTH

GRAPHIC SCALE

300 0 150 300

(IN FEET)

1 inch = 300 ft.

SUMMERLIN VILLAGE 23B

FAR HILLS AVENUE IMPROVMENTS

FIGURE 6B

ONSITE DRAINAGE MAP

ULTIMATE CONDITIONS

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Appendix B - Hydraulic Calculations

1. Proposed/Interim Street Flow Calculations (10-Year and 100-Year)
2. Proposed/Interim Drop Inlet Calculations (10-Year and 100-Year)
3. Channel Normal Depth Calculations
4. Open Pipe Inlet Water Surface Calculations
5. Standard Form 6 for Far Hills RCB Ultimate Conditions
6. Standard Form 6 for Sky Vista 66-Inch RCP Ultimate Conditions
7. Lateral Normal Depth/HGL Calculations
8. Ultimate Street Flow Calculations (10-Year and 100-Year)
9. Ultimate Drop Inlet Calculations (10-Year and100-Year)
10. Standard Form 6 for Far Hills RCB Proposed/Interim Conditions
11. Standard Form 6 for Sky Vista 66-Inch RCP Proposed/Interim Conditions

Worksheet for Section D-D 10 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	5.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50
0+76.00	0.00

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+76.00, 0.00)	0.016

Results

Normal Depth	0.28	ft
Elevation Range	0.000 to 1.127 ft	
Flow Area	1.22	ft²

Worksheet for Section D-D 10 Year

Results

Wetted Perimeter		14.968	ft
Top Width		13.764	ft
Normal Depth		0.28	ft
Critical Depth		0.35	ft
Critical Slope		0.00829	ft/ft
Velocity		4.11	ft/s
Velocity Head		0.26	ft
Specific Energy		0.54	ft
Froude Number		2.44	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.28	ft
Critical Depth	0.35	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00829	ft/ft

Cross Section for Section D-D 10 Year

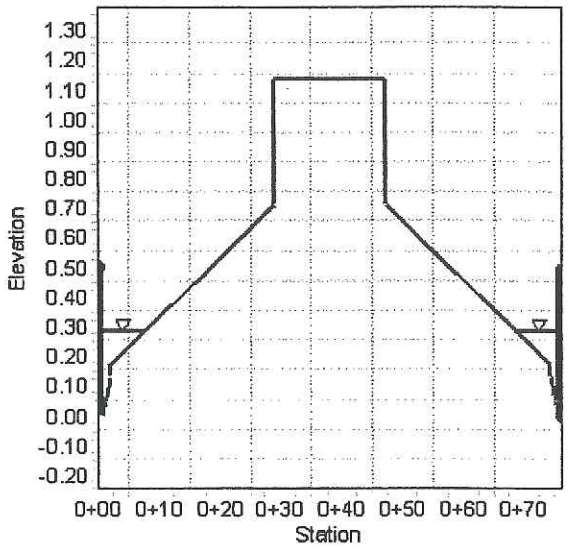
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.28	ft
Discharge	5.00	ft³/s

Cross Section Image



Worksheet for half street E-E north 10 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	3.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+29.00, 1.13)	0.016

Results

Normal Depth		0.30	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		0.78	ft²
Wetted Perimeter		8.371	ft
Top Width		8.023	ft
Normal Depth		0.30	ft
Critical Depth		0.39	ft
Critical Slope		0.00761	ft/ft
Velocity		4.49	ft/s
Velocity Head		0.31	ft
Specific Energy		0.61	ft

Worksheet for half street E-E north 10 Year

Results

Froude Number	2.54	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.30	ft
Critical Depth	0.39	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00761	ft/ft

Cross Section for half street E-E north 10 Year

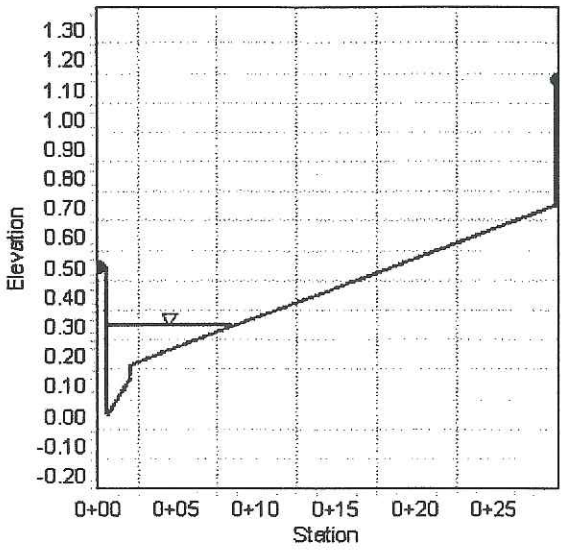
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.30	ft
Discharge	3.50	ft³/s

Cross Section Image



Worksheet for half street E-E south 10 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	2.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+47.00, 1.13)	(0+76.00, 0.50)	0.016

Results

Normal Depth		0.28	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		0.60	ft²
Wetted Perimeter		7.115	ft
Top Width		6.793	ft
Normal Depth		0.28	ft
Critical Depth		0.35	ft
Critical Slope		0.00796	ft/ft
Velocity		4.19	ft/s
Velocity Head		0.27	ft
Specific Energy		0.55	ft

Worksheet for half street E-E south 10 Year

Results

Froude Number	2.49	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.28	ft
Critical Depth	0.35	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00796	ft/ft

Cross Section for half street E-E south 10 Year

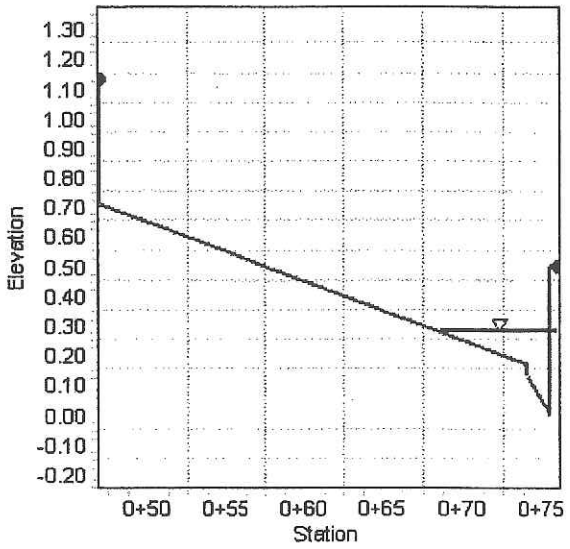
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.28	ft
Discharge	2.50	ft³/s

Cross Section Image



Worksheet for half street F-F north 10 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	2.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+29.00, 1.13)	0.016

Results

Normal Depth		0.28	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		0.60	ft²
Wetted Perimeter		7.115	ft
Top Width		6.793	ft
Normal Depth		0.28	ft
Critical Depth		0.35	ft
Critical Slope		0.00796	ft/ft
Velocity		4.19	ft/s
Velocity Head		0.27	ft
Specific Energy		0.55	ft

Worksheet for half street F-F north 10 Year

Results

Froude Number	2.49	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.28	ft
Critical Depth	0.35	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00796	ft/ft

Cross Section for half street F-F north 10 Year

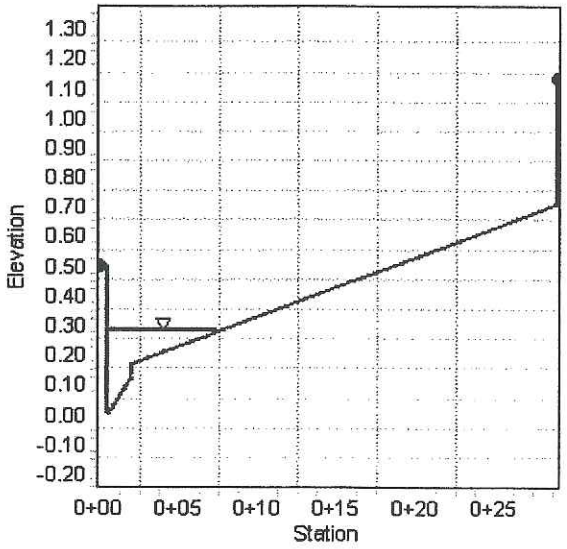
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.28	ft
Discharge	2.50	ft³/s

Cross Section Image



Worksheet for half street F-F south 10 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.60	%
Discharge	2.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+47.00, 1.13)	(0+76.00, 0.50)	0.016

Results

Normal Depth	0.29	ft
Elevation Range	0.000 to 1.127 ft	
Flow Area	0.71	ft²
Wetted Perimeter	7.913	ft
Top Width	7.575	ft
Normal Depth	0.29	ft
Critical Depth	0.35	ft
Critical Slope	0.00796	ft/ft
Velocity	3.53	ft/s
Velocity Head	0.19	ft
Specific Energy	0.48	ft

Worksheet for half street F-F south 10 Year

Results

Froude Number	2.03	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.35	ft
Channel Slope	0.03600	ft/ft
Critical Slope	0.00796	ft/ft

Cross Section for half street F-F south 10 Year

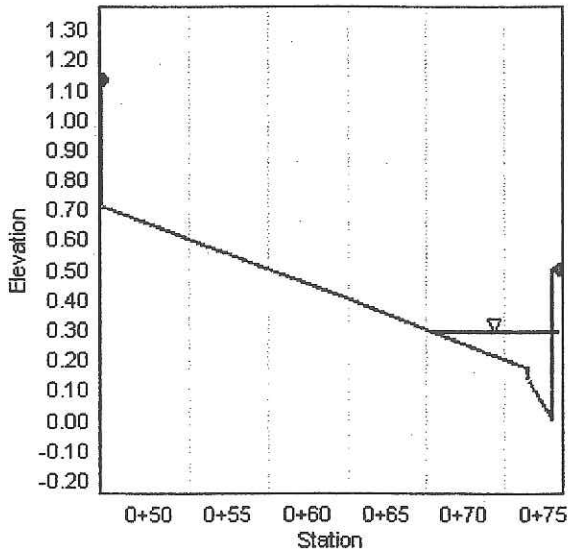
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.60	%
Normal Depth	0.29	ft
Discharge	2.50	ft³/s

Cross Section Image



Worksheet for Section D-D 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	12.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50
0+76.00	0.00

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+76.00, 0.00)	0.016

Results

Normal Depth	0.35	ft
Elevation Range	0.000 to 1.127 ft	
Flow Area	2.41	ft²

Worksheet for Section D-D 100 Year

Results

Wetted Perimeter		22.163	ft
Top Width		20.681	ft
Normal Depth		0.35	ft
Critical Depth		0.45	ft
Critical Slope		0.00735	ft/ft
Velocity		4.98	ft/s
Velocity Head		0.39	ft
Specific Energy		0.73	ft
Froude Number		2.57	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.45	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00735	ft/ft

Cross Section for Section D-D 100 Year

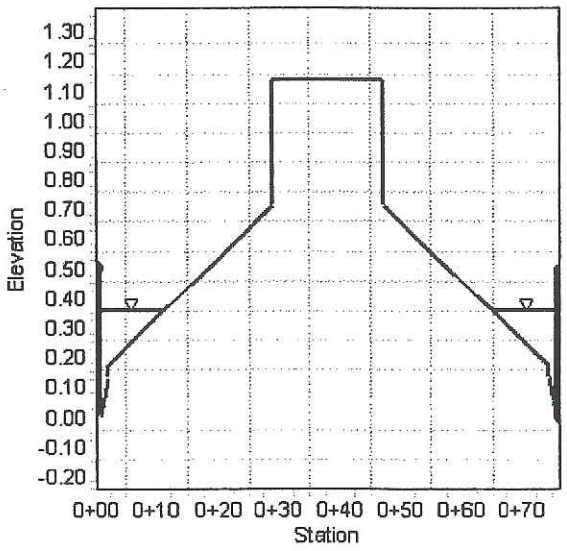
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.35	ft
Discharge	12.00	ft³/s

Cross Section Image



Worksheet for half street E-E north 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	8.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+29.00, 1.13)	0.016

Results

Normal Depth		0.38	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		1.55	ft²
Wetted Perimeter		12.313	ft
Top Width		11.887	ft
Normal Depth		0.38	ft
Critical Depth		0.51	ft
Critical Slope		0.00680	ft/ft
Velocity		5.49	ft/s
Velocity Head		0.47	ft
Specific Energy		0.85	ft

Worksheet for half street E-E north 100 Year

Results

Froude Number	2.68	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.51	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00680	ft/ft

Cross Section for half street E-E north 100 Year

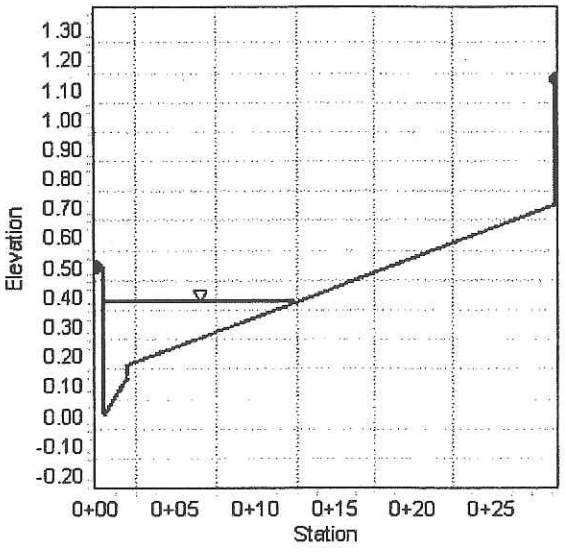
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.38	ft
Discharge	8.50	ft³/s

Cross Section Image



Worksheet for half street E-E south 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	6.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+47.00, 1.13)	(0+76.00, 0.50)	0.016

Results

Normal Depth		0.35	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		1.26	ft²
Wetted Perimeter		11.007	ft
Top Width		10.607	ft
Normal Depth		0.35	ft
Critical Depth		0.46	ft
Critical Slope		0.00701	ft/ft
Velocity		5.16	ft/s
Velocity Head		0.41	ft
Specific Energy		0.77	ft

Worksheet for half street E-E south 100 Year

Results

Froude Number	2.64	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.46	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00701	ft/ft

Cross Section for half street E-E south 100 Year

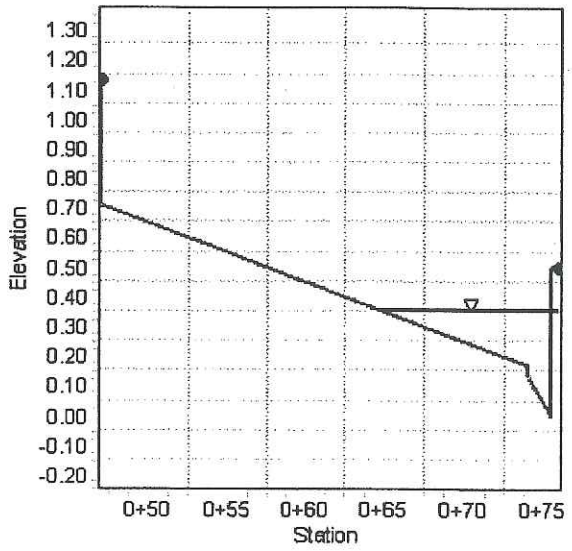
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.35	ft
Discharge	6.50	ft³/s

Cross Section Image



Worksheet for half street F-F north 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	6.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+29.00, 1.13)	0.016

Results

Normal Depth		0.35	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		1.26	ft²
Wetted Perimeter		11.007	ft
Top Width		10.607	ft
Normal Depth		0.35	ft
Critical Depth		0.46	ft
Critical Slope		0.00701	ft/ft
Velocity		5.16	ft/s
Velocity Head		0.41	ft
Specific Energy		0.77	ft

Worksheet for half street F-F north 100 Year

Results

Froude Number	2.64	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.46	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00701	ft/ft

Cross Section for half street F-F north 100 Year

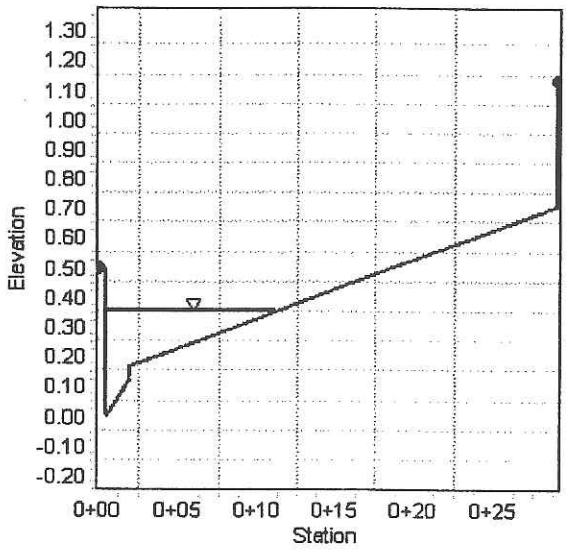
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.35	ft
Discharge	6.50	ft³/s

Cross Section Image



Worksheet for half street F-F south 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.60	%
Discharge	7.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+47.00, 1.13)	(0+76.00, 0.50)	0.016

Results

Normal Depth	0.38	ft
Elevation Range	0.000 to 1.127 ft	
Flow Area	1.57	ft²
Wetted Perimeter	12.426	ft
Top Width	11.999	ft
Normal Depth	0.38	ft
Critical Depth	0.48	ft
Critical Slope	0.00694	ft/ft
Velocity	4.45	ft/s
Velocity Head	0.31	ft
Specific Energy	0.69	ft

Worksheet for half street F-F south 100 Year

Results

Froude Number	2.16	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.48	ft
Channel Slope	0.03600	ft/ft
Critical Slope	0.00694	ft/ft

Cross Section for half street F-F south 100 Year

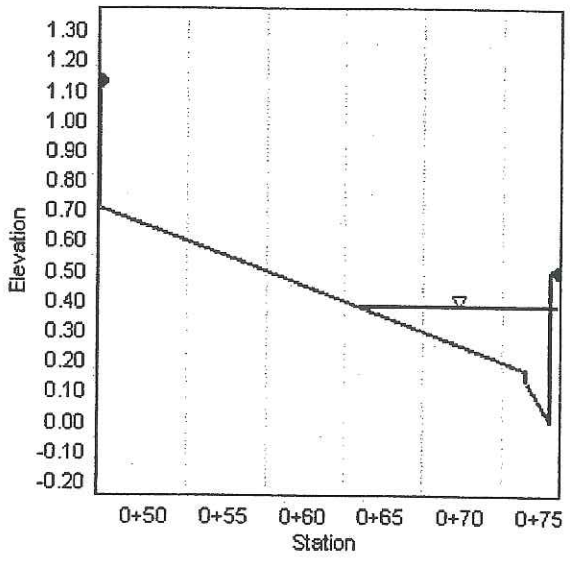
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.60	%
Normal Depth	0.38	ft
Discharge	7.00	ft³/s

Cross Section Image



Type CM Drop Inlet Sizing on a C. G.

Far Hills (Section D-D) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.1
D=	Flow depth (ft)	0.28
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	5.0
L_c=	Length of curb opening (ft)	4.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	7.22
E_o = Grate flow ratio = Q_w/Q_s	0.59
Q_w= Frontal flow=A_w*V_s	1.47
Q_x= Side flow = Q_s-Q_w (cfs)	1.0
R_s = Side flow factor = 1/(1+(0.15*$V_s^{1.8}$)/(S_x*$L_g^{2.3}$))	0.08
Q_{ig} = Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	1.6

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = S_x+S_w*E_o (ft/ft)	0.090
S_w = Gutter cross slope = (0.137+a_{feet})/W	0.119
L_t = Total interception L = 0.60*$Q_s^{0.42}$*$S_o^{0.30}$*(1/n*S_e)$^{0.6}$ (ft)	18.80
Q_{ic} = Flow intercepted = (1-(1-L_c/L_t)$^{1.8}$)*Q_s (cfs)	0.5

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	**2.1**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	**0.44**
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.41
E_q = Efficiency = (Q_{ti}/Q_s)*100	83%

Type CM Drop Inlet Sizing on a C. G.

Far Hills North D.I. (Section E-E) 10 Year

Known:

Q_s=	Half Street flow (cfs)	3.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.5
D=	Flow depth (ft)	0.30
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	12.5
L_c=	Length of curb opening (ft)	12.00
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00
V_o= Splash over velocity=$p+q*L_g-r*L_g^2+s*L_g^{3*}$ (fps)	11.01
E_o = Grate flow ratio = Q_w/Q_s	0.50
Q_w= Frontal flow=A_w*V_s	1.74
Q_x= Side flow = Q_s-Q_w (cfs)	1.8
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.38
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	2.4

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.079
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	23.38
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	1.4

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**3.5**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.28
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

Type CM Drop Inlet Sizing on a C. G.

Far Hills South D.I. (Section E-E) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.2
D=	Flow depth (ft)	0.28
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	7.5
L_c=	Length of curb opening (ft)	7.00
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	8.71
E_o = Grate flow ratio = Q_w/Q_s	0.60
Q_w= Frontal flow=A_w*V_s	1.50
Q_x= Side flow = Q_s-Q_w (cfs)	1.0
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.17
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	1.7

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = S_x+S_w*E_o (ft/ft)	0.091
S_w = Gutter cross slope = (0.137+a $_{feet)}$/W	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	18.63
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	0.8

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	**2.5**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.05
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.33
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	98%

Type CM Drop Inlet Sizing on a C. G.

Far Hills North D.I. (Section F-F) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.2
D=	Flow depth (ft)	0.28
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	15.0
L_c=	Length of curb opening (ft)	14.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00
V_o= Splash over velocity=$p+q*L_g-r*L_g^2+s*L_g^3$* (fps)	12.50
E_o = Grate flow ratio = Q_w/Q_s	0.60
Q_w= Frontal flow=A_w*V_s	1.50
Q_x= Side flow = Q_s-Q_w (cfs)	1.0
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.51
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	2.0

*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 = $S_x+S_w*E_o$ (ft/ft)	0.091
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	18.63
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	1.5

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**2.5**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.17
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

Type CM Drop Inlet Sizing on a C. G.

Far Hills South D.I. (Section F-F) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.5
S_o=	Longitudinal slope (ft/ft)	0.036
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	3.5
D=	Flow depth (ft)	0.29
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	15.0
L_c=	Length of curb opening (ft)	14.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	12.50
E_o = Grate flow ratio = Q_w/Q_s	0.53
Q_w= Frontal flow=A_w*V_s	1.31
Q_x= Side flow = Q_s-Q_w (cfs)	1.2
R_s = Side flow factor = 1/(1+(0.15*$V_s^{1.8}$)/(S_x*$L_g^{2.3}$))	0.59
Q_{ig} = Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	2.0

*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_w*E_o (ft/ft)	0.082
S_w = Gutter cross slope = (0.137+a_{feet})/W	0.119
L_t = Total interception L = 0.60*$Q_s^{0.42}$*$S_o^{0.30}$*(1/n*S_e)$^{0.6}$ (ft)	17.38
Q_{ic} = Flow intercepted = (1-(1-L_c/L_t)$^{1.8}$)*Q_s (cfs)	1.6

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	**2.5**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.17
E_q = Efficiency = (Q_{ti}/Q_s)*100	100%

Type CM Drop Inlet Sizing on a C. G.

Far Hills (Section D-D) 100 Year

Known:

Q_s=	Half Street flow (cfs)	6.0
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	5.1
D=	Flow depth (ft)	0.34
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	5.0
L_c=	Length of curb opening (ft)	4.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	7.22
E_o = Grate flow ratio = Q_w/Q_s	0.38
Q_w= Frontal flow=A_w*V_s	2.26
Q_x= Side flow = Q_s-Q_w (cfs)	3.7
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.06
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	2.5

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.065
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	33.03
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	0.7

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**3.2**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	**2.81**
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.64
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	53%

Type CM Drop Inlet Sizing on a C. G.

Far Hills North D.I. (Section E-E) 100 Year

Known:

Q_s=	Half Street flow (cfs)	8.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	5.5
D=	Flow depth (ft)	0.38
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	12.5
L_c=	Length of curb opening (ft)	12.00
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	11.01
E_o = Grate flow ratio = Q_w/Q_s	0.33
Q_w= Frontal flow=A_w*V_s	2.79
Q_x= Side flow = Q_s-Q_w (cfs)	5.7
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.30
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	4.5

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = S_x+S_w*E_o (ft/ft)	0.059
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	40.48
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	2.1

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	**6.6**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	1.89
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.53
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	78%

Type CM Drop Inlet Sizing on a C. G.

Far Hills South D.I. (Section E-E) 100 Year

Known:

Q_s=	Half Street flow (cfs)	6.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	5.2
D=	Flow depth (ft)	0.35
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	7.5
L_c=	Length of curb opening (ft)	7.00
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	8.71
E_o = Grate flow ratio = Q_w/Q_s	0.37
Q_w= Frontal flow=A_w*V_s	2.39
Q_x= Side flow = Q_s-Q_w (cfs)	4.1
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.13
Q_{ig} = Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	2.9

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = S_x+S_w*E_o (ft/ft)	0.064
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	34.55
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	1.1

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	**4.0**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	2.45
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.54
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	62%

Type CM Drop Inlet Sizing on a C. G.

Far Hills North D.I. (Section F-F) 100 Year

Known:

Q_s=	Half Street flow (cfs)	6.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	5.2
D=	Flow depth (ft)	0.35
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	15.0
L_c=	Length of curb opening (ft)	14.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	12.50
E_o = Grate flow ratio = Q_w/Q_s	0.37
Q_w= Frontal flow=A_w*V_s	2.39
Q_x= Side flow = Q_s-Q_w (cfs)	4.1
R_s = Side flow factor = 1/(1+(0.15*$V_s^{1.8}$)/(S_x*$L_g^{2.3}$))	0.42
Q_{ig} = Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	4.1

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = S_x+S_w*E_o (ft/ft)	0.064
S_w = Gutter cross slope = (0.137+a_{feet})/W	0.119
L_t = Total interception L = 0.60*$Q_s^{0.42}$*$S_o^{0.30}$*(1/n*S_e)$^{0.6}$ (ft)	34.55
Q_{ic} = Flow intercepted = (1-(1-L_c/L_t)$^{1.8}$)*Q_s (cfs)	2.2

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	**6.3**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.15
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.42
E_q = Efficiency = (Q_{ti}/Q_s)*100	98%

Type CM Drop Inlet Sizing on a C. G.

Far Hills South D.I. (Section F-F) 100 Year

Known:

Q_s=	Half Street flow (cfs)	7.0
S_o=	Longitudinal slope (ft/ft)	0.036
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.5
D=	Flow depth (ft)	0.38
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	15.0
L_c=	Length of curb opening (ft)	14.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	12.50
E_o = Grate flow ratio = Q_w/Q_s	0.32
Q_w= Frontal flow=A_w*V_s	2.26
Q_x= Side flow = Q_s-Q_w (cfs)	4.7
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.48
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	4.5

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.058
S_w = Gutter cross slope = $(0.137+a_{(feet)})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	32.97
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	2.5

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**7.0**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.47
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

Worksheet for Section J-J 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	4.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+76.00, 0.50)	0.016

Results

Normal Depth	0.26	ft
Elevation Range	0.000 to 1.127 ft	
Flow Area	1.00	ft²
Wetted Perimeter	12.665	ft

Worksheet for Section J-J 10-Year

Results

Top Width		12.050	ft
Normal Depth		0.26	ft
Critical Depth		0.33	ft
Critical Slope		0.00819	ft/ft
Velocity		4.02	ft/s
Velocity Head		0.25	ft
Specific Energy		0.51	ft
Froude Number		2.46	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.33	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00819	ft/ft

Cross Section for Section J-J 10-Year

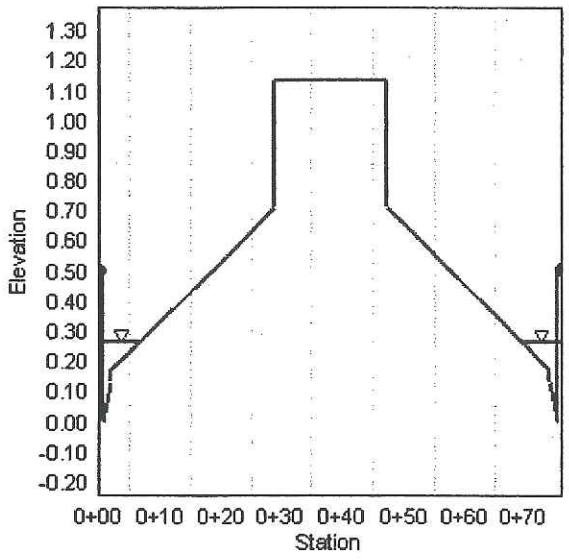
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.26	ft
Discharge	4.00	ft^3/s

Cross Section Image



Worksheet for half street K-K north 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	2.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+29.00, 1.13)	0.016

Results

Normal Depth		0.26	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		0.50	ft²
Wetted Perimeter		6.332	ft
Top Width		6.025	ft
Normal Depth		0.26	ft
Critical Depth		0.33	ft
Critical Slope		0.00819	ft/ft
Velocity		4.02	ft/s
Velocity Head		0.25	ft
Specific Energy		0.51	ft

Worksheet for half street K-K north 10-Year

Results

Froude Number		2.46	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.33	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00819	ft/ft

Cross Section for half street K-K north 10-Year

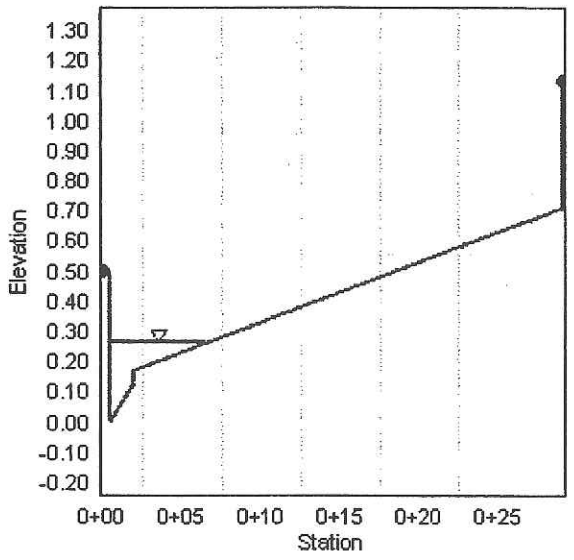
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.26	ft
Discharge	2.00	ft³/s

Cross Section Image



Worksheet for half street K-K south 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	2.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+47.00, 1.13)	(0+76.00, 0.50)	0.016

Results

Normal Depth	0.26	ft
Elevation Range	0.000 to 1.127 ft	
Flow Area	0.50	ft²
Wetted Perimeter	6.332	ft
Top Width	6.025	ft
Normal Depth	0.26	ft
Critical Depth	0.33	ft
Critical Slope	0.00819	ft/ft
Velocity	4.02	ft/s
Velocity Head	0.25	ft
Specific Energy	0.51	ft

Worksheet for half street K-K south 10-Year

Results

Froude Number	2.46	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.33	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00819	ft/ft

Cross Section for half street K-K south 10-Year

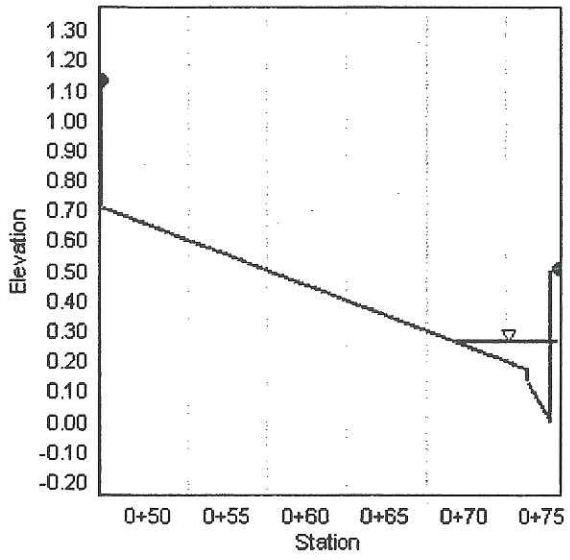
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.26	ft
Discharge	2.00	ft³/s

Cross Section Image



Worksheet for half street L-L north 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	2.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+29.00, 1.13)	0.016

Results

Normal Depth	0.28	ft
Elevation Range	0.000 to 1.127 ft	
Flow Area	0.60	ft²
Wetted Perimeter	7.115	ft
Top Width	6.793	ft
Normal Depth	0.28	ft
Critical Depth	0.35	ft
Critical Slope	0.00796	ft/ft
Velocity	4.19	ft/s
Velocity Head	0.27	ft
Specific Energy	0.55	ft

Worksheet for half street L-L north 10-Year

Results

Froude Number		2.49	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.28	ft
Critical Depth	0.35	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00796	ft/ft

Cross Section for half street L-L north 10-Year

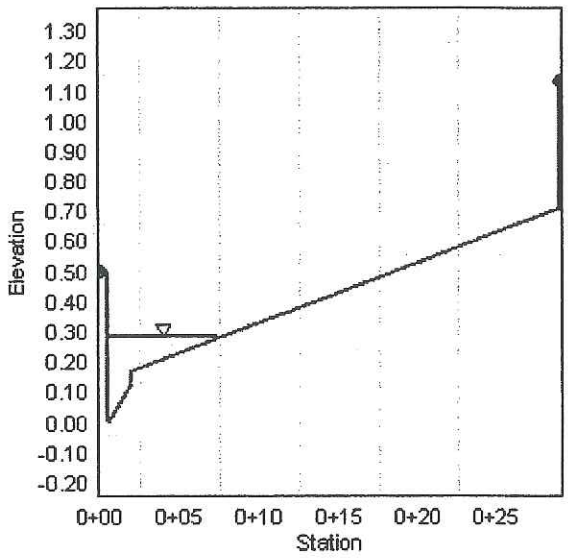
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.28	ft
Discharge	2.50	ft³/s

Cross Section Image



Worksheet for half street L-L south 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.60	%
Discharge	2.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+47.00, 1.13)	(0+76.00, 0.50)	0.016

Results

Normal Depth		0.29	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		0.71	ft²
Wetted Perimeter		7.913	ft
Top Width		7.575	ft
Normal Depth		0.29	ft
Critical Depth		0.35	ft
Critical Slope		0.00796	ft/ft
Velocity		3.53	ft/s
Velocity Head		0.19	ft
Specific Energy		0.48	ft

Worksheet for half street L-L south 10-Year

Results

Froude Number		2.03	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.35	ft
Channel Slope	0.03600	ft/ft
Critical Slope	0.00796	ft/ft

Cross Section for half street L-L south 10-Year

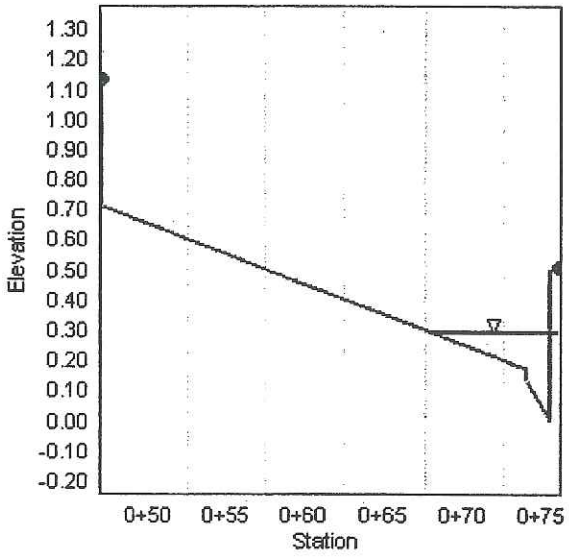
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.60	%
Normal Depth	0.29	ft
Discharge	2.50	ft^3/s

Cross Section Image



Worksheet for Section J-J 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	10.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+76.00, 0.50)	0.016

Results

Normal Depth		0.33	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		2.06	ft²
Wetted Perimeter		19.660	ft

Worksheet for Section J-J 100-Year

Results

Top Width	18.908	ft
Normal Depth	0.33	ft
Critical Depth	0.43	ft
Critical Slope	0.00726	ft/ft
Velocity	4.86	ft/s
Velocity Head	0.37	ft
Specific Energy	0.70	ft
Froude Number	2.60	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.43	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00726	ft/ft

Cross Section for Section J-J 100-Year

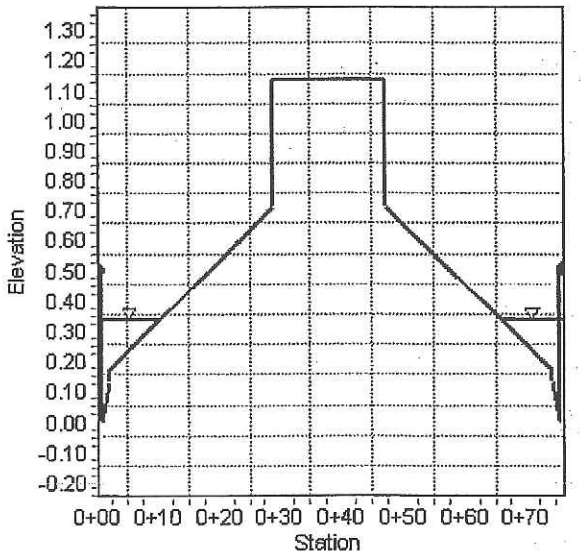
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.33	ft
Discharge	10.00	ft³/s

Cross Section Image



Worksheet for half street K-K north 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	5.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+29.00, 1.13)	0.016

Results

Normal Depth		0.34	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		1.11	ft²
Wetted Perimeter		10.242	ft
Top Width		9.858	ft
Normal Depth		0.34	ft
Critical Depth		0.44	ft
Critical Slope		0.00717	ft/ft
Velocity		4.97	ft/s
Velocity Head		0.38	ft
Specific Energy		0.72	ft

Worksheet for half street K-K north 100-Year

Results

Froude Number	2.61	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.34	ft
Critical Depth	0.44	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00717	ft/ft

Cross Section for half street K-K north 100-Year

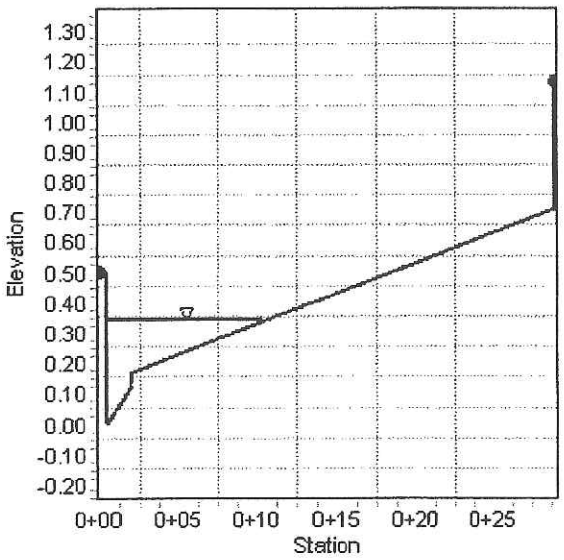
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.34	ft
Discharge	5.50	ft³/s

Cross Section Image



Worksheet for half street K-K south 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	5.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+47.00, 1.13)	(0+76.00, 0.50)	0.016

Results

Normal Depth		0.34	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		1.11	ft²
Wetted Perimeter		10.242	ft
Top Width		9.858	ft
Normal Depth		0.34	ft
Critical Depth		0.44	ft
Critical Slope		0.00717	ft/ft
Velocity		4.97	ft/s
Velocity Head		0.38	ft
Specific Energy		0.72	ft

Worksheet for half street K-K south 100-Year

Results

Froude Number	2.61	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.34	ft
Critical Depth	0.44	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00717	ft/ft

Cross Section for half street K-K south 100-Year

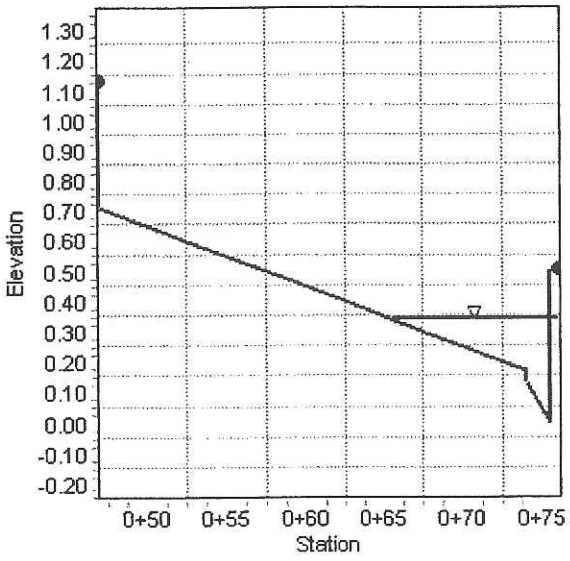
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.34	ft
Discharge	5.50	ft³/s

Cross Section Image



Worksheet for half street L-L north 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Discharge	5.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+29.00	0.71
0+29.00	1.13

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 0.50)	(0+29.00, 1.13)	0.016

Results

Normal Depth		0.33	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		1.03	ft²
Wetted Perimeter		9.830	ft
Top Width		9.454	ft
Normal Depth		0.33	ft
Critical Depth		0.43	ft
Critical Slope		0.00726	ft/ft
Velocity		4.86	ft/s
Velocity Head		0.37	ft
Specific Energy		0.70	ft

Worksheet for half street L-L north 100-Year

Results

Froude Number	2.60	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.43	ft
Channel Slope	0.05550	ft/ft
Critical Slope	0.00726	ft/ft

Cross Section for half street L-L north 100-Year

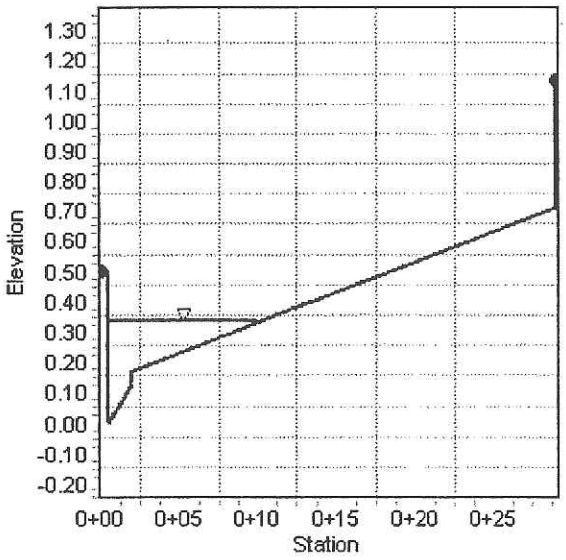
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.55	%
Normal Depth	0.33	ft
Discharge	5.00	ft³/s

Cross Section Image



Worksheet for half street L-L south 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.60	%
Discharge	6.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+47.00	1.13
0+47.00	0.71
0+74.00	0.17
0+74.00	0.13
0+75.50	0.00
0+75.50	0.50
0+76.00	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+47.00, 1.13)	(0+76.00, 0.50)	0.016

Results

Normal Depth		0.37	ft
Elevation Range	0.000 to 1.127 ft		
Flow Area		1.49	ft²
Wetted Perimeter		12.053	ft
Top Width		11.633	ft
Normal Depth		0.37	ft
Critical Depth		0.46	ft
Critical Slope		0.00701	ft/ft
Velocity		4.37	ft/s
Velocity Head		0.30	ft
Specific Energy		0.67	ft

Worksheet for half street L-L south 100-Year

Results

Froude Number	2.15	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.37	ft
Critical Depth	0.46	ft
Channel Slope	0.03600	ft/ft
Critical Slope	0.00701	ft/ft

Cross Section for half street L-L south 100-Year

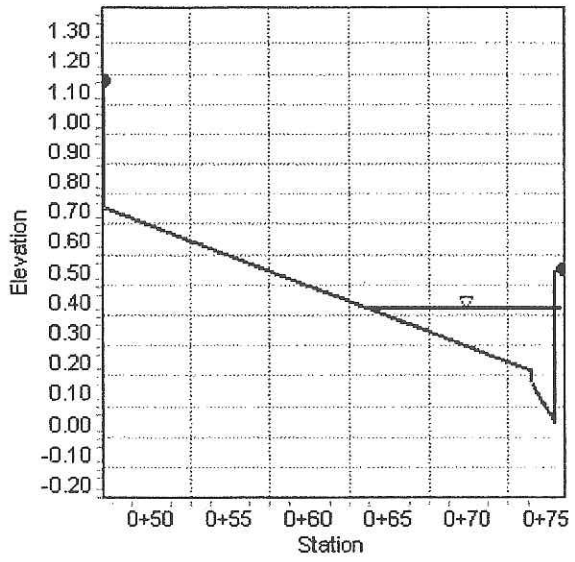
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.60	%
Normal Depth	0.37	ft
Discharge	6.50	ft^3/s

Cross Section Image



Summary of DI calcs

Section	Depth	Slope	Q_{100}	Q interceptor	Q Bypass	Velocity
G	0.26	3%	3	3	Ø	3.0
H	0.25	7.7%	4	4	Ø	4.6
I	0.26	7.7%	5	5	Ø	4.8
J	0.26	5.6%	4	4	Ø	4.0
K North	0.26	5.6%	2	2	Ø	4.0
K South	0.26	5.6%	2	2	Ø	4.0
L North	0.28	5.6%	2.5	2.5	Ø	4.2
L South	0.29	3.6%	2.5	2.5	Ø	3.5

Ultimate 10-year

Type CM Drop Inlet Sizing on a C. G.

Far Hills (Section J-J) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.0
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.0
D=	Flow depth (ft)	0.26
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	5.0
L_c=	Length of curb opening (ft)	4.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	7.22
E_o = Grate flow ratio = Q_w/Q_s	0.66
Q_w= Frontal flow=A_w*V_s	1.31
Q_x= Side flow = Q_s-Q_w (cfs)	0.7
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.08
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	1.4

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = S_x+S_w*E_o (ft/ft)	0.098
S_w = Gutter cross slope = (0.137+a_{feet})/W	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	16.27
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	0.5

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	**1.8**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	**0.16**
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.37
E_q = Efficiency = (Q_{ti}/Q_s)*100	92%

Type CM Drop Inlet Sizing on a C. G.

Far Hills North D.I. (Section K-K) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.0
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.0
D=	Flow depth (ft)	0.26
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	12.5
L_c=	Length of curb opening (ft)	12.00
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00
V_o= Splash over velocity=$p+q*L_g-r*L_g^2+s*L_g^3$* (fps)	11.01
E_o = Grate flow ratio = Q_w/Q_s	0.66
Q_w= Frontal flow=A_w*V_s	1.31
Q_x= Side flow = Q_s-Q_w (cfs)	0.7
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.43
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	1.6

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.098
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	16.27
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	1.1

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**2.0**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.16
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

Type CM Drop Inlet Sizing on a C. G.

Far Hills South D.I. (Section K-K) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.0
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.0
D=	Flow depth (ft)	0.26
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	7.5
L_c=	Length of curb opening (ft)	7.00
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	8.71
E_o = Grate flow ratio = Q_w/Q_s	0.66
Q_w= Frontal flow=A_w*V_s	1.31
Q_x= Side flow = Q_s-Q_w (cfs)	0.7
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.19
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	1.4

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.098
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	16.27
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	0.7

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**2.0**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.27
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

Type CM Drop Inlet Sizing on a C. G.

Far Hills North D.I. (Section L-L) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.2
D=	Flow depth (ft)	0.28
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	15.0
L_c=	Length of curb opening (ft)	14.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^3* (fps)	12.50
E_o = Grate flow ratio = Q_w/Q_s	0.60
Q_w= Frontal flow=A_w*V_s	1.50
Q_x= Side flow = Q_s-Q_w (cfs)	1.0
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.51
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	2.0

*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 = $S_x+S_w*E_o$ (ft/ft)	0.091
S_w = Gutter cross slope = $(0.137+a_{(feet)})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	18.63
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	1.5

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**2.5**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.17
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

Type CM Drop Inlet Sizing on a C. G.

Far Hills South D.I. (Section L-L) 10 Year

Known:

Q_s=	Half Street flow (cfs)	2.5
S_o=	Longitudinal slope (ft/ft)	0.036
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	3.5
D=	Flow depth (ft)	0.29
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	15.0
L_c=	Length of curb opening (ft)	14.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00
V_o= Splash over velocity=$p+q*L_g-r*L_g^2+s*L_g^{3*}$ (fps)	12.50
E_o = Grate flow ratio = Q_w/Q_s	0.52
Q_w= Frontal flow=A_w*V_s	1.30
Q_x= Side flow = Q_s-Q_w (cfs)	1.2
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.59
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	2.0

*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 = $S_x+S_w*E_o$ (ft/ft)	0.082
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	17.45
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	1.5

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**2.5**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.17
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

Drop Inlet Summary

Section	Depth	Slope	Q_{100}	Q intercepted	Q bypass	Velocity 3.28
G	0.30	3.0	5	4	1	
H	0.32	7.7	(9+1) 10	6	4	5.52
I	0.34	7.7	(10+4) 14	13	1	5.95
J	0.33	5.55	(9+1) 10	6	4	4.86
K North	0.34	5.55	(7+4)=11 5.5	5	0.5	4.97
K South	0.34	5.55	5.5	3.5	2	4.97
L North	0.33	5.55	(4.5+0.5) 5.0	5	0	4.86
L South	0.37	3.6	(4.5+2) 6.5	6.5	0	4.37

For K

Ultimate Conditions
100-year

Type CM Drop Inlet Sizing on a C. G.

Far Hills (Section J-J) 100 Year

Known:

Q_s=	Half Street flow (cfs)	5.0
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.9
D=	Flow depth (ft)	0.33
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	5.0
L_c=	Length of curb opening (ft)	4.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^3* (fps)	7.22
E_o = Grate flow ratio = Q_w/Q_s	0.42
Q_w= Frontal flow=A_w*V_s	2.10
Q_x= Side flow = Q_s-Q_w (cfs)	2.9
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.06
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	2.3

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.070
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	29.23
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	0.7

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**2.9**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	**2.05**
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.59
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	59%

Type CM Drop Inlet Sizing on a C. G.

Far Hills North D.I. (Section K-K) 100 Year

Known:

Q_s=	Half Street flow (cfs)	5.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	5.0
D=	Flow depth (ft)	0.34
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	12.5
L_c=	Length of curb opening (ft)	12.00
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^{3*} (fps)	11.01
E_o = Grate flow ratio = Q_w/Q_s	0.40
Q_w= Frontal flow=A_w*V_s	2.22
Q_x= Side flow = Q_s-Q_w (cfs)	3.3
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.33
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	3.3

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.068
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	30.93
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	1.8

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**5.1**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.41
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.41
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	93%

Type CM Drop Inlet Sizing on a C. G.

Far Hills South D.I. (Section K-K) 100 Year

Known:

Q_s=	Half Street flow (cfs)	5.5
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	5.0
D=	Flow depth (ft)	0.34
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	7.5
L_c=	Length of curb opening (ft)	7.00
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = 1-0.09*(V_s-V_o) if V_s>V_o; else R_f=1	1.00
V_o= Splash over velocity=p+q*L_g-r*L_g^2+s*L_g^3* (fps)	8.71
E_o = Grate flow ratio = Q_w/Q_s	0.40
Q_w= Frontal flow=A_w*V_s	2.22
Q_x= Side flow = Q_s-Q_w (cfs)	3.3
R_s = Side flow factor = 1/(1+(0.15*$V_s^{1.8}$)/(S_x*$L_g^{2.3}$))	0.13
Q_{ig} = Flow intercepted = [R_f*E_o+R_s*(1-E_o)]*Q_s	2.7

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = S_x+S_w*E_o (ft/ft)	0.068
S_w = Gutter cross slope = (0.137+a_{feet})/W	0.119
L_t = Total interception L = 0.60*$Q_s^{0.42}$*$S_o^{0.30}$*(1/n*S_e)$^{0.6}$ (ft)	30.93
Q_{ic} = Flow intercepted = (1-(1-L_c/L_t)$^{1.8}$)*Q_s (cfs)	1.1

Total Inlet Calculations

Q_{ti} = Total flow intercepted = Q_{ig}+Q_{ic} (cfs)	**3.7**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	1.77
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.50
E_q = Efficiency = (Q_{ti}/Q_s)*100	68%

Type CM Drop Inlet Sizing on a C. G.

Far Hills North D.I. (Section L-L) 100 Year

Known:

Q_s=	Half Street flow (cfs)	5.0
S_o=	Longitudinal slope (ft/ft)	0.056
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.9
D=	Flow depth (ft)	0.33
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	15.0
L_c=	Length of curb opening (ft)	14.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00
V_o= Splash over velocity=$p+q*L_g-r*L_g^2+s*L_g^{3*}$ (fps)	12.50
E_o = Grate flow ratio = Q_w/Q_s	0.42
Q_w= Frontal flow=A_w*V_s	2.10
Q_x= Side flow = Q_s-Q_w (cfs)	2.9
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.44
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	3.4

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.070
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	29.23
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	2.0

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**5.0**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.33
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

Type CM Drop Inlet Sizing on a C. G.

Far Hills South D.I. (Section L-L) 100 Year

Known:

Q_s=	Half Street flow (cfs)	6.5
S_o=	Longitudinal slope (ft/ft)	0.036
n=	Manning's roughness coef	0.016
V_s=	Flow velocity (fps)	4.4
D=	Flow depth (ft)	0.37
S_x=	Street tranverse slope (ft/ft)	0.02
W=	Gutter Width (ft)	1.5
a=	Gutter Depression (in)	2.0
L_g=	Length of grate (ft)	15.0
L_c=	Length of curb opening (ft)	14.50
C_{fg}=	Clogging factor for grate (%)	50
C_{fc}=	Clogging factor for curb opening (%)	50

Grate Capacity Calculations

R_f= Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00
V_o= Splash over velocity=$p+q*L_g-r*L_g^2+s*L_g^3$* (fps)	12.50
E_o = Grate flow ratio = Q_w/Q_s	0.33
Q_w= Frontal flow=A_w*V_s	2.15
Q_x= Side flow = Q_s-Q_w (cfs)	4.3
R_s = Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*L_g^{2.3}))$	0.49
Q_{ig} = Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	4.3

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

Curb Opening Capacity Calculations

S_e = Equivalent cross slope = $S_x+S_w*E_o$ (ft/ft)	0.059
S_w = Gutter cross slope = $(0.137+a_{feet})/W$	0.119
L_t = Total interception L = $0.60*Q_s^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ (ft)	31.63
Q_{ic} = Flow intercepted = $(1-(1-L_c/L_t)^{1.8})*Q_s$ (cfs)	2.4

Total Inlet Calculations

Q_{ti} = Total flow intercepted = $Q_{ig}+Q_{ic}$ (cfs)	**6.5**
Q_{tq} = Flow bypass = Q_s-Q_{ti} (cfs)	0.00
q = Interception per unit ratio = Q_{ti}/L_g (cfs/ft)	0.43
E_q = Efficiency = $(Q_{ti}/Q_s)*100$	100%

SUMMERLIN

SM

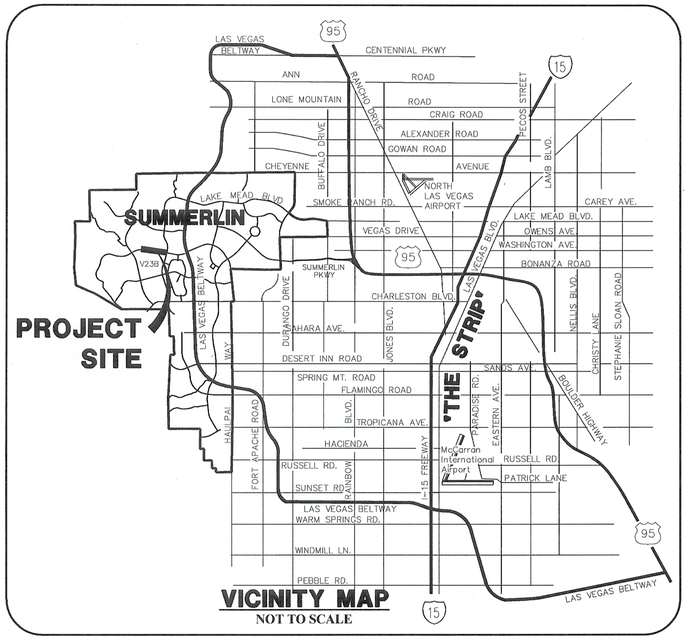
VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE
2013

APN# 137-22-000-015

SID NO. 808 PROJECT 33

SID NO. 810 PROJECTS 4A, 4B, 4C, 5A, 5B, AND 5C

SID NO. 813 PROJECTS 2A, 2B, 2C, 3A, 3B AND 3C



VICINITY MAP
NOT TO SCALE

OWNER/DEVELOPER

THE HOWARD HUGHES COMPANY, LLC
10801 W. CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NEVADA 89146
OFFICE PHONE NO. (702) 791-4300
OFFICE FAX NO. (702) 791-4450

ENGINEER

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BLVD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

DRAINAGE CERTIFICATION

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

JOSHUA L. JOHNSON P.E. 15789 — 6/17/13 DATE

DAVID BOWERS, PE, PTOE, PE# 16736 — DATE
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER "DEVIATIONS FROM STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CLV PLANNING DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE CITY OF LAS VEGAS PLANNING DEPARTMENT

DOUG RANKIN, PLANNING MANAGER, AICP — DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
DRAWINGS

THE HOWARD HUGHES COMPANY, LLC

KEVIN ORROCK — DATE
TITLE: VICE PRESIDENT

UTILITY/AGENCY APPROVALS

COX COMMUNICATIONS LAS VEGAS, INC. — DATE

CENTRAL CO. DBA CENTURYLINK — DATE

THE AFFIXED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

NV ENERGY — DATE

NEVADA POWER COMPANY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NEVADA POWER COMPANY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

NV ENERGY – TRANSMISSION ENGINEERING — DATE

SOUTHWEST GAS CORP. — DATE

H #–
CLV #

ENGINEER - STATE OF NEVADA — JOSHUA L. JOHNSON — No. 15789 — PROFESSIONAL — CIVIL — DATE: 6/17/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: HJF
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:09:57

G. C. WALLACE COMPANIES
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LAS VEGAS · MESQUITE

LAS VEGAS

F:\Projects\600\62023B - 205\GWC\Production\205 - 01.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

COVER SHEET

DRAWING
G1
1 OF 27 SHTS

INDEX OF DRAWINGS

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2	G2	PROJECT DATA SHEET
3	G3	GENERAL NOTES
4	HC	HORIZONTAL CONTROL
5	MU1	MASTER WATER PLAN
6	MU2	MASTER SEWER PLAN
7	MU3	MASTER STORM DRAIN PLAN
8	P1	UTILITY PLAN AND PROFILE 1
9	P2	UTILITY PLAN AND PROFILE 2
10	P3	UTILITY PLAN AND PROFILE 3
11	P4	UTILITY PLAN AND PROFILE 4
12	P5	UTILITY PLAN AND PROFILE 5
13	P6	UTILITY PLAN AND PROFILE 6
14	L1	STORM DRAIN SERVICE PROFILES
15	L2	SEWER PROFILES
16	L3	WATER PROFILES
17	D1	DETAILS 1
18	D2	DETAILS 2
19	R1	ROADWAY PLAN AND PROFILE 1
20	R2	ROADWAY PLAN AND PROFILE 2
21	R3	ROADWAY PLAN AND PROFILE 3
22	RD1	ROADWAY DETAIL 1
23	ST1	SIGNING AND STRIPING PLAN 1
24	ST2	SIGNING AND STRIPING PLAN 2
25	SL1	STREETLIGHT, CONDUIT AND ELECTRICAL PLAN 1
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27	SL3	STREET LIGHT

LEGEND

- PROPOSED UTILITIES
- EXISTING UTILITIES
- FUTURE UTILITIES
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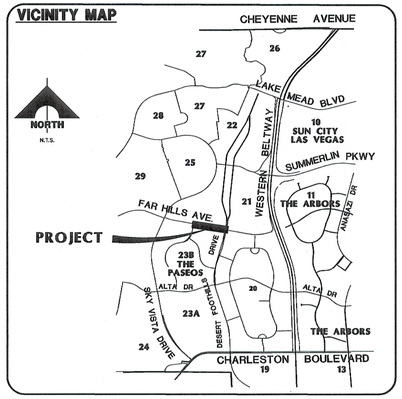
- EASEMENT LINE
- RIGHT-OF-WAY LINE
- PROPERTY LINE
- CENTERLINE
- 100 YR HYDRAULIC GRADE LINE
- PROPOSED SEWER LINE W/MH
- 16" SS — EXISTING SEWER LINE W/MH
- 4" W — EXISTING WATER LINE & GATE VALVE
- 2" G — EXISTING GAS LINE
- 2-6" E — EXISTING UNDERGROUND ELECTRICAL
- CATV — EXISTING CABLE TV
- TEL — EXISTING TELEPHONE
- OHP — EXISTING OVERHEAD AND POWER POLES
- TSD 6"x6" SD — EXISTING STORM DRAIN
- 6"x6" SD — FUTURE STORM DRAIN
- EXISTING SIDEWALK AND RAMP
- VIEW FENCE
- NEW ABANDONED PIPE
- EXISTING ABANDONMENT
- SAWCUT
- CONCRETE ENCASEMENT
- ASPHALT, CURB AND GUTTER REMOVAL
- STUB & PLUG PIPE
- EDGE OF PAVEMENT
- RETAINING WALL
- EX. WATER VALVE

- 1 / CD1 — DRAWING NUMBER FOR DETAIL W/ REF. TO THE SHEET WHERE IT IS SHOWN
- XX / YYY — STANDARD DRAWING NUMBER / GOVERNING AGENCY
- BENCHMARK
- POTHOLE LOCATION
- SWV — SEWER BACK WATER VALVE
- EXISTING NPC RS-100
- EXISTING DROP INLET
- EXISTING GATE VALVE
- EXISTING WATER METER
- EXISTING TRAFFIC SIGNAL PULL BOX
- EXISTING TELEPHONE MANHOLE
- EXISTING POWER POLE
- EXISTING ELEC MARKER
- EXISTING TRAFFIC SIGNAL
- EXISTING FIRE HYDRANT
- EXISTING UTILITY BOX
- EXISTING METER BOX
- 3005 — PROPOSED CONTOUR
- (3005) — EXISTING CONTOUR
- 60.50 TC — SPOT ELEVATION
- (60.50) TC — EXISTING SPOT ELEVATION
- 1.00% — ROAD SLOPE
- EXISTING STREET LIGHT (STLT)
- TOP SLOPE / TOE SLOPE — 3:1 SLOPE UNLESS OTHERWISE NOTED ON PLAN

ABBREVIATIONS

A	AIR	FH	FIRE HYDRANT	RCB	REINFORCED CONCRETE BOX
AC	ASPHALT CONCRETE, ACRE	FL	FLOW LINE	RCP	REINFORCED CONCRETE PIPE
ACP	ASBESTOS CEMENT PIPE	FO	FIBER OPTIC	RD	ROAD
ADD'L	ADDITIONAL	FRP	FIBERGLASS REINFORCED PLASTIC	RDWY	ROADWAY
AP	ANGLE POINT	FS	FINISH SURFACE	REC	RECTANGULAR
APN	ASSESSOR'S PARCEL NUMBER	FT	FOOT/FEET	REF	REFERENCE
APPROX	APPROXIMATELY	FTG	FOOTING	REINF	REINFORCED
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS	FUT	FUTURE	REQD	REQUIRED
		G	GAS	RIM	TOP OF RIM ELEVATION
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	GA	GAGE, GUY ANCHOR	RND	ROUND
		GB	GRADE BREAK	ROW,R/W	RIGHT OF WAY
AVE	AVENUE	GND	GROUND	RP	RADIUS POINT
AVAR	AIR VALVE, AIR RELEASE ASSEMBLY	GRD	GRADE, GROUND	RPM	RAISED PAVEMENT MARKERS
		H, HGT	HEIGHT	RSGV	RESILIENT SEAT GATE VALVE
AWWA	AMERICAN WATER WORKS ASSOCIATION	HDWL	HEADWALL	S	SEWER, SOUTH
		HGL	HYDRAULIC GRADE LINE	SCH	SCHEDULE
BC	BACK OF CURB	HORIZ	HORIZONTAL	SD	STORM DRAIN
BCR	BEGIN CURB RETURN	HP	HIGH POINT, HIGH PRESSURE	SDMH	STORM DRAIN MANHOLE
BLM	BUREAU OF LAND MANAGEMENT	HPS	HIGH PRESSURE SODIUM	SECT	SECTION
BLVD	BOULEVARD	IBC	INTERNATIONAL BUILDING CODE	SF	SQUARE FOOT/FEET
BM	BENCHMARK	INV	INVERT	SHLDR	SHOULDER
BO	BLOW-OFF	INT	INTERIM	SHT	SHEET
BVCE	BEGIN VERTICAL CURVE ELEVATION	JT	JOINT	SL	STREET LIGHT
BVCS	BEGIN VERTICAL CURVE STATION	L	LENGTH	SP	SERVICE POINT
BW	BACK OF SIDEWALK	L, LT	LEFT	SQ	SQUARE
C, ℄	CENTERLINE	LF	LINEAR FEET	SR	SEWER RECLAIM MAIN
C&G	CURB AND GUTTER	LIP	LIP OF GUTTER	SS	SANITARY SEWER
CATV	UNDERGROUND CABLE TV	LN	LANE	SSMH	SANITARY SEWER MANHOLE
CCBM	CLARK COUNTY BENCH MARK	LP	LIGHT POLE	STA	STATION
CCPW	CLARK COUNTY PUBLIC WORKS	LSCP	LANDSCAPE	ST	STREET
CCTV	CLOSED-CIRCUIT TELEVISION	LVVWD	LAS VEGAS VALLEY WATER DISTRICT	STD	STANDARD
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT	MAX	MAXIMUM	STL	STEEL
		MH	MANHOLE	STRUCT	STRUCTURE
CFS	CUBIC FEET PER SECOND	MIN	MINIMUM	SVZ	SIGHT VISIBILITY ZONE
CIP	CAPITAL IMPROVEMENTS PROJECT, CORRUGATED IRON PIPE	MLCP	MORTAR LINED AND COATED PIPE	SW	SIDEWALK
		MOD	MODIFY/MODIFIED	SWG	SOUTHWEST GAS
CIPM	CURED-IN-PLACE MANHOLE	MON	MONUMENT	T	TELEPHONE OR TOP
CIPP	CURED-IN-PLACE PIPE	MPH	MILES PER HOUR	TAN	TANGENT
CIR	CIRCLE	N	NORTH	TB	TOP OF BERM
CLR	CLEAR OR CLEARANCE	NDOT	NEVADA DEPARTMENT OF TRANSPORTATION	TC	TOP OF CURB
CLSM	CONTROLLED LOW STRENGTH MATERIAL			TCE	TEMPORARY CONSTRUCTION ESMT
		NO	NUMBER	TEL,TELE	TELEPHONE
CLV	CITY OF LAS VEGAS	NOSHA	STATE OF NEVADA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	TEMP	TEMPORARY
CMP	CORRUGATED METAL PIPE			TF	TOP OF FOOTING
CMU	CONCRETE MASONRY UNIT	NPC	NEVADA POWER COMPANY	TG	TOP OF GRATE
CNLV	CITY OF NORTH LAS VEGAS	NTS	NOT TO SCALE	TMH	TOP OF MANHOLE
CO	CLEANOUT	OC	ON CENTER	TOP	TOP OF PIPE
CONC	CONCRETE	OHC	OVERHEAD COX COMMUNICATION	TP	TELEPHONE POLE
COND	CONDUIT	OHP	OVERHEAD POWER LINE	TRANS	TRANSITION
CONST	CONSTRUCT OR CONSTRUCTION	P	POWER LINE	TRW	TOP OF RETAINING WALL
COORD	COORDINATE	PB	PULL BOX	TS	TRAFFIC SIGNAL
COR	CORNER	PBS	PLANTMIX BITUMINOUS SURFACE	TW	TOP OF WALL
CPEP	CORRUGATED POLYETHELYNE PIPE	PC	POINT OF CURVE, PRESSURE CLASS	TYP,(TYP)	TYPICAL
CT	COURT			UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS (LATEST EDITION)
CY	CUBIC YARD(S)	PCC	POINT OF COMPOUND CURVE		
Δ	DELTA	PE	PROJECT ENGINEER OR		
DBL	DOUBLE		POLYETHYLENE	UG	UNDERGROUND
DCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEM (LATEST EDITION)	PED	PEDESTRIAN	ULT	ULTIMATE
		PGL	PROFILE GRADE LINE	USD	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
		PH	POTHOLE		
DEFL	DEFLECTION	PI	POINT OF INTERSECTION	USDCCA	UNIFORM STD. DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS CLARK COUNTY AREA, NEVADA (LATEST EDITION)
DIA, ø	DIAMETER	PIV	POST INDICATOR VALVE		
DIP	DUCTILE IRON PIPE	℄	PROPERTY LINE		
DIST	DISTANCE	PLCP	POLYURETHANE LINED AND COATED STEEL PIPE		
DR	DRIVE	PMF	PAVEMENT MARKING FILM	UT	UNDERGROUND TELEPHONE
DS	DOWNSPOUT	POB	POINT OF BEGINNING	VAR	VARIABLE/VARIES
DTL	DETAIL	POC	POINT ON CURVE	VC	VERTICAL CURVE
DW	DRIVEWAY	P.O.C.	POINT OF CONNECTION	VCP	VITRIFIED CLAY PIPE
DWG	DRAWING	POT	POINT ON TANGENT	VERT	VERTICAL
E	EAST	PP	POWER POLE	VG	VALLEY GUTTER
ECR	END CURB RETURN	PROP	PROPOSED	VOL	VOLUME
ELE,ELEC	ELECTRICAL	PRC	POINT OF REVERSE CURVE	W	WATER, WEST
ELEV	ELEVATION	PRVC	POINT OF REVERSE VERTICAL CURVE	W/	WITH
EP, EOP	EDGE OF PAVEMENT			WS	WATER SUPPLY
ESMT	EASEMENT	PSI	POUNDS PER SQUARE INCH	WT	WEIGHT
EVC	END VERTICAL CURVE	PT	POINT OF TANGENCY	WTR	WATER
EXIST,EX	EXISTING	PVC	POLYVINYL CHLORIDE	XING	CROSSING
EXP	EXPANSION JOINT	PVI	POINT OF VERTICAL INTERSECTION	YD	YARD, YARD DRAIN
FC	FACE OF CURB	PVMT	PAVEMENT	Z	PRESSURE ZONE
FF, FFE	FINISH FLOOR ELEVATION	PZ	PRESSURE ZONE		
FG	FINISH GRADE	R, RAD	RADIAL, RADIUS		
		R, RT	RIGHT		

VICINITY MAP



LOCATION

LYING WITHIN SECTIONS 34 TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

BASIS OF BEARINGS

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

BENCHMARK

DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
RIVET AND PLATE IN TOP OF CURB @ SOUTHEAST CORNER OF FAR HILLS AVENUE AND DESERT FOOTHILLS DRIVE	3335.36 (FEET)	1016.620 (METERS)
CLV BM No. 7LV09 27E4		

SUMMERLIN STREET CLASSIFICATION

DESERT FOOTHILLS DRIVE:	NEIGHBORHOOD ARTERIAL WITH BIKE LANES
MOUNTAIN SHADOW ROAD:	NEIGHBORHOOD COLLECTOR (LEVEL 1)
ANTELOPE RIDGE DRIVE:	NEIGHBORHOOD COLLECTOR (LEVEL 1)
FOX HILL DRIVE:	NEIGHBORHOOD COLLECTOR (LEVEL 1)
ALTA DRIVE:	NEIGHBORHOOD ARTERIAL WITH BIKE LANES
FAR HILLS AVENUE:	NEIGHBORHOOD ARTERIAL WITH BIKE LANES

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:

H #-
CLV #

ENGINEER - STATE OF NEVADA — JOSHUA L. JOHNSON — No. 15708 — PROFESSIONAL — Exp. 06/30/2015 — DATE 6/11/13

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP	DATE

PROJECT NO.
DESIGN: DFK
DRAWN: HJF
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:10:08

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2799 - GCWALLACE.COM
LAS VEGAS - MESQUITE
LAS VEGAS
F:\Projects\600\620238-205\DWG\Production\205-G2.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 29B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

PROJECT DATA SHEET

DRAWING
G2
2 OF 27 SHTS

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" 'S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

FLOOD ZONE NOTE

NO PORTION OF THE SITE FALLS WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA. SITE LOCATED ON PANEL 32003C2150E, DATED SEPTEMBER 27, 2002, TO REFLECT A LOMR. THIS PANEL SHOWS THAT THE PROJECT IS LOCATED WITHIN A ZONE X AND NOT LOCATED WITHIN A FEMA DESIGNATED 100-YEAR ZONE A OR SPECIAL FLOOD HAZARD AREA.

DEVIATION FROM STANDARD

NONE

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 STANDARDS.
2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS (ETC.) LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC ENGINEER AND THE CITY ENGINEER.
3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.
4. ALL STREET LIGHTING CONDUITS STUB SHALL HAVE AT LEAST ONE GREEN #8 THW WIRE INSTALLED, AS TRACER WIRE. WHEN "EMPTY" CONDUIT IS COMPLETELY INSTALLED FROM PB 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 USD NO. 320A.
6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TEFO PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
7. SERVICE POINT SHALL BE COORDINATED WITH NV ENERGY COMPANY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE 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 BOND RELEASE OR PROJECT COMPLETION. THE DEVELOPER/OWNER WILL BE RESPONSIBLE FOR ALL ITEMS ASSOCIATED WITH THE INSTALLATION, CONSTRUCTION, ENERGIZING, MAINTENANCE AND OPERATIONAL COST OF SAID STREET LIGHTS PRIOR TO PROJECT COMPLETION. REFER 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 LIGHT/S AND/OR SERVICE/S INSTALLED UNDER THIS PLAN 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) 229-6331.

REVISED 04/15/10

CITY OF LAS VEGAS GRADING NOTES

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

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

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE. COMPACTION SHALL COMPLY WITH THE REQUIREMENTS OF THE ENGINEER.

7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT- OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, SUCH ITEM SHALL BE PROVIDED, AS DIRECTED BY THE CITY ENGINEER, AT NO EXPENSE TO THE CITY OF LAS VEGAS. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 4/15/10

STORMWATER RUNOFF MANAGEMENT

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE CITY OF LAS VEGAS AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

ADDITIONAL WATER NOTES:

1. INSTALL PIPELINE MARKER BALLS IN TRENCH ABOVE EACH HORIZONTAL ELBOW FITTING, PER UDACS PLATE #15.
2. ADJUST WATER VALVE BOX TO FINISHED GRADE PER UDACS PLATE #39. VALVE SHALL BE ACCESSIBLE AT ALL TIMES.
3. RELOCATE 6" MANUAL BLOW-OFF PER UDACS PLATE #37.
4. RELOCATE 4" COMBINATION AIR VALVE PER UDACS PLAT #38.
5. THE DISTRICT CANNOT GUARANTEE A WATERTIGHT SHUTDOWN WHERE CONNECTIONS OR REPAIRS TO EXISTING FACILITIES ARE REQUIRED. THE CONTRACTOR SHALL ENSURE ALL LABOR AND EQUIPMENT IS AVAILABLE TO REMOVE FUGITIVE WATER THAT MAY IMPEDE CONSTRUCTION AT ALL TIMES. COORDINATION WITH INSPECTION DIVISION MUST TAKE PLACE PRIOR TO ANY TRIAL SHUTDOWN.
6. CONTRACTOR TO INSTALL TEMPORARY SERVICE TO ENSURE PROPER SHUTDOWN IN THE EVENT NO OTHER APPURTENANCES ARE AVAILABLE.
7. THIS PROJECT PROVIDES FOR THE INSTALLATION OF OFF-SITE MAINS ONLY, AND DOES NOT PROVIDE OR IMPLY ANY WATER COMMITMENT.

PROCEDURES TO RELOCATE A CORROSION TEST STATION:

1. EXPOSE THE TEST STATION(S) AND LABEL ALL LEADS ACCORDING TO THE TYPICAL TEST BOARD DETAIL.
2. THE LEADS THAT ARE CONNECTED TO THE PIPE REQUIRE #6 COPPER WIRE WITH A HMWPE JACKET SUCH AS RAYCHEM PERMARAD.
3. THE LEAD THAT IS CONNECTED TO THE REFERENCE CELL REQUIRES #14 COPPER WIRE WITH A HMWPE JACKET SUCH AS RAYCHEM PERMARAD.
4. CONNECT THE TWO WIRES TO BE SPLICED WITH A COPPER BUTT CONNECTION USING THE PROPER CRIMPING TOOL.
5. MAKE EACH SPLICE USING A SCOTCH-CAST RESIN SPLICING KIT, DURO-CAST UNIVERSAL SPLICE KIT, OR A RAYCHEM ANODE SPLICE ENCAPSULATION KIT.
6. RECONNECT THE TEST BOARD TO PROPER LEADS, AND PLACE THE TEST BOX AT THE NEW SITE.
7. THE TEST BOX AT THE NEW SITE WILL BE INSTALLED ACCORDING TO THE TYPICAL TEST BOX DETAIL.
8. ALL TEST LEADS AND ANODE AND ANODE LEADS INSIDE THE TEST BOX SHALL BE BUNDLED TOGETHER AT 8" INTERVALS WITH NYLON TIES AND SHALL BE PROVIDED WITH A MINIMUM OF 4' OF SLACK.
9. ALL TEST LEADS AND ANODE LEADS SHALL BE COLOR CODED WITH COLORED TAPE AT EACH END, AND AT 4' INTERVALS.
10. RELOCATED TEST STATION TO BE TESTED BY CERTIFIED CATHODIC PROTECTION SPECIALIST, CORROSION SPECIALIST, OR REGISTERED PROFESSIONAL CORROSION ENGINEER. RESULTS TO BE SUBMITTED IN WRITING TO LVVWD CONSTRUCTION DIVISION.

WATER MAIN JOINT NOTES (PVC, 4"-24"):

PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE ONE (1) DEGREE PER JOINT WITH A MINIMUM RADIUS OF CURVATURE OF 1,150 FEET, PER UDACS 2.07.01 AND 2.07.02.

FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION, FITTINGS SHALL BE USED.

APPROVED FOR CONSTRUCTION

_____

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____

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 ADVANCED 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 ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR 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 SIGNS SHALL BE FABRICATED WITH DIAMOND GRADE TM 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 ANIT-GRAFFITI PROTECTIVE 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 SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT-OF-WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO 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 DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED 4/15/10

LAS VEGAS VALLEY WATER DISTRICT (LVVWD) STANDARD NOTES

LVVWD PROJECT

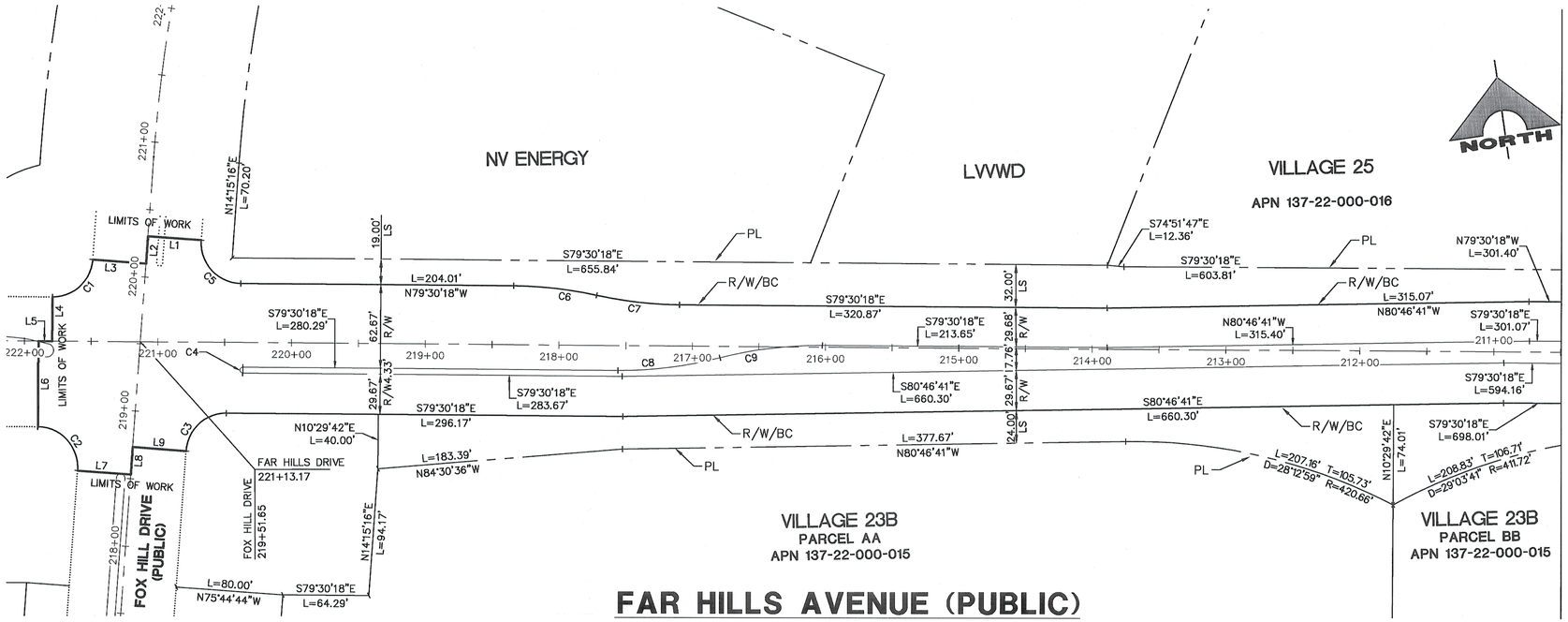
1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN 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 PURVEYABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM 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 GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS
9. ALL WATER FACILITIES 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 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
14. THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVVWD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORMED STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR ON THE STREET SURFACE. ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

LAS VEGAS FIRE AND RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6124 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. AUTHORIZED FIRE HYDRANTS ARE AS FOLLOWS:

   KENNEDY - GUARDIAN MODELS K81A AND K81D
   MUELLER - SUPER CENTURION 250 MODEL A-423
   CLOW - MEDALLION MODEL F-2546LWD
   TROY VALVE - PATRIOT MODEL PTB100N NEVADA HYDRANT
   U.S. PIPE - METROFLOW/M-03

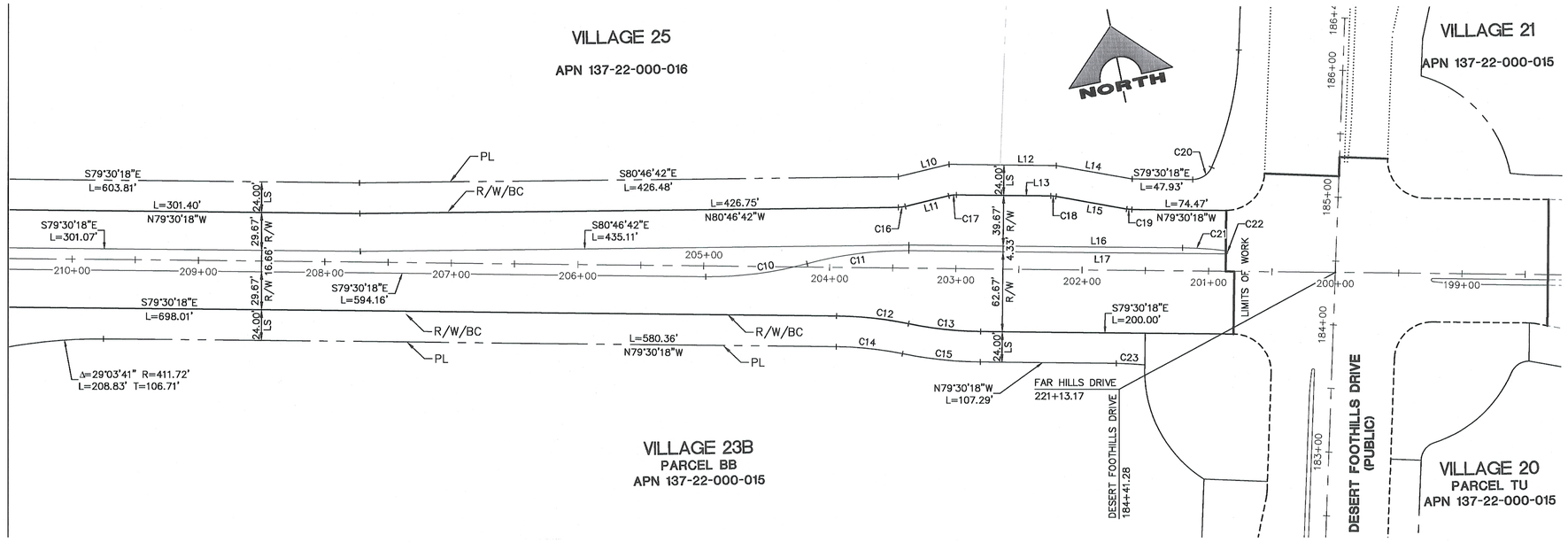
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK.
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW.
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF STREET ADJACENT TO THE FIRE HYDRANTS.
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL.
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, AWWA APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE.
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY THE LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION.
9. PRIVATE FIRE HYDRANTS SHALL BE PAINTED RED.
10. PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW..
11. FIRE HYDRANTS SPACING SHALL BE AS FOLLOWS:
    RESIDENTIAL - 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    COMMERCIAL - 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1,000 FT SPACING, TO PROVIDE FOR TRANSPORTATION 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 VEHICLES 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 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. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE.
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIR



FAR HILLS AVENUE (PUBLIC)

SCALE: 1" = 50'

SCALE 50 0 50 100 FEET



BENCHMARK

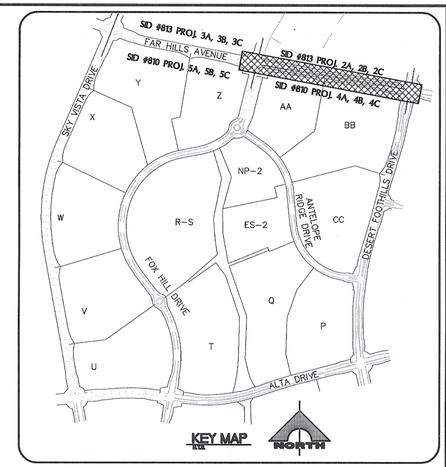
BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LV09-34NE6	RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

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

BASIS OF BEARINGS

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



CURVE TABLE				
CURVE #	LENGTH	RADIUS	TANGENT	DELTA
C1	45.16'	30.00'	28.09'	N57°22'29"E
C2	49.09'	30.00'	32.04'	N32°37'31"W
C3	45.16'	30.00'	28.09'	S57°22'29"W
C4	6.80'	2.16'	348134.10'	S10°29'41"W
C5	49.09'	30.00'	32.04'	S32°37'31"E
C6	62.56'	300.00'	31.40'	N73°31'50"W
C7	62.56'	300.00'	31.40'	S73°31'50"E
C8	77.68'	300.00'	39.06'	S86°55'21"E
C9	77.68'	300.00'	39.06'	N86°55'21"W
C10	81.49'	300.00'	41.00'	S87°17'12"E
C11	81.49'	300.00'	41.00'	N87°17'12"W
C12	57.53'	300.00'	28.86'	N74°00'39"W
C13	57.53'	300.00'	28.86'	S74°00'39"E
C14	52.93'	276.00'	26.55'	N74°00'39"W
C15	62.14'	324.00'	31.16'	S74°00'39"E
C16	5.64'	25.00'	2.83'	S87°14'33"E
C17	6.20'	25.00'	3.11'	N86°36'21"W
C18	4.13'	25.00'	2.07'	N74°46'26"W
C19	4.13'	25.00'	2.07'	S74°46'26"E
C20	18.62'	16.00'	10.53'	N67°08'59"E
C21	34.64'	300.00'	17.34'	N76°11'49"W
C22	3.54'	1.17'	20.24'	N13°48'11"E
C23	22.86'	251.00'	11.44'	N76°53'46"W

PARCEL LINE TABLE		
LINE #	LENGTH	DIRECTION
L1	40.00'	N75°44'44"W
L2	20.22'	S14°15'16"W
L3	40.00'	N75°44'44"W
L4	33.00'	S10°29'42"W
L5	10.29'	N79°30'18"W
L6	63.67'	S10°29'42"W
L7	40.00'	N75°49'07"W
L8	20.22'	S14°15'16"W
L9	40.00'	N75°40'22"W
L10	41.42'	N86°17'36"E
L11	35.31'	S86°17'36"W
L12	84.98'	S79°30'18"E
L13	74.82'	N79°30'18"W
L14	60.74'	S70°02'34"E
L15	56.69'	N70°02'34"W
L16	216.54'	S79°30'18"E
L17	250.97'	S79°30'18"E

H #-
CLV #

ENGINEER, STATE OF NEVADA
JOSHUA L. JOHNSON
No. 15768
DATE: 6/17/15

REV	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO.
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 06-18-13
PLOT TIME: 14:41:29

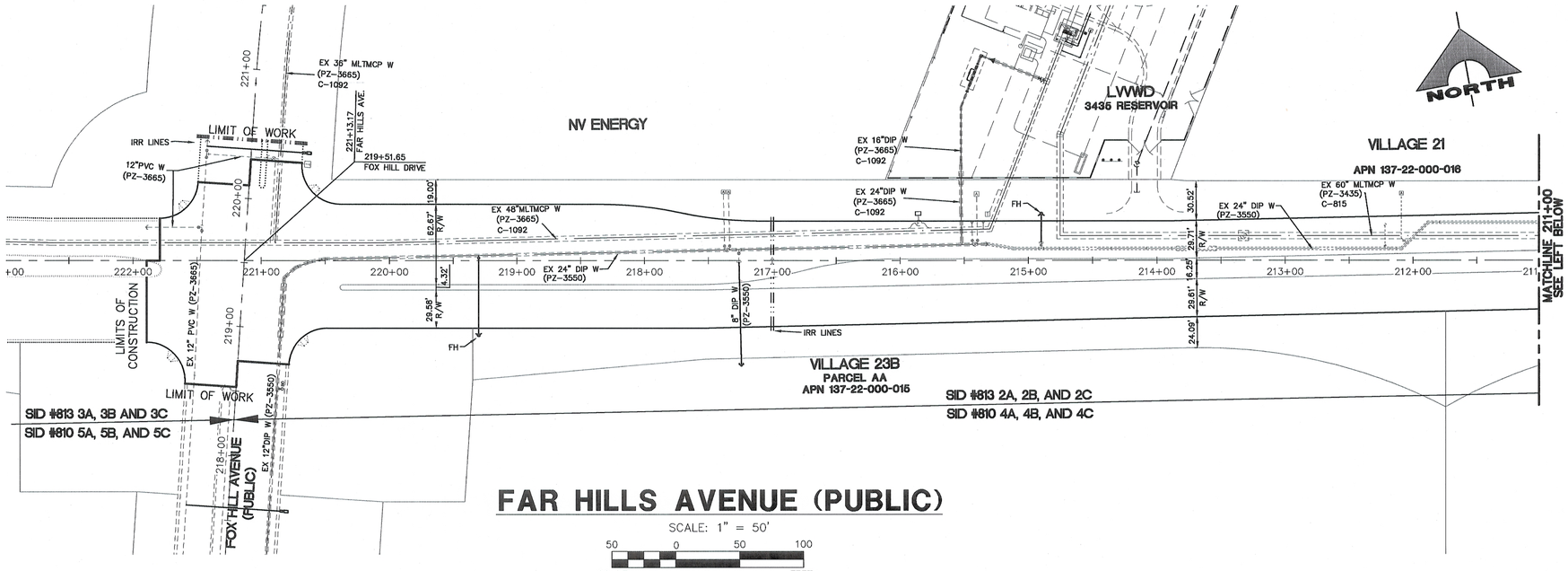
G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS MESQUITE
LAS VEGAS
F:\Projects\601\62023B-205\DWG\Production\205-HZLC.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

HORIZONTAL CONTROL

DRAWING
HC
4 OF 27 SHTS

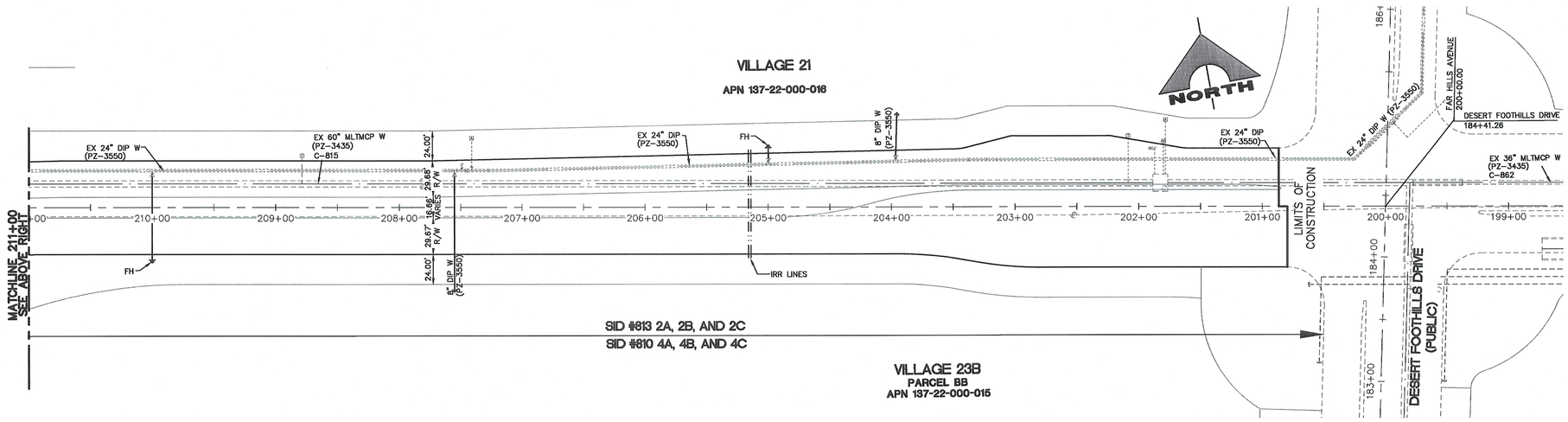


FAR HILLS AVENUE (PUBLIC)

SCALE: 1" = 50'

50 0 50 100

SCALE FEET



Call before you Dig
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Call 811
OR
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AND
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

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

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

WATER QUANTITIES (PUBLIC)

8" DIP W	205	LF
FIRE HYDRANT ASSEMBLY	4	EA
6" 45° BEND	6	EA
8" 45° BEND	6	EA
8" CAP AND BLOW-OFF	3	EA
18" STEEL CASING	72	LF
24"X6" TAPPING SLEEVE W/ 6" TAPPING VALVE	1	EA

APPROVED FOR CONSTRUCTION

CITY OF LAS VEGAS FIRE DEPARTMENT DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

PROJECT NO. XXXXXX DATE:

H #---
CLV #

REV | DATE | DESCRIPTION | DATE | AGEN APP | DATE | GCW APP

PROJECT NO. 62023B-205

DESIGN: DFK
DRAWN: HJF
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:10:53

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM
LAS VEGAS · MESQUITE

LAS VEGAS

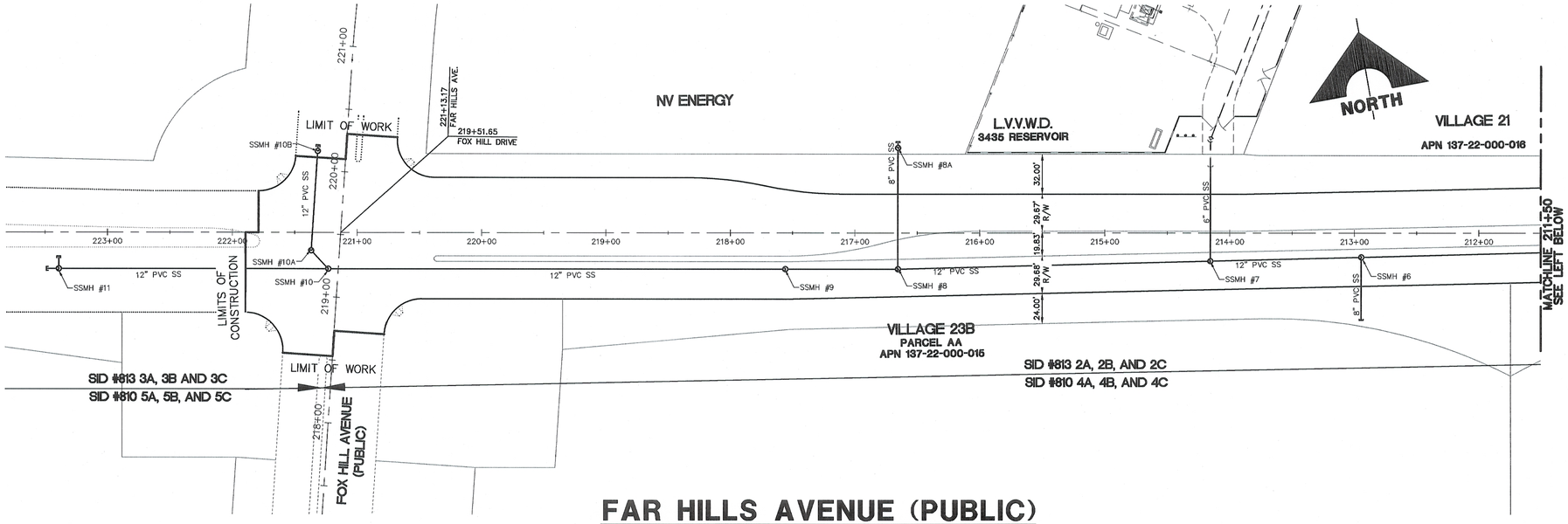
F:\Projects\600\62023B-205\DWG\Production\205-MU1.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

MASTER WATER PLAN

DRAWING
MU1
5 OF 27 SHTS

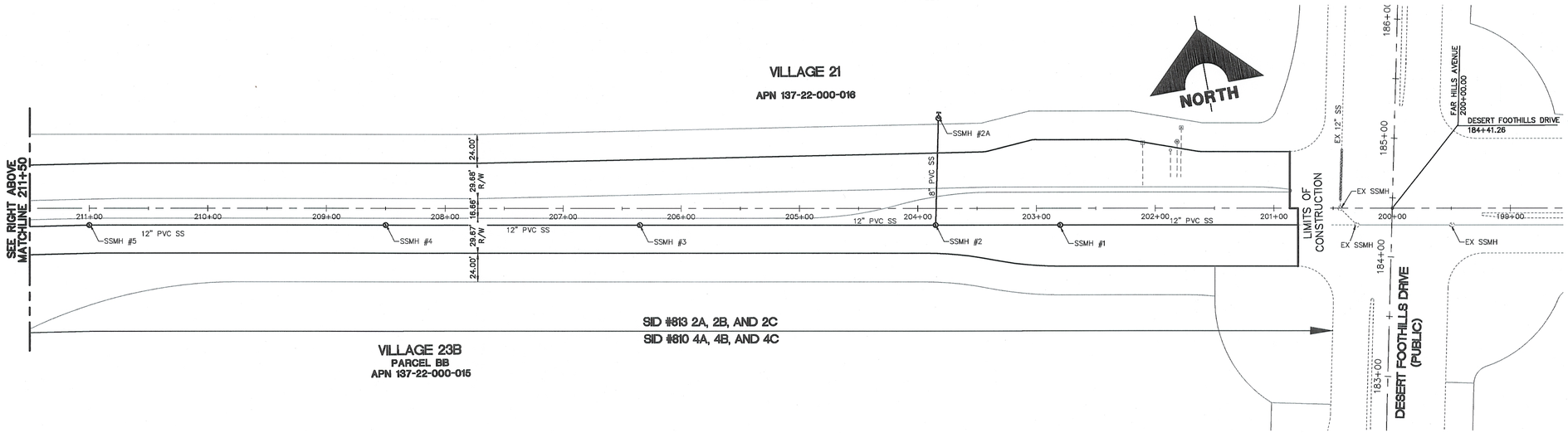


FAR HILLS AVENUE (PUBLIC)

SCALE: 1" = 50'

50 0 50 100

SCALE FEET



SANITARY SEWER MANHOLE SCHEDULE

MH #	STREET NAME	STATION & OFFSET	INV IN	INV IN	INV OUT	RIM	NORTHING	EASTING	MH #
1	FAR HILLS AVE.	202+80.00, 14.33' LT	3342.93 (W)	3343.10 (12" N)	3342.73 (E)	3350.2±	521273.84	568028.89	1
2	FAR HILLS AVE.	206+30.00, 14.33' LT	3362.40	N/A	3362.20	3368.9±	521337.59	567684.74	2
3	FAR HILLS AVE.	208+67.46, 14.33' LT	3375.41	N/A	3375.21	3382.1±	521380.84	567451.26	3
4	FAR HILLS AVE.	212+93.69, 18.92' LT	3399.27 (W)	3399.60 (8" S)	3399.07 (E)	3405.7±	521453.97	567031.33	4
5	FAR HILLS AVE.	214+15.56, 21.44, LT	3401.53 (W)	3402.03 (6" N)	3401.33 (E)	3412.4±	521473.69	566911.03	5
6	FAR HILLS AVE.	217+55.94, 29.00' LT	3416.76 (W)	3417.09 (8" N)	3416.56 (E)	3430.7±	521528.25	566574.97	6
7	FAR HILLS AVE.	221+33.66, 29.00' LT	3435.23 (W)	3435.23 (12" N)	3435.03 (E)	3443.6±	521597.06	566203.57	7
8	FAR HILLS AVE.	223+39.00, 29.00' LT	3442.80 (W)	3442.23 (8" N)	3441.60 (E)	3449.8±	521634.46	566001.66	8
9	FAR HILLS AVE.	202+80.00, 91.67' RT	3445.22	N/A	3445.22	3355.4±	521378.07	568048.15	9
10	FAR HILLS AVE.	217+58.11, 68.76' RT	3420.54	N/A	3420.54	3430.9±	521624.78	566590.64	10
11	FOX HILL DR.	219+84.23, 22.67' LT	3436.69	N/A	3436.49	3444.3±	521658.99	566215.04	11

SEWER QUANTITIES (PUBLIC)

6" PVC S	76	LF
8" PVC S	247	LF
12" PVC S	2,383	LF
48" SEWER MANHOLE	13	EA
60" SEWER MANHOLE	2	EA

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

H #---
CLV #

ENGINEER - STATE OF NEVADA
JOSHUA J. JOHNSON
No. 15769
PROFESSIONAL
Exp. 06/30/2015
DATE: 6/17/15

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP	DATE

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: HJF
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:11:08

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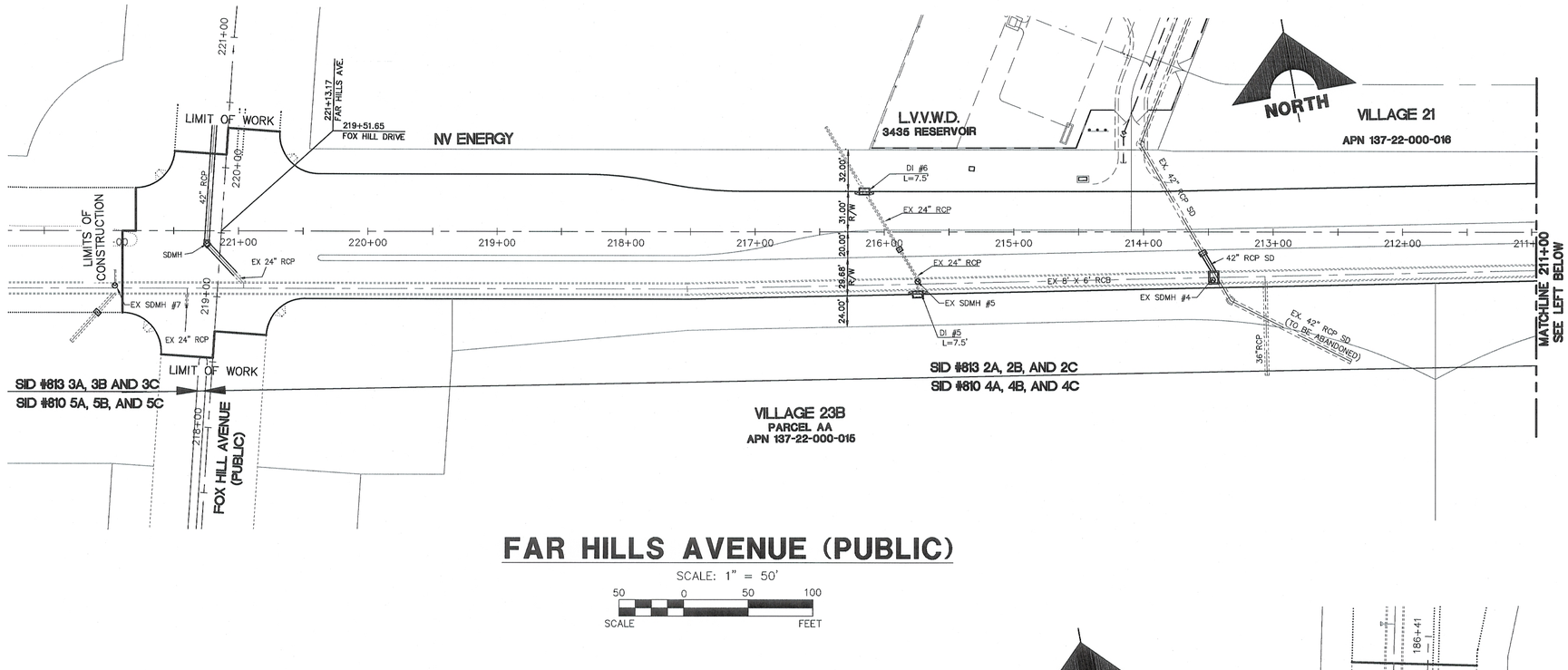
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS - MESQUITE
LAS VEGAS
F:\Projects\600\62023B-205\DWG\Production\205-MU3.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

MASTER SEWER PLAN

DRAWING
MU2
6 OF 27 SHTS



FAR HILLS AVENUE (PUBLIC)

SCALE: 1" = 50'

50 0 50 100

SCALE FEET

STORM DRAIN QUANTITIES (PUBLIC)

24" RCP	64	LF
42" RCP	242	LF
7.5' TYPE "CM2" DROP INLET	2	EA
10.0' TYPE "CM2" DROP INLET	1	EA
15.0' TYPE "CM2" DROP INLET	1	EA
17.5' TYPE "CM2" DROP INLET	2	EA
TYPE III MANHOLE	2	EA

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or
1-800-227-2600
AND
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

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CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

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

H #---
CLV #

ENGINEER - STATE OF NEVADA
JOSHUA L. JOHNSON
No. 15713
PROFESSIONAL
DATE: 6/7/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: HJF
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:11:25

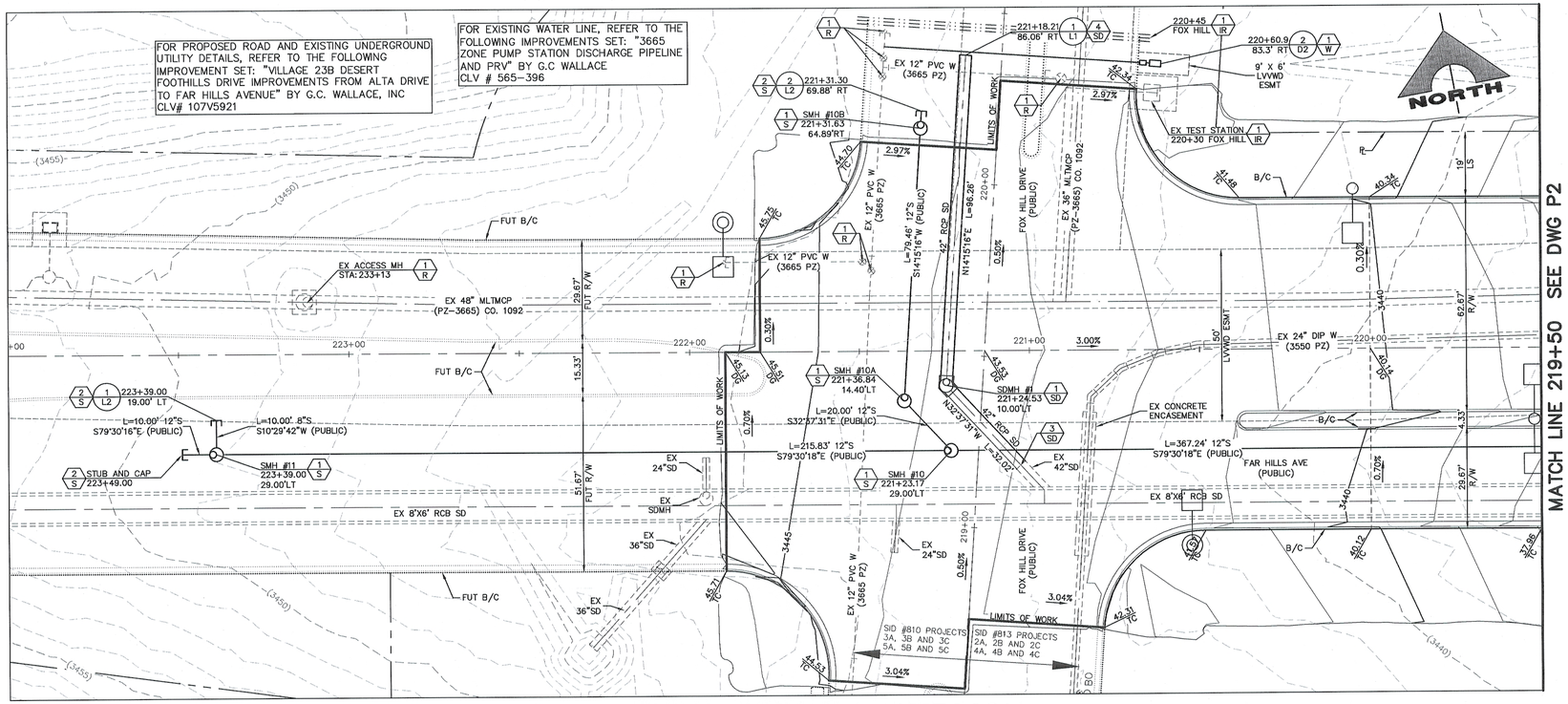
G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS | MESQUITE
LAS VEGAS
F:\Projects\600\62023B-205\DWG\Production\205-MU2.dwg
Humberto Franco-Rivas

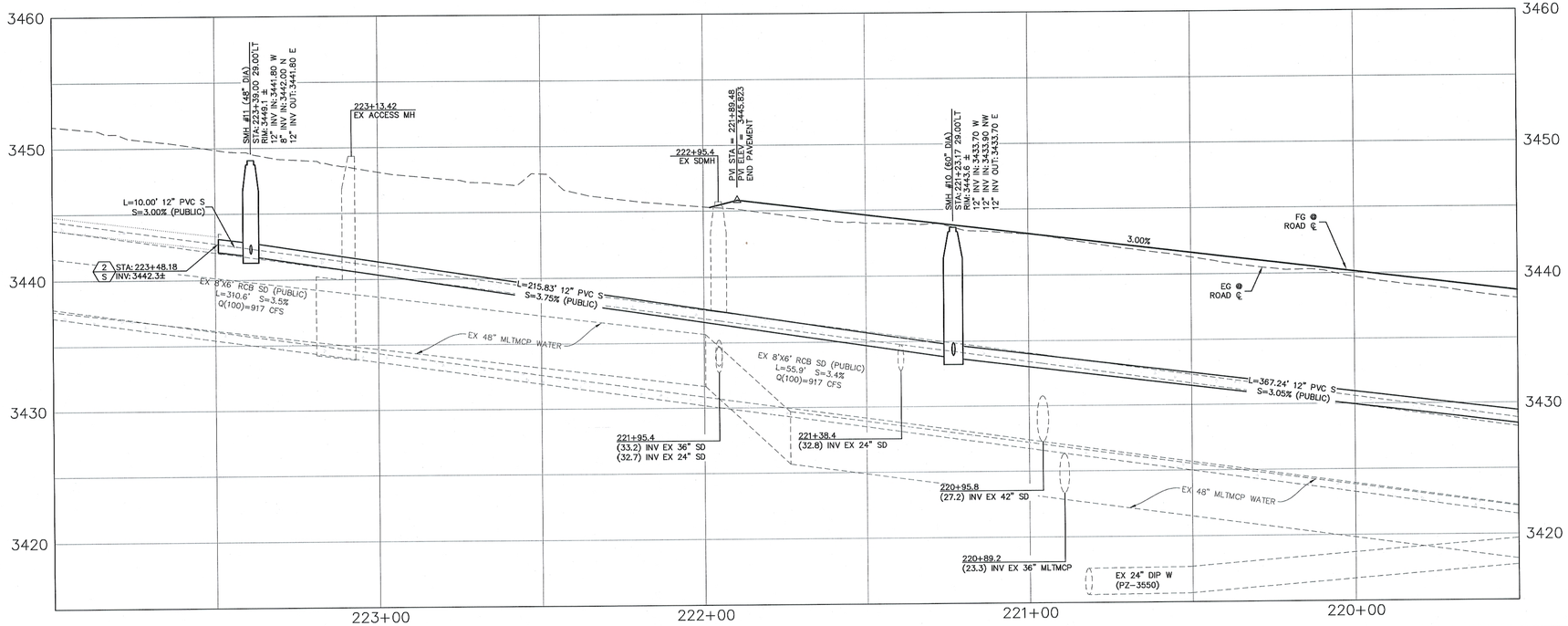
THE HOWARD HUGHES COMPANY, LLC

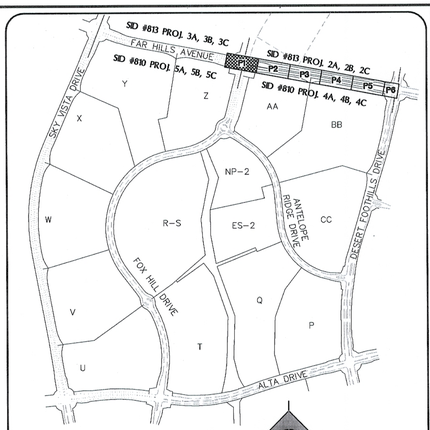
VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

MASTER STORM DRAIN PLAN

DRAWING
MU3
7 OF 27 SHTS







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3W INSTALL FIRE HYDRANT PER UDACS PLATES 40 OR 41 (AS APPLICABLE)
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7W REMOVE CAP AND BLOWOFF PER UDACS PL. 36 AND CONNECT TO EX WATER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX WATER PRIOR TO CONSTRUCTION)
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3S REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)
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STORM DRAIN CONSTRUCTION NOTES:
1SD INSTALL TYPE III MANHOLE PER USD DWG. NO. 406
2SD INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
3SD REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
4SD INSTALL TEMPORARY PLUG AND CAP
5SD USE MECHANICAL WATER STOPS, CENTER BULB, OR FLAT STRIP TO PROVIDE WATER-TIGHT JOINTS OF STRUCTURE (VINYLEX, GREENSTREAK PLASTIC PRODUCTS, OR APPROVED EQUAL), SEAL BETWEEN WALLS AND ROOF TO BE KENT SEAL, OR APPROVED EQUAL.
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IRRIGATION CONSTRUCTION NOTES:
1IR BANK "A": 1-6" & 2-4" SCH 40 PVC
2IR BANK "B": 2-4" SCH 40 PVC

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
SLVD9-34NE6	RIVET AND PLATE IN TOP OF CURB ℄ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

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

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

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

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AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

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FAST
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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

H #---
CLV #

ENGINEER - STATE OF NEVADA
JOSHUA L. HOWARD
No. 15789
PROFESSIONAL
CIVIL
DATE: 6/27/13

DESCRIPTION	DATE	ASEN APP	DATE	CCW APP

PROJECT NO. 62023B-205
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 06-18-13
PLOT TIME: 15:10:33

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 RAINBOW BOULEVARD - LAS VEGAS, NV 89146
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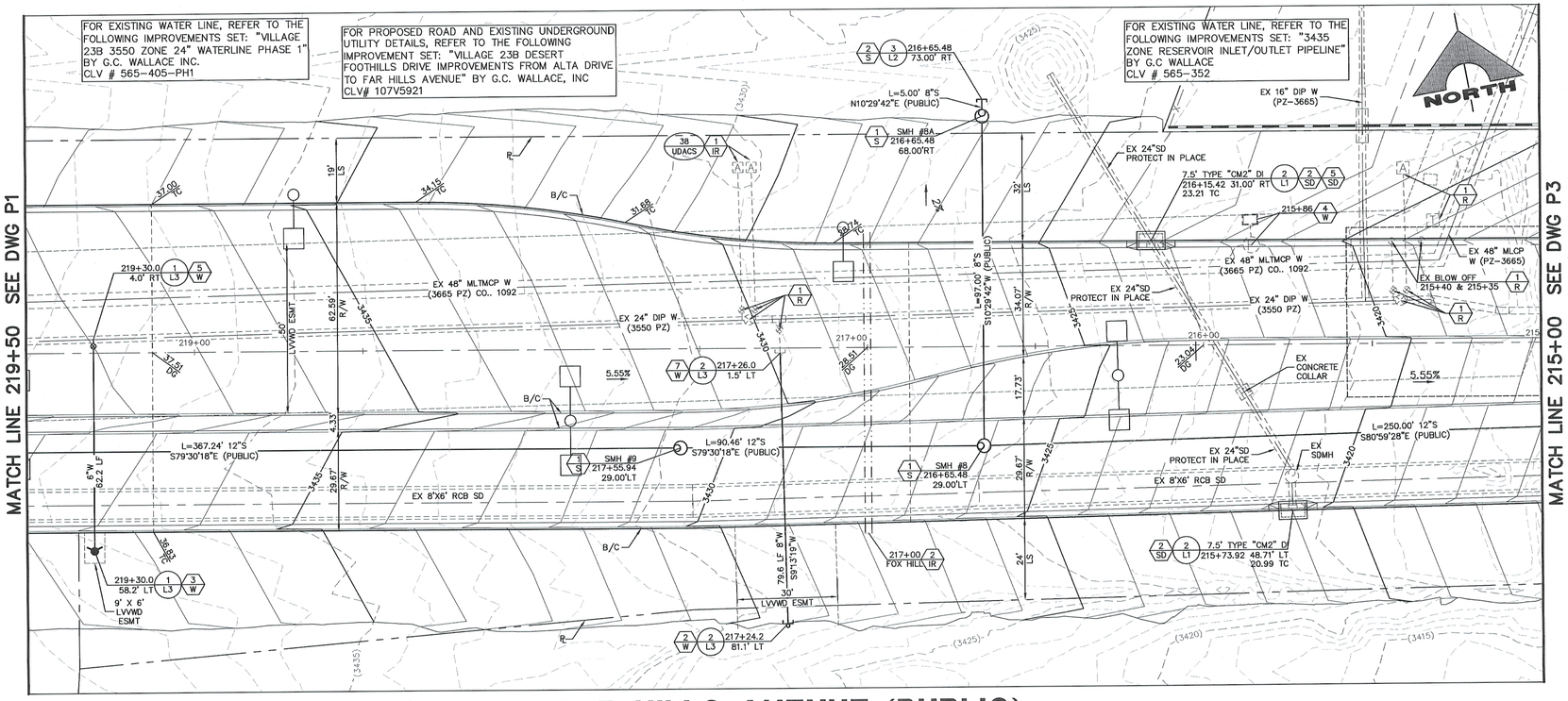
LAS VEGAS - MESQUITE
LAS VEGAS
F:\Projects\600\62023B-205\DWG\Production\205-UTILITY.dwg
Humberto Franco-Rivas

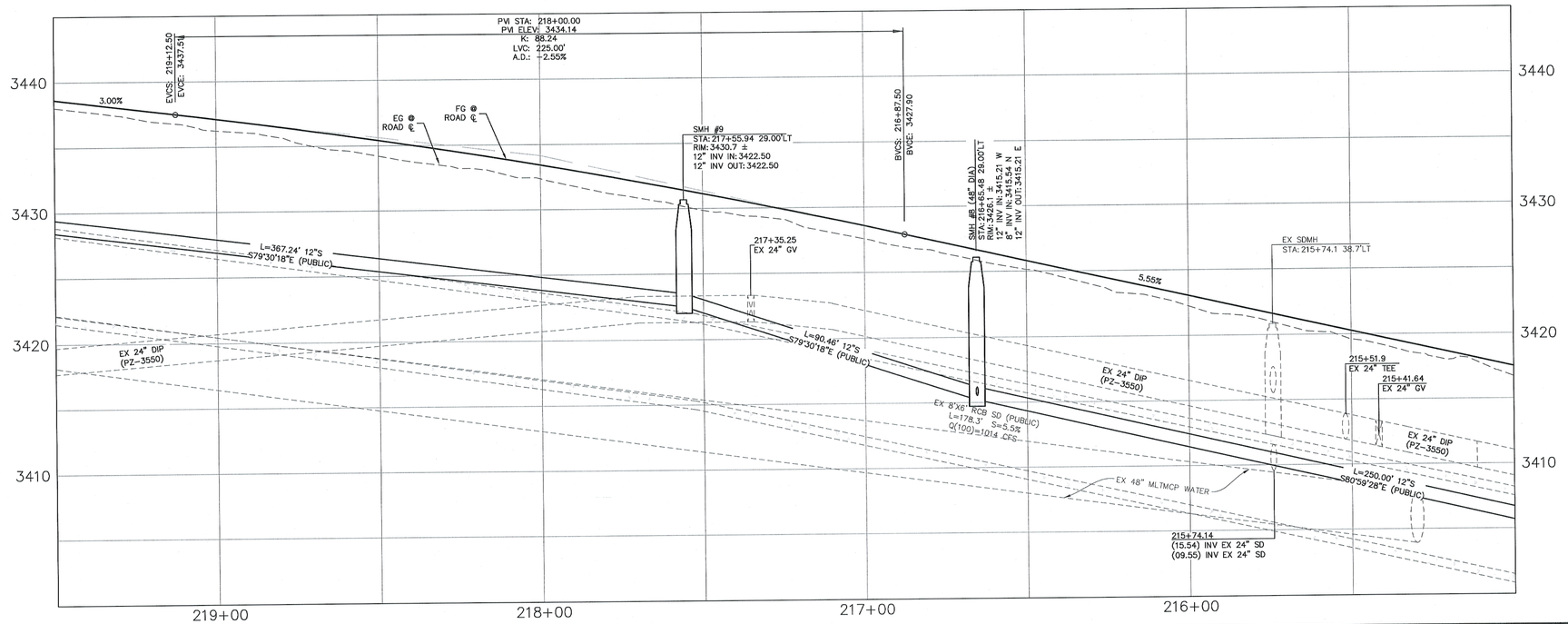
THE HOWARD HUGHES COMPANY, LLC

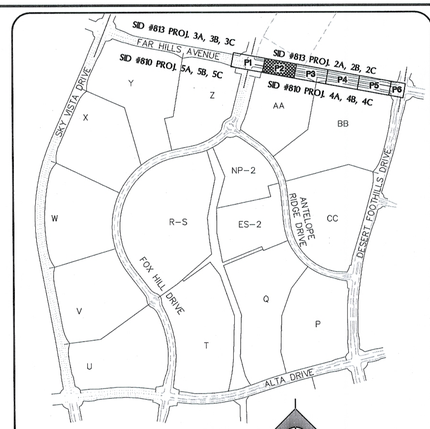
VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

UTILITY PLAN AND PROFILE 1

DRAWING
P1
8 OF 27 SHTS







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BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
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APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

H #---
CLV #

STATE OF NEVADA — REGISTERED PROFESSIONAL ENGINEER — JOSHUA M. JOHNSON — No. 17051 — CIVIL — 6/27/13
DATE: 6/27/13

REV	DATE	DESCRIPTION	DATE	AGENCY APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN:
DRAWN:
CHECK:
PLOT DATE 06-18-13
PLOT TIME 15:10:44

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LAS VEGAS

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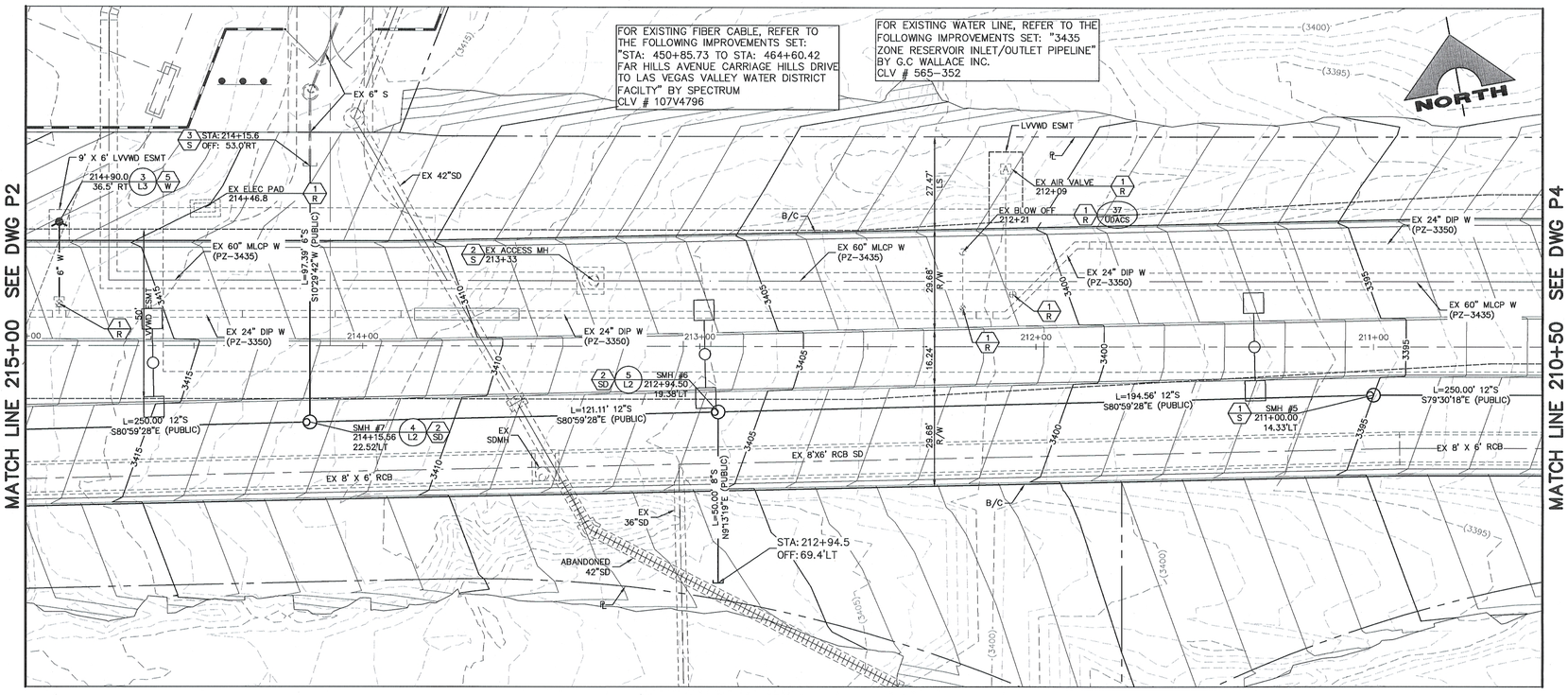
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC
VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE
UTILITY PLAN AND PROFILE 2

DRAWING
P2
9 OF 27 SHTS

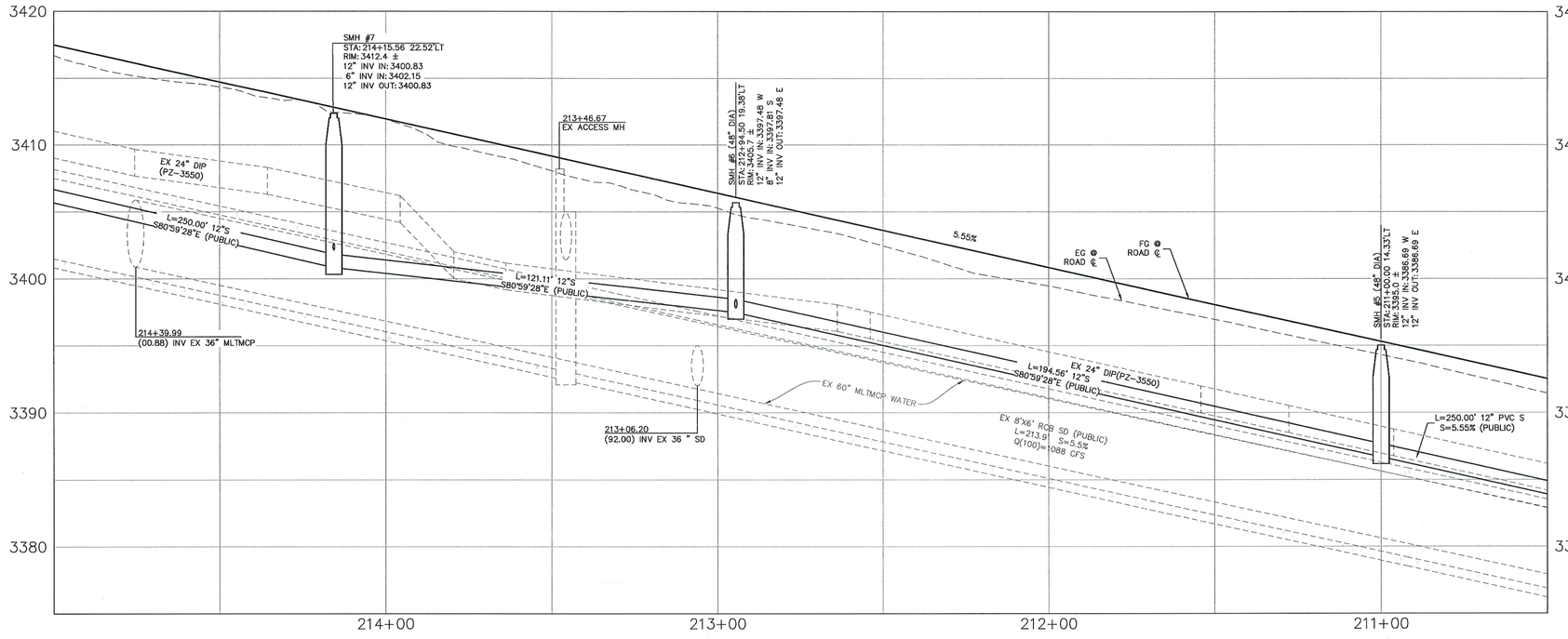


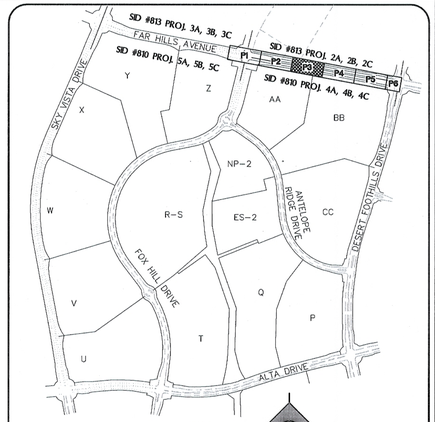
FAR HILLS AVENUE (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

SID #810 PROJECTS 4A, 4B, 4C, 5A, 5B, 5C
SID #813 PROJECTS 2A, 2B, 2C, 3A, 3B, 3C

20 0 20 40
SCALE FEET





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BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

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1-702-227-2929

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

H #---
CLV #

STATE OF NEVADA — ENGINEER — JOSHUA M. HOWARD — No. 15010 — CIVIL — 08-31-2015

DESCRIPTION	REV	DATE	AGEN APP	DATE	GOW APP	DATE

PROJECT NO. 62023B-205
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 06-18-13
PLOT TIME: 15:10:52

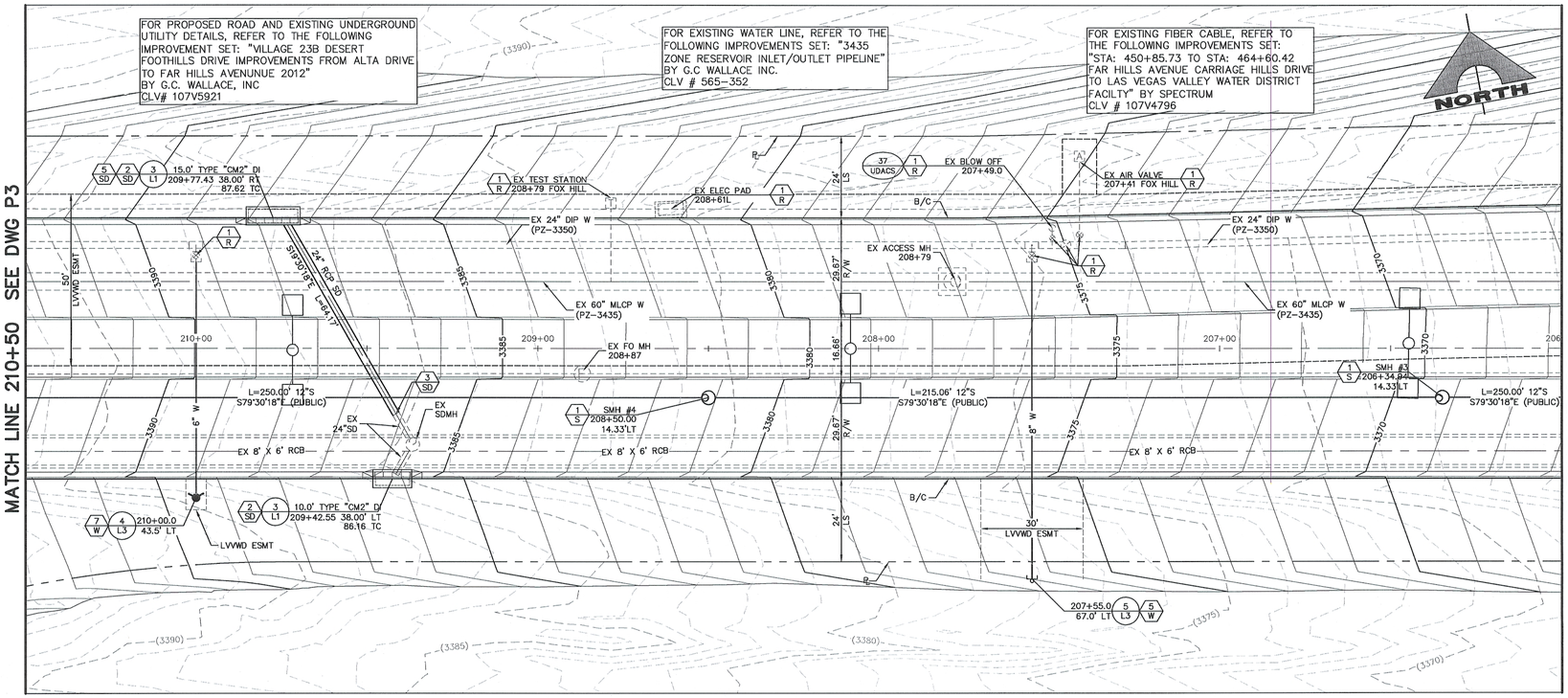
G.C WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS - MESQUITE
LAS VEGAS
F:\Projects\600\62023B-205\DWG\Production\205-UTILITY.dwg
Humberto Frenco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

UTILITY PLAN AND PROFILE 3

DRAWING
P3
10 OF 27 SHTS



FAR HILLS AVENUE (PUBLIC)

SCALE: HORIZ. 1" = 20'
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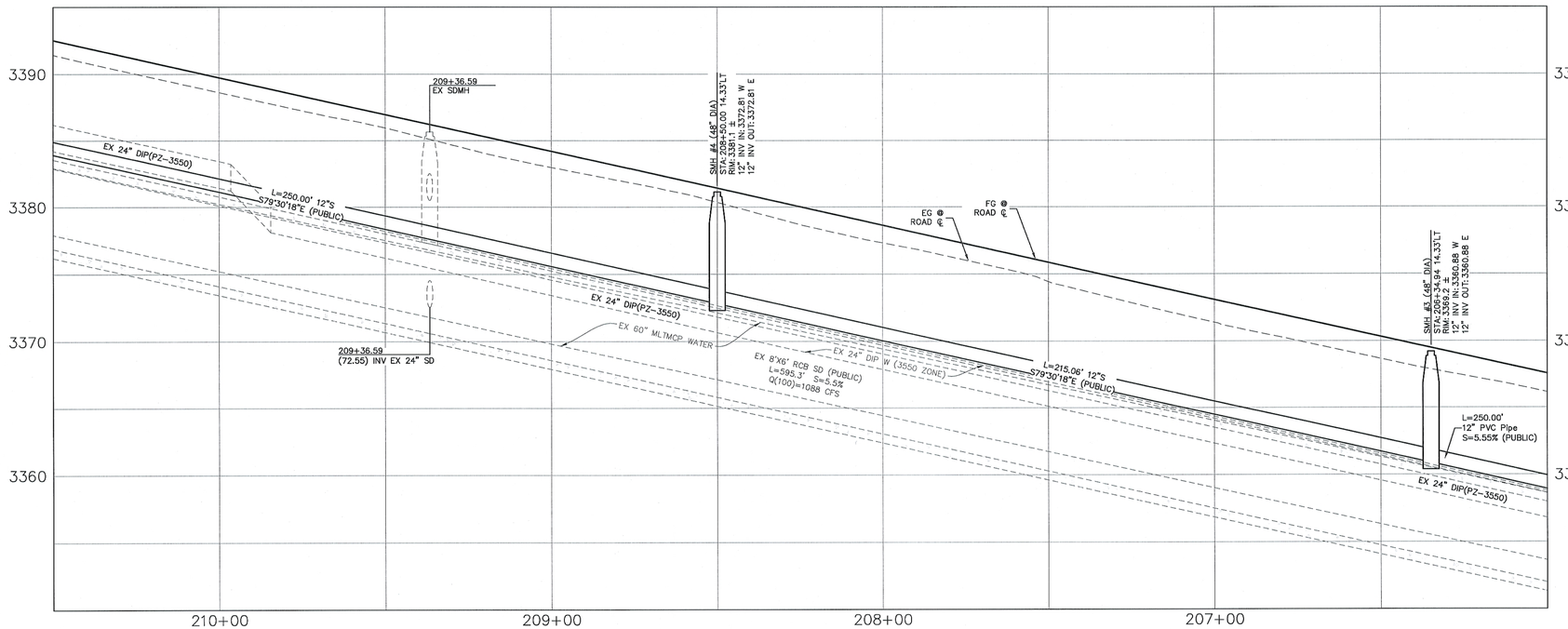
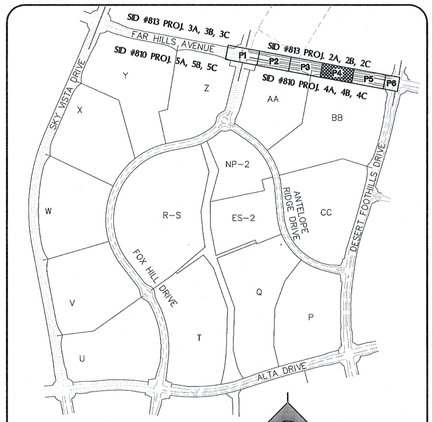
SID #810 PROJECTS 4A, 4B, 4C, 5A, 5B, 5C
SID #813 PROJECTS 2A, 2B, 2C, 3A, 3B, 3C

20 0 20 40
SCALE FEET





SEWER CONNECTION NOTE:

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ROADWAY CONSTRUCTION NOTES:

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3W INSTALL FIRE HYDRANT PER UDACS PLATES 40 OR 41 (AS APPLICABLE)
4W PROTECT EX FO PB AND SPLICE PIT, AND ADJUST PER DTL 9, DWG D1
5W INSTALL 24"X6" TAPPING SLEEVE W/ 6" TAPPING VALVE PER UDACS 2.24.01(B) AND UDACS PLATES 34, 38 AND 39
6W INSTALL 45° BEND PER UDACS PL. 31
7W REMOVE CAP AND BLOWOFF PER UDACS PL. 36 AND CONNECT TO EX WATER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX WATER PRIOR TO CONSTRUCTION)
8W INSTALL 1" WATER METER AND 1-½" RPPA PER UDACS PLATES 4 AND 8

SEWER CONSTRUCTION NOTES:

1S INSTALL SEWER MANHOLE PER DCS STD. DWG. 1A AND 1B
2S STUB AND CAP SEWER PIPE PER DTL 2, DWG D1
3S REMOVE PLUG AND CONNECT TO EX SEWER LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX SEWER PRIOR TO CONSTRUCTION)
4S ELASTOMERIC JOINT SEALANT TO BE INSTALLED AT ALL MANHOLE JOINTS.

STORM DRAIN CONSTRUCTION NOTES:

1SD INSTALL TYPE III MANHOLE PER USD DWG. NO. 406
2SD INSTALL TYPE "CM2" DROP INLET PER USD DWG. NO. 412.1 AND 421
3SD REMOVE PLUG AND CONNECT TO EX STORM DRAIN LINE (CONTRACTOR TO VERIFY SIZE, INVERT AND LOCATION OF EX STORM DRAIN PRIOR TO CONSTRUCTION)
4SD INSTALL TEMPORARY PLUG AND CAP
5SD USE MECHANICAL WATER STOPS, CENTER BULB, OR FLAT STRIP TO PROVIDE WATER-TIGHT JOINTS OF STRUCTURE (VINYLEX, GREENSTREAK PLASTIC PRODUCTS, OR APPROVED EQUAL). SEAL BETWEEN WALLS AND ROOF TO BE KENT SEAL, OR APPROVED EQUAL.
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IRRIGATION CONSTRUCTION NOTES:

1IR BANK "A": 1-6" & 2-4" SCH 40 PVC
2IR BANK "B": 2-4" SCH 40 PVC

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LV09-34NE6	RIVET AND PLATE IN TOP OF CURB ⊕ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

NOTE

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BASIS OF BEARINGS

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR 1-800-227-2600
OR CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

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

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

H #---
CLV #

STATE OF NEVADA — JOSHUA L. JOHNSON — No. 15113 — PROFESSIONAL ENGINEER — DATE 6/17/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 06-18-13
PLOT TIME: 15:11:04

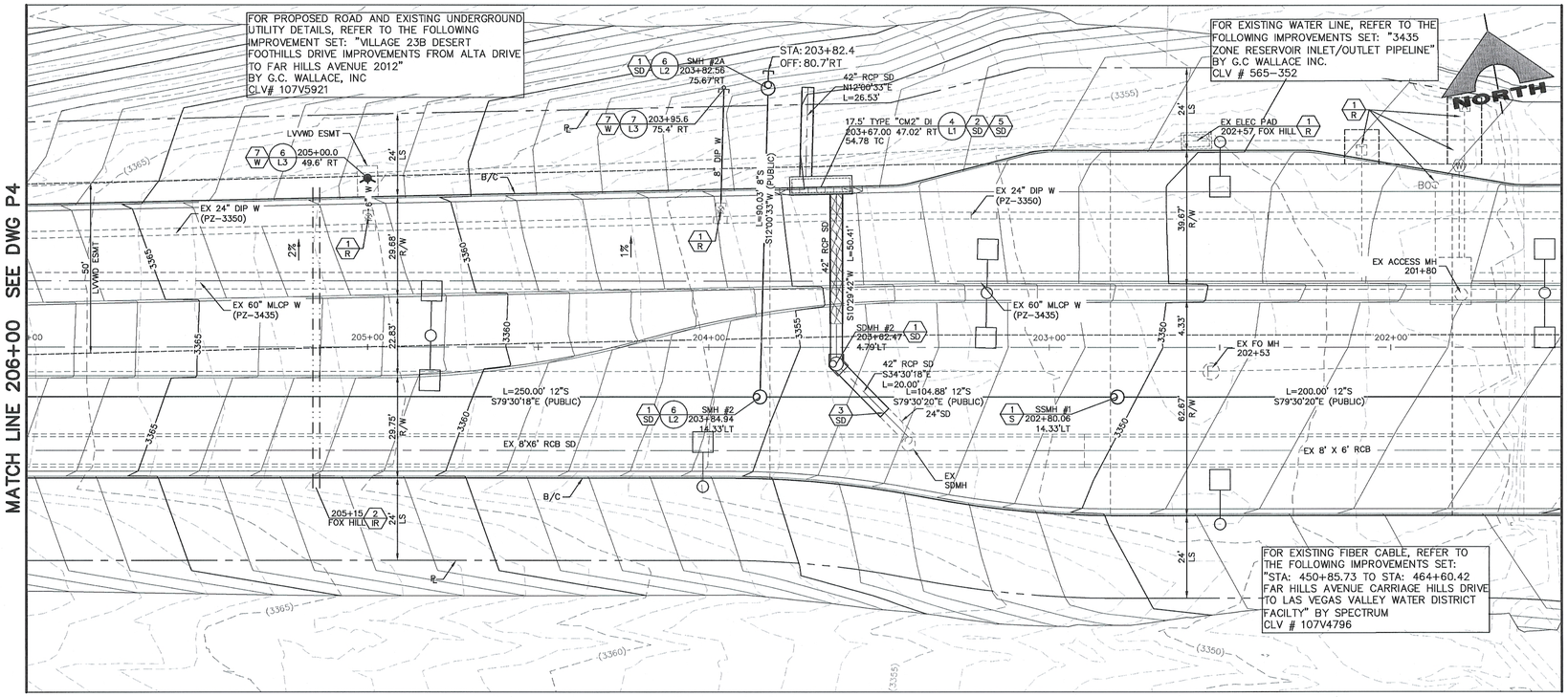
G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS NV 89146
T: 702.804.2000 F: 702.804.2001 WWW.GCWALLACE.COM
LAS VEGAS - MESQUITE
LAS VEGAS
F:\Projects\600\62023B-205\DWG\Production\205-UTILITY.dwg
Rumberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

UTILITY PLAN AND PROFILE 4

DRAWING
P4
11 OF 27 SHTS

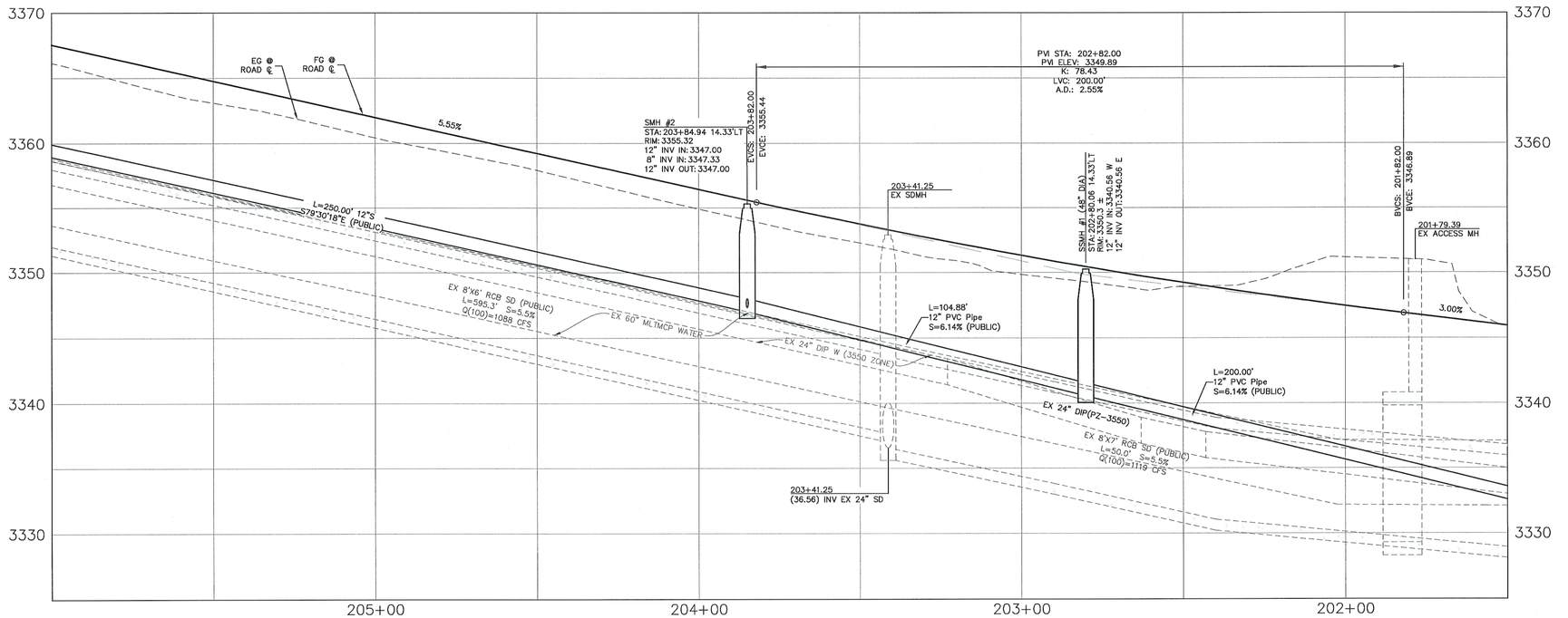


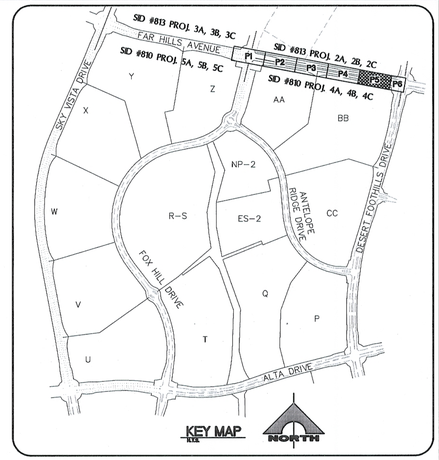
FAR HILLS AVENUE (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

SID #810 PROJECTS 4A, 4B, 4C, 5A, 5B, 5C
SID #813 PROJECTS 2A, 2B, 2C, 3A, 3B, 3C

20 0 20 40
SCALE FEET





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(1 IR) BANK "A": 1-6" & 2-4" SCH 40 PVC
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BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
5LVD0-34NE6	RIVET AND PLATE IN TOP OF CURB ⊕ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR
1-800-227-2600
AND
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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

H #---
CLV #

ENGINEER - STATE OF NEVADA - 9851 - JOSHUA L. JOHNSON - No. 9851 - PROFESSIONAL - Exp. 06/30/2013 - DATE: 6/7/13

DATE	DESCRIPTION	REV. DATE	PLOT TIME: 15:11:12
			PLOT DATE: 06-18-13
			CHECK:
			DRAWN:
			DESIGN:
			PROJECT NO. 62023B-205
			CCW APP
			DATE
			AGEN. APP
			DATE

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 SOUTH RAINBOW BOULEVARD, LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS - MESQUITE
LAS VEGAS

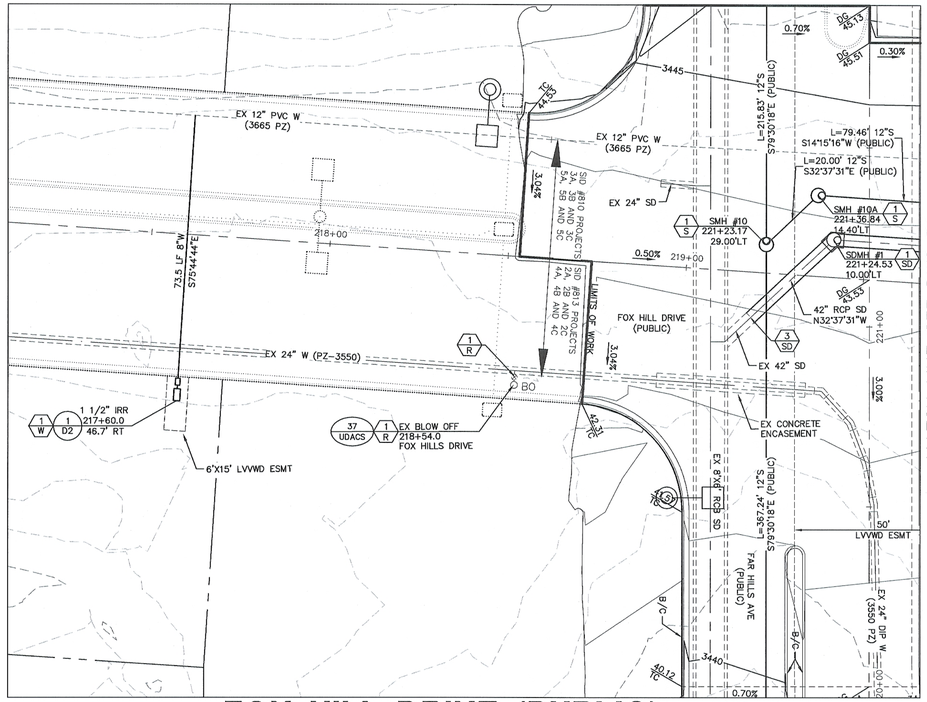
F:\Projects\600\62023B-205\DWG\Production\205-UTILITY.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

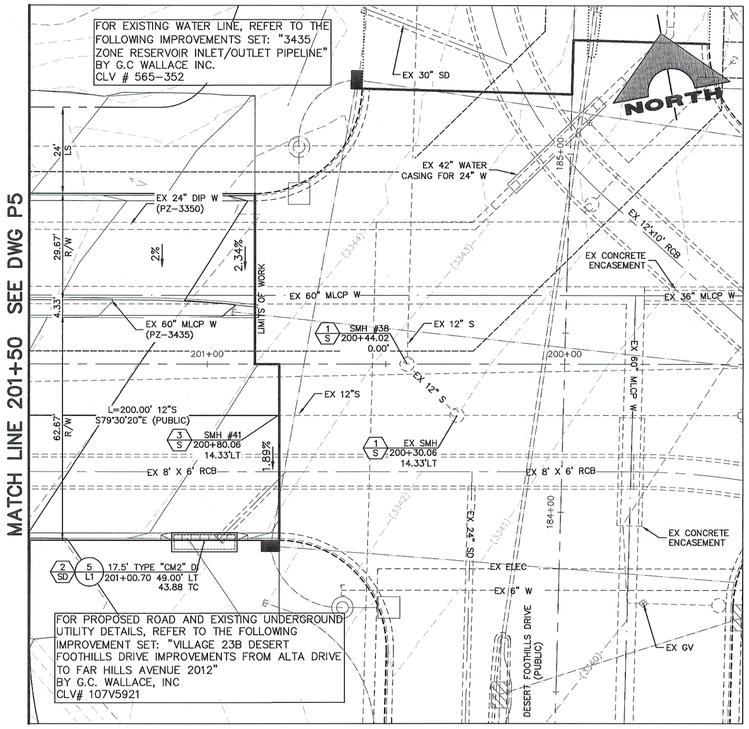
UTILITY PLAN AND PROFILE 5

DRAWING
P5
12 OF 27 SHTS



FOX HILL DRIVE (PUBLIC)

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'



FAR HILLS AVENUE (PUBLIC)

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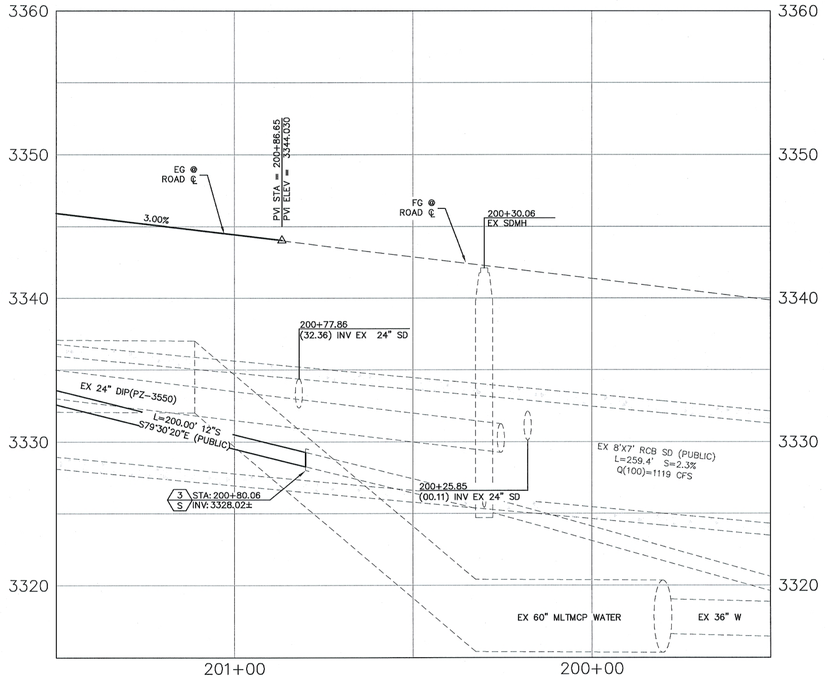
20 0 20 40
SCALE FEET

SID #810 PROJECTS 4A, 4B, 4C, 5A, 5B, 5C
SID #813 PROJECTS 2A, 2B, 2C, 3A, 3B, 3C



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BENCHMARK

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____

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OR 1-800-227-2600 AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

H #---
CLV #

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS · MESQUITE

LAS VEGAS

F:\Projects\600\62023B-205\DWG\Production\205-UTILITY.dwg
Humberto Franco-Rivas

PROJECT NO. 62023B-205
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 05-18-13
PLOT TIME: 15:11:27

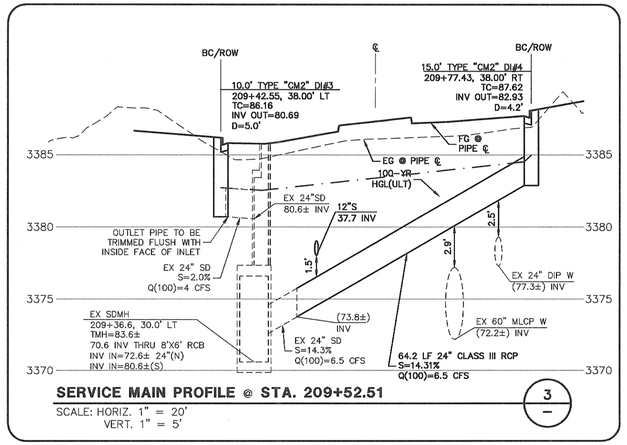
REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP	DATE: 4/2013

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

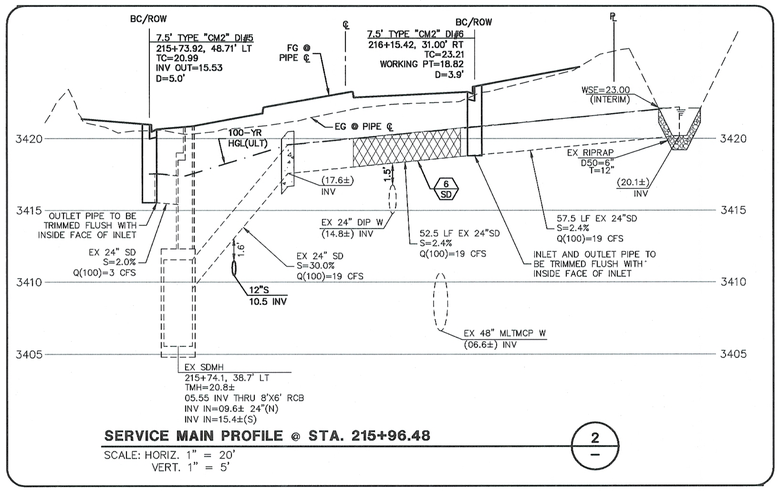
UTILITY PLAN AND PROFILE 6

DRAWING
P6
13 OF 27 SHTS



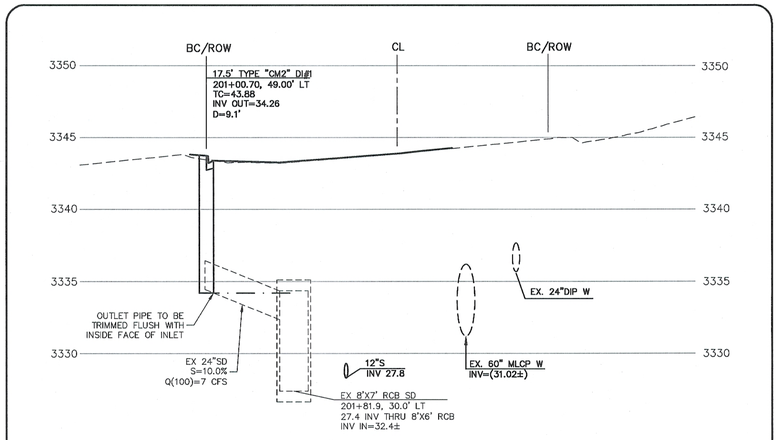
SERVICE MAIN PROFILE @ STA. 209+52.51 — 3

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'



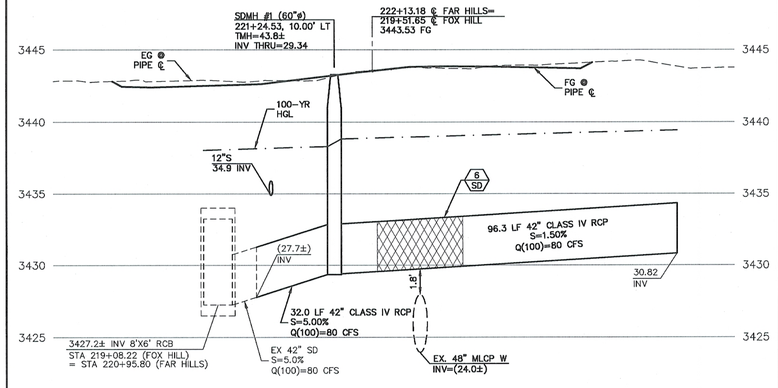
SERVICE MAIN PROFILE @ STA. 215+96.48 — 2

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'



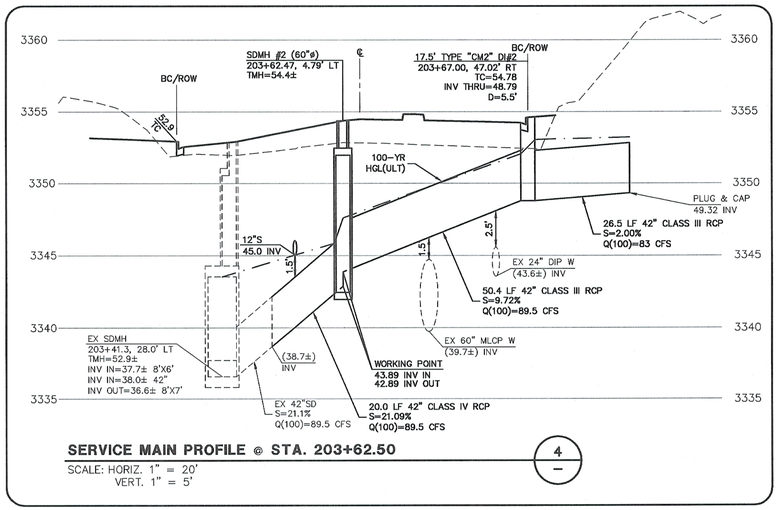
SERVICE MAIN PROFILE @ STA. 200+81.87 — 5

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'



STORM DRAIN PROFILE @ STA. 221+23.87 — 1

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'



SERVICE MAIN PROFILE @ STA. 203+62.50 — 4

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:

H #---
CLV #

NEVADA ENGINEER - STATE OF NEVADA - PROFESSIONAL - No. 15178 - JOSHUA L. JOHNSON - Not for Construction - DATE: 6/7/13

REV	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: DFK
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:14:02

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BLVD. - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS - MESQUITE

LAS VEGAS

F:\Projects\600\62023B-205\DWG\Production\205-LAT-Storm.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
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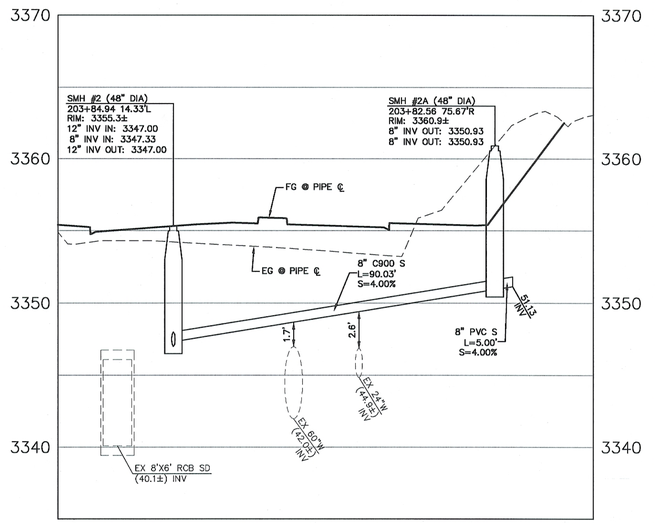
STORM DRAIN SERVICE PROFILES

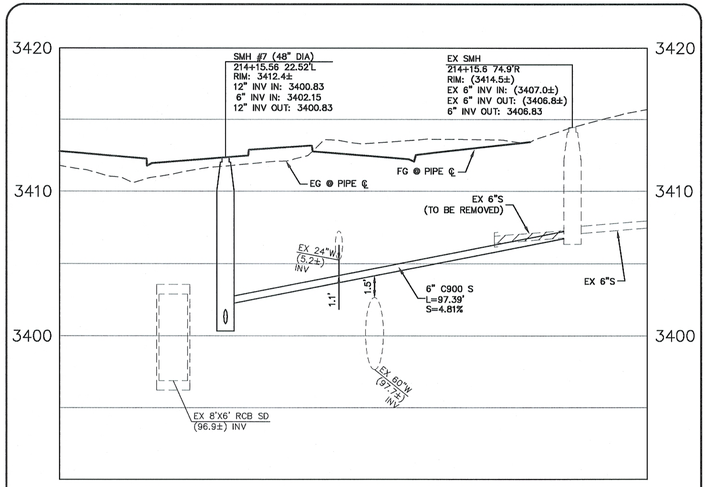
DRAWING
L1
14 OF 27 SHTS



FAR HILLS AVENUE
SEWER PROFILE @ 203+84.94

6

SCALE: HORIZ. 1"=20', VERT. 1"=5'
SID #813 PROJECTS 4A, 4B & 4C
SID #810 PROJECTS 2A, 2B & 2C



FAR HILLS AVENUE
SEWER PROFILE @ 214+15.56

4

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SID #813 PROJECTS 4A, 4B & 4C
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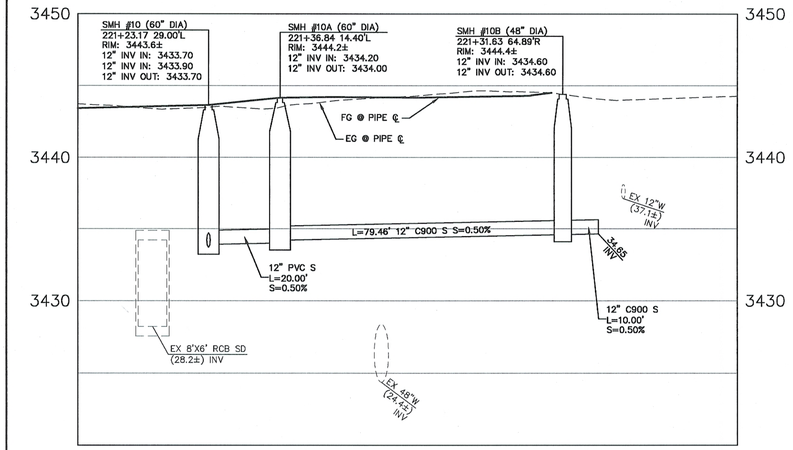

FAR HILLS AVENUE
SEWER PROFILE @ 221+31.30

2

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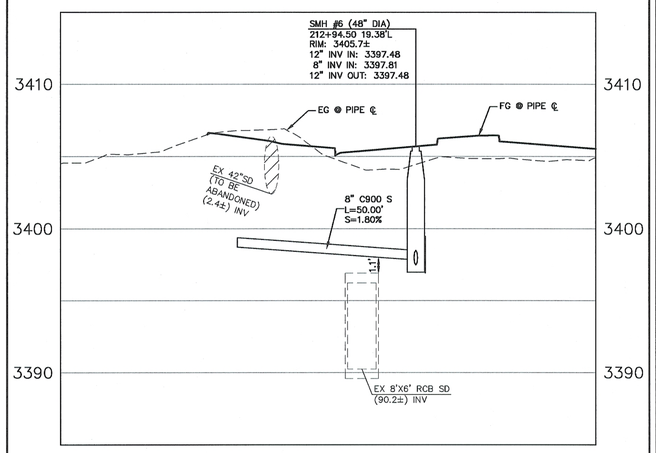
SID #810 PROJECTS 2A, 2B & 2C



FAR HILLS AVENUE
SEWER PROFILE @ 212+94.50

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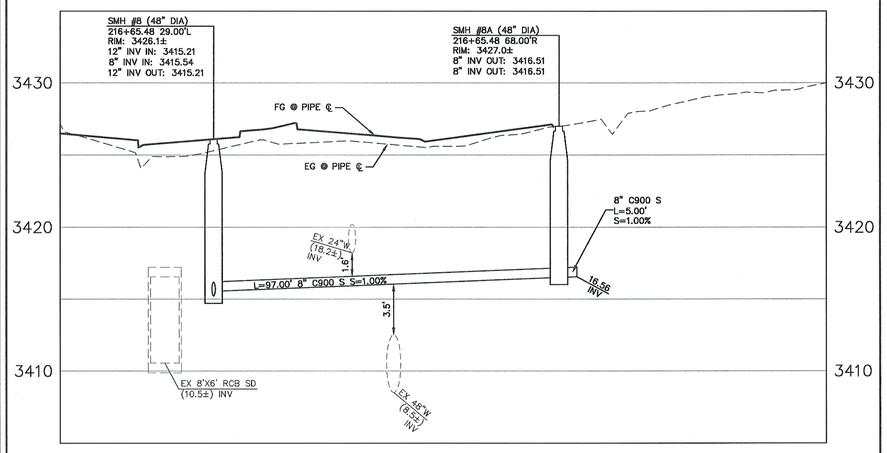
SID #810 PROJECTS 2A, 2B & 2C



FAR HILLS AVENUE
SEWER PROFILE @ 216+65.48

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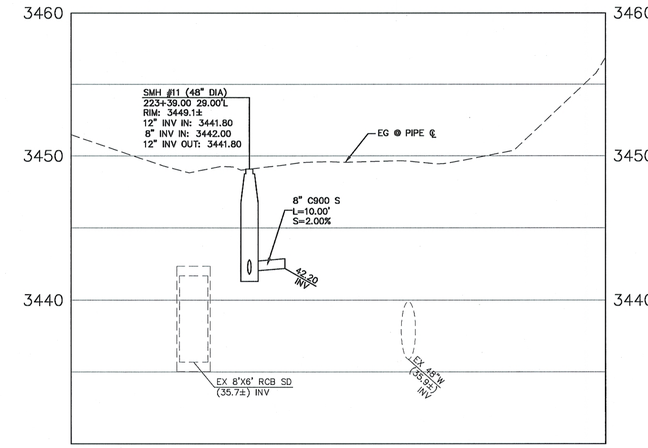


FAR HILLS AVENUE
SEWER PROFILE @ 223+39.00

1

SCALE: HORIZ. 1"=20', VERT. 1"=5'
SID #813 PROJECTS 4A, 4B & 4C
SID #810 PROJECTS 2A, 2B & 2C

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:

H #---
CLV #

STATE OF NEVADA
PROFESSIONAL ENGINEER
JOSHUA J. JOHNSON
No. 15757
DATE: 6/11/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN: JPC
DRAWN: JPC
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:14:22

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS NV 89146
T: 702.804.2000 F: 702.804.2299 GCWALLACE.COM
LAS VEGAS MESQUITE

LAS VEGAS

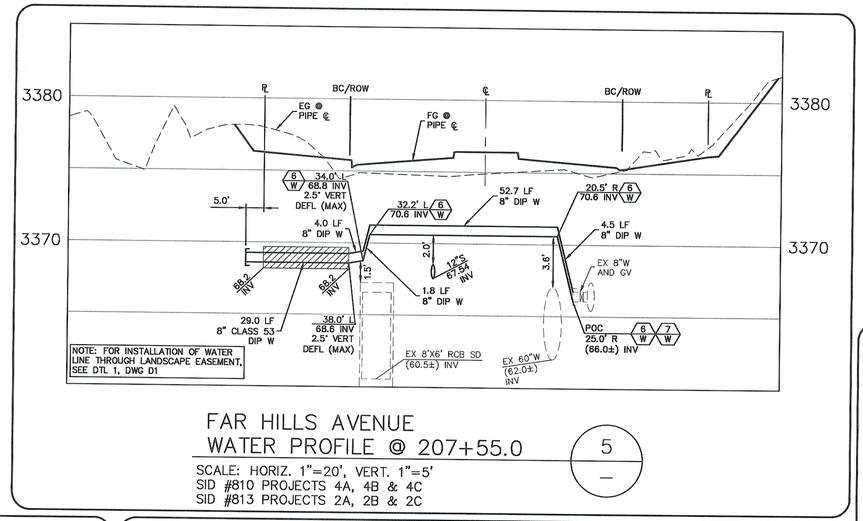
F:\Projects\600\62023B-205\DWG\Production\205-LA1-Sewer.dwg
Humberto Franco-Rivas

HOWARD HUGHES PROPERTIES, INC.

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

SEWER PROFILES

DRAWING
L2
15 OF 27 SHTS



FAR HILLS AVENUE
WATER PROFILE @ 207+55.0

5 / —

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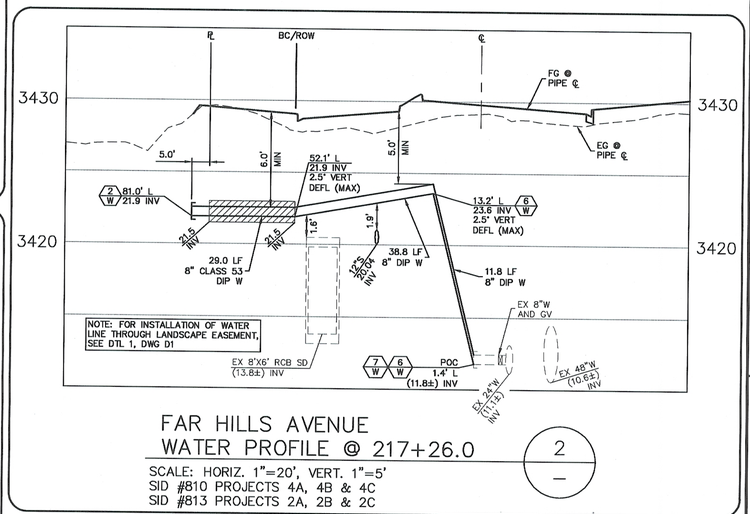

FAR HILLS AVENUE
WATER PROFILE @ 217+26.0

2 / —

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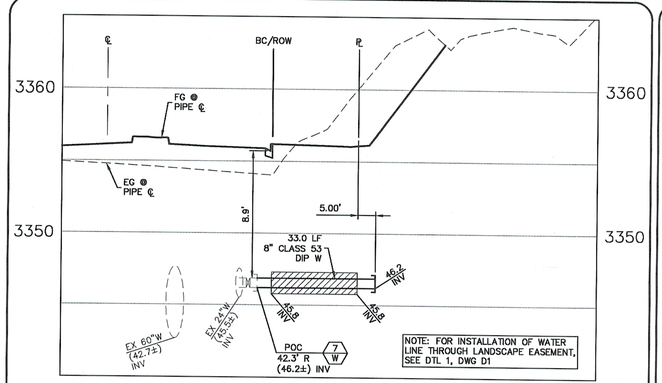

FAR HILLS AVENUE
WATER PROFILE @ 203+95.6

7 / —

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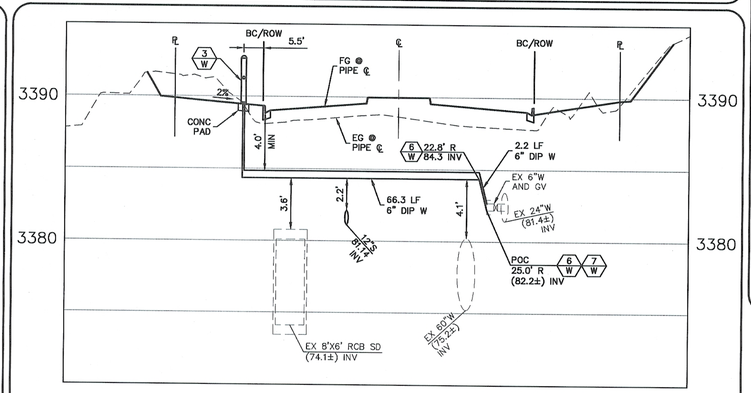
SID #813 PROJECTS 2A, 2B & 2C



FAR HILLS AVENUE
WATER PROFILE @ 210+00.0

4 / —

SCALE: HORIZ. 1"=20', VERT. 1"=5'
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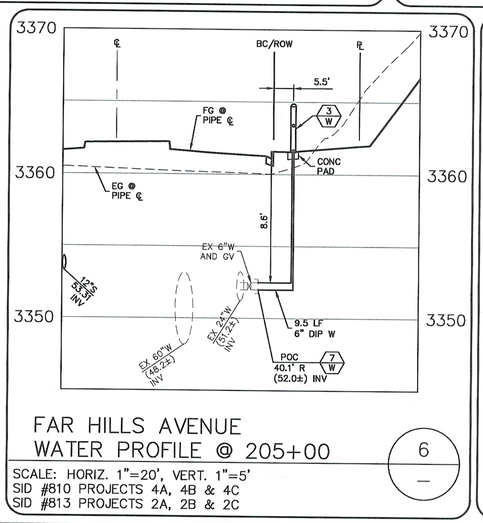
SID #813 PROJECTS 2A, 2B & 2C



FAR HILLS AVENUE
WATER PROFILE @ 205+00

6 / —

SCALE: HORIZ. 1"=20', VERT. 1"=5'
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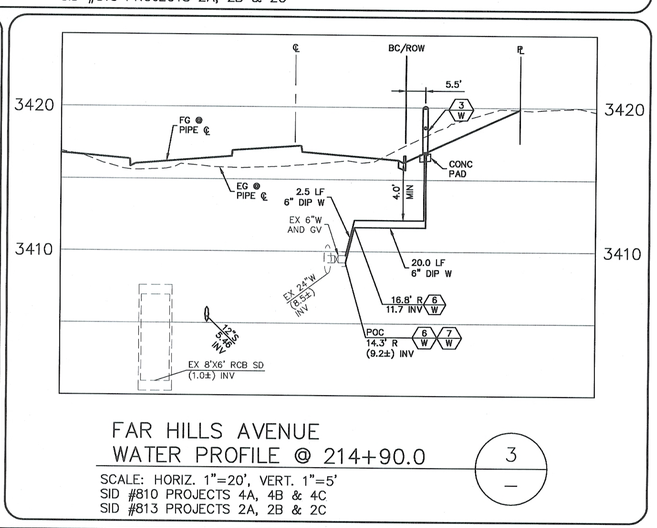
SID #813 PROJECTS 2A, 2B & 2C



FAR HILLS AVENUE
WATER PROFILE @ 214+90.0

3 / —

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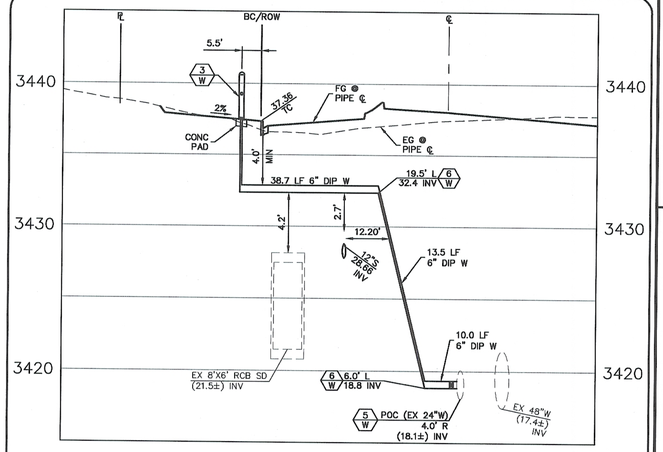
SID #813 PROJECTS 2A, 2B & 2C



FAR HILLS AVENUE
WATER PROFILE @ 219+30.0

1 / —

SCALE: HORIZ. 1"=20', VERT. 1"=5'
SID #810 PROJECTS 4A, 4B & 4C
SID #813 PROJECTS 2A, 2B & 2C

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:

H #---
CLV #

PROFESSIONAL ENGINEER - STATE OF NEVADA - JOSHUA C. JOHNSON - No. 15178 - 08/29/2013 - DATE: 6/27/13

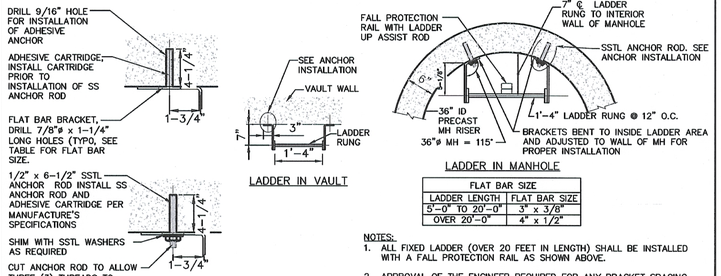
DESCRIPTION	DATE	ASEN APP	DATE	GCW APP
REV	DATE			

PROJECT NO. 62023B-205
DESIGN: JPC
DRAWN: JPC
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:14:43

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS - MESQUITE
LAS VEGAS
F:\Projects\600\62023B-205\DWG\Production\205-LAT-Water.dwg
Humberto Franco-Rivas

HOWARD HUGHES PROPERTIES, INC.
VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE
WATER PROFILES

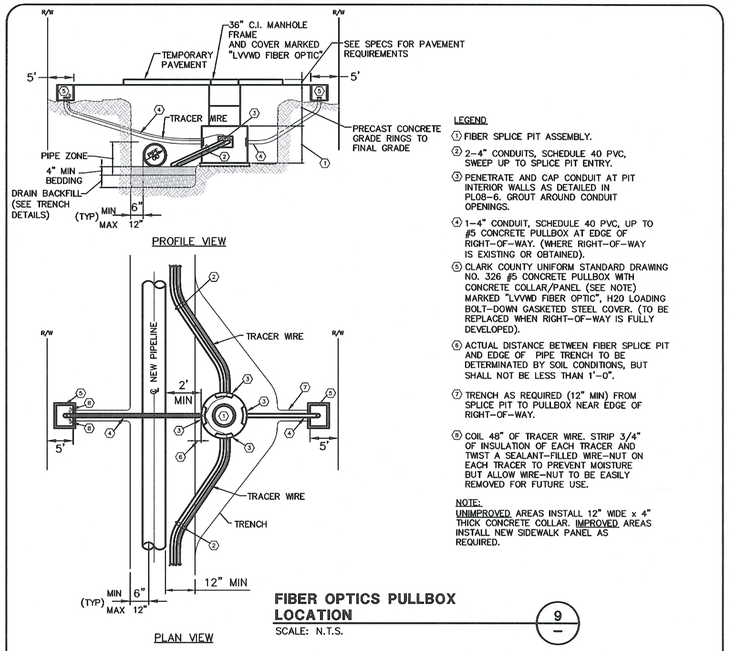
DRAWING
L3
16 OF 27 SHTS



FLAT BAR SIZE	
LADDER LENGTH	FLAT BAR SIZE
5'-0" TO 20'-0"	3" x 3/8"
OVER 20'-0"	4" x 1/2"

NOTES:
1. ALL FIXED LADDER (OVER 20 FEET IN LENGTH) SHALL BE INSTALLED WITH A FALL PROTECTION RAIL AS SHOWN ABOVE.
2. APPROVAL OF THE ENGINEER REQUIRED FOR ANY BRACKET SPACING OVER 5'-0" OC
3. LADDER SHALL BE MADE OF MILD STEEL WITH 3/4"ø SMOOTH BAR RUNGS PLUG WELDED TO RUNNERS.
4. GALVANIZE LADDER ASSEMBLY AFTER WELDING.

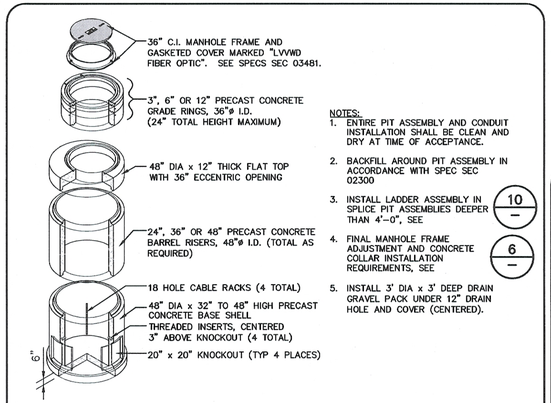
LABBER INSTALLATION DETAILS — 10
SCALE: N.T.S.



LEGEND
1. FIBER SPLICE PIT ASSEMBLY.
2. 2-4" CONDUITS, SCHEDULE 40 PVC, SWEEP UP TO SPLICE PIT ENTRY.
3. PENETRATE AND CAP CONDUIT AT PIT INTERIOR WALLS AS DETAILED IN PLOB-6. GROUT AROUND CONDUIT OPENINGS.
4. 1-4" CONDUIT, SCHEDULE 40 PVC, UP TO #5 CONCRETE PULLBOX AT EDGE OF RIGHT-OF-WAY. (WHERE RIGHT-OF-WAY IS EXISTING OR OBTAINED).
5. CLARK COUNTY UNIFORM STANDARD DRAWING NO. 326 #5 CONCRETE PULLBOX WITH CONCRETE COLLAR/PANEL (SEE NOTE) MARKED "LVVWD FIBER OPTIC", H20 LOADING BOLT-DOWN GASKETED STEEL COVER. (TO BE REPLACED WHEN RIGHT-OF-WAY IS FULLY DEVELOPED).
6. ACTUAL DISTANCE BETWEEN FIBER SPLICE PIT AND EDGE OF PIPE TRENCH TO BE DETERMINATED BY SOIL CONDITIONS, BUT SHALL NOT BE LESS THAN 1'-0".
7. TRENCH AS REQUIRED (12" MIN) FROM SPLICE PIT TO PULLBOX NEAR EDGE OF RIGHT-OF-WAY.
8. COIL 48" OF TRACER WIRE. STRIP 3/4" OF INSULATION OF EACH TRACER AND TWIST A SEALANT-FILLED WIRE-NUT ON EACH TRACER TO PREVENT MOISTURE BUT ALLOW WIRE-NUT TO BE EASILY REMOVED FOR FUTURE USE.

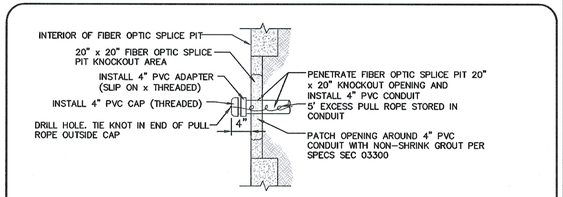
NOTE:
UNIMPROVED AREAS INSTALL 12" WIDE x 4" THICK CONCRETE COLLAR. IMPROVED AREAS INSTALL NEW SIDEWALK PANEL AS REQUIRED.

FIBER OPTICS PULLBOX LOCATION — 9
SCALE: N.T.S.

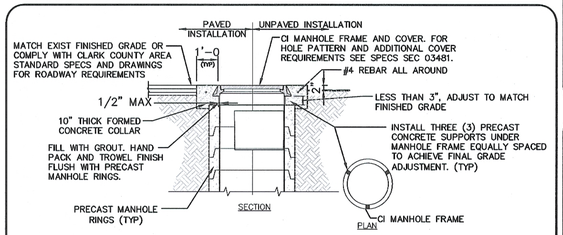


NOTES:
1. ENTIRE PIT ASSEMBLY AND CONDUIT INSTALLATION SHALL BE CLEAN AND DRY AT TIME OF ACCEPTANCE.
2. BACKFILL AROUND PIT ASSEMBLY IN ACCORDANCE WITH SPEC SEC 02300
3. INSTALL LADDER ASSEMBLY IN SPLICE PIT ASSEMBLIES DEEPER THAN 4'-0", SEE — 10
4. FINAL MANHOLE FRAME ADJUSTMENT AND CONCRETE COLLAR INSTALLATION REQUIREMENTS, SEE — 6
5. INSTALL 3' DIA x 3' DEEP DRAIN GRAVEL PACK UNDER 12" DRAIN HOLE AND COVER (CENTERED).

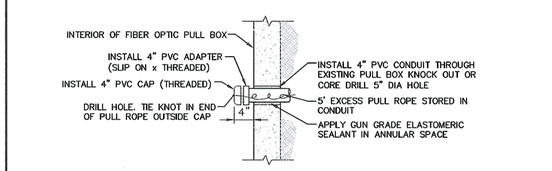
FIBER OPTICS SPLICE PIT ASSEMBLY — 8
SCALE: N.T.S.



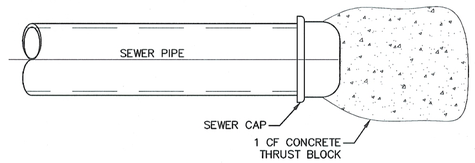
FIBEROPTICS SPLICE PIT PENETRATION DETAIL — 7
SCALE: N.T.S.



MANHOLE COVER AND COLLAR INSTALLATION — 6
SCALE: N.T.S.

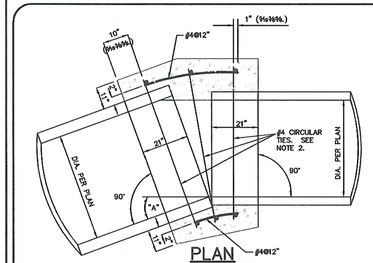


CONDUIT PENETRATION FOR VAULT STRUCTURE — 5
SCALE: N.T.S.



NOTE: CONCRETE TO CONFORM WITH SECTION 4.11.2 OF THE LATEST VERSION OF THE DCS.

SEWER STUB AND CAP WITH THRUST BLOCK — 4
SCALE: N.T.S.

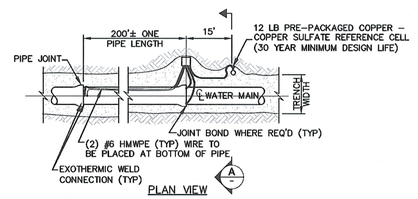


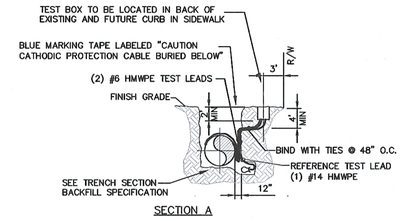
NOTES:
1. WHERE THE SLOPE OF THE UPSTREAM PIPE IS GREATER THAN THE SLOPE OF THE DOWNSTREAM PIPE, JOIN SOFFITS. WHERE THE SLOPE OF THE UPSTREAM PIPE IS LESS THAN THE SLOPE OF THE DOWNSTREAM PIPE, JOIN INVERTS.
2. WHERE THE SPACE BETWEEN THE PIPE EXTREMITIES EXCEEDS 2 1/2 INCHES, THE NUMBER OF CIRCULAR TIES SHALL BE INCREASED TO MAINTAIN A MAXIMUM SPACING OF 6 INCHES CENTER TO CENTER. CIRCULAR TIES SHALL HAVE A DIAMETER 5 INCHES GREATER THAN THE OUTSIDE DIAMETER OF THE LARGER PIPE.
3. CONTRACTOR TO USE CONCRETE COLLAR WHEN CONNECTING TO AN EXISTING STUB WHERE A FIELD ADJUSTMENT IS NEEDED. ANGLE "A" SHALL NOT EXCEED 45°.

CIRCULAR TIES:

PIPE DIAMETER	SPACE BETWEEN PIPE EXTREMITIES	NO. OF CIRCULAR TIES
21" or less	2 1/2"	3
24" to 30"	2 1/2" or less	3
33" to 57"	2 1/2" or less	4
60" to 66"	2 1/2" or less	5

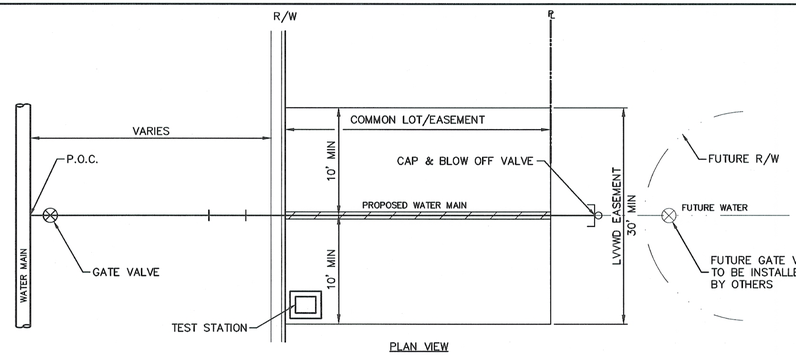
CONCRETE COLLAR DETAIL — 3
SCALE: N.T.S.

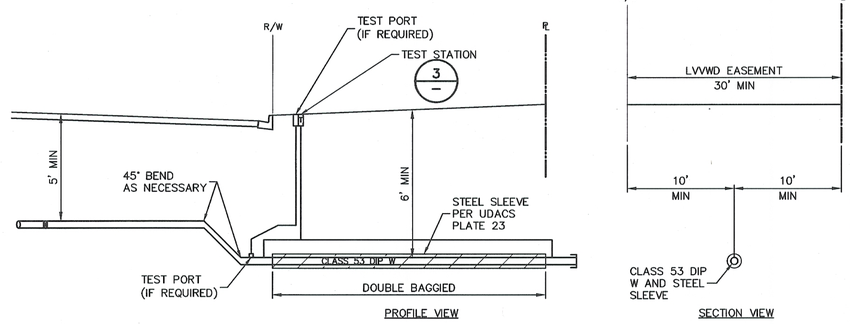




NOTES:
1. USE ONLY NATIVE SOIL FREE OF ROCKS AND CLODS FOR BACKFILL AROUND CELLS WITH A MINIMUM OF 5 GALS OF WATER SATURATION DURING INSTALLATION. DO NOT USE SAND AS BACKFILL.
2. SUPPLY ENOUGH WIRE FROM EACH LEAD TO REACH FULL R/W WIDTH PLUS FIVE (5) ADDITIONAL FEET. COIL WIRE IN BOTTOM OF BOX.
3. TEST STATION PLACEMENT TO BE PERPENDICULAR TO PIPE, AT INTERSECTIONS, TEST STATION WIRES TO BE PLACED PARALLEL TO PIPE FOR PLACEMENT PERPENDICULAR TO PIPE AFTER ROAD EASEMENT RADIUS.

TYPE 'T' TEST STATION WITHOUT ANODES — 2
SCALE: N.T.S.





NOTES
1. NO BUILDINGS, STRUCTURES, WALLS, FENCES OR TREES SHALL BE PLACED UPON, OVER OR UNDER SAID EASEMENT FOR THE DURATION OF THIS EASEMENT EXCEPT THAT SAID EASEMENT MAY BE IMPROVED AND USED FOR STREET, ROAD, OR DRIVEWAY PURPOSES, TRAIL, PATH, PARKING LOT, PLAYGROUND, NON-VEHICULAR PUBLIC ACCESS, OR SHALLOW ROOT LANDSCAPING PURPOSES AND FOR OTHER UTILITIES, INSOFAR AS SUCH USE DOES NOT INTERFERE WITH ITS USE BY THE DISTRICT FOR THE PURPOSES FOR WHICH IT IS GRANTED.
2. A SURFACE MAINTENANCE/REPAIR AGREEMENT WILL BE REQUIRED STATING THE DEVELOPER AGREES TO SURFACE RESTORATION/REPAIR AT SOLE COST IN PERPETUITY.
3. THE FINAL MAP MUST DEDICATE THE SUBJECT EASEMENT AREA AS A COMMON ELEMENT.
4. TRENCH BACKFILL MUST BE CLASS 1 CLSM
5. PIPELINE MUST HAVE MECHANICAL JOINTS
6. AT A MINIMUM, THE JOINTS MUST BE BONDED AND TEST STATION INSTALLED ON ONE END OF THE EASEMENT
7. FOR 16-INCH AND LARGE PIPELINES, A TEST PORT WILL BE REQUIRED TO FACILITATE PIPELINE CONDITION EASEMENT
8. CARSONITE OR BRASS MARKERS MUST BE TO DELINEATE THE LOCATION/ALIGMENT OF THE PIPELINE WITHIN THE EASEMENT

TYPICAL COMMON ELEMENT/ EASEMENT REQUIREMENTS — 1
SCALE: N.T.S.

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:

H #---
CLV #

JOSHUA T. JOHNSON — STATE OF NEVADA — No. 15186 — PROFESSIONAL ENGINEER — CIVIL — Exp. 06/30/2015 — DATE: 6/7/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	CCW APP

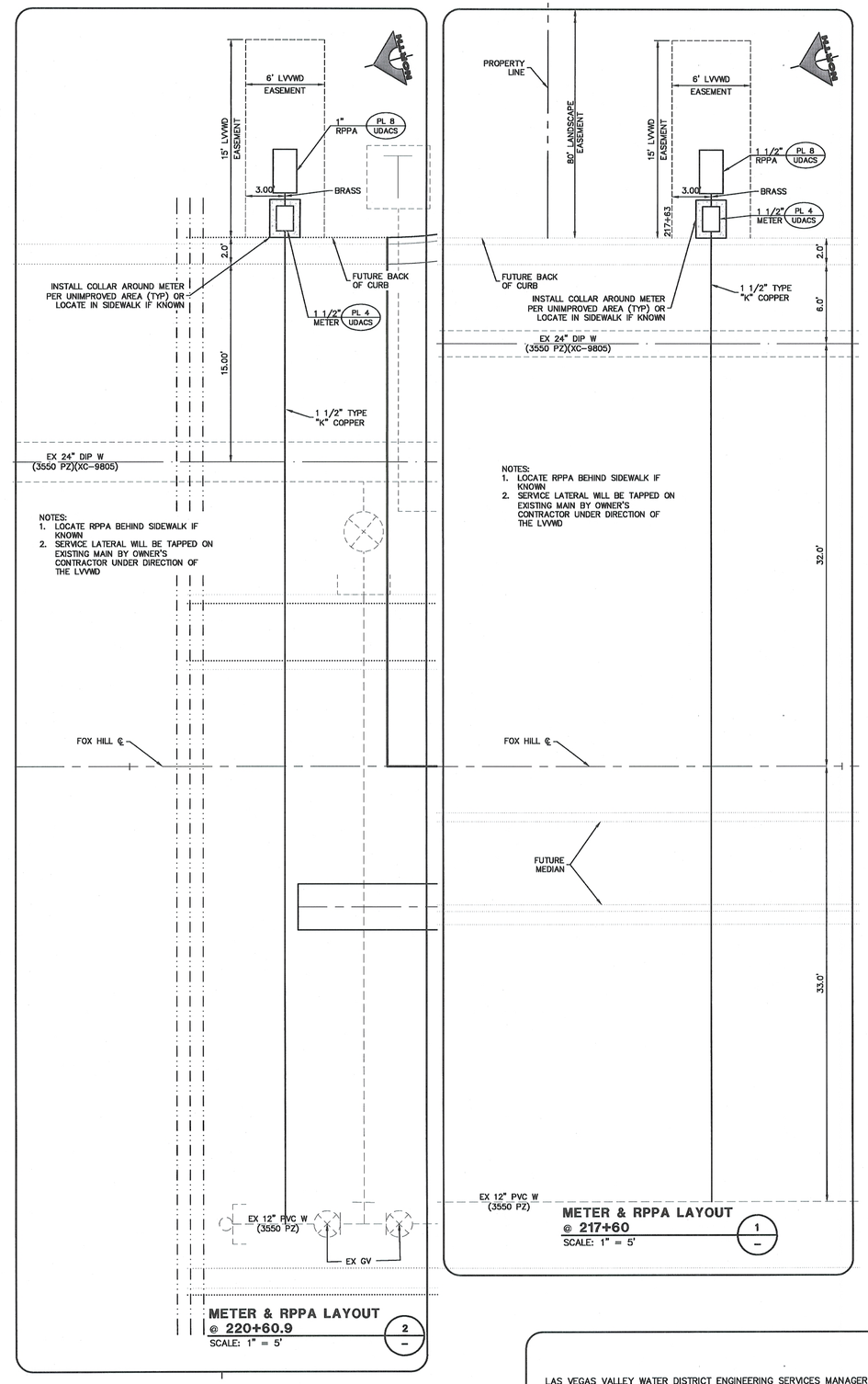
PROJECT NO. 62023B-205
DESIGN: JPC
DRAWN: JPC
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:14:58

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RANCHO DRIVE, SUITE 4 LAS VEGAS, NEVADA 89102 (702) 384-2000 FAX (702) 384-2259 GCWALLACE.COM
LAS VEGAS · MESQUITE

LAS VEGAS
F:\Projects\600\620239-205\DWG\Production\205-DET-Utility.dwg
Humberto Franco-Rivas

HOWARD HUGHES PROPERTIES, INC.
VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE
DETAILS 1

DRAWING D1
17 OF 27 SHTS



LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:

H #---
CLV #

ENGINEER - STATE OF NEVADA
JOSHUA L. JOHNSON
Exp. 06/30/2013
CIVIL
PROFESSIONAL
No. 15789

DATE: 6/17/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205

DESIGN: JPC
DRAWN: JPC
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:39:55

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
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T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM
LAS VEGAS · MESQUITE

LAS VEGAS

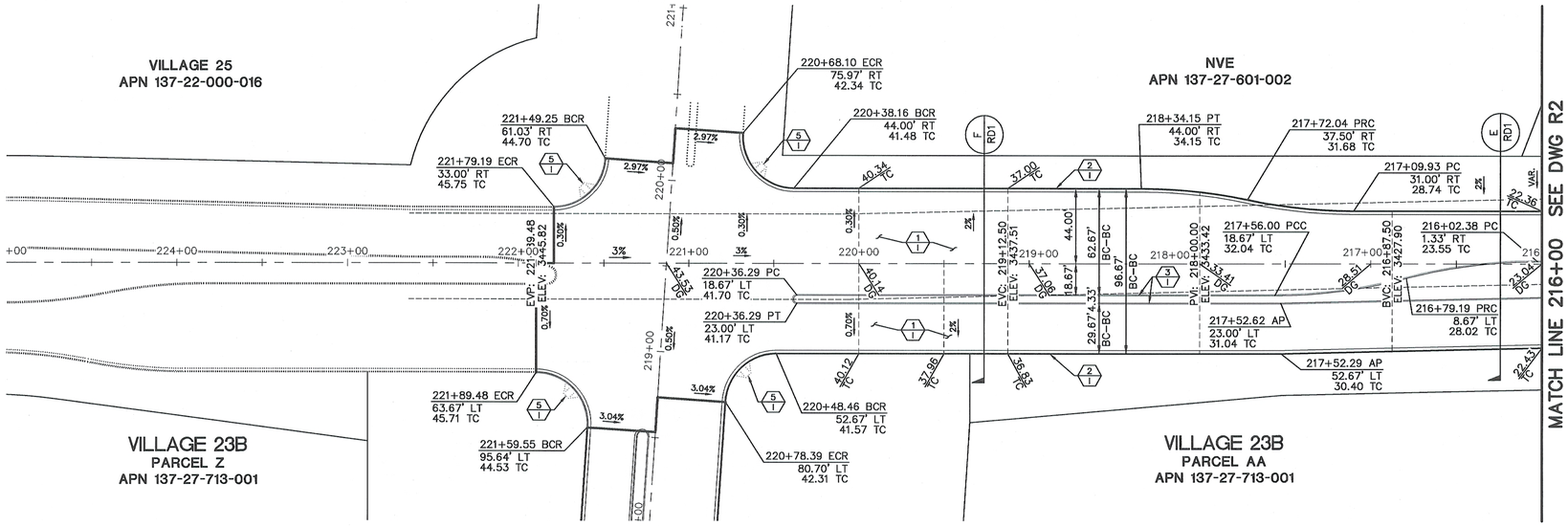
F:\Projects\600\62023B-205\DWG\Production\205-DET-Utility.dwg
Humberto Franco-Rivas

HOWARD HUGHES PROPERTIES, INC.

VILLAGE 23B
FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

DETAILS 2

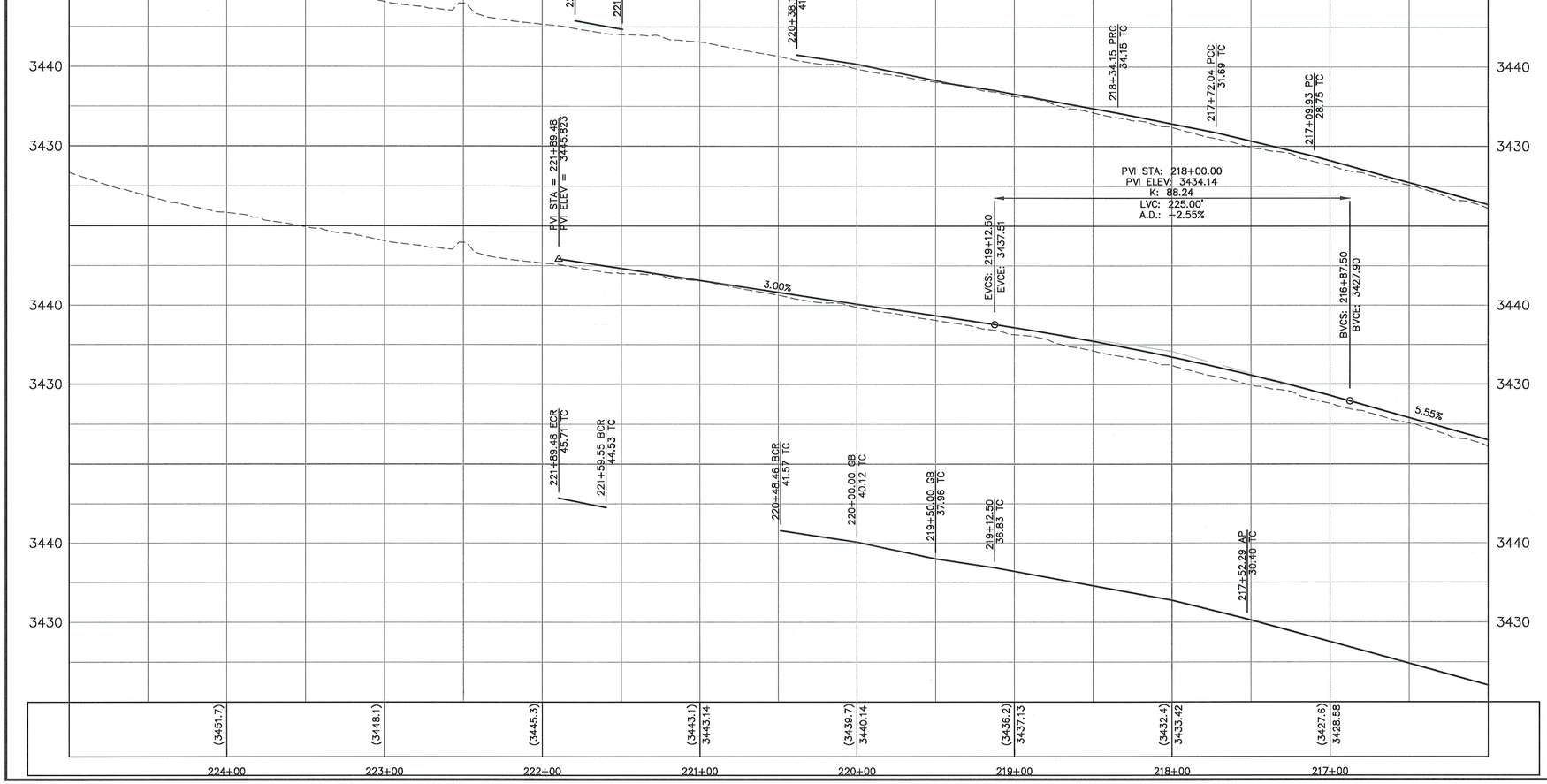
DRAWING
D2
18 OF 27 SHTS

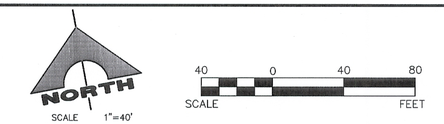


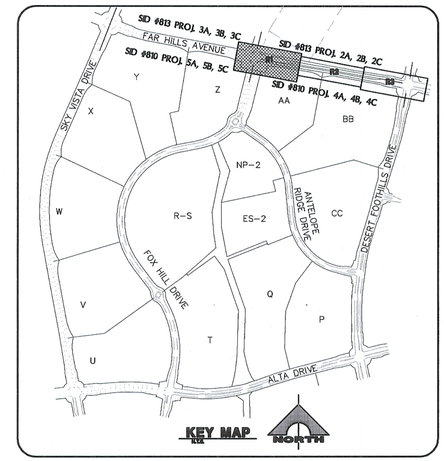
FAR HILLS AVENUE (PUBLIC)

SCALE: HORIZ. 1" = 40'
VERT. 1" = 8'

SID #810 PROJECTS 4A, 4B, 4C, 5A, 5B, 5C SID #813 PROJECTS 2A, 2B, 2C, 3A, 3B, 3C







CONSTRUCTION NOTES

IMPROVEMENTS

1. INSTALL A.C. PAVEMENT PER SHEET RD1
2. INSTALL 6" "L" TYPE CURB & GUTTER (S-47 S)
3. INSTALL "A" TYPE ISLAND CURB (S-50 S)
4. INSTALL CONCRETE BUS TURNOUT (234.1 USD)
5. INSTALL HANDICAP RAMP CURB DEPRESSION.

CONTRACTOR NOTE:

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BENCHMARK

DESC.	NAVD 88 DATUM	NAVD 88 DATUM
RIVET AND PLATE IN TOP OF CURB @ NORTHEAST CORNER OF DESERT FOOTHILLS AND ALTA DRIVE	3304.45 (FEET)	1007.197 (METERS)
CLV BM No. SLV09 34NE6		

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

DATE

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-227-2600

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

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

NOTE

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DRAINAGE CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY (HTE #06-17835) ON FILE AT THE CLARK COUNTY DEVELOPMENT SERVICES FOR THIS PROJECT.

DATE

JOSHUA L. JOHNSON — 15789 P.E. NO. — DATE

H #-
CLV #

ENGINEER - STATE OF NEVADA
JOSHUA L. JOHNSON
No. 15789
PROFESSIONAL
DATE: 6/11/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: DFK
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:15:34

G.C. WALLACE COMPANIES
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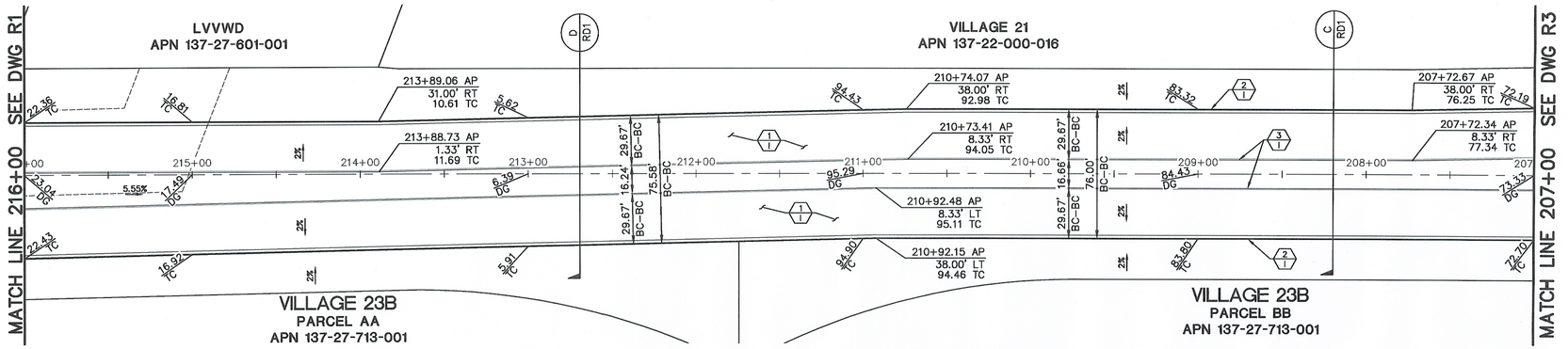
LAS VEGAS
F:\Projects\600\62023B-205\DWG\Production\205-ROAD.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

ROADWAY PLAN AND PROFILE 1

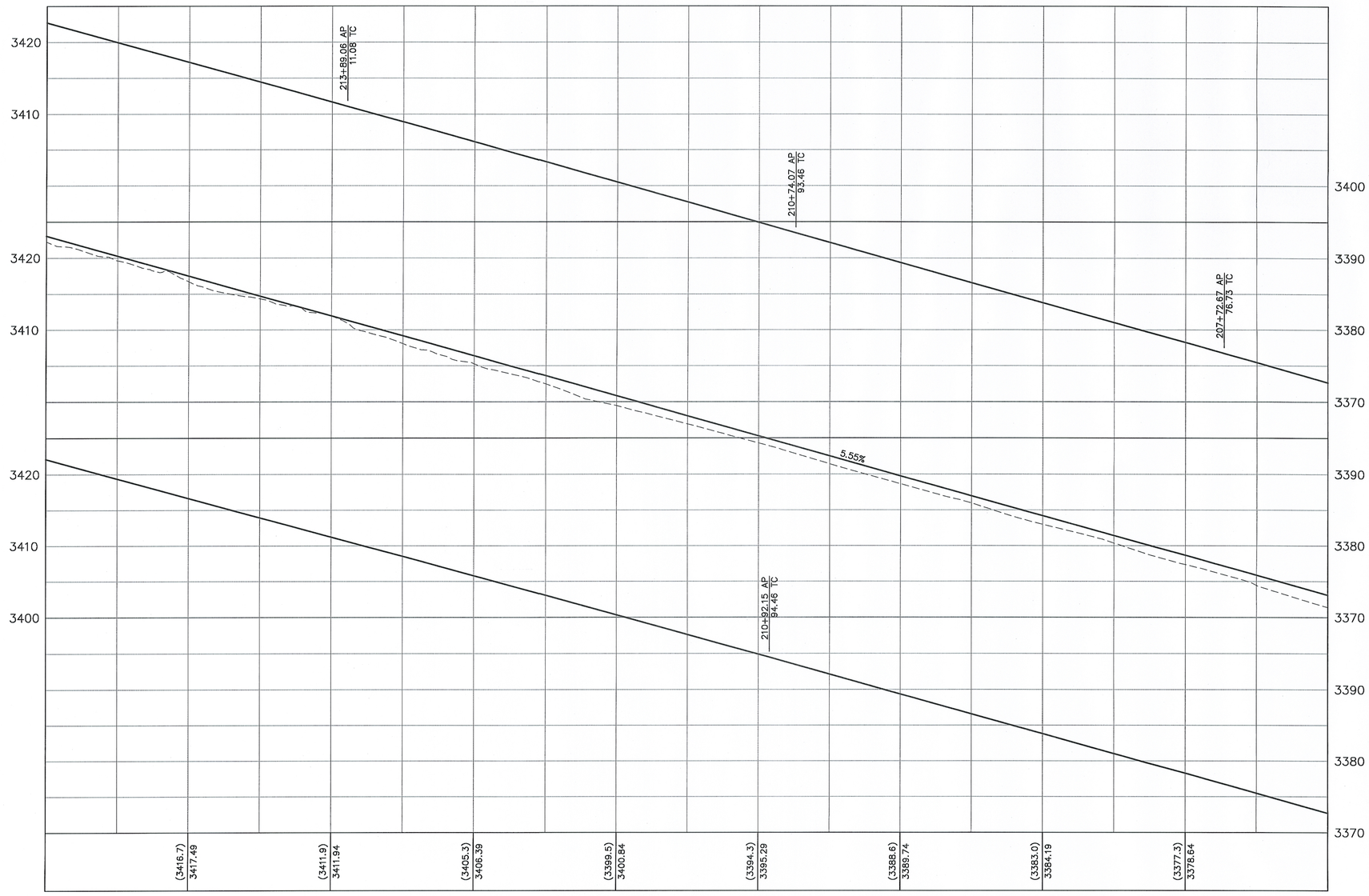
DRAWING
R1
19 OF 27 SHTS

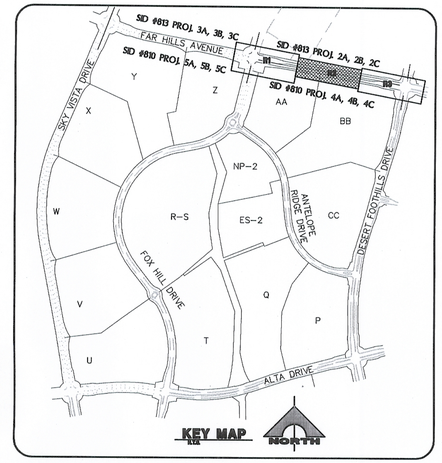


FAR HILLS AVENUE (PUBLIC)

SCALE: HORIZ. 1" = 40'
VERT. 1" = 8'

SID #810 PROJECTS 4A, 4B, 4C, 5A, 5B, 5C SID #813 PROJECTS 2A, 2B, 2C, 3A, 3B, 3C





NORTH

SCALE 1"=40'

40 0 40 80
SCALE FEET

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DATE

JOSHUA L. JOHNSON — 15789 P.E. NO. — DATE

H #-
CLV #

ENGINEER - STATE OF NEVADA - REGISTERED PROFESSIONAL
JOSHUA L. JOHNSON
No. 15789
06/30/2013
PE LEVEL
DATE: 6/11/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: DFK
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:15:42

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LAS VEGAS

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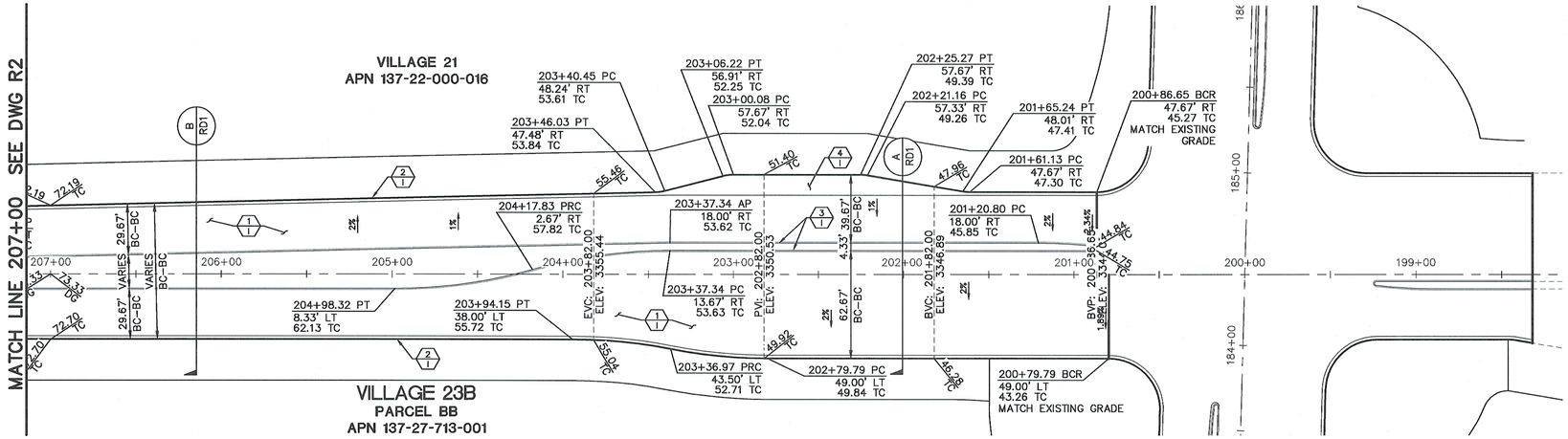
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

ROADWAY PLAN AND PROFILE 2

DRAWING
R2
20 OF 27 SHTS



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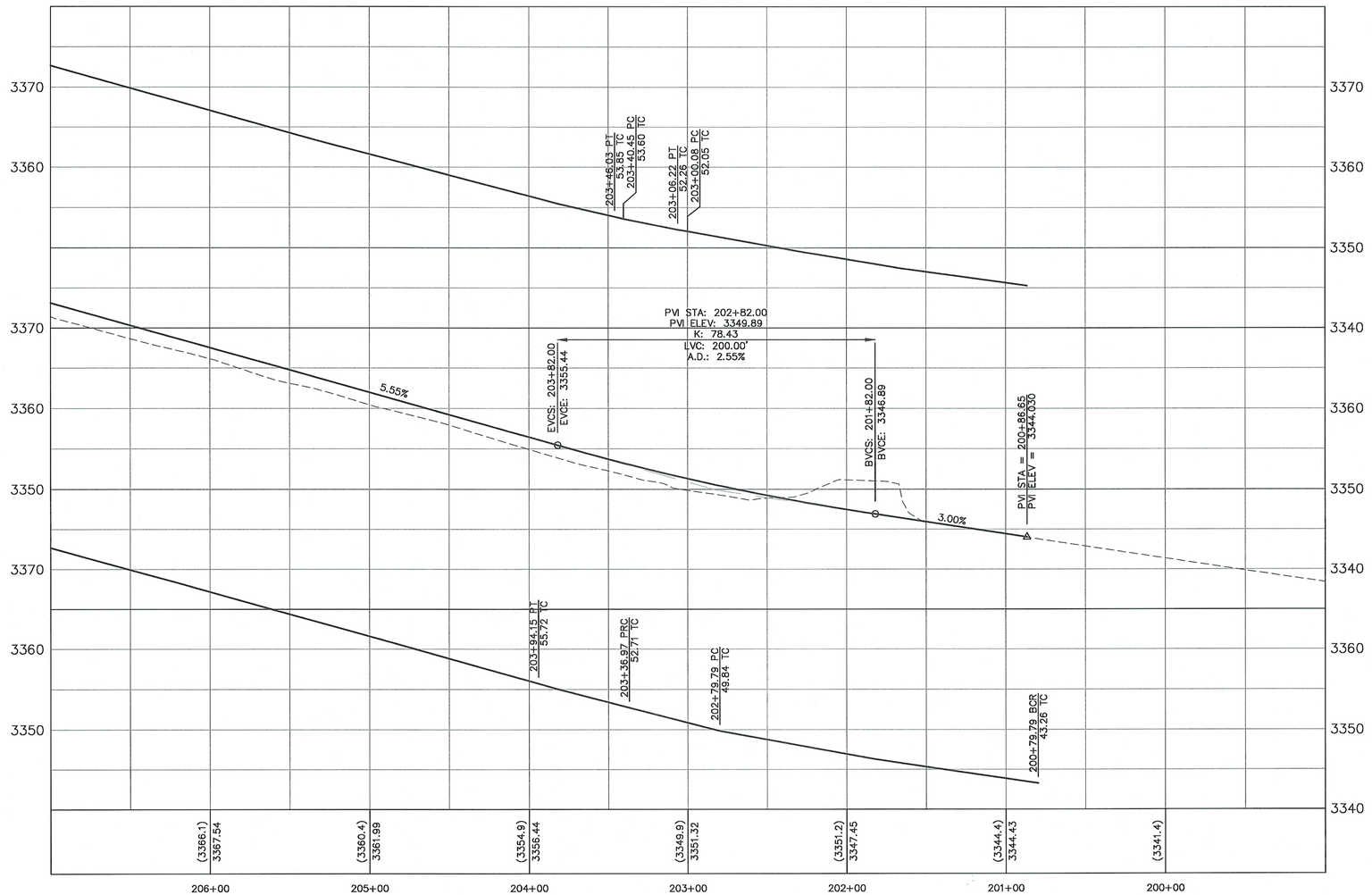
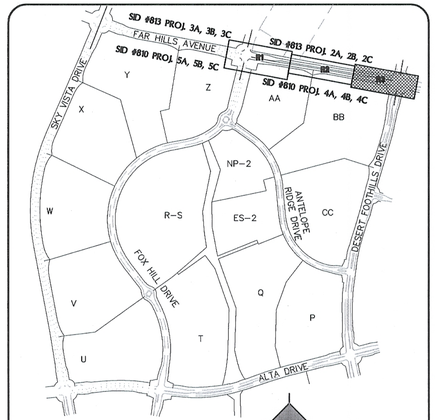
SID #810 PROJECTS 4A, 4B, 4C, 5A, 5B, 5C SID #813 PROJECTS 2A, 2B, 2C, 3A, 3B, 3C





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DATE

JOSHUA L. JOHNSON	15789	
	P.E. NO.	DATE

H #–
CLV #

NORTH
SCALE 1"=40'

40 0 40 80
SCALE FEET

DATE: 6/17/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: DFK
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:15:53

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LAS VEGAS - MESQUITE
LAS VEGAS

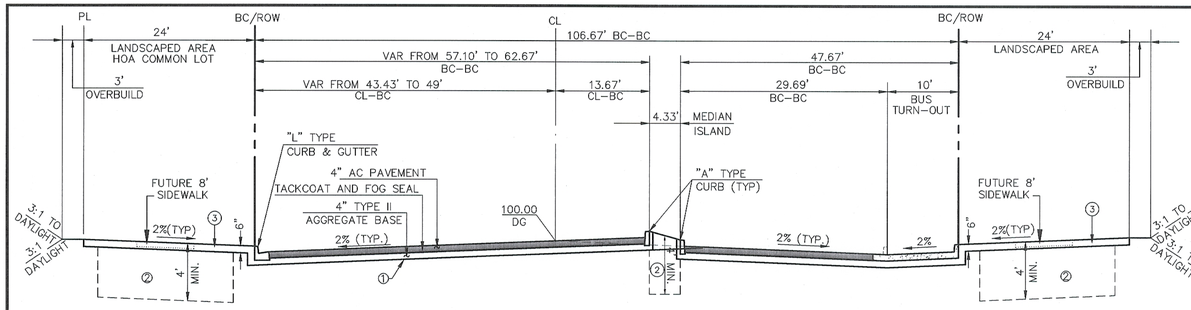
F:\Projects\600\62023B-205\DWG\Production\205-ROAD.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

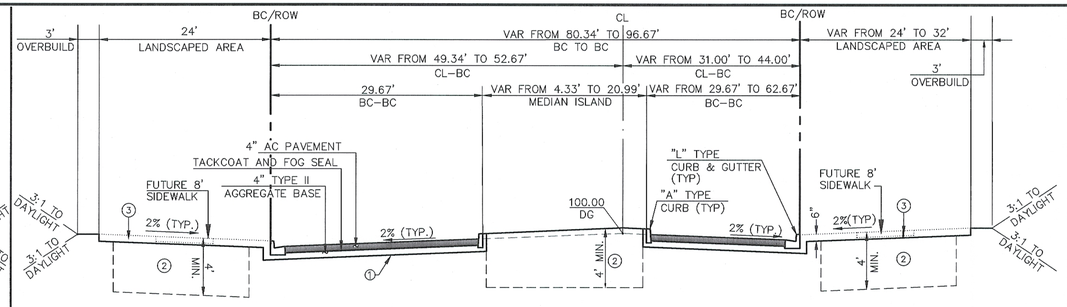
ROADWAY PLAN AND PROFILE 3

DRAWING
R3
21 OF 27 SHTS



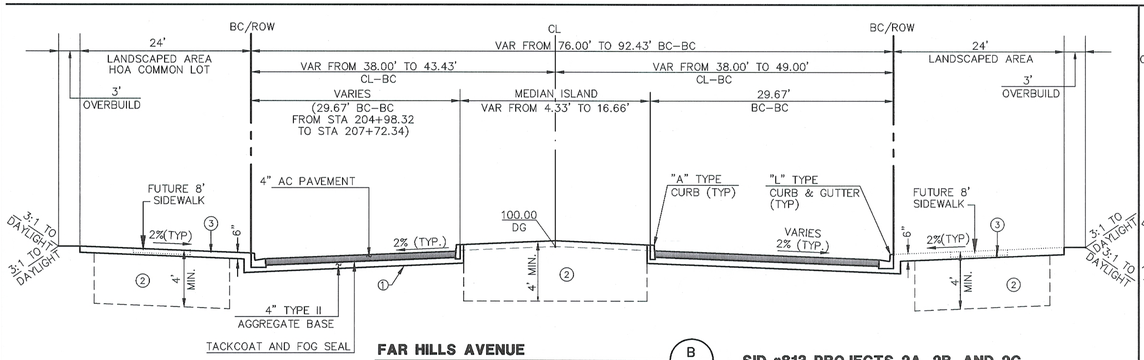
FAR HILLS AVENUE (A)
STA 201+60.13 TO STA 203+46.03
NOT TO SCALE

SID #813 PROJECTS 2A, 2B, AND 2C
SID #810 PROJECTS 4A, 4B, AND 4C



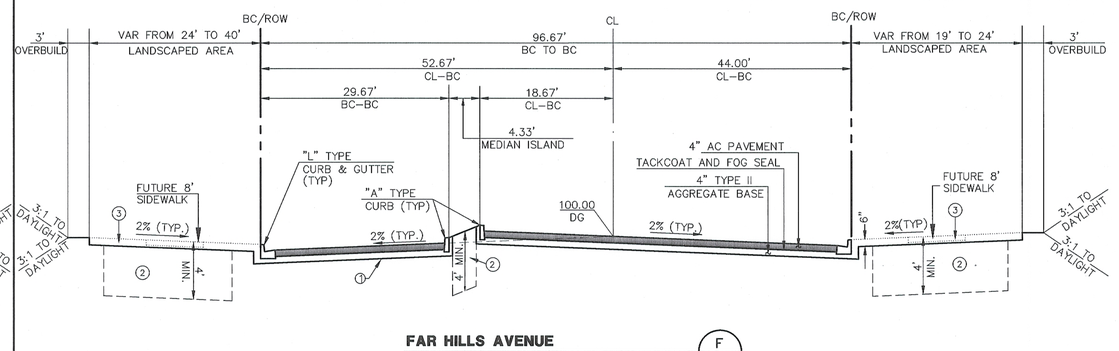
FAR HILLS AVENUE (E)
STA 216+02.38 TO STA 218+34.15
NOT TO SCALE

SID #813 PROJECTS 2A, 2B, AND 2C
SID #810 PROJECTS 4A, 4B, AND 4C

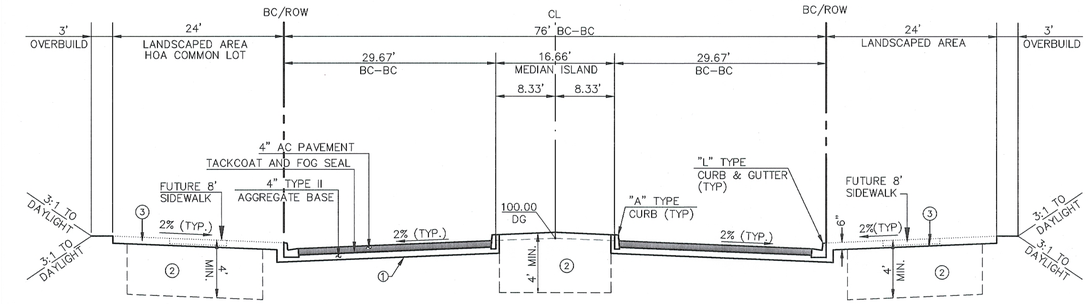


FAR HILLS AVENUE (B)
STA 203+37.34 TO STA 207+72.34
NOT TO SCALE

SID #813 PROJECTS 2A, 2B, AND 2C
SID #810 PROJECTS 4A, 4B, AND 4C

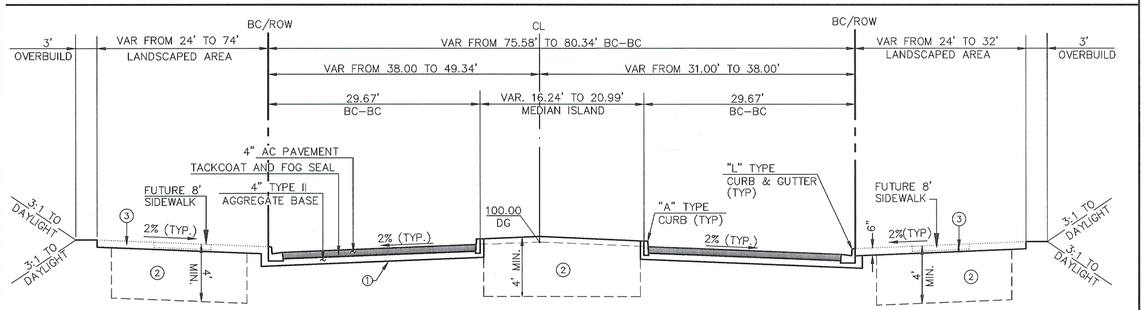


FAR HILLS AVENUE (F)
STA 218+34.15 TO 220+48.46
NOT TO SCALE



FAR HILLS AVENUE (C)
STA 207+72.34 TO STA 210+73.41
NOT TO SCALE

SID #813 PROJECTS 2A, 2B, AND 2C
SID #810 PROJECTS 4A, 4B, AND 4C



FAR HILLS AVENUE (D)
STA 210+73.41 TO STA 216+02.38
NOT TO SCALE

SID #813 PROJECTS 2A, 2B, AND 2C
SID #810 PROJECTS 4A, 4B, AND 4C

NOTES

1. SCARIFY NATIVE 6" AND RECOMPACT TO 95%
2. LANDSCAPE AREA: EXCAVATE AND RECOMPACT TO 85% OR RIP ENTIRE AREA TO DEPTH INDICATED.
3. ROUGH GRADE (RG) TO BE 6" BELOW FINISHED GRADE (FG) FOR FUTURE LANDSCAPE PURPOSES.

STATE OF NEVADA — ENGINEER — JOSHUA M. JOHNSON — No. 15704 — PROFESSIONAL — DATE: 6/17/15

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO.

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 06-18-13
PLOT TIME: 14:16:02

G.C. WALLACE COMPANIES
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LAS VEGAS

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Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

ROADWAY DETAIL 1

DRAWING
RD1
22 OF 27 SHTS

SID #813 2A, 2B, AND 2C
SID #810 4A, 4B, AND 4C

MATCH LINE STA. 210+00 SEE BELOW RIGHT

FAR HILLS AVENUE

DESERT FOOTHILLS DRIVE

TYPE 4 LANE LINE (RPM) TYP (244.1 USD)

6" SOLID WHITE BIKE LANE STRIPE (PMF) TYP. (244.2 USD)

BIKE LANE MARKINGS (PMF) (244.9 USD)

WHITE PAVEMENT MARKERS (PMF) TYP. (246 USD)

6" SOLID WHITE LANE STRIPE (PMF) TYP. (246.1 USD)

6" SOLID WHITE BIKE LANE STRIPE (PMF) TYP. (244.2 USD)

STORAGE LANE LINE TYPE A (RPM) (246 USD)

MEDIAN NOSE MARKERS (TYP) (248 USD)

REMOVE EXIST 24" STOP BAR (PMF)

STA 208+42 R3-17 24"X30" RIGHT LANE ONLY

STA 205+45 R3-17 24"X30" RIGHT LANE ONLY

STA 203+00 PC R7-107A 10' 5 ROUTE

STA 202+60 (234.1 USD)

STA 202+97 ONLY

STA 201+24 BIKE LANE MARKINGS (PMF) SPEED LIMIT 35 R2-1 24"X30" RIGHT LANE ONLY R3-17 24"X30"

STA 201+30 R3-7R 30"X30" RIGHT LANE MUST TURN RIGHT

STA 203+94 END 6"X2' SKIP LINE 8' ON CENTER BEGIN 6" SOLID WHITE LINE

STA 203+37 END LEFT TURN STORAGE LANE LINE

STA 202+80 END 6" SOLID WHITE LINE BEGIN 6"X2' SKIP LINE 8' ON CENTER

STA 202+40 WHITE PAVEMENT MARKERS (PMF) TYP.

BEGIN RIGHT TURN LANE YIELD TO BIKES R4-4 36"X30"

RIGHT LANE MUST TURN RIGHT R3-7R 30"X30"

200+00.00 FAR HILLS AVE.

184+41.26 DESERT FOOTHILLS DR.

186+00 185+00 184+00 183+00 200+00 199+00 198+00

HOWARD HUGHES COMPANY, LLC.
APN 137-22-000-016
VILLAGE 21

LVVWD

NPC

SID #813 PROJ. 3A, 3B, & 3C
SID #810 PROJ. 5A, 5B, & 5C

SID #813 PROJ. 2A, 2B, & 2C
SID #810 PROJ. 4A, 4B, & 4C

SHEET 22

FAR HILLS AVE.

SKY VISTA DRIVE

FOX HILL DR

DESERT FOOTHILLS DR

VILLAGE 20

Y Z AA BB

KEY MAP
NTS

NORTH

SCALE 40 0 40 100 FEET

SIGNING AND STRIPING CONSTRUCTION NOTES

1. EXISTING SIGNAGE/STRIPING TO REMAIN
2. FUTURE SIGNAGE/STRIPING

ROAD CLOSED (601 USD)

INSTALL 6-6' MIN TYPE IIIA BARRICADES R11-2 48"X30" MOUNT ON TYPE IIIA BARRICADE STRUCTURE

INSTALL 6-6' MIN NDOT TYPE IIIA BARRICADES R11-2, 48"X30" MOUNT ON TYPE IIIA BARRICADE STRUCTURE

219+51.65 FOX HILL DRIVE

221+13.17 FAR HILLS AVE

24" STOP BAR (PMF)

STA 220+54 R3-7R 30"X30" RIGHT LANE MUST TURN RIGHT

STA 220+00 R3-17 24"X30" RIGHT LANE ONLY R2-1 24"X30" SPEED LIMIT 35

BIKE LANE MARKINGS (PMF) (244.9 USD)

6" SOLID WHITE BIKE LANE STRIPE (PMF) (244.2 USD)

6" SOLID WHITE LANE STRIPE (PMF) (246.1 USD)

STA 218+74 STORAGE LANE TYPE A (RPM) (246 USD)

STA 218+34 R3-7R 30"X30" RIGHT LANE MUST TURN RIGHT

6"X2' SKIP WHITE LINE, 8' ON CENTER (PMF) (246.1 USD)

STA 217+56 BEGIN LEFT TURN STORAGE LANE

STA 217+21 END 6" SOLID WHITE LINE BEGIN 6"X2' SKIP WHITE LINE 8' ON CENTER

BEGIN RIGHT TURN LANE YIELD TO BIKES R4-4 36"X30"

STA 216+02 BEGIN 6"X2' SKIP WHITE LINE 8' ON CENTER

STA 215+02 R3-17 24"X30" RIGHT LANE ONLY

TYPE 4 LANE LINE (RPM) TYP (244.1 USD)

6" SOLID WHITE BIKE LANE STRIPE (PMF) TYP. (244.2 USD)

R6-1 R 36"X12"

STA 212+70 R3-17 24"X30" RIGHT LANE ONLY

6" SOLID WHITE BIKE LANE STRIPE (PMF) TYP. (244.2 USD)

WHITE PAVEMENT MARKERS (PMF) TYP. (246 USD)

PEDESTRIAN CROSSWALK (TYP) (254 USD)

FOX HILL DRIVE

222+00 221+00 220+00 219+00 218+00 217+00 216+00 215+00 214+00 213+00 212+00 211+00 210+00

MATCH LINE STA. 210+00 SEE ABOVE LEFT

NORTH

SCALE 40 0 40 100 FEET

SID #813 2A, 2B, AND 2C
SID #810 4A, 4B, AND 4C

ENGINEER - STATE OF NEVADA
JOSHUA D. JOHNSON
No. 15786
EXP. 06/30/2015
PROFESSIONAL
DATE: 6/11/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO.

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 06-18-13
PLOT TIME: 14:16:16

G.C. WALLACE COMPANIES
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1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM
LAS VEGAS - MESQUITE
LAS VEGAS

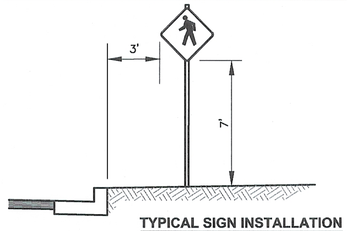
F:\Projects\600\620238-205\DWG\Production\205-ST22-STRIPE1.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

SIGNING AND STRIPING PLAN 1

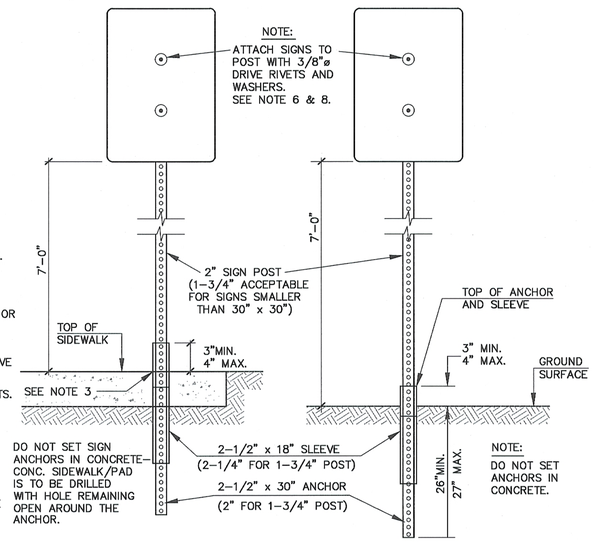
DRAWING
ST1
23 OF 27 SHTS



TYPICAL SIGN INSTALLATION
NOT TO SCALE

NOTES:

1. ALL COMPONENTS SHALL BE MINIMUM 12 GA. SQUARE POST WITH 7/16" PUNCHED THRU HOLES. @ 1' ON CENTER, ON ALL FOUR SIDES. ANCHORS SHALL BE TWO PIECE BREAKAWAY ANCHORS.
2. ATTACH ANCHOR AND SLEEVE TOGETHER PRIOR TO DRIVING INTO GROUND. LEAVE AT LEAST TWO HOLES, BUT NOT MORE THAN THREE HOLES ABOVE GROUND OR ABOVE SIDEWALK.
3. FOR SIDEWALK INSTALLATION, DRILL SIDEWALK WITH A 3" TO 4" HOLE (DEPENDENT UPON ANCHOR SIZE). THE CENTER TO BE 8" FROM BACK OF THE SIDEWALK.
4. ATTACH POST TO ANCHORING SYSTEM BY USING AT LEAST TWO 3/8" DIA. DRIVE RIVETS.
5. PROVIDE 4" MINIMUM LAP BETWEEN BOTTOM OF POST AND THE BOTTOM OF THE ANCHOR/SLEEVE ASSEMBLY.
6. SIGNS LARGER THAN 24" x 30" REQUIRE 3/8" x 1-1/2" FENDER WASHERS UNDER DRIVE RIVETS.
7. "U-CHANNEL" POSTS ARE NOT ACCEPTABLE.
8. BOLTS IN LIEU OF DRIVE RIVETS ARE NOT ACCEPTABLE.
9. ALL URBAN SIGN INSTALLATIONS ARE TO BE INSTALLED IN A CONCRETE SIDEWALK, OR IN A CONCRETE PAD (24"X24"X4") WHEN NO SIDEWALK EXISTS.
10. INSTALLATION OF SIGNS SHALL MEET LATEST ADA REQUIREMENTS.
11. SIGNS SHALL HAVE A STICKER AT THE BACK WITH THE NAME OF THE CONTRACTOR AND DATE OF INSTALLATION.



SIGN LOCATION DETAIL (1/–)
NOT TO SCALE

GENERAL NOTES

1. TEMPORARY SIGNS TO BE REMOVED WHEN THROUGH STREETS ARE OPENED TO TRAFFIC.
2. SEE SIGN LOCATION/INSTALLATION DETAIL.
3. SIGNAGE SHALL BE INSTALLED PRIOR TO ANY PORTION OF THE ROADWAY BEING OPEN TO PUBLIC TRAFFIC.
4. ALL LANE DELINEATIONS TO BE MEASURED AT RIGHT ANGLES AND PARALLEL TO BACK OF CURB TO CONFORM TO CURB ANGLE POINTS AND TRANSITIONS.
5. ALL COLD POLYMER FILM STOP BARS, CROSSWALKS, PAVEMENT ARROWS, AND PAVEMENT MARKINGS SHALL BE 3M-N440 OR APPROVED EQUIVALENT.
6. ALL CONSTRUCTION AND MATERIALS FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" CLARK COUNTY AREA, NEVADA, THIRD EDITION, UNLESS OTHERWISE SPECIFIED BY NOTE ON THE DRAWINGS AND/OR SPECIFICATIONS.
7. ALL DIMENSIONS ARE TAKEN TO BACK OF CURB AND LANE LINES UNLESS OTHERWISE NOTED.

NOTE:

INSTALL BLUE COLORED REFLECTIVE RAISED PAVEMENT MARKERS ADJACENT TO THE FIRE HYDRANT ON ALL IMPROVED FIRE APPARATUS ACCESS ROADWAYS WITH HARD SURFACES, INCLUDING BOTH PUBLIC AND PRIVATE ROADS, STREET OR FIRE LANES.
- ON ROADWAYS WITH NO PARKING PERMITTED ON THE HYDRANT SIDE; EIGHT (8) FEET FROM THE FACE OF THE CURB ON THE HYDRANT SIDE.
- ON ROADWAYS WITH PARKING PERMITTED ON THE HYDRANT SIDE; SIXTEEN (16) FEET FROM THE FACE OF THE CURB ON THE HYDRANT SIDE.

SVRZ NOTE:

NO WALLS, FENCES, TREES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT OTHER THAN TRAFFIC CONTROL DEVICES AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE.

JOSHUA L. JOHNSON No. 15198 PROFESSIONAL ENGINEER STATE OF NEVADA CIVIL
DATE: 6/7/13

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: DFK
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:16:27

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LAS VEGAS

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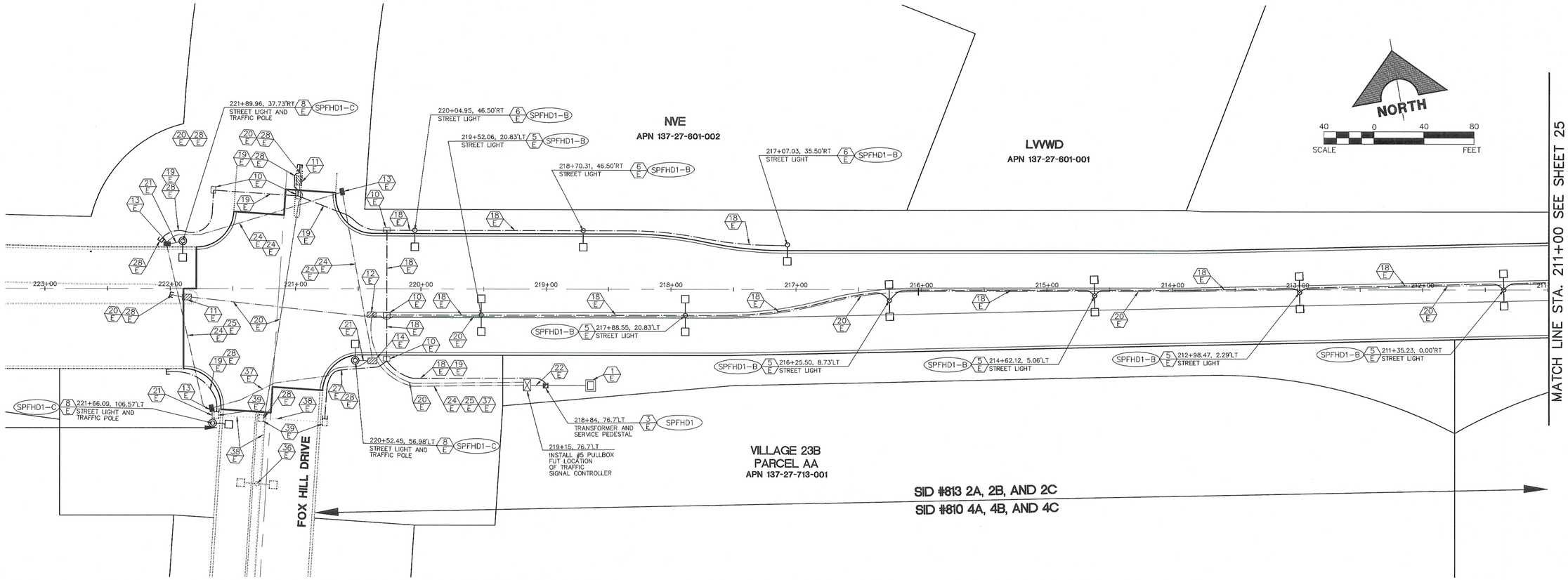
Humberto Fonseca-Rivas

THE HOWARD HUGHES COMPANY, LLC

FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

SIGNING AND STRIPING PLAN 2

DRAWING
ST2
24 OF 27 SHTS



ELECTRICAL CONSTRUCTION NOTES

1E PROPOSED NV ENERGY TRANSFORMER.

2E SPDFD1: EXISTING SERVICE PEDESTAL. REFER TO ELECTRICAL SERVICE NOTES.

3E SPFHD1: PROPOSED SERVICE PEDESTAL. REFER TO ELECTRICAL SERVICE NOTES AND DETAIL 2 / SHEET 26.

4E ADD 2#4, 1#8GND TO EXISTING CONDUIT ONLY.

5E SUMMERLIN TYPE 2B TWIN STREETLIGHT PER SIS E-1 (150W).

6E SUMMERLIN TYPE 2B SINGLE STREETLIGHT PER SIS E-1 (150W).

7E SUMMERLIN TYPE 2A SINGLE STREETLIGHT PER SIS E-1 (250W).

8E SUMMERLIN TYPE 2A MOD1 PER SSD E-1, WITH PROVISION FOR FUTURE TRAFFIC SIGNAL MAST ARM (250W).

9E EXISTING STREETLIGHT. REFER TO SUMMERLIN VILLAGE 23A DESERT FOOTHILLS DRIVE IMPROVEMENTS OR TO SUMMERLIN VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS OR TO SUMMERLIN VILLAGE 20 UNIT 3 IMPROVEMENTS.

10E PROPOSED NO. 3-1/2 PULLBOX PER USD 326.

11E PROPOSED P30 PULLBOX PER USD 404.132.

12E PROPOSED TYPE 200 PULLBOX PER USD 404.133.

13E PROPSED NO. 5 PULLBOX PER USD 326.

14E PROPOSED NO. 7 PULLBOX PER USD 326.

15E EXISTING NO. 5 PULLBOX.

16E EXISTING NO. 3-1/2 PULLBOX.

17E EXISTING P30 PULLBOX.

18E PROPOSED 1-1/4" CONDUIT CONTAINING 2#4, 1#8 GND [STREETLIGHTING CONDUIT].

19E PROPOSED 1-1/4" CONDUIT W/PULLSTRING

20E PROPOSED 4" CONDUIT W/PULLSTRING [FUTURE TRAFFIC SIGNAL INTERCONNECT WITH 2'RADIUS BENDS].

21E PROPOSED 2" CONDUIT CONTAINING 2#10, 1#8 GND [INTERSECTION LUMINAIRES] AND 2" CONDUIT W/PULLSTRING [FUTURE TRAFFIC SIGNAL].

22E PROPOSED 2" CONDUIT CONTAINING 2#4, 1#8 GND [TRAFFIC SIGNAL CONTROLLER CABINET].

23E PROPOSED 2" CONDUIT CONTAINING 2#10, 1#8 GND [INTERSECTION LUMINAIRES & FUTURE TRAFFIC SIGNAL].

24E PROPOSED 3" CONDUIT W/PULLSTRING [INTERSECTION LUMINAIRES AND FUTURE TRAFFIC SIGNAL].

25E PROPOSED 3" CONDUIT CONTAINING 2#10, 1#8 GND [INTERSECTION LUMINAIRES AND FUTURE TRAFFIC SIGNAL].

26E EXISTING 1-1/4" CONDUIT CONTAINING 2#4, 1#8 GND.

27E EXISTING 1-1/4" CONDUIT ONLY.

28E STUB AND CAP 5' MIN BEYOND EDGE OF CONSTRUCTION OR PULLBOX.

29E PROPOSED TRAFFIC CONTROL CABINET. REFER TO DETAIL 1 / SHEET 26.

30E EXISTING TRAFFIC CONTROL CABINET.

31E CONNECT TO EXISTING CONDUIT STUB.

32E EXISTING 4" CONDUIT ONLY [FUTURE TRAFFIC SIGNAL INTERCONNECT WITH 2' RADIUS BENDS].

33E EXISTING 2" CONDUIT ONLY

34E EXISTING 3" CONDUITS.

35E EXISTING TRAFFIC SIGNAL POLE WITH LIGHT

36E FUTURE STREETLIGHTING AND/OR TRAFFIC CONTROL INFRASTRUCTURE.

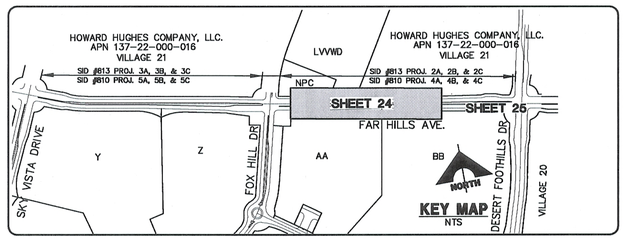
37E PROPOSED (2) 3" CONDUIT CONTAINING 2#10, 1#8 GND [INTERSECTION LUMINAIRES AND FUTURE TRAFFIC SIGNAL]

38E FUTURE CONDUIT

39E FUTURE PULLBOX

LEGEND

- STREET LIGHT CONDUIT (1) 1-1/4"C, 2#4, 1#8 GND. THW. UNLESS OTHERWISE NOTED
- TRAFFIC INTERCONNECT CONDUIT (1) 4" CONDUIT W/ 2' RADUIS SWEEPS INTO PULLBOXES FOR FUTURE FIBER OPTIC.
- TRAFFIC SIGNAL CONDUIT (1) 3"C, 4#10, 2#8 GND. THW., (1) 3" CONDUIT ONLY, WITH PULLSTRING, UNLESS OTHERWISE NOTED
- TRAFFIC SIGNAL POLE WITH STREET LIGHT
- STREET LIGHT
- FUTURE STREET LIGHT
- EXISTING STREET LIGHT
- METER SERVICE PEDESTAL
- CONTROL CABINET FOR FUTURE TRAFFIC SIGNALS
- (0) 200A SERVICE PEDESTAL AND N.P.CO. TRANSFORMER
- (0) CIRCUIT DESIGNATION: (CONTAINED WITHIN BOUNDRY) N = SERVICE PEDESTAL X = CIRCUIT
- #3-1/2 PULLBOX, MARKED "STREET LIGHTING" UNLESS OTHERWISE NOTED.
- #5 PULLBOX, MARKED "TRAFFIC SIGNAL" UNLESS OTHERWISE NOTED.
- P30 PULLBOX, MARKED "TRAFFIC SIGNAL" UNLESS OTHERWISE NOTED.
- NEVADA POWER TRANSFORMER AND METER SERVICE PEDESTAL



ELECTRICAL NOTES

1. ALL UNDERGROUND CONDUIT SHALL BE TYPE RNC (RIGID NONMETALLIC CONDUIT), SCHEDULE 40 PVC AND SHALL BE INSTALLED PER USD 404.1419. ABOVE GRADE CONDUIT SHALL BE TYPE RMC (RIGID METALLIC CONDUIT). CONDUIT RISERS SHALL BE TYPE RMC WITH PVC COATING OR TAPE WRAP.

2. ALL CONDUIT WHICH WOULD OTHERWISE BE EMPTY SHALL INCLUDE A NYLON PULLSTRING AND 1#8 FOR LOCATING PURPOSES.

3. ALL CONDUCTORS SHALL BE STRANDED, 600-VOLT, TYPE THW INSULATED COPPER.

4. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL ELECTRICAL COMPONENTS AND HARDWARE AS REQUIRED BY THE NATIONAL ELECTRICAL CODE, LATEST EDITION AND SHALL COMPLY WITH THE REQUIREMENTS OF THE INSPECTING AUTHORITY HAVING JURISDICTION.

PROFESSIONAL ENGINEER - STATE OF NEVADA
JOHN T. BROWN
Exp. 12/31/2014
ELECTRICAL
No. 16033

DATE: 6/18/13

FOR ELECTRICAL COMPONENTS ONLY

NOTES:

REFER TO SHEET 26 FOR ELECTRICAL NOTES AND DETAILS.
REFER TO SHEET 3 FOR CITY OF LAS VEGAS STREETLIGHT NOTES.

PROFESSIONAL ENGINEER - STATE OF NEVADA
JOSHUA JOHNSON
Civil
No. 15768
DATE: 6/17/13

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: DFK
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:16:39

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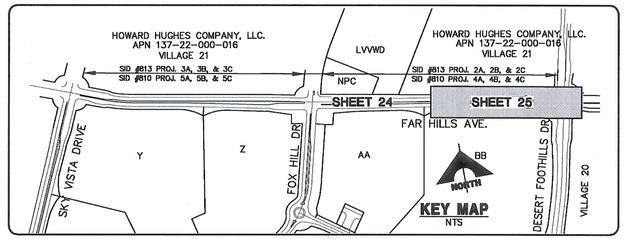
F:\Projects\600\62023B-205\DWG\Production\205-ST24-STLT1.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

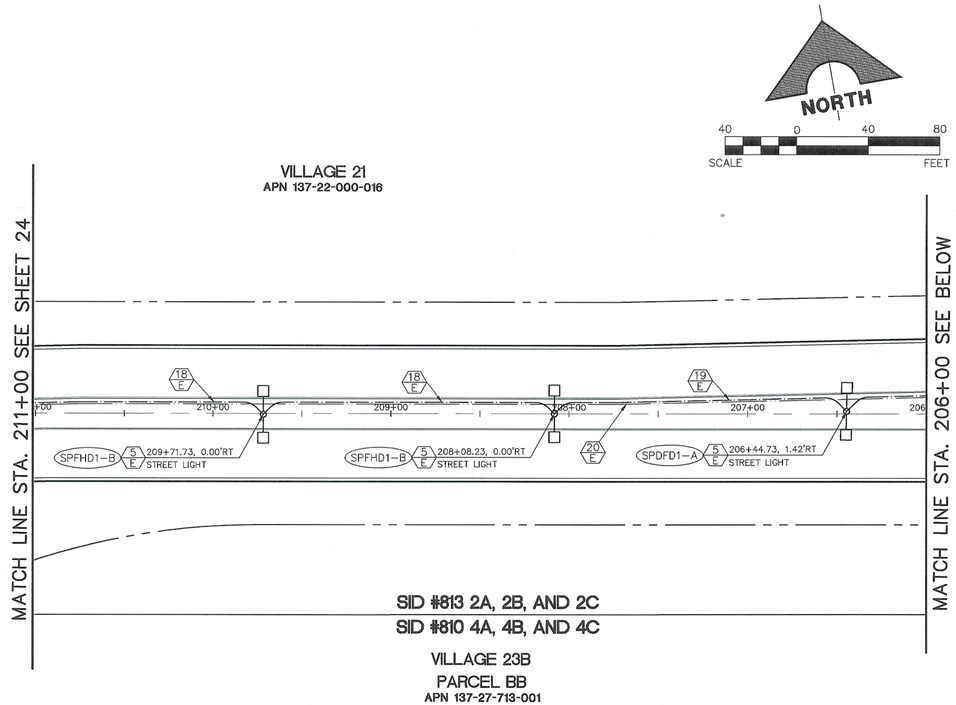
STREETLIGHT, CONDUIT AND ELECTRICAL PLAN 1

DRAWING
SL1
25 OF 27 SHTS



NOTE

SEE DWG SL1 FOR ELECTRICAL CONSTRUCTION NOTES



ELECTRICAL NOTES

1. ALL UNDERGROUND CONDUIT SHALL BE TYPE RNC (RIGID NONMETALLIC CONDUIT), SCHEDULE 40 PVC AND SHALL BE INSTALLED PER USD 404.1419. ABOVE GRADE CONDUIT SHALL BE TYPE RMC (RIGID METALLIC CONDUIT). CONDUIT RISERS SHALL BE TYPE RMC WITH PVC COATING OR TAPE WRAP.

2. ALL CONDUIT WHICH WOULD OTHERWISE BE EMPTY SHALL INCLUDE A NYLON PULLSTRING AND 1#8 FOR LOCATING PURPOSES.

3. ALL CONDUCTORS SHALL BE STRANDED, 600-VOLT, TYPE THW INSULATED COPPER.

4. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL ELECTRICAL COMPONENTS AND HARDWARE AS REQUIRED BY THE NATIONAL ELECTRICAL CODE, LATEST EDITION AND SHALL COMPLY WITH THE REQUIREMENTS OF THE INSPECTING AUTHORITY HAVING JURISDICTION.

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Avoid cutting underground utility lines. It's costly.
Call 811
OR
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AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
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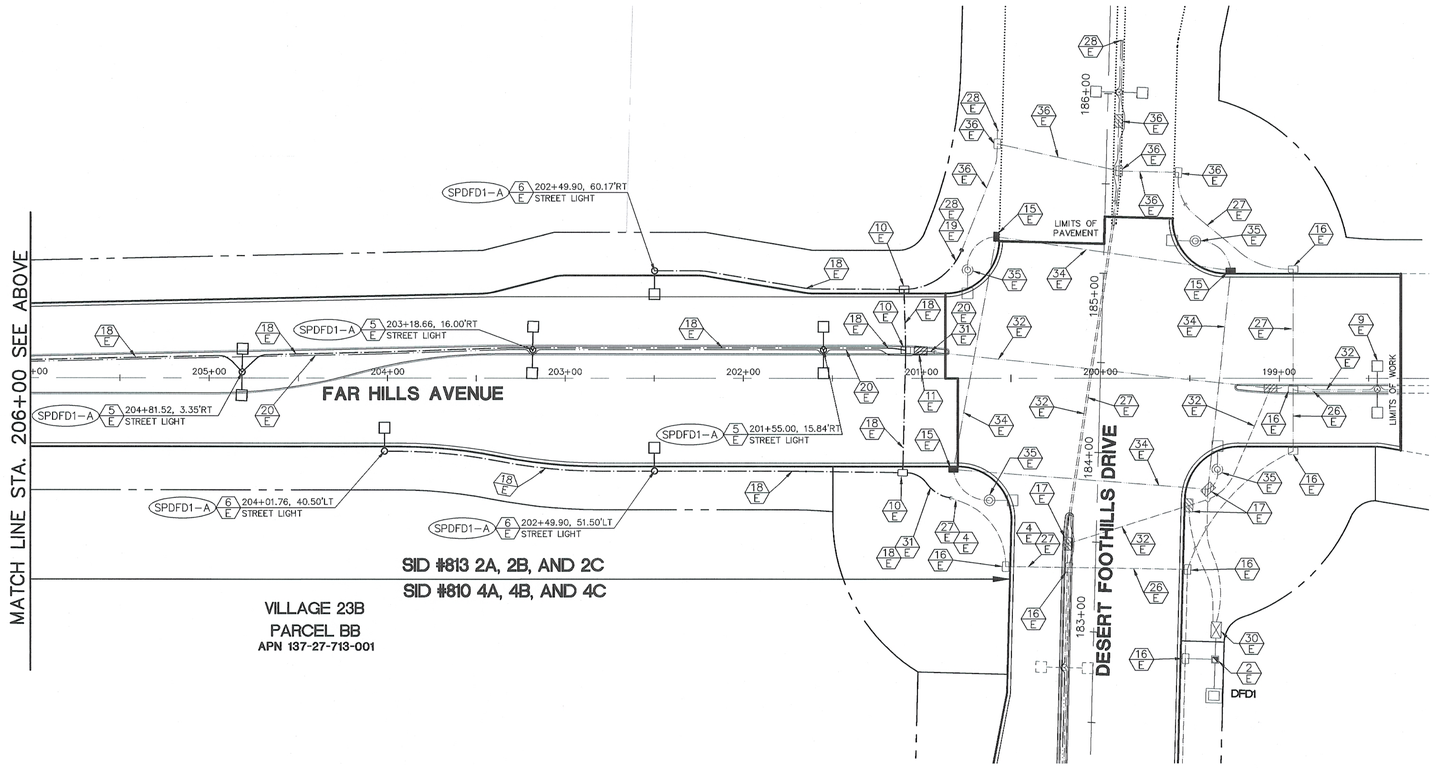
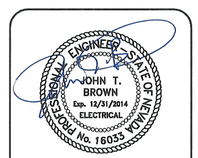
FAST
Call before you UnderGround.
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION





DATE: 6/18/13

FOR ELECTRICAL COMPONENTS ONLY

NOTES:

REFER TO SHEET 24 FOR LEGEND AND CONSTRUCTION NOTES.
REFER TO SHEET 26 FOR ELECTRICAL NOTES AND DETAILS.
REFER TO SHEET 3 FOR CITY OF LAS VEGAS STREETLIGHT NOTES.

DATE: 6/17/13

REV	DESCRIPTION	DATE	AGEN APP	DATE	CGW APP

PROJECT NO. 62023B-205
DESIGN: DFK
DRAWN: DFK
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:16:49

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Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY, LLC

FAR HILLS AVENUE IMPROVEMENTS - PHASE 1
DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

STREETLIGHT, CONDUIT AND ELECTRICAL PLAN 2

DRAWING
SL2
26 OF 27 SHTS

SPDFD1, SPFHD1, SPSVD1: SERVICE PEDESTAL CIRCUIT CAPACITY VERIFICATION

CIRCUIT NAME	SPDFD1(A)		SPDFD1(B)		SPDFD1(C)		SPFHD1(A)		SPFHD1(B)		SPFHD1(C)	
CIRCUIT TYPE	STREET LIGHTING (EXISTING)		STREET LIGHTING (EXISTING)		INTERSECTION LIGHTING (EXISTING)		STREET LIGHTING (PROPOSED)		STREET LIGHTING (PROPOSED)		INTERSECTION LIGHTING (PROPOSED)	
VOLTAGE:	240		240		120		240		240		120	
CIRCUIT CAPACITY:	60		60		40		60		60		40	
MAXIMUM CONTINUOUS CURRENT DRAW IS 80% OF CIRCUIT CAPACITY:	48		48		32		48		48		32	
EXISTING CIRCUIT LOAD AMPS =	1.50		3.00		16.00		0.00		0.00		0.00	
	PROPOSED		PROPOSED		PROPOSED		PROPOSED		PROPOSED		PROPOSED	
PROPOSED LOAD TO CIRCUIT:	QTY.	AMPS	QTY.	AMPS	QTY.	AMPS	QTY.	AMPS	QTY.	AMPS	QTY.	AMPS
150 WATT SINGLE LUMINAIRES AT 240V = 0.75 AMPS	3	2.25	0	0.00	0	0.00	3	2.25	3	2.25	0	0.00
150 WATT TWIN LUMINAIRES AT 240V = 1.50 AMPS	4	6.00	0	0.00	0	0.00	5	7.50	8	12.00	0	0.00
250 WATT SINGLE LUMINAIRES AT 240V = 1.25 AMPS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
400 WATT SINGLE LUMINAIRES AT 120V = 4.00 AMPS (SEE NOTE BELOW)	0	0.00	0	0.00	0	16.00	0	0.00	0	0.00	3	12.00
TOTAL PROPOSED LOAD AMPS =	8.25		0.00		0.00		9.75		14.25		12.00	
EXISTING PLUS PROPOSED LOAD AMPS =	9.75		3.00		16.00		9.75		14.25		12.00	
REMAINING AVAILABLE LOAD AMPS: MAXIMUM − EXISTING − PROPOSED =	38.25		42.00		16.00		38.25		33.75		20.00	

NOTE: INTERSECTION LUMINAIRES WILL BE INSTALLED AT 250W, BUT WILL BE UPGRADED TO 400W WHEN INTERSECTION IS SIGNALIZED.

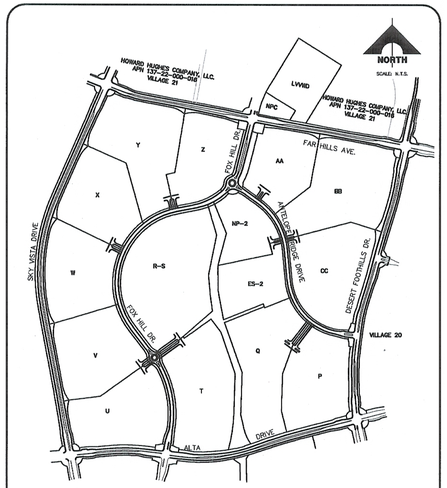
ELECTRICAL NOTES

1. ALL UNDERGROUND CONDUIT SHALL BE TYPE RNC (RIGID NONMETALLIC CONDUIT), SCHEDULE 40 PVC AND SHALL BE INSTALLED PER USD 404.1419. ABOVE GRADE CONDUIT SHALL BE TYPE RMC (RIGID METALLIC CONDUIT). CONDUIT RISERS SHALL BE TYPE RMC WITH PVC COATING OR TAPE WRAP.

2. ALL CONDUIT WHICH WOULD OTHERWISE BE EMPTY SHALL INCLUDE A NYLON PULLSTRING AND 1#8 FOR LOCATING PURPOSES.

3. ALL CONDUCTORS SHALL BE STRANDED, 600−VOLT, TYPE THW INSULATED COPPER.

4. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL ELECTRICAL COMPONENTS AND HARDWARE AS REQUIRED BY THE NATIONAL ELECTRICAL CODE, LATEST EDITION AND SHALL COMPLY WITH THE REQUIREMENTS OF THE INSPECTING AUTHORITY HAVING JURISDICTION.

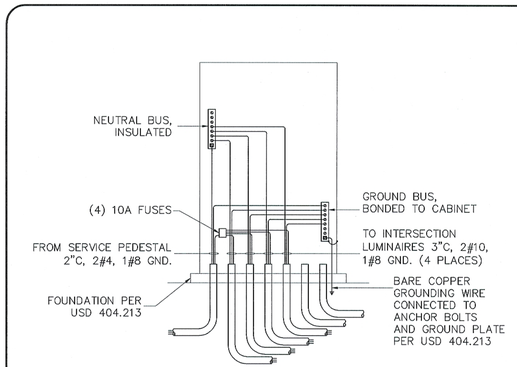


PROJECT LOCATION/SHEET INDEX MAP

ELECTRICAL SERVICE NOTES:

SPDFD1: EXISTING 200 AMP SERVICE PEDESTAL. REFER TO SUMMERLIN VILLAGE 23B DESERT FOOTHILLS DRIVE IMPROVEMENTS AND VILLAGE 23A/23B ALTA DRIVE IMPROVEMENTS FOR ADDITIONAL INFORMATION INCLUDING EXISTING CONNECTED LOADS.

SPFHD1: 200 AMP, SINGLE PHASE, 3 WIRE, 120/240V PAD MOUNTED SERVICE PEDESTAL. FEEDER FROM N.P.CO. POINT OF CONNECTION TO BE 2"C, 2#3/0 THW, 1#3/0 WHITE THW (COPPER). SERVICE PEDESTAL SHALL BE LOCATED A MINIMUM OF 30 FEET FROM THE TRANSFORMER. THE FOLLOWING SHALL BE INCLUDED IN THE SERVICE PEDESTAL:
(2) 60 AMP, 240V, 2−POLE CIRCUIT BREAKERS,
(2) 60 AMP, 240V, 2−POLE LIGHTING CONTACTORS,
(2) TEST SWITCHES (ONE FOR EACH CONTACTOR),
PHOTOELECTRIC CONTROL,
(1) 15 AMP, 120V, SINGLE POLE CIRCUIT BREAKER FOR LIGHTING CONTROLS,
(1) 40 AMP, 120V, SINGLE POLE CIRCUIT BREAKER FOR INTERSECTION LUMINAIRES,
(1) 60 AMP, 120V, SINGLE POLE CIRCUIT BREAKER FOR TRAFFIC SIGNAL CONTROLLER.
CONTRACTOR TO PROVIDE (2) 1−1/4" CONDUITS FROM SERVICE PEDESTAL TO FIRST STREETLIGHTING PULLBOX AND (1) 2" CONDUIT AS SHOWN FOR TRAFFIC SIGNAL CONTROLLER AND INTERSECTION LUMINAIRE BRANCH CIRCUITS. SERVICE PEDESTAL SHALL COMPLY WITH CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS 330, 331, 332.1 AND 335.1.

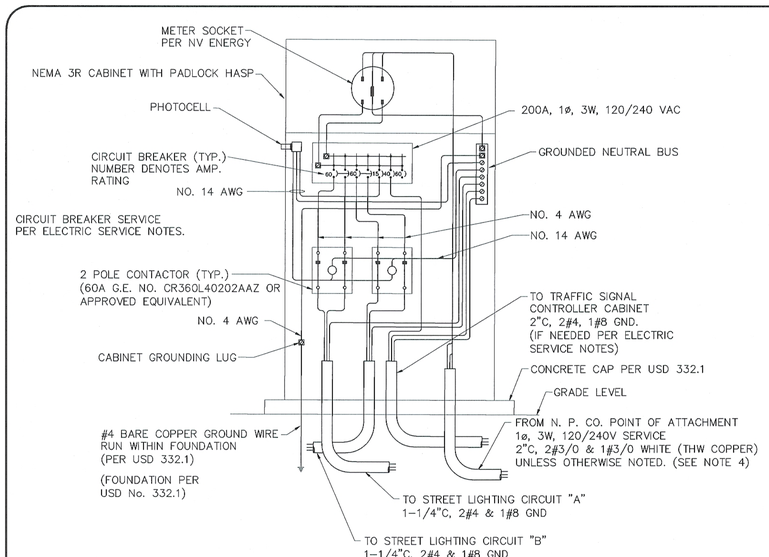


NOTES:

1. INSTALL PER CLARK COUNTY AREA UNIFORM STANDARD DRAWING NUMBER 404.307.
2. ALL BUSSING SHALL BE COPPER.
3. ALL CONDUCTORS SHALL BE STRANDED 600V THW INSULATED COPPER.

TRAFFIC SIGNAL CONTROLLER CABINET (1/26)

NOT TO SCALE

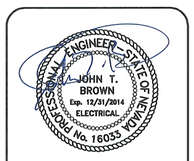


NOTES:

1. MANUFACTURER'S CATALOG NUMBERS ARE SHOWN TO ESTABLISH A DEGREE OF QUALITY AND PERFORMANCE, APPROVED AS EQUIVALENT ARE ACCEPTABLE.
2. ALL CONDUCTORS AND BUSSING TO BE COPPER.
3. INSTALL PER CLARK COUNTY AREA, UNIFORM STANDARD DRAWING NUMBER 330, 331, 332.1, 335.1.
4. TRANSFORMER TO SERVICE PEDESTAL DISTANCES GREATER THAN 195' FOR SPECIFIED CONDUCTORS MUST BE APPROVED BY ENGINEER.
5. ALL CONDUCTOR SHALL BE STRANDED 600V THW INSULATED COPPER.

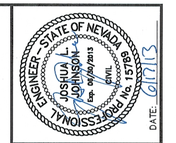
(CLV) 200A PAD MOUNTED SERVICE POINT FOR TRAFFIC SIGNAL AND STREET LIGHTING (2/26)

NOT TO SCALE



DATE: 6/18/13

FOR ELECTRICAL COMPONENTS ONLY



DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO.

DESIGN: DFK
DRAWN: DFK
CHECK: JLJ
PLOT DATE: 06-18-13
PLOT TIME: 14:16:57

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
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LAS VEGAS | MESQUITE

F:\Projects\600\602028-205\DWG\Production\205-ST28-SIL13.dwg
Humberto Franco-Rivas

THE HOWARD HUGHES COMPANY

FAR HILLS AVE PHASE 1
FROM DESERT FOOTHILLS DRIVE TO FOX HILL DRIVE

STREET LIGHT, MASTER CONDUIT AND ELECTRICAL PLAN 3

DRAWING
SL3
26 OF 26 SHTS