

DS #: 4663

APN: 125-01-402-009 to -016

PROJECT: GRANITE FALLS 2 SOUTH

SUBMITTAL: 2ND

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		June 11, 2014
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	COPIES TO:
	Granite Falls 2 South	Slater Hanifan Group
Cross Streets:	NWC of Iron Mountain Road & Bradley Road	Verlaine LLC / Richmond American
File Number:	F:\Depot\DSMemos\DS4663B.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-01-402-009 to 125-01-402-016	
Zoning Action:	GPA-52122; ZON-52123; VAC-52125 & TMP-52127	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	3/27/2014	4/10/2014	Not Approved	\$400.00	352205: \$400
2 nd Submittal	5/27/2014	6/10/2014	See Comments Below	\$400.00	358136: \$400
TOTAL FEES (LDDRS):				\$800.00	----

REMARKS:

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

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

- Second request:** Provide a copy of the zoning/planning conditions associated with this site (**GPA-52122; ZON-52123; VAC-52125 & TMP-52127**) with the next submittal to verify compliance with conditions. Flood Control will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the **City Council**). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

The letters provided in the last submittal were issued by the *Planning Commission*. Note that *City Council* is the ultimate authority in the matter. Please provide approval letters from the *Council* in the next submittal.

- The proposed bubbler and the bleeder line encroach into the property of the *Bureau of Land Management* (BLM). Drainage easement grant must be obtained from the BLM prior to the final approval of the improvement plans.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased



RAH1322.001

April 3, 2014

Linda Hartman-Maynard
City of Las Vegas
Department of Building and Safety
333 S. Rancho Drive
Las Vegas, NV 89101

SUBJECT: Justification Letter for proposed grades greater than 2-feet from existing ground for Granite Falls 2 South (APNs 125-01-402-009 Thru 016)

Ms. Hartman-Maynard,

Slater Hanifan Group, respectfully submits this justification letter in support of proposed grades greater than 2-feet above and below existing ground on the subject site. The site is located at Bradley Road and Iron Mountain Road. The Assessor's Parcel Number is 125-01-402-009 Thru 016 and the site is 9.18 gross acres.

As shown on the attached grading plan, high points are created on Pauley Hills Street and Saxon Canyon Street to prevent storm runoff entering the site. Although the intent is to match existing grade and adjacent development as closely as possible, there is portion of the site which exceeds a difference of 2-feet from our proposed grades to existing ground. This is mostly due to the high points created on the interior streets. Additionally, we must also follow the street design criteria, which establish limitations on various aspects of design for the proposed streets. I hope that you find that we have adequately justified our design, but should you have any questions, please do not hesitate to contact our office.

Slater Hanifan Group, Inc.

Christopher Zhang, P.E.
Project Engineer

PLANS APPROVED
PLANNING
Building & Safety Dept.
City of Las Vegas, Nevada
GRADE DIFFERENCE ONLY
LHM APR 08 2014

Conforms to the minimum requirements of
LVMC Title 10, and all applicable Master Plan
development standards and/or Conditions of
Approval. Make No Change Without Approval.
Plan is Not a Permit to Violate Any Ordinance.

R-1

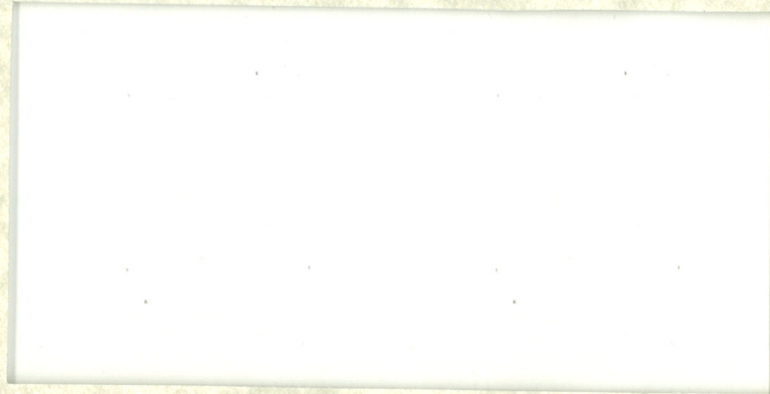
PRJ 52087
TMP 52127

Rec'd: 5/27/19

DS 4663

G-01

\$400



S-I-G SLATER
HANIFAN
GROUP

CONSULTING ENGINEERS & PLANNERS

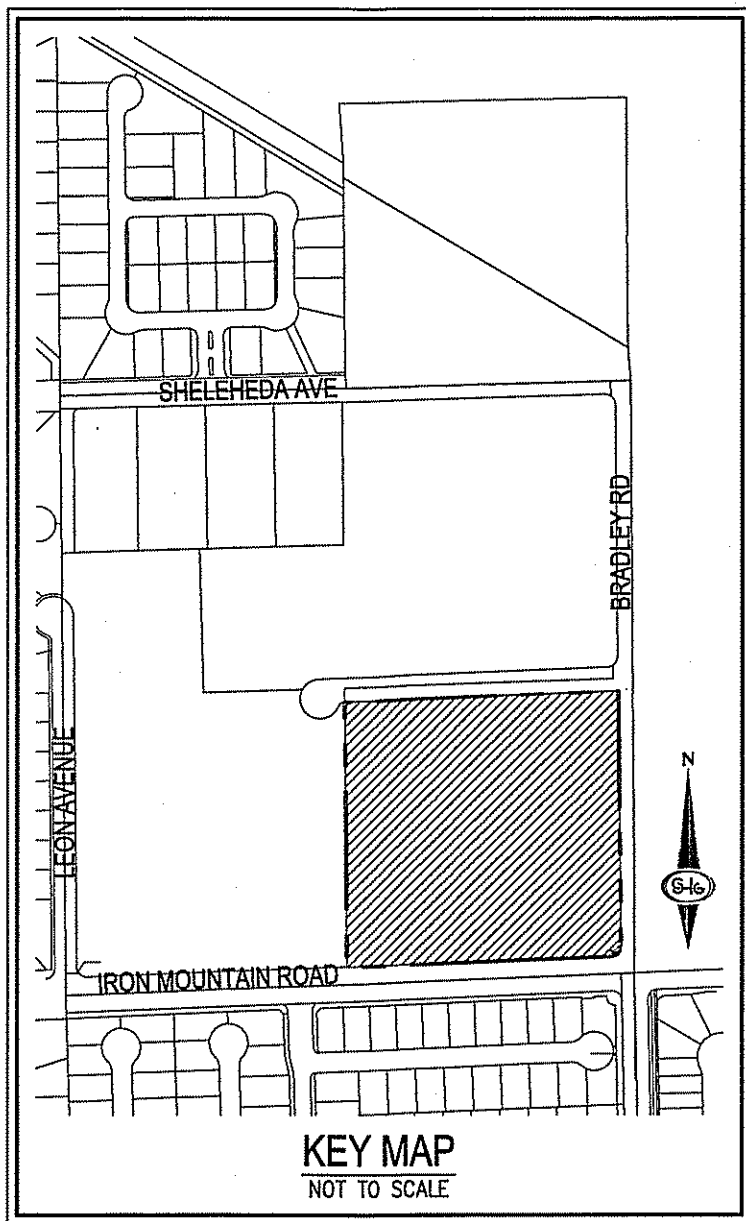
5740 S. ARVILLE STREET, SUITE 216

LAS VEGAS, NEVADA 89118

PHONE: 702-284-5300 • FAX: 702-284-5399



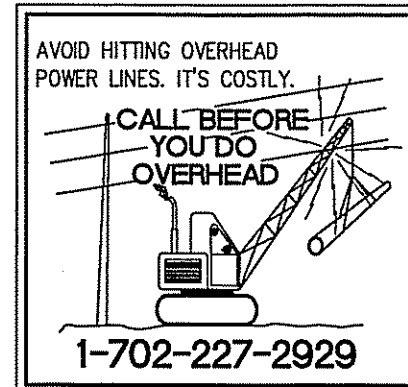
IMPROVEMENT PLANS
FOR
GRANITE FALLS 2 SOUTH
APN 125-01-402-009 THRU 016



CITY ENGINEER-DAVID BOWERS PE, PTOE #16736		DATE
APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OF RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FORM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.		
LAS VEGAS FIRE AND RESCUE		DATE
CHRIS KNIGHT, DIRECTOR BUILDING AND SAFETY DEPARTMENT		
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.		
CENTRAL TELEPHONE COMPANY D/B/A CENTURYLINK		DATE
THE AFFIRED 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.		
APPROVED FOR CONSTRUCTION		
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER PROJECT NO. XXXXXX DATE: SHEETS: C-1, C-2, PP-1 THRU PP-5, AND U-1		
LVWD APPROVED FIREFLOW: 1500 GPM AT 20 PSI RESIDUAL		
APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM THE LAS VEGAS VALLEY WATER DISTRICT.		
NV ENERGY		DATE
NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.		
SOUTHWEST GAS		DATE
COX COMMUNICATIONS LAS VEGAS, INC.		DATE

OWNER RICHMOND AMERICAN HOMES 7770 DEAN MARTIN DR #308 LAS VEGAS, NV 89139	PROJECT INFORMATION EXISTING ZONING: R-E PROPOSED ZONING: R-1 ACREAGE (GROSS): 9.18 AC ACREAGE (NET): 6.97 AC TOTAL DWELLING UNITS: 40 TYP. LOT SIZE: 60'x100' MIN. LOT WIDTH: 60' MIN. LOT SQFT: 6,500 SQFT MAX LOT SQFT: 9,483 SQFT DENSITY (NET ACREAGE): 4.36 DU/AC MAX. LOT COVERAGE: 50%
DEVELOPER RICHMOND AMERICAN HOMES 7770 DEAN MARTIN DR #308 LAS VEGAS, NV 89139 PH (702) 617-8464 FX (702) 617-8499 CONTACT: BRIAN WALSH	

LEGAL DESCRIPTION
LYING WITHIN THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 1, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.



SLATER
HANIFAN
GROUP

CONSULTING ENGINEERS & PLANNERS

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

LAS VEGAS, NEVADA

RICHMOND
AMERICAN HOMES

GRANITE FALLS 2 SOUTH
COVER SHEET

DATE: ---

DRAFTER: CZ

DESIGNER: CZ

CHECKED: TJS

PROJECT NO.
RAH1322-001

PROFESSIONAL ENGINEER - STATE OF NEVADA

TODD J. STEADHAM

Exp. 06/30/2014

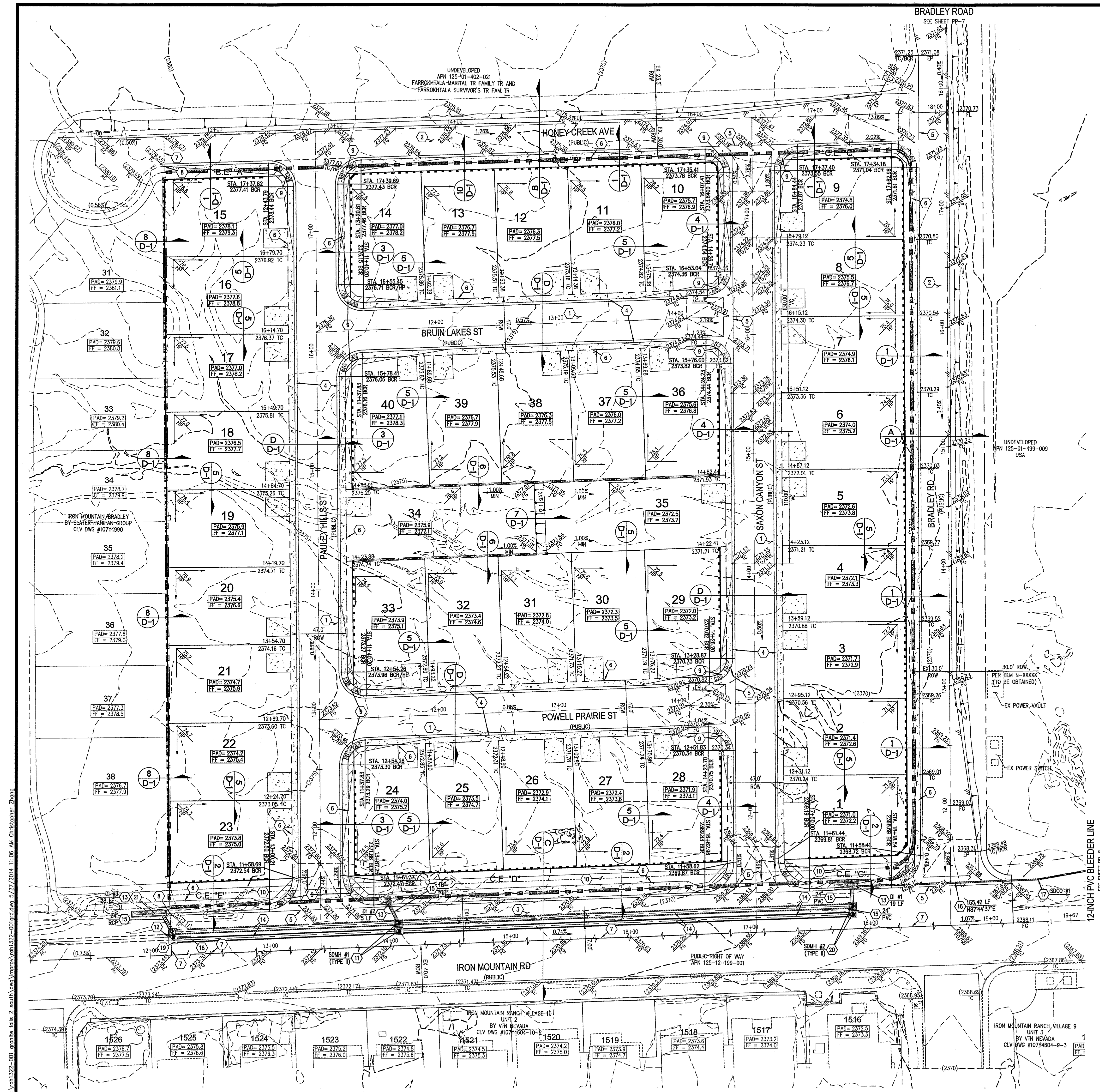
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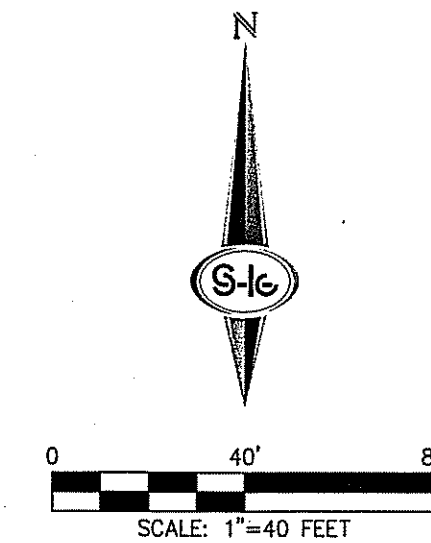
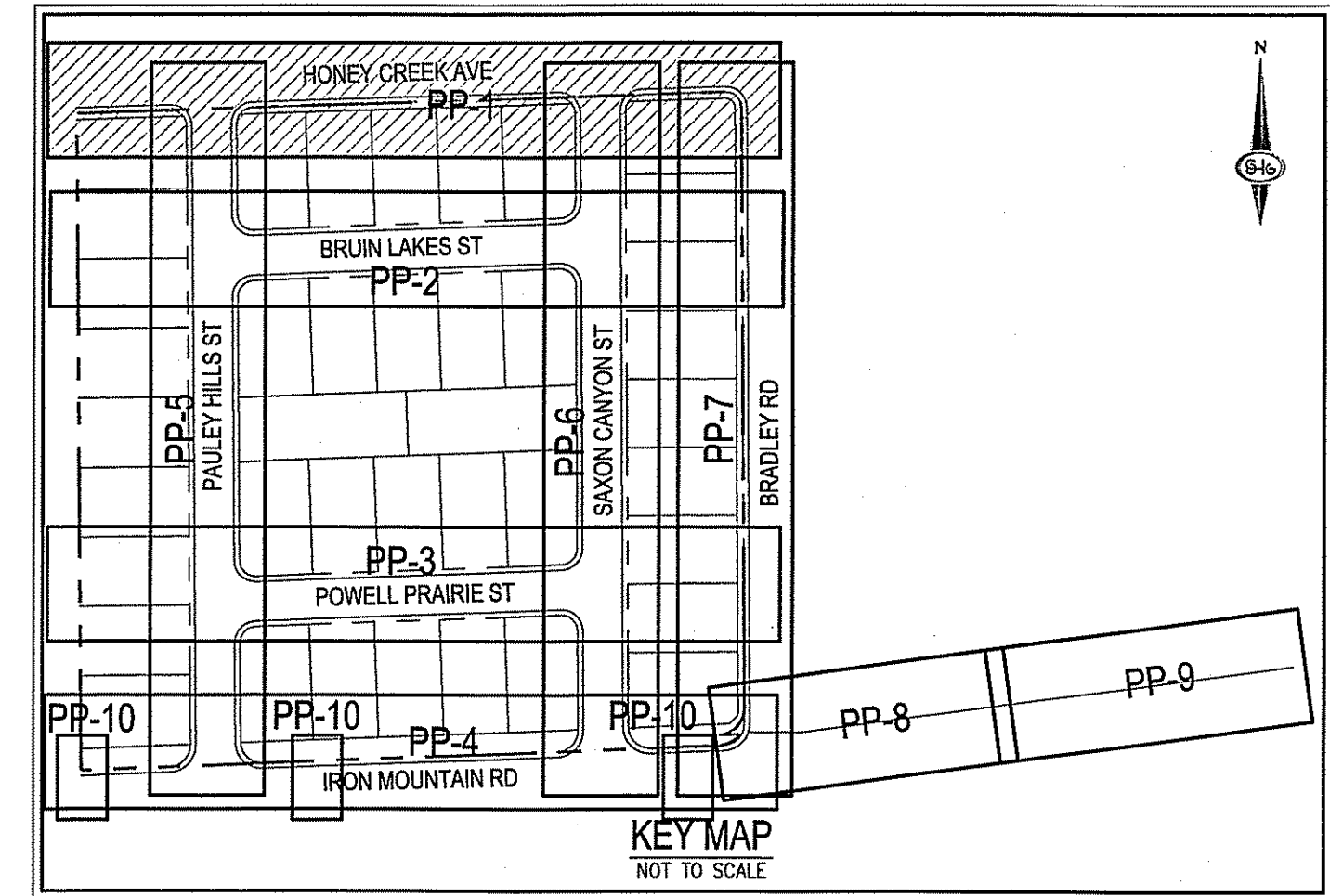
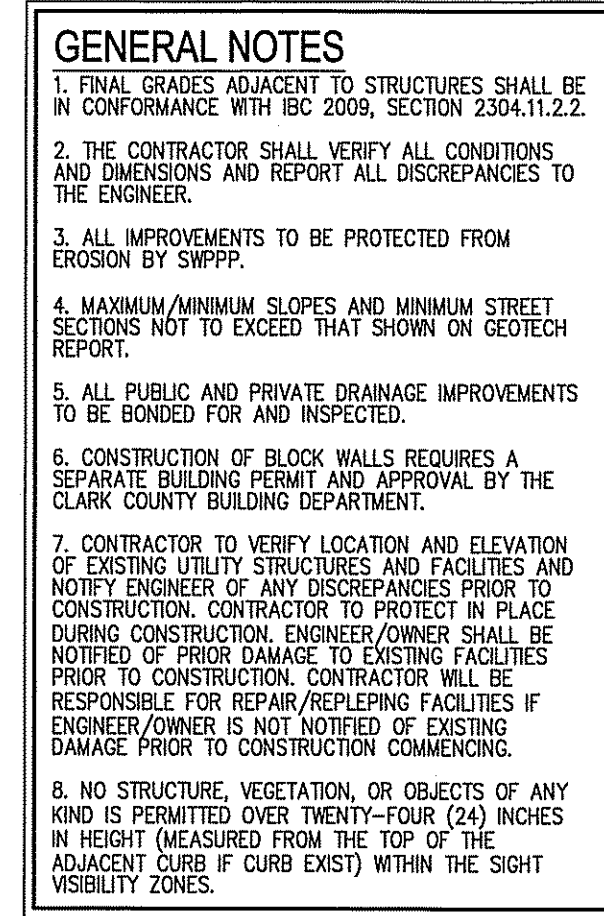
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C-1

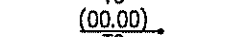
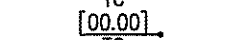
SHEET 1 OF ---

\\rah1322-001\granite falls 2 south\dwg\improv\rah1322-001cov.dwg 5/27/2014 11:05 AM Christopher Zhong





- ## CONSTRUCTION NOTES
- (1) CONSTRUCT 2.5" AC PAVEMENT WITH 6" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
 - (2) CONSTRUCT 3.5" AC PAVEMENT WITH 7" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
 - (3) CONSTRUCT 4.5" AC PAVEMENT WITH 12" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
 - (4) CONSTRUCT "L" TYPE CURB AND GUTTER PER CAUSAUD.
 - (5) CONSTRUCT 6" CROSS GUTTER PER CAUSAUD NO. 228
 - (6) CONSTRUCT 5' WIDE SIDEWALK PER CAUSAUD NO. 234
 - (7) SAWCUT AND MATCH EXISTING IMPROVEMENTS
 - (8) FIELD VERIFY AND CONNECT TO EXISTING CURB, GUTTER AND SIDEWALK
 - (9) CONSTRUCT SIDEWALK RAMP USING ARMOR TILE, TRUNCATED DOMES OR EQUIVALENT PER CAUSAUD NO. 17
 - (10) CONSTRUCT 6" WIDE, 3" CRUSHED FINES FUELSHED IN PLACE PER CIVL TRAIL IMPROVEMENT GUIDELINE DWG. T-107
 - (11) INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CAUSAUD NO. 401 & 405
 - (12) FIELD VERIFY STUB AND CONNECT TO EXISTING STORM DRAIN STUB
 - (13) INSTALL TYPE C DRAIN INLET PER CAUSAUD NO. 413 & SEE PROFILE, SHEET PP-10
 - (14) INSTALL 48" RCP CLASS III SD (PUBLIC)
 - (15) INSTALL SD LATERALS (PUBLIC), SEE SHEET PP-10
 - (16) INSTALL 12" PVC SD BLEEDER LINE (PUBLIC)
 - (17) INSTALL STORM DRAIN CLEAN-OUT PER DETAIL 9, SHEET D-1
 - (18) REMOVE EX 48" CLASS III CRUSH SD
 - (19) JUNCTION STRUCTURE BY OTHERS
 - (20) INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CAUSAUD NO. 401 & 405 WITH BOLTED GRATE MANHOLE LID
 - (21) REMOVE EXISTING DRAIN INLET
- SEE SHEET C-2 FOR ABBREVIATIONS, LEGEND & QUANTITIES

- ## LEGEND
- | | |
|---|--|
|  | BOUNDARY LINE |
|  | ROADWAY CENTERLINE |
|  | RIGHT-OF-WAY |
|  | PROPERTY LINE |
|  | CURB AND GUTTER |
|  | EXISTING CURB AND GUTTER |
|  | FLOWLINE |
|  | EDGE OF PAVEMENT (EP) |
|  | SAWTOOTH LINE PER CALCAISO
NO. 503 |
|  | PROPOSED ELEVATION |
|  | EXISTING ELEVATION |
|  | FUTURE ELEVATION |
|  | EXISTING CONTOUR (5'-FT) |
|  | EXISTING CONTOUR (1'-FT) |
|  | CUT/FILL TRANSITION LINE |
|  | FIRE HYDRANT ASSEMBLY |
|  | SIGHT VISIBILITY ZONE |
|  | WROUGHT IRON FENCE |
|  | PONY WALL |
|  | RETAINING WALL |
|  | DECORATIVE PERIMETER WALL |
|  | DECORATIVE PERIMETER
RETAINING WALL |
- SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

DISCLAIMER NOTE

1. EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL, AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITY LINES TO PROPOSED SIDEWALKS, CROSSLANDINGS, AND CROSSLANDINGS. THE CONTRACTOR SHALL VERIFY THE LOCATION OF PAVEMENT OR PROJECTED TOP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26163-1, DATED 11/22/13
EARTHWORK QUANTITIES (RAW):
CUT= 74.922 CU YDS/FILL= 87.610 CU YDS

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X', (OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD), PER FIRM PANEL 32003C1745E, DATED SEPTEMBER 27, 2002.

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED
TECHNICAL DRAINAGE STUDY DS4663A ON FILE AT CITY OF LAS VEGAS FOR THE
SUBJECT PROJECT.

TODD J. STEADHAM, P.E. 15292

BASIS OF BEARING

SOUTH 00°23'54" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 1, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 117, PAGE 43 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK NUMBER: 6LV9012NNW6
RIVET AND PLATE IN TOP OF CURB ON THE SOUTH SIDE OF IRON MOUNTAIN ROAD, 35' ±
SOUTHEAST OF PI OF LEON DRIVE AND IRON MOUNTAIN ROAD.
ELEVATION: 2378.778, 21 US SURVEY FEET (NAVD88)
725.053 METERS
PER CITY OF LAS VEGAS BENCHMARKS, 2008 ADJUSTMENT (UPDATED MAY 24, 2010)

**AVOID HITTING UNDERGROUND
TRAFFIC SIGNAL SYSTEMS
AND STREET LIGHT SYSTEM
CONDUITS. IT'S COSTLY.**

Call

**before you
do UnderGround**

1-702-455-7511

**CLARK COUNTY TRAFFIC OPERATIONS
AND**

1-702-432-5300

**LAS VEGAS AREA
COMPUTERIZED TRAFFIC SYSTEM**

Call before you Dig
Avoid cutting underground
utility lines. It's costly.
Call

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

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

THE NEW YORK PUBLIC LIBRARY



RICHMOND
AMERICAN HOMES

**GRANITE FALLS 2 SOUTH
PLAN AND PROFILE - HONEY CREEK AVE**

**T19S
R60E**

DATE: _____

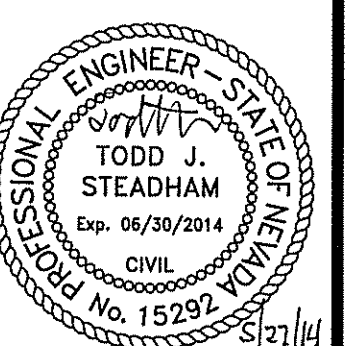
RAFTER: CZ

DESIGNER: C7

CHECKED: TJS

PROJECT NO.

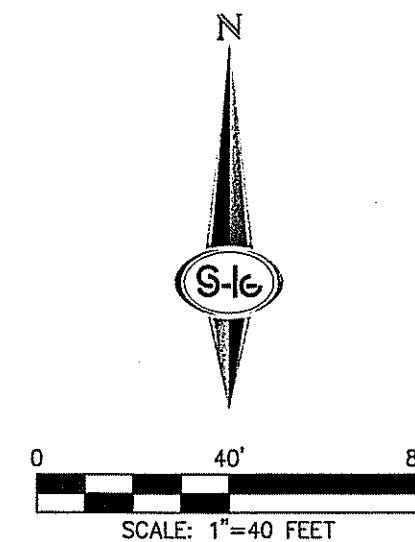
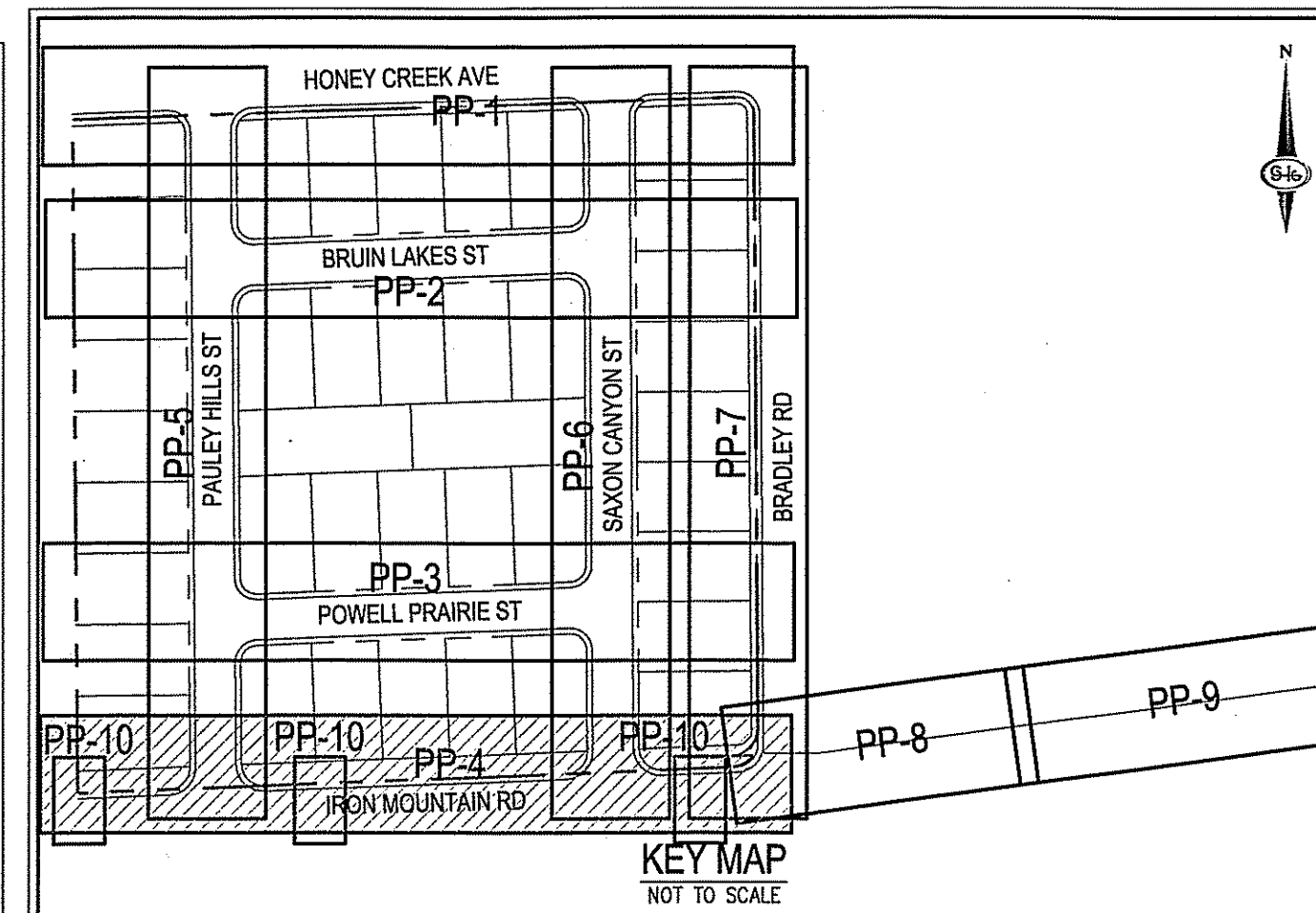
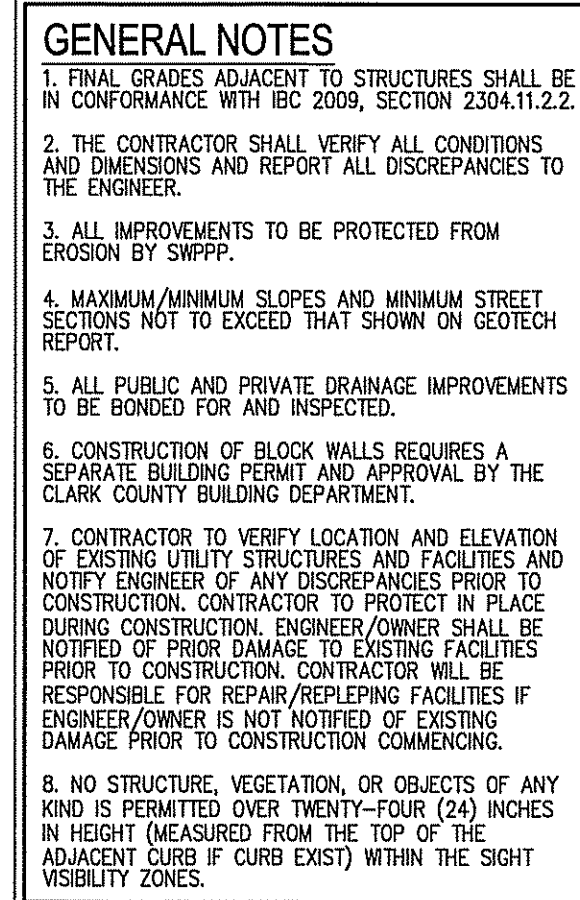
RAH1322-001



PP-1

Page 5 of 10

\\rah1322-001 granite falls 2 south\dwg\improv\rah1322-001pnp.dwg 5/27/2014 11:07 AM Christopher Zhang



- ## CONSTRUCTION NOTES
- (1) CONSTRUCT 2" MIN. PAVEMENT WITH 6" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOLS REPORT.
 - (2) CONSTRUCT 3.5" AC PAVEMENT WITH 7" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOLS REPORT.
 - (3) CONSTRUCT 4.5" AC PAVEMENT WITH 12" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOLS REPORT.
 - (4) CONSTRUCT "L" TYPE CURB AND GUTTER PER CAUSA NO. 216
 - (5) CONSTRUCT 8" CROSS GUTTER PER CAUSA NO. 228
 - (6) CONSTRUCT 5" WIDE SIDEWALK PER CAUSA NO. 234
 - (7) SAWCUT AND MATCH EXISTING IMPROVEMENTS
 - (8) FIELD VERIFY AND CONNECT TO EXISTING CURB, GUTTER AND SIDEWALK
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 - (10) CONSTRUCT 8" WIDE, 3" CRUSHED FINES FLOESTRAN 255 1/2" MIN. THICK IMPROVEMENT GUIDELINE DWG T-107
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 - (12) FIELD VERIFY STUB AND CONNECT TO EXISTING STORM DRAIN STUB
 - (13) INSTALL TYPE C DRAIN INLET PER CAUSA NO. 413 & 421, SEE PROFILE, SHEET PP-10.
 - (14) INSTALL 48" RCP CLASS III SD (PUBLIC)
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- SEE SHEET C-2 FOR ABBREVIATIONS, LEGEND & QUANTITIES

- | SYMBOL | USE | REMARKS |
|---|---------------------------------|---------|
| _____ | BOUNDARY LINE | |
| _____ | ROADWAY CENTERLINE | |
| _____ | RIGHT-OF-WAY | |
| _____ | PROPERTY LINE | |
| _____ | CURB AND GUTTER | |
| ===== | EXISTING CURB AND GUTTER | |
| _____ | FLOWLINE | |
| ~~~~~ | EDGE OF PAVEMENT (EP) | |
|  | SAWCUT LINE PER CAUSWAY NO. 503 | |
| 00.00
(00.00) | PROPOSED ELEVATION | |
| 10
(00.00) | EXISTING ELEVATION | |
| 00.00
10
(00.00) | FUTURE ELEVATION | |
| -----
(2000) | EXISTING CONTOUR (5'-FT) | |
| ----- | EXISTING CONTOUR (1'-FT) | |
| v | CUT/FILL TRANSITION LINE | |
| ⊙ | FIRE HYDRANT ASSEMBLY | |
|  | SIGHT VISIBILITY ZONE | |
| ***** | WROUGHT IRON FENCE | |
| ●-----● | PONY WALL | |
| -----
RETAINING WALL | RETAINING WALL | |
| -----
DECORATIVE PERIMETER WALL | DECORATIVE PERIMETER WALL | |
| -----
DECORATIVE PERIMETER | DECORATIVE PERIMETER | |
| -----
RETAINING WALL | RETAINING WALL | |

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2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SAWCUT LINE, EXISTING CURB OF PAVEMENT OR PROJECTED UP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26163-1, DATED 11/22/13
EARTHWORK QUANTITIES (RAW):
CUT= 74.922 CU YDS/FILL= 87.610 CU YD

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X', (OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD), PER FIRM PANEL 32003C1745E, DATED SEPTEMBER 27, 2002.

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS4663A ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

TODD J. STEADHAM, P.E. 15292

BASIS OF BEARING

SOUTH 00°23'54" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 1, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 117, PAGE 43 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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RIVE AND PLATE 11 OF CURB ON THE SOUTH SIDE OF IRON MOUNTAIN ROAD, 35' ±
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ELEVATION: 2378.778,21 US SURVEY FEET (NAVD88)
725.053 METERS
PER CITY OF LAS VEGAS BENCHMARKS, 2008 ADJUSTMENT (UPDATED MAY 24, 2010)

AVOID HITTING OVERHEAD
POWER LINES. IT'S COSTLY.
**CALL BEFORE
YOU DO
OVERHEAD**



1-702-227-2929

AVOID HITTING UNDERGROUND
TRAFFIC SIGNAL SYSTEMS
AND STREET LIGHT SYSTEM
CONDUITS. IT'S COSTLY.

 before you
do UnderGround

1-702-455-7511

CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-432-5300

LAS VEGAS AREA
COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig
Avoid cutting underground utility lines. It's costly.

Call

811

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

S-I GROUP
SLATER
HANIFAN
GROUP
CONSULTING ENGINEERS & PLANNERS
 5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
 PHONE (702) 294-5300
 FAX (702) 294-5309

LAS VEGAS, NEVADA



RICHMOND

GRANITE FALLS 2 SOUTH
PLAN AND PROFILE - IRON MOUNTAIN RD

S1
T106

DATE: _____

DRAFTER: CZ

DESIGNER: C7

CHECKED: TJS

PROJECT NO.

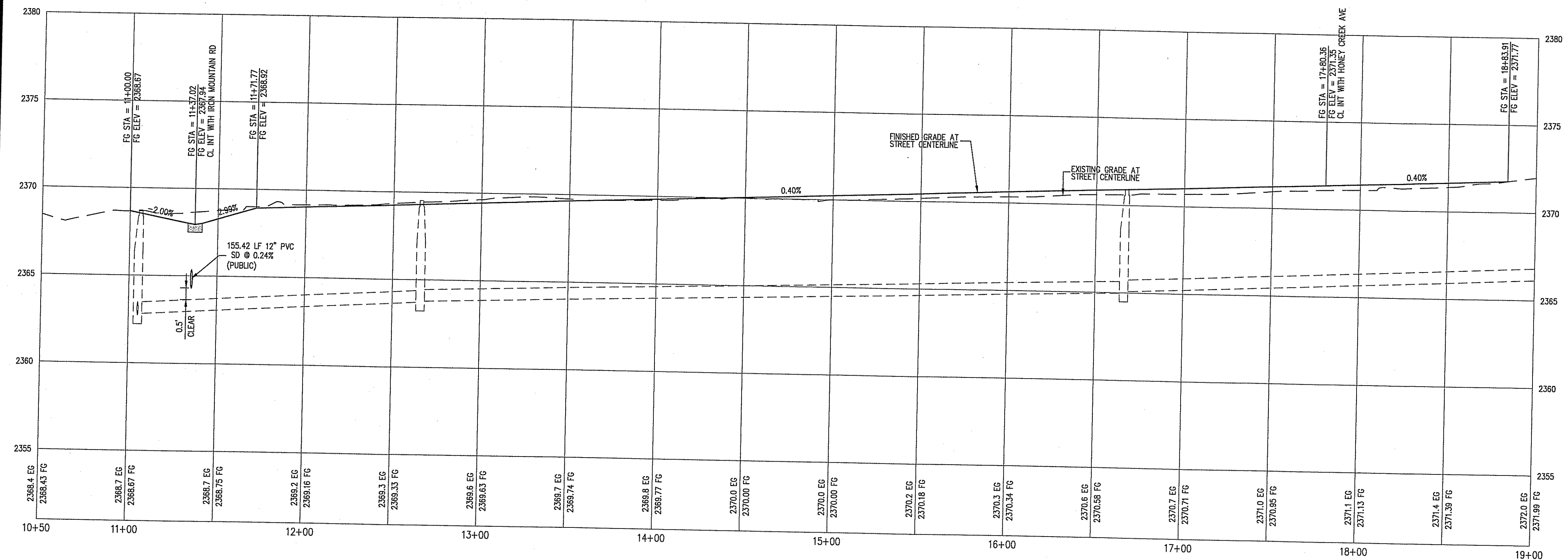
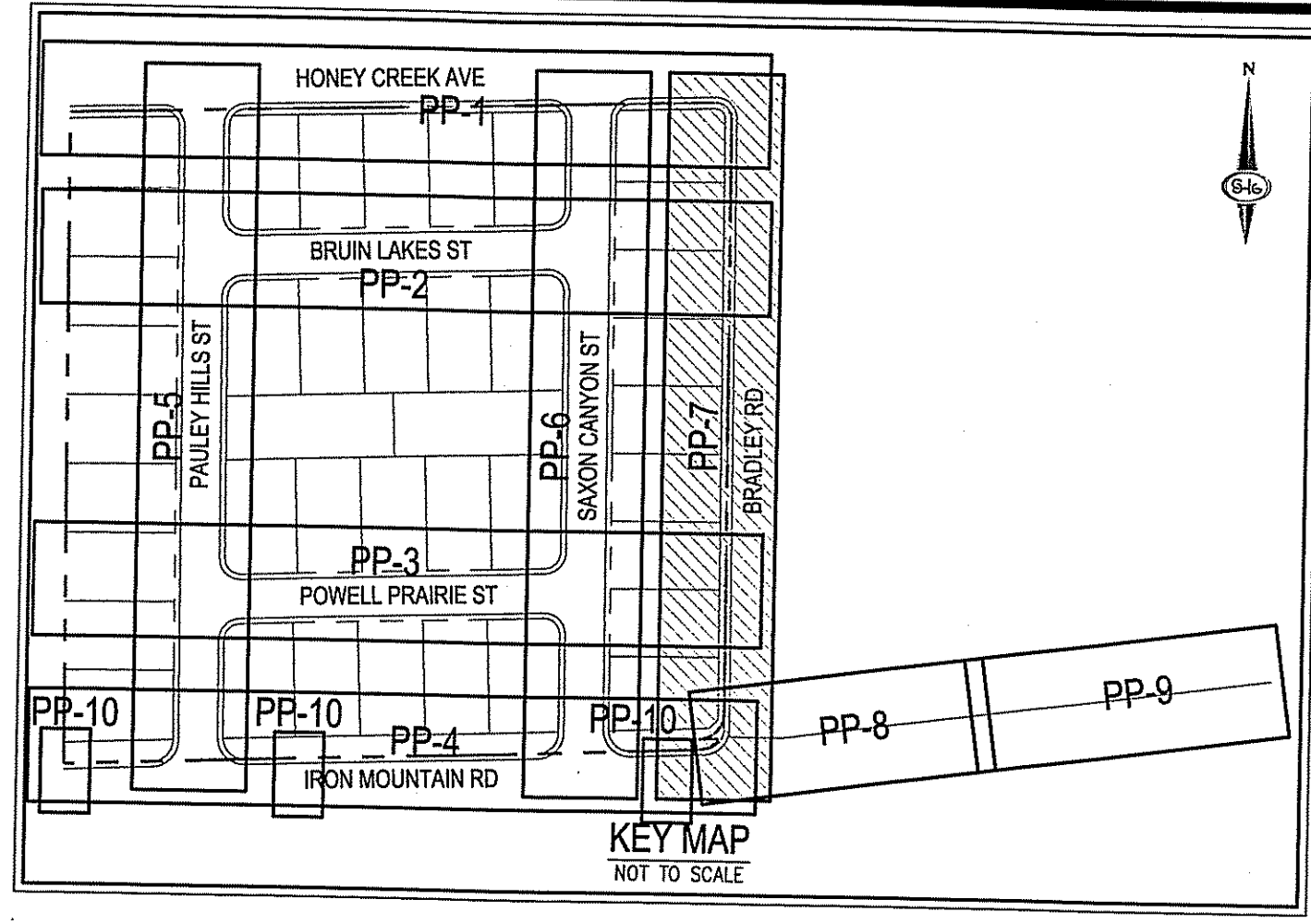
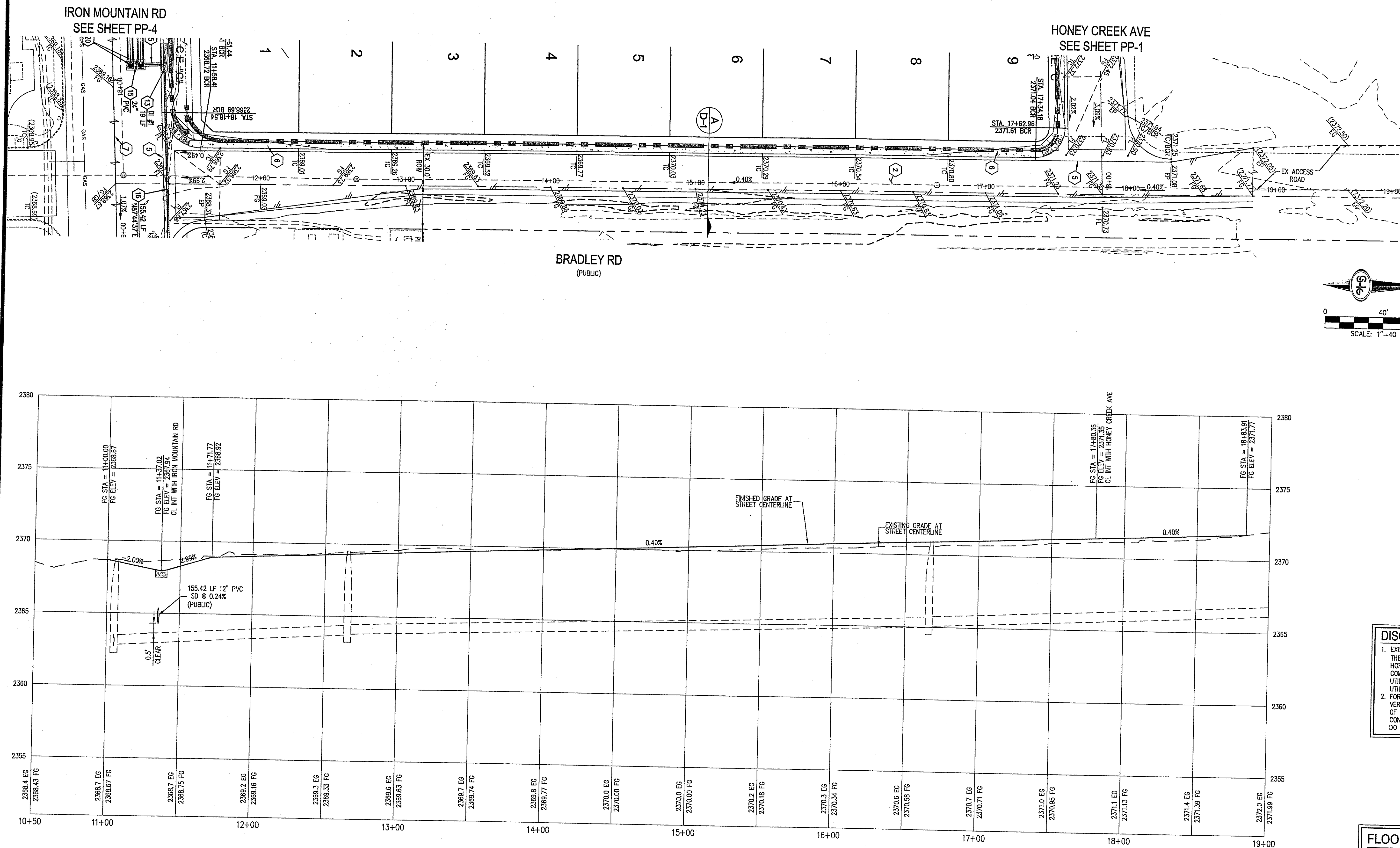
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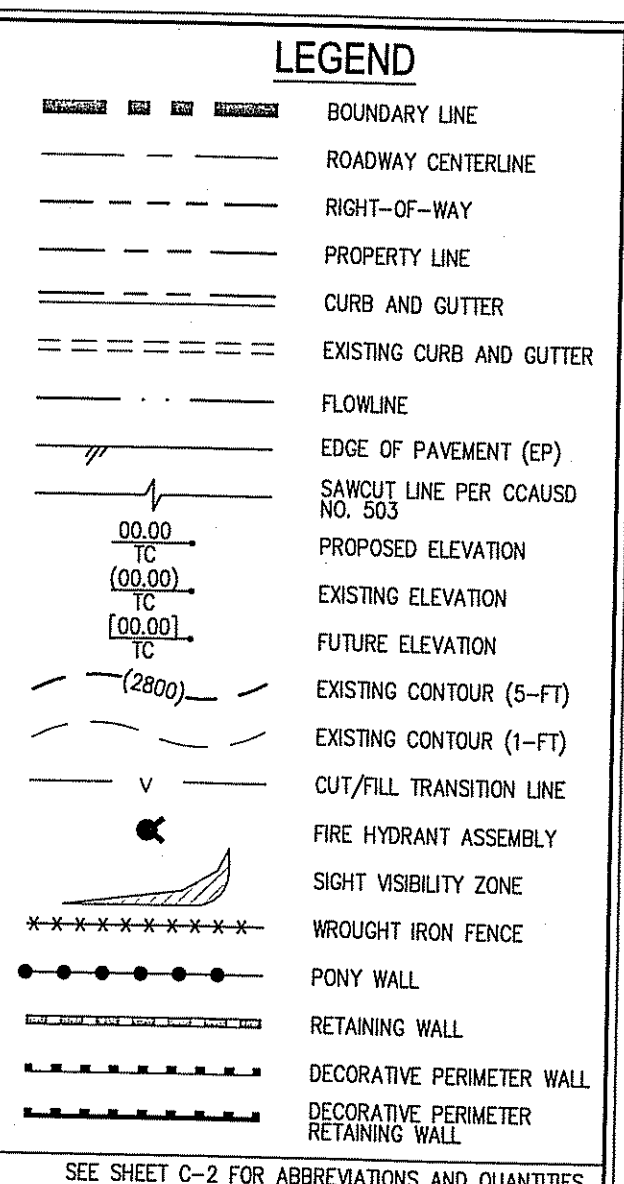
PP-4

SHEET 8 OF ----

I:\rah1322-001\granite falls 2 south\dwg\improveh1322-001.dwg 5/21/2014 11:07 AM Christopher Zhang



- ### CONSTRUCTION NOTES
1. CONSTRUCT 2.5" AC PAVEMENT WITH 6" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
 2. CONSTRUCT 3.5" AC PAVEMENT WITH 7" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
 3. CONSTRUCT 4.5" AC PAVEMENT WITH 12" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
 4. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216.
 5. CONSTRUCT 8" CROSS GUTTER PER CCAUSD NO. 228.
 6. CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234.
 7. SAWCUT AND MATCH EXISTING IMPROVEMENTS.
 8. FIELD VERIFY AND CONNECT TO EXISTING CURB, GUTTER AND SIDEWALK.
 9. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE 1.
 10. CONSTRUCT 8" WIDE, 3" CRUSHED FINES EQUESTRIAN TRAIL PER CLV TRAIL IMPROVEMENT GUIDELINE DWG. 1-107.
 11. INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CCAUSD NO. 401 & 405 WITH BOLTED GRATE.
 12. FIELD VERIFY STUB AND CONNECT TO EXISTING STORM DRAIN STUB.
 13. INSTALL TYPE C DROP INLET PER CCAUSD NO. 413 & 415. SEE TWOFIELD SHEET PP-10.
 14. INSTALL 48" RCP CLASS III SD (PUBLIC).
 15. INSTALL SD LATERALS (PUBLIC), SEE SHEET PP-10.
 16. INSTALL 12" PVC SD BLEEDER LINE (PUBLIC).
 17. INSTALL STORM DRAIN CLEAN-OUT PER DETAIL 9.
 18. REMOVE EX 48" CLASS III RCP SD.
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 21. REMOVE EXISTING DROP INLET.
- SEE SHEET C-2 FOR ABBREVIATIONS, LEGEND & QUANTITIES



DISCLAIMER NOTE

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SOILS REPORT BY: ANGLE ENGINEERING
PROJECT NO. 28163-1, DATED 11/22/13
EARTHWORK QUANTITIES (BAW):
CUT=74,922 CU YDS/FILL=87,610 CU YDS

FEMA FLOOD ZONE DESIGNATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD), PER FIRM PANEL 32003C1745E, DATED SEPTEMBER 27, 2002.

FLOOD CERTIFICATION

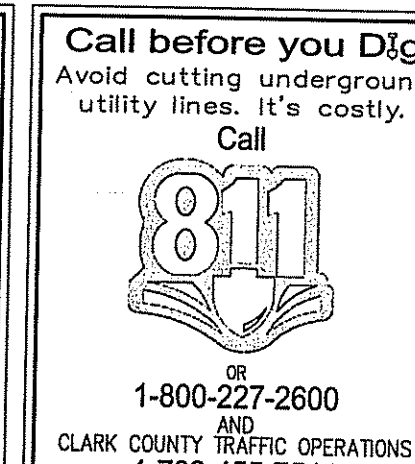
I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS4683A ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

TODD J. STEADHAM, P.E. 15292 DATE: _____

BASIS OF BEARING

SOUTH 00°23'54" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 1, TOWNSHIP 19 SOUTH, RANGE 60 EAST, W.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 117, PAGE 43 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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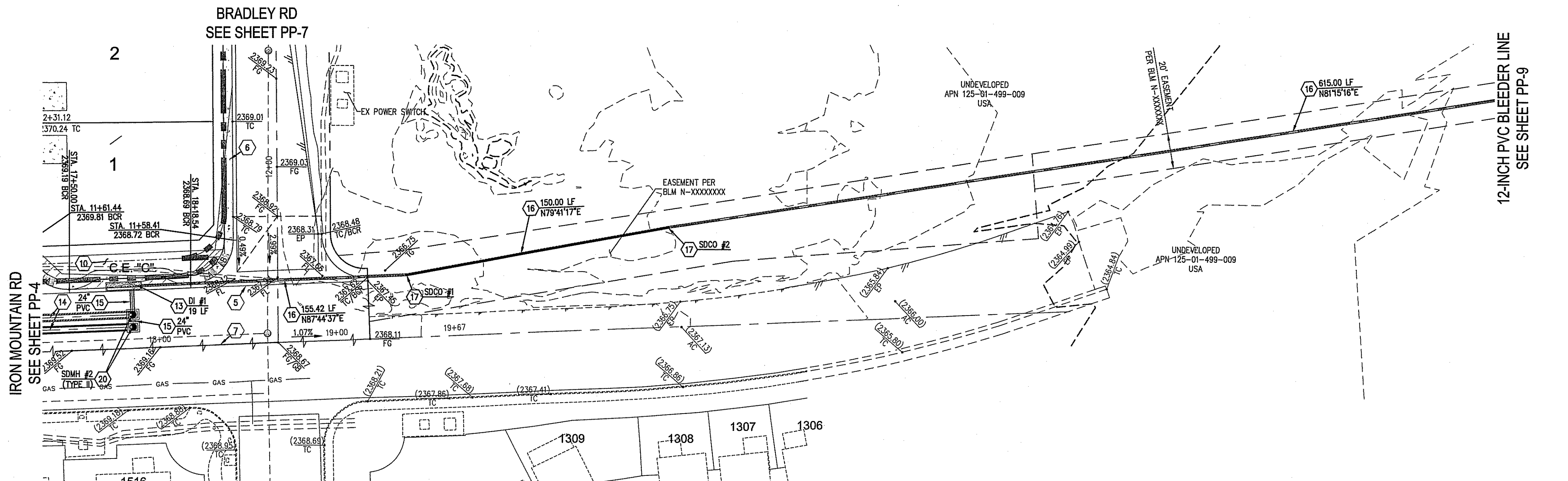
SLATER HANFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5389

RICHMOND AMERICAN HOMES
GRANITE FALLS 2 SOUTH
PLAN AND PROFILE - BRADLEY RD

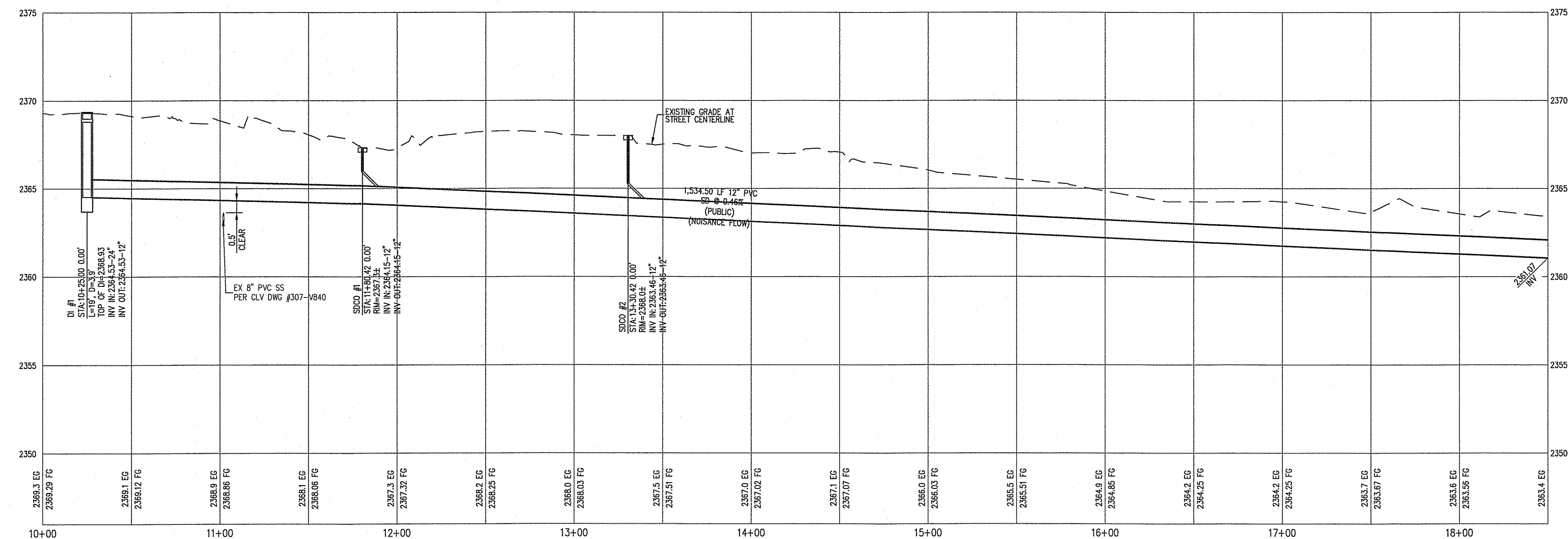
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DESIGNER: CZ
CHECKED: TJ
PROJECT NO. RAH1322-001

PP-7
SHEET 11 OF _____

PROFESSIONAL ENGINEER - STATE OF NEVADA
TODD J. STEADHAM
Exp. 06/30/2014
CIVIL
No. 15292

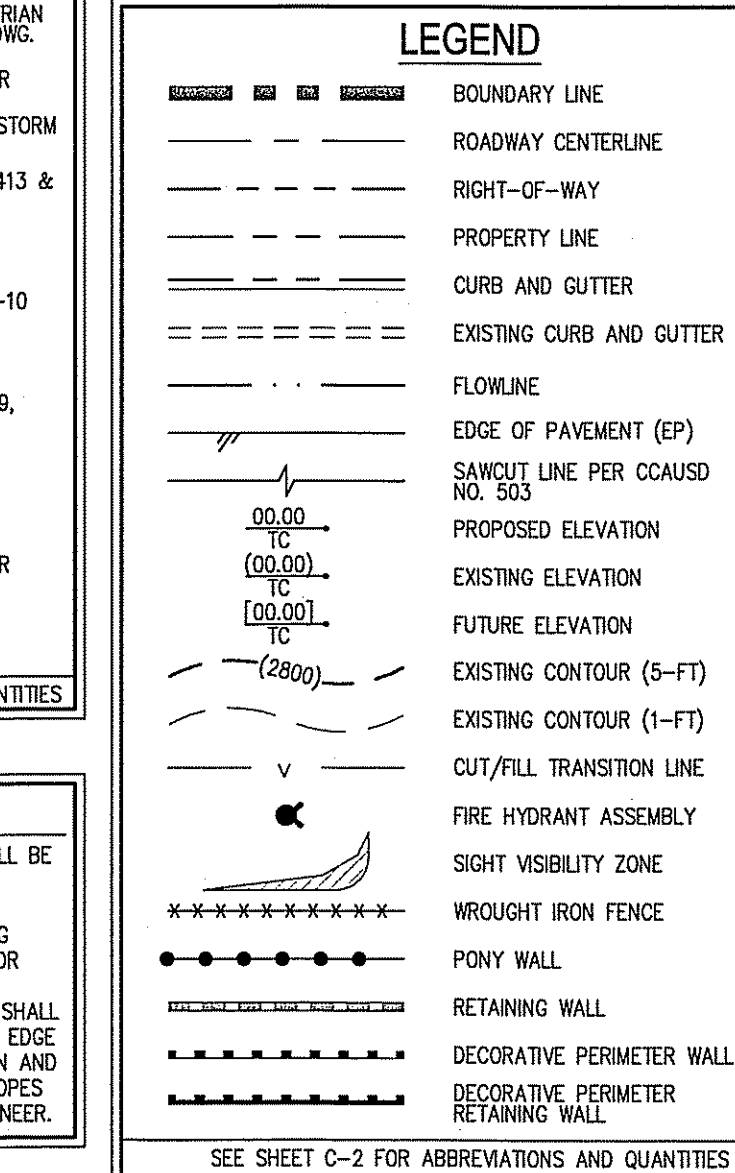
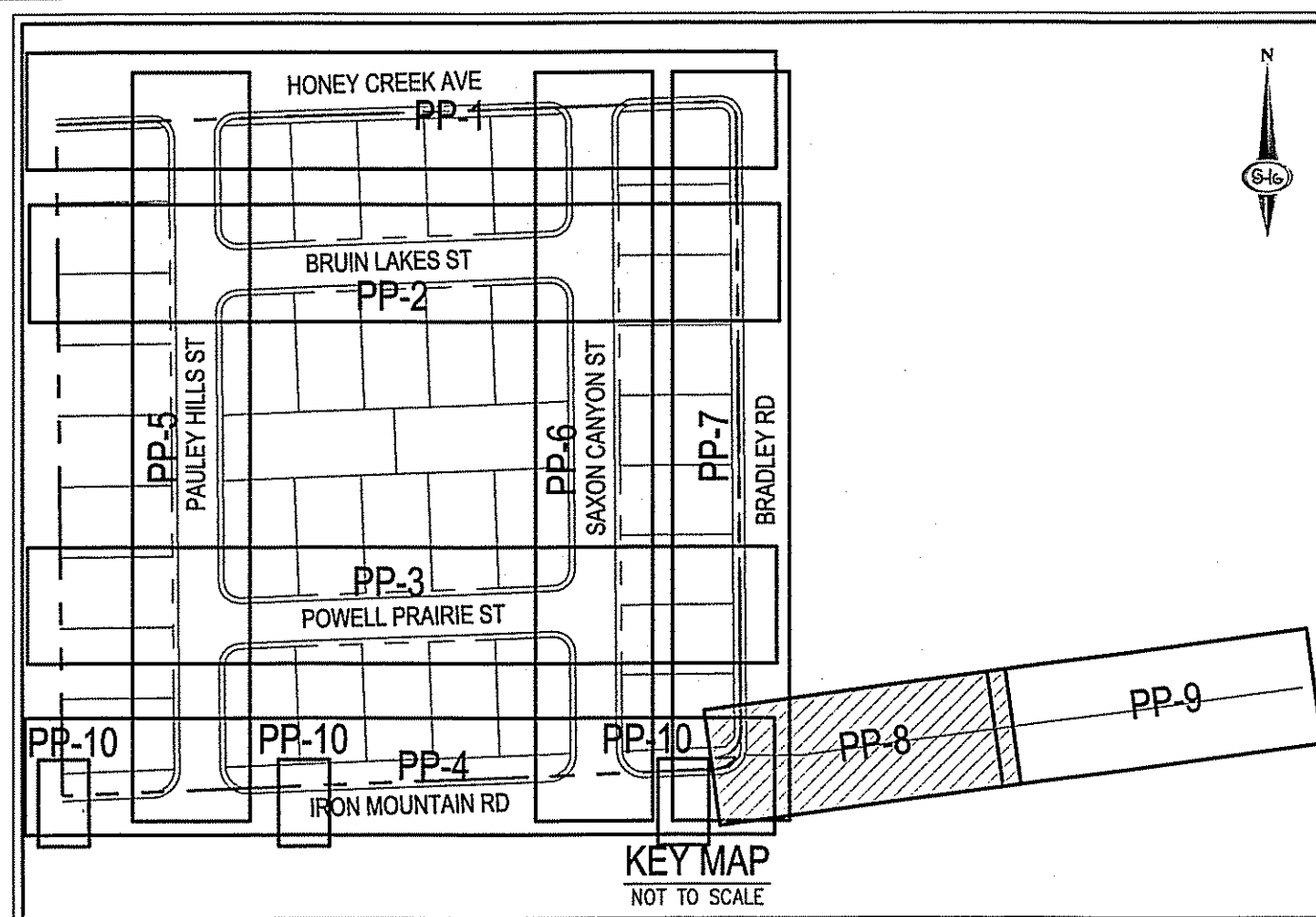


12-INCH PVC BLEEDER LINE
(PUBLIC)



PROFILE

HOR. : 1"=40'
VERT. : 1"=4'



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SOILS REPORT BY: ANGLE ENGINEERING
PROJECT NO. 28163-1, DATED 11/22/13
EARTHWORK QUANTITIES (RAW):
CUT= 74,922 CU YDS/FILL= 87,610 CU YDS

FEMA FLOOD ZONE DESIGNATION

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FLOOD CERTIFICATION

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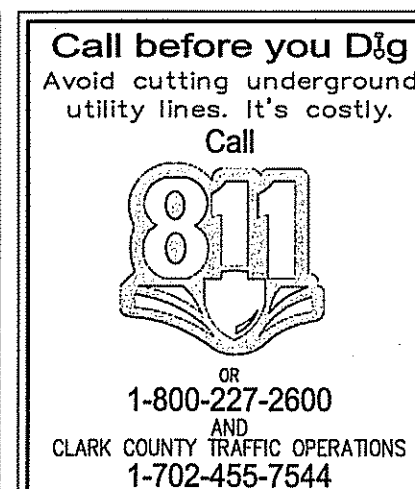
TODD J. STEADHAM, P.E. 15292 DATE: _____

BASIS OF BEARING

SOUTH 00°23'54" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 1, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 117, PAGE 43 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

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

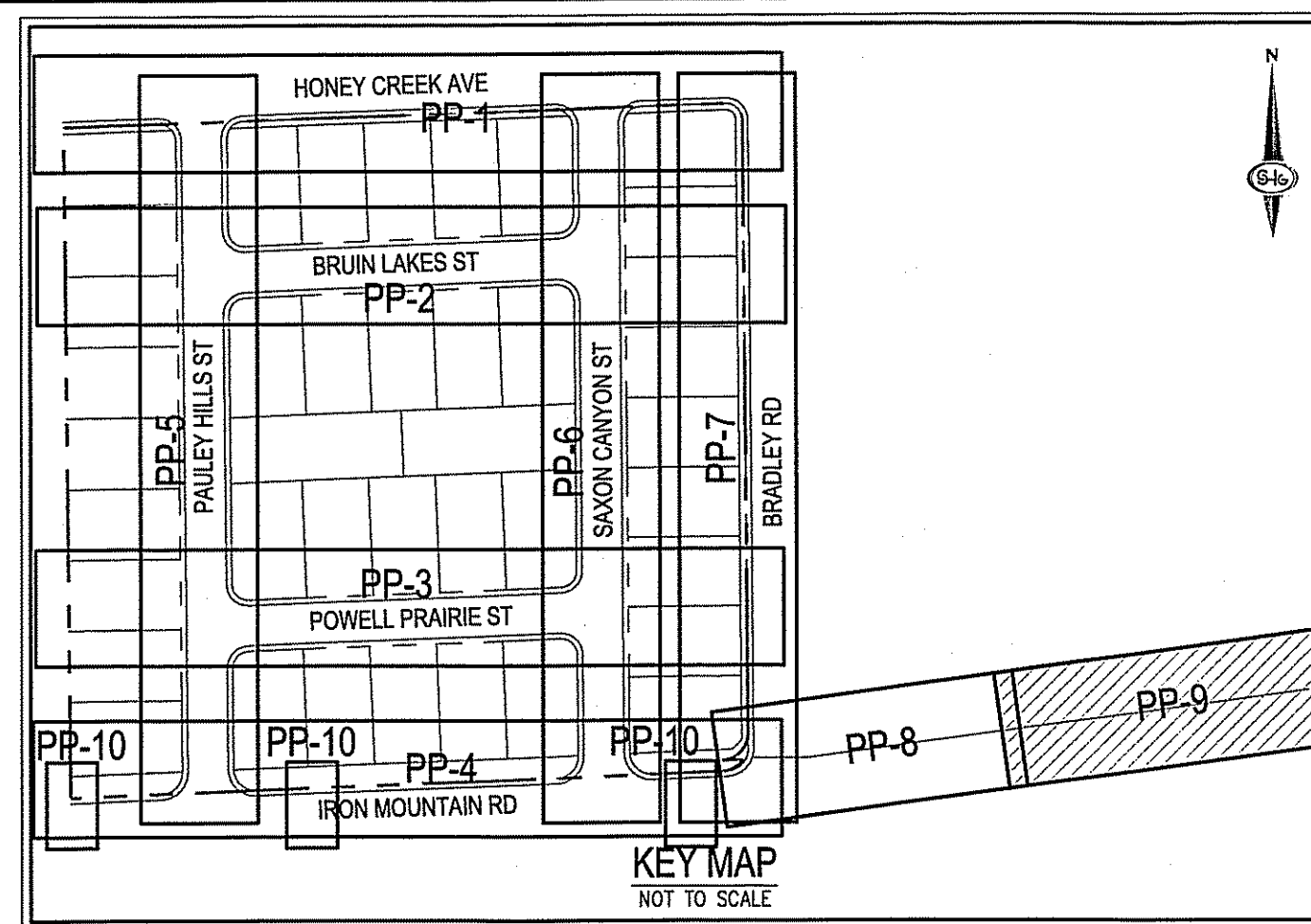
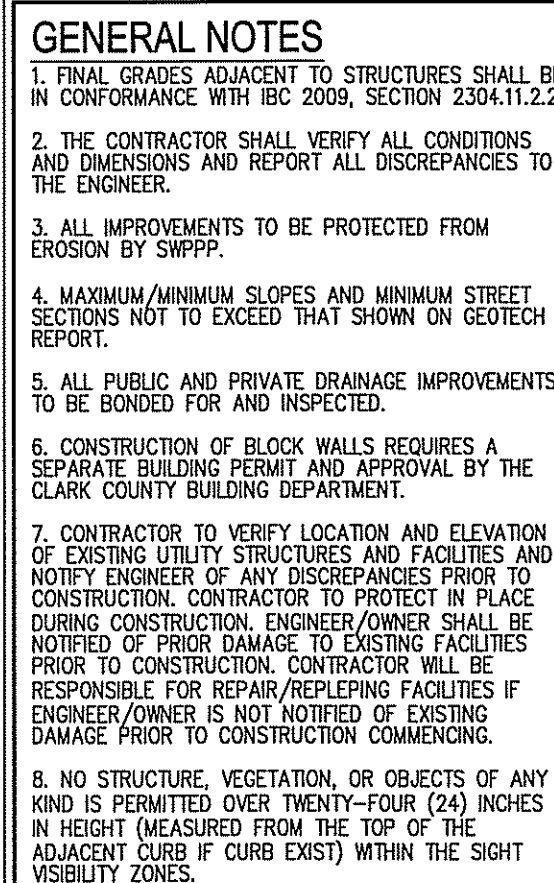
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DRAFTER: CZ
DESIGNER: CZ
CHECKED: TJS
PROJECT NO. RAH1322-001

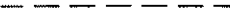
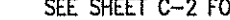
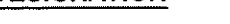
DATE: _____
DRAFTER: CZ
DESIGNER: CZ
CHECKED: TJS
PROJECT NO. RAH1322-001

DATE: _____
DRAFTER: CZ
DESIGNER: CZ
CHECKED: TJS
PROJECT NO. RAH1322-001

PLAN AND PROFILE - 12-INCH PVC SD BLEEDER

PP-8
SHEET 12 OF ----



- # LEGEND
- | | |
|---|--------------------------------|
|  | BOUNDARY LINE |
|  | ROADWAY CENTERLINE |
|  | RIGHT-OF-WAY |
|  | PROPERTY LINE |
|  | CURB AND GUTTER |
|  | EXISTING CURB AND GUTTER |
|  | FLOWLINE |
|  | EDGE OF PAVEMENT (EP) |
|  | SAWCUT LINE PER CAAUSD NO. 503 |
|  | PROPOSED ELEVATION |
|  | EXISTING ELEVATION |
|  | FUTURE ELEVATION |
|  | EXISTING CONTOUR (5-FT) |
|  | EXISTING CONTOUR (1-FT) |
|  | CUT/FILL TRANSITION LINE |
|  | FIRE HYDRANT ASSEMBLY |
|  | SIGHT VISIBILITY ZONE |
|  | WROUGHT IRON FENCE |
|  | PONY WALL |
|  | RETAINING WALL |
|  | DECORATIVE PERIMETER WALL |
|  | DECORATIVE PERIMETER WALL |
|  | RETAINING WALL |
- SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

SOILS REPORT BY ANGLE ENGINEERING
PROJECT NO. 26163-1, DATED 11/22/13
EARTHWORK QUANTITIES (RAW):
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FEMA FLOOD ZONE DESIGNATION

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FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED
 TECHNICAL DRAINAGE STUDY DS4663A ON FILE AT CITY OF LAS VEGAS FOR THE
 SUBJECT PROJECT.

TODD J. STEADHAM P.E. 15292 DATE _____

BASIS OF BEARING
SOUTH 00°23'54" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 1, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 117, PAGE 43 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK NUMBER: 6LV9012NNWG
RIVET AND PLATE IN TOP OF CURB ON THE SOUTH SIDE OF IRON MOUNTAIN ROAD, 35' ±
SOUTHEAST OF PI OF LEON DRIVE AND IRON MOUNTAIN ROAD.
ELEVATION: 2378.778 ±1 US SURVEY FEET (NAV88)
725.053 METERS
PER CITY OF LAS VEGAS BENCHMARKS, 2008 ADJUSTMENT (UPDATED MAY 24, 2010)

AVOID HITTING OVERHEAD
POWER LINES. IT'S COSTLY.

**CALL BEFORE
YOU DO
OVERHEAD**



1-702-227-2929



AVOID HITTING UNDERGROUND
TRAFFIC SIGNAL SYSTEMS
AND STREET LIGHT SYSTEM
CONDUITS. IT'S COSTLY.

Call
**before you
do UnderGround**
1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
AND
CITY OF LAS VEGAS
1-702-432-6300
LAS VEGAS AREA
COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig
Avoid cutting underground
utility lines. It's costly.

Call

811

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

TECHNICAL DRAINAGE STUDY
ADDENDUM #1

Granite Falls 2 South
City of Las Vegas, Nevada

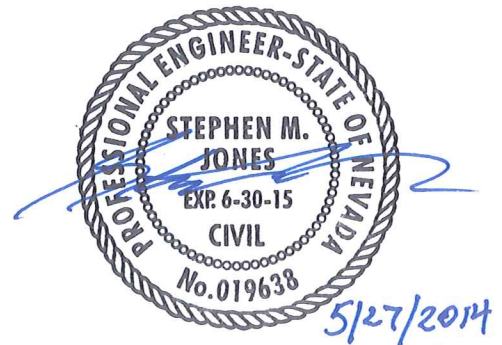
Job No.: RAH1322.001
Date: May 2014

Prepared By:

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

Prepared For:

Richmond American Homes
7770 S. Dean Martin Drive, Suite 308
Las Vegas, Nevada 89139
Phone: 702-617-8464 • Fax: 702-617-8499



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

Assisted by: Erick Mata, EI

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Granite Falls 2 – South (Addendum No.1) Date: May 2014
 Location of Development: a) Descriptive (Cross Streets): North/South: Bradley Road
 East/West: Iron Mountain Road
 b) Section: 1 Township: 19 South Range: 60 East
 c) APN: 125-01-402-009 thru 125-01-402-016

Name of Owner/ Developer: Richmond American Homes
 Telephone No.: 702-617-8464 Fax No.: 702-617-8499 E-mail Address: Brian.Walsh@mdch.com
 Address: 7770 S. Dean Martin Drive, Suite 308 Las Vegas, Nevada 89139

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

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 9.2 +/- Acres Being Developed/Disturbed: All
2. Is a portion or all of the subject property located in a FEMA Flood Hazard Area? ☐ Yes** ☒ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No
4. Proposed type of development (Residential, Commercial, Etc.): Single-Family Residential
12 acres (North)
5. Approximate upstream land area which drains to the subject site: 50 acres + NWNS Area (Iron Mountain Road)
6. Has the site drainage been evaluated in the past? ☐ Yes ☒ No If yes, please identify documentation:

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

Iron Mountain Road

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.

***Newly Required Field**

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

Revision	Date

Local Entity File No. _____

REFERENCE: SHG Job RAH1322.001

STANDARD FORM 1

Updated 05/01/2008

RAH1322.001

May 27, 2014

Albert Sung, P.E.
Flood Control Project Engineer
City of Las Vegas Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Subject: Addendum No. 1 to the Technical Drainage Study for Granite Falls 2 South (CLV DS4663)

Dear Mr. Sung:

This letter is submitted in response to comments contained in the April 10, 2014 review memorandum, regarding the above referenced project. A copy of the City of Las Vegas (CLV) Department of Public Works comment letter has been provided in front of this letter, and the comments have been individually addressed as follows:

1. **Comment:** *Provide a copy of the zoning/planning conditions associated with this site (GPA-52122; ZON-52123; VAC-52125 & TMP-52127) with the next submittal to verify compliance with conditions. Flood Control will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the City Council). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.*

Response: All conditions associated with the site have been included in Appendix B.

2. **Comment:** *The proposed bubbler and the bleeder line encroach into the property of the Bureau of Land Management (BLM). Drainage easement grant must be obtained from the BLM prior to the final approval of the improvement plans.*

Response: Acknowledged, the BLM grant for the adjacent property will be provided upon receipt.

3. **Comment:** *On the Drainage Maps, it appears that concentration point *CPO was omitted in all the Flow Rate Summary Tables. Provide as such in the next submittal.*

Response: Concentration point *CP0 is not necessary as it is inclusive within the referenced concentration point *CP1. Concentration point *CP1, from the previously approved Iron Mountain / Bradley study, combines flow from *CP0, *ON1D, *LEO-D and *IMT-D utilized for illustrational purposes in guidance with the HEC-1 analysis provided in the original subject study. The pertinent concentration point for any design is *CP1 and therefore included in the summary tables.

4. **Comment:** *The proposed hump in the west driveway entrance off of Honey Creek Avenue does not provide enough freeboard for 100-year storm event protection. The hump has to provide a minimum freeboard of six inches above the anticipated 100-year storm water surface in the corresponding street elevation. Review and revise accordingly.*

Response: Per a meeting between Steve Jones and Albert Sung on April 21, 2014 it was agreed to revise the humps as follows:

- A high point in the Pauley Hills Street entry from Honey Creek Avenue is no longer proposed. The flow generated by offsite basin OFF2 will now be routed onsite instead of east in Honey Creek Avenue as previously established by this study. As a result, the following table summarizes the before and after flow rates at each section analyzed with this study.

Summary of Revised Street Section Flow Rates – Developed Condition		
Section	Previous Q ₁₀₀ (cfs)	Current Q ₁₀₀ (cfs)
DEV1	19	21
HNY1	2	2
HNY2	21	19
BRAD	22	20
IRN1	188	187

Summary of Revised Street Section Flow Rates – Ultimate Condition		
Section	Previous Q ₁₀₀ (cfs)	Current Q ₁₀₀ (cfs)
HNY1	3	3
HNY2	27	24
IRN0	-	148
IRN1	164	167
BRAD	97	191

- Iron Mountain street section IRN0 has been provided to validate the necessity of a 5-ft Type C drop inlet to meet street flow criteria after flow contribution from Pauley Hills Street. The Iron Mountain Road storm drain profile has been revised and reflects the addition this drop inlet. Refer to Appendix C for supporting computations. See "Additional Revision 2" in this report to further elaborate on storm drain revisions.
- The proposed high point at the Saxon Canyon Street entry from Honey Creek Avenue, has been elevated approximately 0.1-ft above the 100-year flow depth produced by Section HNY2. The high point perpetuates Honey Creek flows east without causing any impact to proposed lots from offsite flows. However, since the CCRFCD required 6-inches of freeboard above the 100-year flow depth is not provided in Saxon Canyon, an assessment of the offsite flow thru the site has been performed to show that the affected finished floors remain adequately elevated above the resulting overflow depth. Note that the developed condition (19 cfs) generates the highest flow rate that can overflow thru the site at Section HNY2, because during the ultimate condition (24 cfs) it is anticipated that half of the flow is

contained in north half of Honey Creek. Refer to Appendix C for the overflow evaluation of the onsite finished floors associated with the overflow calculations.

Revised Exhibits F, G and H have been provided in Appendix C to properly illustrate the changes regarding the routing of offsite flows from Honey Creek thru the project site.

5. **Comment: Sheet G-1:** Lot 34 and Lot 35 are the two long lots in the development. The proposed high point in each lot is placed in the middle of the lot instead of at the far corners as typically shown in other lots. It is not clear how the far corners in each lot drain. Review and address in the next submittal.

Response: Additional tags have been provided on the grading plans for Lot 34 and Lot 35 to show positive drainage from the back of wall.

Additional Revision 1:

A Technical Drainage Study for Granite Falls 2 – North (hereafter referred to as the North Study), prepared by Slater Hanifan Group, is being processed concurrently (DS4666) near the vicinity of Granite Falls 2 - South. The North Study shows technical analysis at the intersection of Sheleheda and Bradley Road and concluded a flowsplit, as previously established by the City of Las Vegas Northwest Neighborhood Study (CLV NWNS), never occurs in the ultimate condition. Flow is routed south in Bradley with larger flow rates than the CLV NWNS defined. The following table summarizes a comparison of ultimate condition flows addressed by the North Study.

Comparison of Ultimate Condition Flow Rates @ Intersection of Sheleheda & Bradley			
Study	Total Q ₁₀₀ (cfs)	Split South Q ₁₀₀ (cfs) (Bradley Road)	Split East Q ₁₀₀ (cfs) (Sheleheda Avenue)
Granite Falls 2 - North	150	150	0
CLV NWNS	107	53	54

As a result, a new ultimate condition hydraulic section was provided in Bradley Road (Section BRAD) to show adjacent finished floors adequately flood protected to twice the depth of flow. The perimeter wall adjacent to Bradley Road is designed as a retaining wall therefore considered adequate to protect against pertaining flows. Computations for Section BRAD can be found in Appendix C under "Revised Hydraulic Sections". The table below summarizes the results with the new flow rate.

Summary of 100-Year Ultimate Condition Street Flow Hydraulics for Bradley Road						
Street Cross Section ID	Contributing Basins	Q ₁₀₀ (cfs)	Slope (%)	Velocity, V (ft/s)	Depth, D (ft)	DxV Product
BRAD	CP2 + BRAD + *(150cfs)	191	0.40	4.67	1.09	5.1
* REFERENCED FROM THE GRANITE FALLS 2 NORTH STUDY						

Additional Revision 2:

The previous submittal provided a 48-inch RCP through Iron Mountain that connected to an NDOT Type 2B drop inlet across the intersection of Iron Mountain Road and Bradley Road. The Type 2B inlet was proposed to function as an interim bubbler inclusive of a 12-inch PVC bleeder pipe. Through further inspection, it was determined there was a utility conflict in the intersection of Iron Mountain Road and Bradley Road; therefore the 48-inch RCP storm drain had to be replaced with dual 36-inch RCPs. As a result, the revised storm drain was remodeled in WSPGW and determined to meet storm drain criteria. In order to avoid the existing sewer utility, it was agreed in a May 12, 2014 meeting with CLV that the Iron Mountain storm drain can terminate short of the intersection with Bradley. It is anticipated that future development east of Bradley will extend the storm drain thru the intersection in a more feasible manner than this project. At the terminus of the dual 36-inch RCPs, two grated manhole lids and a drop inlet intended to collect flow to meet dry lane criteria in the ultimate condition will bubble the storm flows out of the system. Note a temporary PVC pipe perpetuates positive drainage for the low flows from the dual 36-inch RCPs, thru the proposed drop inlet and into a daylighting 12-inch PVC bleeder line that extends east across BLM property.

Note that previous submittal had proposed a 10-ft Type CM2 drop inlet to collect dry lane flows in the ultimate condition near the vicinity of Bradley; however, due to depth constraints of the proposed Iron Mountain storm drain and thus the inlet's lateral storm drain, the Type CM2 drop inlet has been modified to a 19-ft Type C drop inlet.

Note that the addition of the 5-ft drop inlet upstream was not introduced into the WSPGW model of the storm drain because the flow contribution is less than 3% of the overall flow (2 cfs of the total 81 cfs in the dual 36-inch RCPs) and is considered insignificant. Please see Appendix D for all supporting computations.

Additional Revision 3:

The referenced Iron Mountain/Bradley Study had proposed a 12.5-ft Type CM2 drop inlet at Section IMT1. Through further inspection it was concluded that due to the geometry of the junction structure and the depth of the connecting lateral storm drain, the connecting lateral and drop inlet were revised. As a result, the previous 12.5-ft Type CM2 drop inlet was revised to a 28-ft Type C drop inlet to adequately meet specifications. Referenced material for the 28-ft Type C drop inlet and all pertinent calculations have been provided in Appendix D for reference.

Additional Revision 4:

Per the above mentioned meeting with City of Las Vegas, the 12-inch bleeder line provided for positive drainage of nuisance flow has been revised to include clean outs per CLV's request. See Appendix E for pertinent profiles.

The revised plan, profile and detail sheets adopting the revisions addressed in this letter have been included in Appendix E. If you have any questions or require additional information, please do not hesitate to contact us at 284-5300.

Respectfully Submitted,

SLATER HANIFAN GROUP

Erick Mata, E.I.
Flood Control Division

cc: Mark Failla, P.E., CFM – SHG
Steve Jones, P.E. - SHG
Todd Steadham, P.E. – SHG

APPENDIX

Appendix A – Response to April 10, 2014 CLV Drainage Study Comments

Appendix B – Response to Comment #1 – Planning Conditions of Approval

Appendix C – Response to Comment #4 – Revised Humps

- Revised Exhibits
- Revised Hydraulic Sections
 - Developed Condition
 - Ultimate Condition
- Finished Floor Analysis

Appendix D – Additional Revisions

- Drop Inlet Computations
- WSPG Model

Appendix E – Revised Grading Plan, Profile and Detail Sheets

APPENDIX A

City of Las Vegas Comment Letter

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: April 10, 2014
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: Granite Falls 2 South	COPIES TO: Slater Hanifan Group
Cross Streets:	NWC of Iron Mountain Road & Bradley Road	Verlaine LLC / Richmond American
File Number:	F:\Depot\DSMemos\DS4663A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-01-402-009 to 125-01-402-016	
Zoning Action:	GPA-52122; ZON-52123; VAC-52125 & TMP-52127	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	3/27/2014	4/10/2014	See Comments Below	\$400.00	352205: \$400
			TOTAL FEES (LDDRS):	\$400.00	*****

REMARKS:

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

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

1. Provide a copy of the zoning/planning conditions associated with this site (**GPA-52122; ZON-52123; VAC-52125 & TMP-52127**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the **City Council**). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
2. The proposed bubbler and the bleeder line encroach into the property of the *Bureau of Land Management* (BLM). Drainage easement grant must be obtained from the BLM prior to the final approval of the improvement plans.
3. On the *Drainage Maps*, it appears that concentration point *CP0 was omitted in all the *Flow Rate Summary Tables*. Provide as such in the next submittal.
4. The proposed hump in the west driveway entrance off of Honey Creek Avenue does not provide enough freeboard for 100-year storm event protection. The hump has to provide a minimum freeboard of six inches above the anticipated 100-year storm water surface in the corresponding street elevation. Review and revise accordingly.

5. **Sheet G-1:** Lot 34 and Lot 35 are the two long lots in the development. The proposed high point in each lot is placed in the middle of the lot instead of at the far corners as typically shown in other lots. It is not clear how the far corners in each lot drain. Review and address in the next submittal.

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: T19S/R60E/01
AREA G-01

APPENDIX B

Response to Comment #1 – Planning Conditions of Approval



LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
RICKI Y. BARLOW
BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

February 12, 2014

Verlaine, LLC
3425 Cliff Shadows Parkway, Suite #150
Las Vegas, Nevada 89129

**RE: ABEYANCE - GPA-52122 - [PRJ-52087] GENERAL PLAN AMENDMENT RELATED
TO ZON-52123, WVR-52171, VAC-52125 AND TMP-52127
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a General Plan Amendment FROM: DR (DESERT RURAL DENSITY RESIDENTIAL) TO: L (LOW DENSITY RESIDENTIAL) on 8.70 acres at the northwest corner of Iron Mountain Road and Bradley Road (APNs 125-01-402-009 thru 016), Ward 6 (Ross) [PRJ-52087], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to recommend **APPROVAL** of your request.

This item will be considered by the City Council on March 19, 2014, at 1:00 P.M. in the Council Chambers of City Hall, 495 South Main Street, Las Vegas, Nevada. ***The Council requires that you or your representative be present at this meeting.*** If you or your representative chooses not to attend, the City Council may act in your absence without your input.

Sincerely,

Doug Rankin, AICP
Planning Manager
Case Planning Division

DR:nl

cc:

Mr. Brian Walsh
Richmond American Homes
7770 South Dean Martin Drive, Suite #308
Las Vegas, Nevada 89139

Ms. Chelsea Peltier
Slater Hanifan Group
5740 South Arville Street, Suite #216
Las Vegas, Nevada 89118

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING
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MAYOR PRO TEM

LOIS TARKANIAN
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BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

February 12, 2014

Verlaine, LLC
3425 Cliff Shadows Parkway, Suite #150
Las Vegas, Nevada 89129

**RE: ABEYANCE - ZON-52123 [PRJ-52087] - REZONING RELATED TO GPA-52122,
WVR-52171, VAC-52125 AND TMP-52127
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a Rezoning FROM: R-E (RESIDENCE ESTATES) TO: R-1 (SINGLE FAMILY RESIDENTIAL) on 8.70 acres at the northwest corner of Iron Mountain Road and Bradley Road (APNs 125-01-402-009 thru 016), Ward 6 (Ross) [PRJ-52087], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to recommend **APPROVAL** of your request.

This item will be considered by the City Council on March 19, 2014, at 1:00 P.M. in the Council Chambers of City Hall, 495 South Main Street, Las Vegas, Nevada. *The Council requires that you or your representative be present at this meeting.* If you or your representative chooses not to attend, the City Council may act in your absence without your input.

Sincerely,

Doug Rankin, AICP
Planning Manager
Case Planning Division

DR:nl

cc:

Mr. Brian Walsh
Richmond American Homes
7770 South Dean Martin Drive, Suite #308
Las Vegas, Nevada 89139

Ms. Chelsea Peltier
Slater Hanifan Group
5740 South Arville Street, Suite #216
Las Vegas, Nevada 89118

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BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

February 12, 2014

Verlaine, LLC
3425 Cliff Shadows Parkway, Suite #150
Las Vegas, Nevada 89129

**RE: ABEYANCE - VAC-52125 [PRJ-52087] - VACATION RELATED TO GPA-52122,
ZON-52123, WVR-52171 AND TMP-52127
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a Petition to Vacate a 10-foot wide roadway easement of the west side of Bradley Road, as well as all of Honeycreek Avenue at the northwest corner of Iron Mountain Road and Bradley Road, Ward 6 (Ross) [PRJ-52087], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to recommend **APPROVAL** of your request, subject to the following:

Planning

1. The limits of this Petition of Vacation shall be defined as all of Honeycreek Avenue and a 10-foot wide Roadway Easement along Bradley Road from Iron Mountain Road to Honeycreek Avenue recorded as Document # 1350:1309324.
2. Prior to the recordation of the Order of Vacation, provide a plan signed and Sealed by a professional Land Surveyor that meets all state requirements for re-allocating vacated rights-of-way. This plan must show how the vacated right-of-way will be incorporated into the adjacent properties and be approved by the Department of Public Works; said plan shall be made a part of and recorded with the Order of Vacation. If the Iron Mountain/Bradley Subdivision (FMP-51383) has recorded, an amended Final Map of Iron Mountain Bradley that includes how the area affected by this vacation will be incorporated into that subdivision must be submitted and must record concurrent with the recordation of the Order of Vacation.
3. Assessor Parcel Numbers #125-01-402-017 and #125-01-402-018 are owned by the City of Las Vegas and shall be excluded from this Petition of Vacation.
4. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the recordation of the Order of Vacation for this application. Appropriate drainage easements shall be reserved if recommended by the approved Drainage Plan/Study. The drainage study required by TMP-52127 may be used to satisfy this requirement provided that it addresses the area to be vacated.

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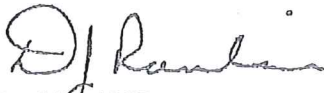
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5. All existing public improvements, if any, adjacent to and in conflict with this vacation application are to be modified, as necessary, at the applicant's expense prior to the recordation of the Order of Vacation.
6. The Order of Vacation shall not be recorded until all of the conditions of approval have been met provided, however, that conditions requiring modification of public improvements may be fulfilled for purposes of recordation by providing sufficient security for the performance thereof in accordance with the Subdivision Ordinance of the City of Las Vegas. City Staff is empowered to modify this application if necessary because of technical concerns or because of other related review actions as long as current City right-of-way requirements are still complied with and the intent of the vacation application is not changed. If applicable, a five foot wide easement for public streetlight and fire hydrant purposes shall be retained on all vacation actions abutting public street corridors that will remain dedicated and available for public use. Also, if applicable and where needed, public easement corridors and sight visibility or other easements that would/should cross any right-of-way or easement being vacated must be retained.
7. Reservation of easements for the facilities of the various utility companies together with reasonable ingress thereto and egress there from shall be provided if required.
8. All development shall be in conformance with code requirements and design standards of all City Departments.
9. If the Order of Vacation (or Order of Relinquishment of Interest if a Patent Reservation) is not recorded within one (1) year after approval by the City of Las Vegas or an Extension of Time is not granted by the Planning Director, then approval will terminate and a new petition must be submitted.

This item will be considered by the City Council on March 19, 2014, at 1:00 P.M. in the Council Chambers of City Hall, 495 South Main Street, Las Vegas, Nevada. *The Council requires that you or your representative be present at this meeting.* If you or your representative chooses not to attend, the City Council may act in your absence without your input.

Sincerely,



Doug Rankin, AICP
Planning Manager
Case Planning Division

DR:nl

Verlaine, LLC
VAC-52125 [PRJ-52087] - Page Three
February 12, 2014

cc:

Mr. Brian Walsh
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Ms. Chelsea Peltier
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BOB COFFIN

BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

February 12, 2014

Verlaine, LLC
3425 Cliff Shadows Parkway, Suite #150
Las Vegas, Nevada 89129

**RE: ABEYANCE - TMP-52127 [PRJ-52087] - TENTATIVE MAP RELATED TO GPA-52122, ZON-52123, WVR-52171 AND VAC-52125
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a Tentative Map FOR A PROPOSED 40-LOT SINGLE FAMILY RESIDENTIAL SUBDIVISION on 8.70 acres at the northwest corner of Iron Mountain Road and Bradley Road (APNs 125-01-402-009 thru 016), R-E (Residence Estates) Zone [PROPOSED: R-1 (Single Family Residential)], Ward 6 (Ross) [PRJ-52087], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to recommend **APPROVAL** of your request, subject to the following:

Planning

1. Approval of the Tentative Map shall be for no more than four (4) years. If a Final Map is not recorded on all or a portion of the area embraced by the Tentative Map with four (4) years of the approval of the Tentative Map, this action is void.
2. Prior to City Council hearing this item, the applicant will provide a revised Landscape Plan to Planning Department staff that shows Honeycreek Avenue.
3. Street names must be provided in accordance with the City's Street Naming Regulations.
4. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.
5. In conjunction with creation, declaration and recordation of the subject common-interest community, and prior to recordation of the Covenants, Codes and Restrictions "CC&R", or conveyance of any unit within the community, the Developer is required to record a Declaration of Private Maintenance Requirements ("DPMR") as a covenant on all associated properties, and on behalf of all current and future property owners. The DPMR is to include a listing of all privately owned and/or maintained infrastructure improvements, along with assignment of maintenance responsibility for each to the common interest community or the respective individual property owners, and is to provide a brief description of the required level of maintenance for privately maintained components. The DPMR must be reviewed and approved by the City of Las Vegas Department of Field Operations prior to recordation, and must include a statement that all properties within the community are subject to assessment for all associated costs should private maintenance obligations not be met, and the City of Las Vegas be required to provide for said maintenance. Also, the CC&R are to include a statement of obligation of compliance with the DPMR. Following recordation, the Developer is to submit copies of the recorded DPMR and CC&R documents to the City of Las Vegas Department of Field Operations.

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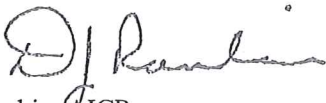
6. All development is subject to the conditions of City Departments and State Subdivision Statutes.

Public Works

7. A Petition of Vacation such as VAC-52125 shall record prior to the recordation of a Final Map for this site. If the Vacation is not approved, this Tentative Map shall be revised and resubmitted excluding the right-of-way proposed to be vacated on Honeycreek Avenue.
8. Grant an Equestrian Trail Easement to be privately maintained by the Homeowner's Association adjacent to Iron Mountain Road for all portions of the required trail that are not within the public right-of-way and grant public Pedestrian Access Easements for all public sidewalk areas not within the public right-of-way concurrent with a Final Map for this site.
9. Prior to recordation of a Final Map for this site, coordinate with the Right-of-Way Section of the Department of Field Operations to incorporate the appropriate portions of Assessor's Parcel Numbers 125-01-402-018 and 125-01-402-017 into a Final Map for this site.
10. Construct half street improvements on Iron Mountain Road and Bradley Road, including overpaving and appropriate transitions where legally able adjacent to this site concurrent with development of this site.
11. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.
12. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits, submittal of any construction drawings or the submittal of a Map subdividing this site, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

This item will be considered by the City Council on March 19, 2014, at 1:00 P.M. in the Council Chambers of City Hall, 495 South Main Street, Las Vegas, Nevada. *The Council requires that you or your representative be present at this meeting.* If you or your representative chooses not to attend, the City Council may act in your absence without your input.

Sincerely,



Doug Rankin, AICP
Planning Manager
Case Planning Division

Verlaine, LLC
TMP-52127 [PRJ-52087] - Page Three
February 12, 2014

DR:nl

cc:

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Las Vegas, Nevada 89139

Ms. Chelsea Peltier
Slater Hanifan Group
5740 South Arville Street, Suite #216
Las Vegas, Nevada 89118

APPENDIX C

Response to Comment #4 – Revised Humps

Revised Exhibits

Revised Hydraulic Sections

Developed Condition

SECTION DEV1 DEVELOPED (100-YR MAX SLOPE)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION DEV1 DEVELOPED (100-YR MAX SLOPE)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	1.33 %
Discharge	21.00 cfs

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

Results	
Mannings Coefficient	0.014
Water Surface Elevation	0.47 ft
Elevation Range	0.00 to 0.60
Flow Area	5.8 ft ²
Wetted Perimeter	34.15 ft
Top Width	33.11 ft
Actual Depth	0.47 ft
Critical Elevation	0.54 ft
Critical Slope	0.53 %
Velocity	3.65 ft/s
Velocity Head	0.21 ft
Specific Energy	0.68 ft
Froude Number	1.54
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+40.0	0.016
0+40.0	0+47.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+23.5	0.50
0+40.0	0.17
0+40.0	0.13

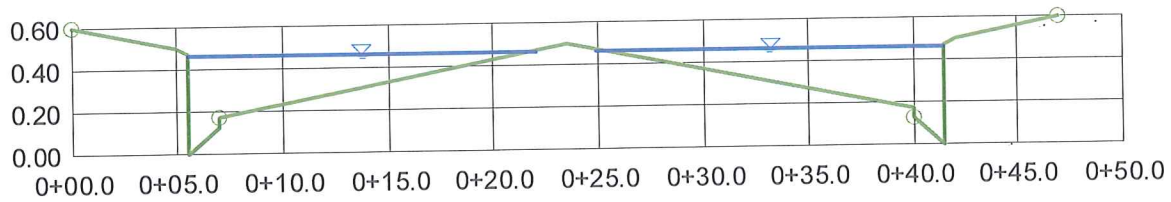
SECTION DEV1 DEVELOPED (100-YR MAX SLOPE)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+41.5	0.00
0+41.5	0.48
0+42.0	0.50
0+47.0	0.60

SECTION DEV1 DEVELOPED (100-YR MAX SLOPE) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION DEV1 DEVELOPED (100-YR MAX SLOPE)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	1.33 %
Water Surface Elevation	0.47 ft
Elevation Range	0.00 to 0.60
Discharge	21.00 cfs



V:10.0
H:1
NTS

SECTION DEV1 DEVELOPED (100-YR MIN SLOPE)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION DEV1 DEVELOPED (100-YR MIN SLOPE)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.50 %
Discharge	21.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.55 ft
Elevation Range	0.00 to 0.60
Flow Area	8.8 ft ²
Wetted Perimeter	43.29 ft
Top Width	42.23 ft
Actual Depth	0.55 ft
Critical Elevation	0.54 ft
Critical Slope	0.60 %
Velocity	2.38 ft/s
Velocity Head	0.09 ft
Specific Energy	0.64 ft
Froude Number	0.92
Flow Type	Subcritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+40.0	0.016
0+40.0	0+47.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+23.5	0.50
0+40.0	0.17
0+40.0	0.13
0+41.5	0.00
0+41.5	0.48
0+42.0	0.50

SECTION DEV1 DEVELOPED (100-YR MIN SLOPE)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+47.0	0.60

SECTION DEV1 DEVELOPED (100-YR MIN SLOPE)

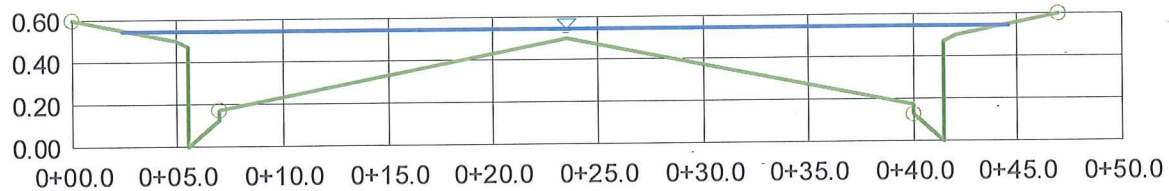
Cross Section for Irregular Channel

Project Description

Worksheet	SECTION DEV1 DEVELOPED (100-YR MIN SLOPE)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	0.50 %
Water Surface Elevation	0.55 ft
Elevation Range	0.00 to 0.60
Discharge	21.00 cfs



V:10.0
H:1
NTS

SECTION DEV1 EMERGENCY OVERFLOW (MAX SLOPE)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION DEV1 EMERGENCY OVERFLOW (MAX SLOI
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	1.33 %
Discharge	40.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.58 ft
Elevation Range	0.00 to 0.60
Flow Area	9.8 ft ²
Wetted Perimeter	45.62 ft
Top Width	44.56 ft
Actual Depth	0.58 ft
Critical Elevation	0.65 ft
Critical Slope	0.53 %
Velocity	4.06 ft/s
Velocity Head	0.26 ft
Specific Energy	0.83 ft
Froude Number	1.52
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+40.0	0.016
0+40.0	0+47.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+23.5	0.50
0+40.0	0.17
0+40.0	0.13
0+41.5	0.00
0+41.5	0.48
0+42.0	0.50

SECTION DEV1 EMERGENCY OVERFLOW (MAX SLOPE)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+47.0	0.60

SECTION DEV1 EMERGENCY OVERFLOW (MAX SLOPE)

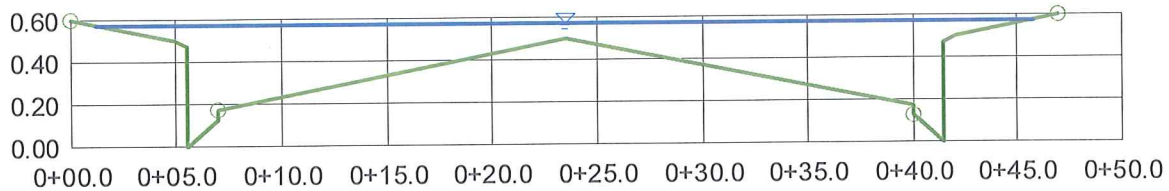
Cross Section for Irregular Channel

Project Description

Worksheet	SECTION DEV1 EMERGENCY OVERFLOW (MAX SLOI
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	1.33 %
Water Surface Elevation	0.58 ft
Elevation Range	0.00 to 0.60
Discharge	40.00 cfs



V:10.0
H:1
NTS

SECTION DEV1 EMERGENCY OVERFLOW (MIN SLOPE)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION DEV1 EMERGENCY OVERFLOW (MIN SLOP
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.50 %
Discharge	40.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.65 ft
Elevation Range	0.00 to 0.60
Flow Area	13.4 ft ²
Wetted Perimeter	48.17 ft
Top Width	47.00 ft
Actual Depth	0.65 ft
Critical Elevation	0.65 ft
Critical Slope	0.52 %
Velocity	2.98 ft/s
Velocity Head	0.14 ft
Specific Energy	0.79 ft
Froude Number	0.98
Flow Type	Subcritical

Calculation Messages:
Water elevation exceeds lowest end station by 0.52444823e-1 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+40.0	0.016
0+40.0	0+47.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+23.5	0.50
0+40.0	0.17
0+40.0	0.13

SECTION DEV1 EMERGENCY OVERFLOW (MIN SLOPE)
Worksheet for Irregular Channel

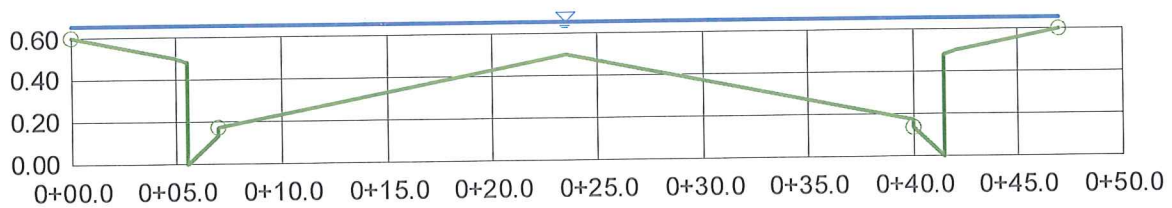
Natural Channel Points	
Station (ft)	Elevation (ft)
0+41.5	0.00
0+41.5	0.48
0+42.0	0.50
0+47.0	0.60

SECTION DEV1 EMERGENCY OVERFLOW (MIN SLOPE)

Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION DEV1 EMERGENCY OVERFLOW (MIN SLOP
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.50 %
Water Surface Elevation	0.65 ft
Elevation Range	0.00 to 0.60
Discharge	40.00 cfs



V:10.0
H:1
NTS

SECTION HNY2 DEVELOPED (100-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION HNY2 DEVELOPED (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	1.26 %
Discharge	19.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.58 ft
Elevation Range	0.00 to 0.63
Flow Area	5.2 ft ²
Wetted Perimeter	27.23 ft
Top Width	26.70 ft
Actual Depth	0.58 ft
Critical Elevation	0.64 ft
Critical Slope	0.57 %
Velocity	3.63 ft/s
Velocity Head	0.20 ft
Specific Energy	0.79 ft
Froude Number	1.45
Flow Type	Supercritical

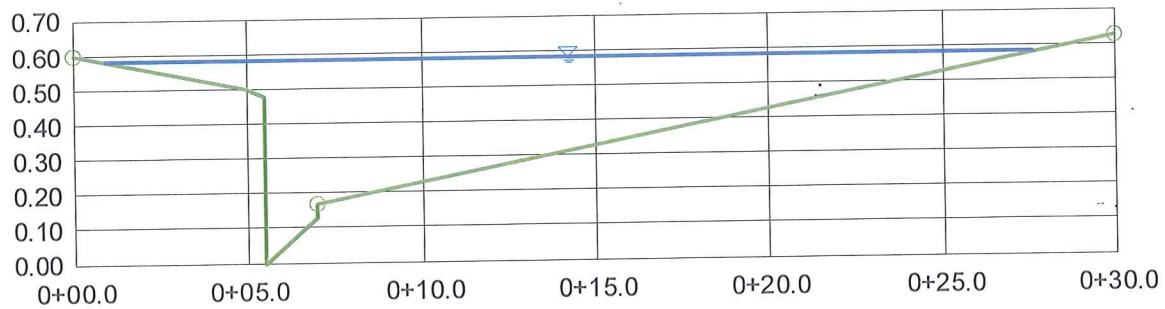
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+30.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+30.0	0.63

SECTION HNY2 DEVELOPED (100-YR) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION HNY2 DEVELOPED (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	1.26 %
Water Surface Elevation	0.58 ft
Elevation Range	0.00 to 0.63
Discharge	19.00 cfs



V:10.0
H:1
NTS

SECTION BRAD DEVELOPED (100-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION BRAD DEVELOPED (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.40 %
Discharge	20.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.57 ft
Elevation Range	0.00 to 0.63
Flow Area	9.9 ft ²
Wetted Perimeter	52.28 ft
Top Width	51.22 ft
Actual Depth	0.57 ft
Critical Elevation	0.54 ft
Critical Slope	0.62 %
Velocity	2.02 ft/s
Velocity Head	0.06 ft
Specific Energy	0.63 ft
Froude Number	0.81
Flow Type	Subcritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+53.0	0.016
0+53.0	0+60.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+53.0	0.13

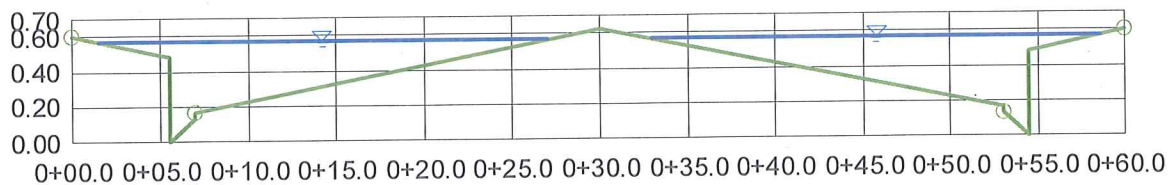
SECTION BRAD DEVELOPED (100-YR)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+54.5	0.00
0+54.5	0.48
0+55.0	0.50
0+60.0	0.60

SECTION BRAD DEVELOPED (100-YR) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION BRAD DEVELOPED (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.40 %
Water Surface Elevation	0.57 ft
Elevation Range	0.00 to 0.63
Discharge	20.00 cfs



V:10.0
H:1
NTS

SECTION IRN1 DEVELOPED (100-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION IRN1 DEVELOPED (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.74 %
Discharge	187.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.96 ft
Elevation Range	0.00 to 0.83
Flow Area	37.6 ft ²
Wetted Perimeter	81.79 ft
Top Width	80.00 ft
Actual Depth	0.96 ft
Critical Elevation	1.04 ft
Critical Slope	0.43 %
Velocity	4.97 ft/s
Velocity Head	0.38 ft
Specific Energy	1.34 ft
Froude Number	1.28
Flow Type	Supercritical

Calculation Messages:
Water elevation exceeds lowest end station by 0.35995243 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+73.0	0.016
0+73.0	0+80.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+40.0	0.83
0+73.0	0.17
0+73.0	0.13

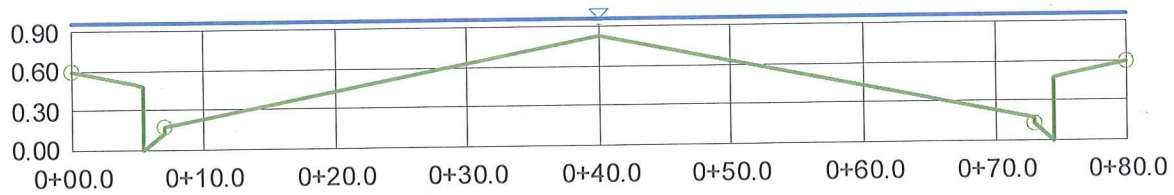
SECTION IRN1 DEVELOPED (100-YR)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+74.5	0.00
0+74.5	0.48
0+75.0	0.50
0+80.0	0.60

SECTION IRN1 DEVELOPED (100-YR) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION IRN1 DEVELOPED (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.74 %
Water Surface Elevation	0.96 ft
Elevation Range	0.00 to 0.83
Discharge	187.00 cfs



V:10.0
H:1
NTS

Ultimate Condition

IRON MOUNTAIN 10-YR CAPACITY

Worksheet for Irregular Channel

Project Description	
Worksheet	IRON MOUNTAIN 10-YR CAPACITY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Channel Slope	0.74 %
Water Surface Elevation	0.45 ft

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

Results	
Mannings Coefficient	0.014
Elevation Range	0.00 to 0.83
Discharge	6.71 cfs
Flow Area	2.5 ft ²
Wetted Perimeter	16.00 ft
Top Width	15.50 ft
Actual Depth	0.45 ft
Critical Elevation	0.47 ft
Critical Slope	0.55 %
Velocity	2.64 ft/s
Velocity Head	0.11 ft
Specific Energy	0.56 ft
Froude Number	1.15
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+05.0	0.025
0+05.0	0+07.0	0.013
0+07.0	0+40.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+40.0	0.83

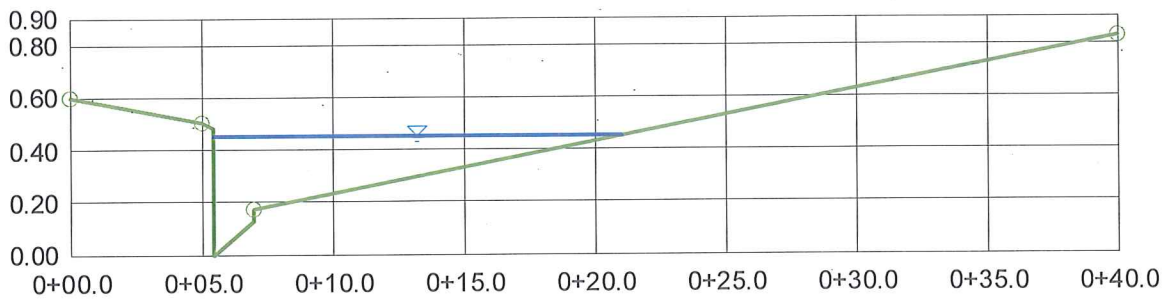
IRON MOUNTAIN 10-YR CAPACITY

Cross Section for Irregular Channel

Project Description	
Worksheet	IRON MOUNTAIN 10-YR CAPACITY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Mannings Coefficient	0.014
Channel Slope	0.74 %
Water Surface Elevation	0.45 ft
Elevation Range	0.00 to 0.83
Discharge	6.71 cfs

DRY LANE = $\frac{0.83 - 0.45}{.02} = 19'$



V:10.0
H:1
NTS

SECTION IRN0 ULTIMATE (10-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION IRN0 ULTIMATE (10-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.74 %
Discharge	8.50 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.48 ft
Elevation Range	0.00 to 0.83
Flow Area	3.1 ft ²
Wetted Perimeter	17.88 ft
Top Width	17.35 ft
Actual Depth	0.48 ft
Critical Elevation	0.51 ft
Critical Slope	0.56 %
Velocity	2.74 ft/s
Velocity Head	0.12 ft
Specific Energy	0.60 ft
Froude Number	1.14
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+05.0	0.025
0+05.0	0+07.0	0.013
0+07.0	0+40.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+40.0	0.83

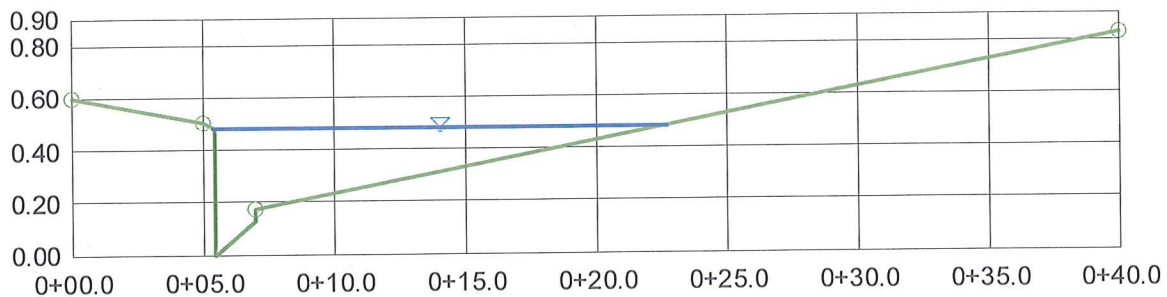
Notes: Q= (11CFS/2 + DEV1/4 + OFF2-U)

SECTION IRN0 ULTIMATE (10-YR) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION IRN0 ULTIMATE (10-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.74 %
Water Surface Elevation	0.48 ft
Elevation Range	0.00 to 0.83
Discharge	8.50 cfs

$$\text{DRY LANE} = \frac{.83 - .48}{.02} = 17.5'$$



* 5-ft DI PROVIDED TO COLLECT FLOW AND MEET DRY LANE CRITERIA.

V:10.0
H:1
NTS

SECTION IRN1 ULTIMATE (10-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION IRN1 ULTIMATE (10-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.74 %
Discharge	13.00 cfs

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

Results	
Mannings Coefficient	0.014
Water Surface Elevation	0.55 ft
Elevation Range	0.00 to 0.83
Flow Area	4.5 ft ²
Wetted Perimeter	24.16 ft
Top Width	23.63 ft
Actual Depth	0.55 ft
Critical Elevation	0.58 ft
Critical Slope	0.52 %
Velocity	2.91 ft/s
Velocity Head	0.13 ft
Specific Energy	0.68 ft
Froude Number	1.18
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+05.0	0.025
0+05.0	0+07.0	0.013
0+07.0	0+40.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+40.0	0.83

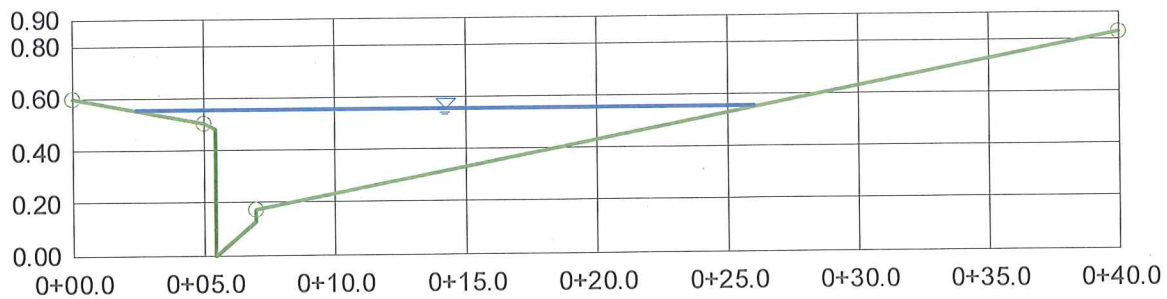
Notes: $Q = (11CFS/2 + IRN-D/2 + DEV1 + OFF2-U - 3CFS)$

SECTION IRN1 ULTIMATE (10-YR) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION IRN1 ULTIMATE (10-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	0.74 %
Water Surface Elevation	0.55 ft
Elevation Range	0.00 to 0.83
Discharge	13.00 cfs

$$\text{DRY LANE} = \frac{.83 - .55}{.02} = 14'$$



* 10-ft DROP INLET PROVIDED TO
COLLECT FLOW AND MEET STREET
FLOW CRITERIA. (DRY LANE)

V:10.0
H:1
NTS

SECTION IRN0 ULTIMATE (100-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION IRN0 ULTIMATE (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.74 %
Discharge	148.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.90 ft
Elevation Range	0.00 to 0.83
Flow Area	32.6 ft²
Wetted Perimeter	81.66 ft
Top Width	80.00 ft
Actual Depth	0.90 ft
Critical Elevation	0.96 ft
Critical Slope	0.45 %
Velocity	4.53 ft/s
Velocity Head	0.32 ft
Specific Energy	1.22 ft
Froude Number	1.25
Flow Type	Supercritical

Calculation Messages:

Water elevation exceeds lowest end station by 0.29783806 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+73.0	0.016
0+73.0	0+80.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+40.0	0.83
0+73.0	0.17
0+73.0	0.13

SECTION IRN0 ULTIMATE (100-YR)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+74.5	0.00
0+74.5	0.48
0+75.0	0.50
0+80.0	0.60

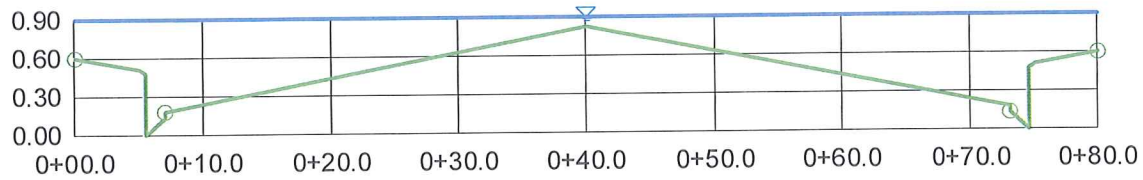
SECTION IRN0 ULTIMATE (100-YR) Cross Section for Irregular Channel

Project Description

Worksheet	SECTION IRN0 ULTIMATE (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	0.74 %
Water Surface Elevation	0.90 ft
Elevation Range	0.00 to 0.83
Discharge	148.00 cfs



V:10.0
H:1
NTS

SECTION IRN1 ULTIMATE (100-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION IRN1 ULTIMATE (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.74 %
Discharge	167.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.93 ft
Elevation Range	0.00 to 0.83
Flow Area	35.1 ft ²
Wetted Perimeter	81.72 ft
Top Width	80.00 ft
Actual Depth	0.93 ft
Critical Elevation	1.00 ft
Critical Slope	0.44 %
Velocity	4.76 ft/s
Velocity Head	0.35 ft
Specific Energy	1.28 ft
Froude Number	1.27
Flow Type	Supercritical

Calculation Messages:
Water elevation exceeds lowest end station by 0.32881707 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+73.0	0.016
0+73.0	0+80.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+40.0	0.83
0+73.0	0.17
0+73.0	0.13

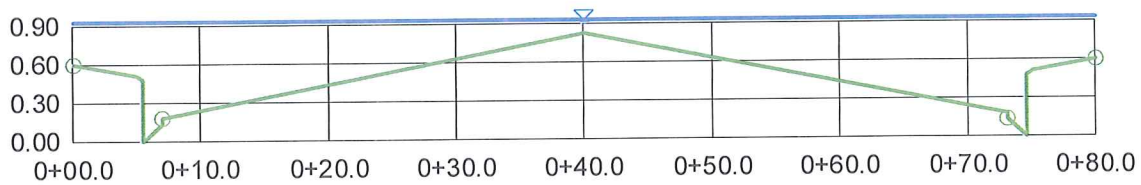
SECTION IRN1 ULTIMATE (100-YR)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+74.5	0.00
0+74.5	0.48
0+75.0	0.50
0+80.0	0.60

SECTION IRN1 ULTIMATE (100-YR) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION IRN1 ULTIMATE (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.74 %
Water Surface Elevation	0.93 ft
Elevation Range	0.00 to 0.83
Discharge	167.00 cfs



V: 10.0
H: 1
NTS

SECTION HNY2 ULTIMATE (100-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION HNY2 ULTIMATE (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	1.26 %
Discharge	24.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	0.50 ft
Elevation Range	0.00 to 0.63
Flow Area	6.8 ft ²
Wetted Perimeter	38.12 ft
Top Width	37.06 ft
Actual Depth	0.50 ft
Critical Elevation	0.57 ft
Critical Slope	0.57 %
Velocity	3.54 ft/s
Velocity Head	0.20 ft
Specific Energy	0.70 ft
Froude Number	1.46
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+53.0	0.016
0+53.0	0+60.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+53.0	0.13

SECTION HNY2 ULTIMATE (100-YR)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+54.5	0.00
0+54.5	0.48
0+55.0	0.50
0+60.0	0.60

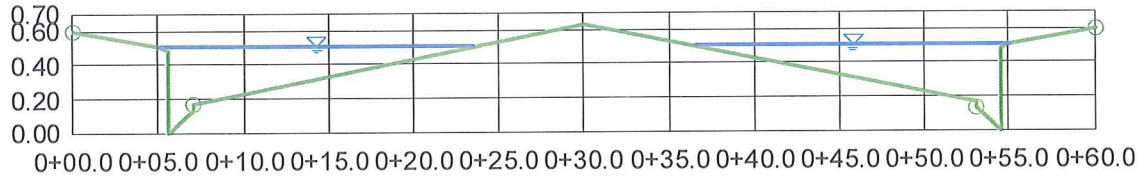
SECTION HNY2 ULTIMATE (100-YR) Cross Section for Irregular Channel

Project Description

Worksheet	SECTION HNY2 ULTIMATE (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	1.26 %
Water Surface Elevation	0.50 ft
Elevation Range	0.00 to 0.63
Discharge	24.00 cfs



V:10.0
H:1
NTS

SECTION BRAD ULTIMATE (100-YR)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION BRAD ULTIMATE (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.40 %
Discharge	191.00 cfs

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

Results	
Mannings Coefficient	0.015
Water Surface Elevation	1.09 ft
Elevation Range	0.00 to 0.63
Flow Area	40.9 ft ²
Wetted Perimeter	62.05 ft
Top Width	60.00 ft
Actual Depth	1.09 ft
Critical Elevation	1.09 ft
Critical Slope	0.40 %
Velocity	4.67 ft/s
Velocity Head	0.34 ft
Specific Energy	1.43 ft
Froude Number	1.00
Flow Type	Subcritical

Calculation Messages:
 Water elevation exceeds lowest end station by 0.49122499 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+53.0	0.016
0+53.0	0+60.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+53.0	0.13

SECTION BRAD ULTIMATE (100-YR)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+54.5	0.00
0+54.5	0.48
0+55.0	0.50
0+60.0	0.60

SECTION BRAD ULTIMATE (100-YR)

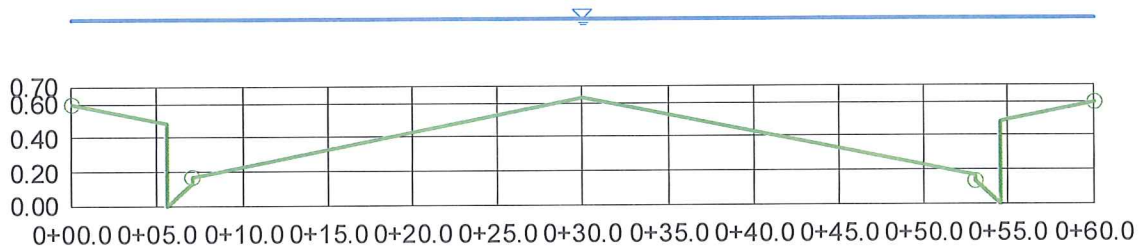
Cross Section for Irregular Channel

Project Description

Worksheet	SECTION BRAD ULTIMATE (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	0.40 %
Water Surface Elevation	1.09 ft
Elevation Range	0.00 to 0.63
Discharge	191.00 cfs



V:10.0
H:1
NTS

Finished Floor Analysis

GRANITE FALLS 2 - SOUTH FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F.-Design (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
1	ODEV1	2370.24	2369.74	0.65	2371.04	2370.74	2372.2	OK	OK	
2	ODEV1	2370.56	2370.06	0.65	2371.36	2371.06	2372.6	OK	OK	
3	ODEV1	2370.88	2370.38	0.65	2371.68	2371.38	2372.9	OK	OK	
4	ODEV1	2371.21	2370.71	0.65	2372.01	2371.71	2373.3	OK	OK	
5	ODEV1	2372.01	2371.51	0.65	2372.81	2372.51	2373.8	OK	OK	
6	ODEV1	2373.36	2372.86	0.65	2374.16	2373.86	2375.2	OK	OK	
7	ODEV1	2374.30	2373.80	0.65	2375.10	2374.80	2376.1	OK	OK	
8	ODEV1	2374.23	2373.73	0.65	2375.03	2374.73	2376.7	OK	OK	
9	ODEV1	2374.23	2373.73	0.65	2375.03	2374.73	2376.0	OK	OK	
10	ODEV1	2374.82	2374.32	0.65	2375.62	2375.32	2376.9	OK	OK	
11	ODEV1	2375.16	2374.66	0.65	2375.96	2375.66	2377.2	OK	OK	
12	ODEV1	2375.51	2375.01	0.65	2376.31	2376.01	2377.5	OK	OK	
13	ODEV1	2375.86	2375.36	0.65	2376.66	2376.36	2377.9	OK	OK	
14	ODEV1	2376.15	2375.65	0.65	2376.95	2376.65	2378.2	OK	OK	
15	ODEV1	2377.41	2376.91	0.65	2378.21	2377.91	2379.3	OK	OK	
16	ODEV1	2376.92	2376.42	0.65	2377.72	2377.42	2378.8	OK	OK	
17	ODEV1	2376.37	2375.87	0.65	2377.17	2376.87	2378.2	OK	OK	
18	ODEV1	2375.81	2375.31	0.65	2376.61	2376.31	2377.7	OK	OK	
19	ODEV1	2375.26	2374.76	0.65	2376.06	2375.76	2377.1	OK	OK	
20	ODEV1	2374.71	2374.21	0.65	2375.51	2375.21	2376.6	OK	OK	
21	ODEV1	2374.16	2373.66	0.65	2374.96	2374.66	2375.9	OK	OK	
22	ODEV1	2373.60	2373.10	0.65	2374.40	2374.10	2375.4	OK	OK	
23	ODEV1	2373.05	2372.55	0.65	2373.85	2373.55	2375.0	OK	OK	
24	ODEV1	2373.29	2372.79	0.65	2374.09	2373.79	2375.2	OK	OK	
25	ODEV1	2372.85	2372.35	0.65	2373.65	2373.35	2374.7	OK	OK	
26	ODEV1	2372.31	2371.81	0.65	2373.11	2372.81	2374.1	OK	OK	
27	ODEV1	2371.78	2371.28	0.65	2372.58	2372.28	2373.6	OK	OK	
28	ODEV1	2371.24	2370.74	0.65	2372.04	2371.74	2373.1	OK	OK	
29	ODEV1	2371.19	2370.69	0.65	2371.99	2371.69	2373.2	OK	OK	
30	ODEV1	2371.73	2371.23	0.65	2372.53	2372.23	2373.5	OK	OK	
31	ODEV1	2372.27	2371.77	0.65	2373.07	2372.77	2374.0	OK	OK	
32	ODEV1	2372.80	2372.30	0.65	2373.60	2373.30	2374.6	OK	OK	
33	ODEV1	2373.27	2372.77	0.65	2374.07	2373.77	2375.1	OK	OK	
34	ODEV1	2375.25	2374.75	0.65	2376.05	2375.75	2377.1	OK	OK	
35	ODEV1	2371.93	2371.43	0.65	2372.73	2372.43	2373.7	OK	OK	
36	ODEV1	2374.85	2374.35	0.65	2375.65	2375.35	2376.8	OK	OK	
37	ODEV1	2375.19	2374.69	0.65	2375.99	2375.69	2377.2	OK	OK	
38	ODEV1	2375.53	2375.03	0.65	2376.33	2376.03	2377.5	OK	OK	
39	ODEV1	2375.87	2375.37	0.65	2376.67	2376.37	2377.9	OK	OK	
40	ODEV1	2376.16	2375.66	0.65	2376.96	2376.66	2378.3	OK	OK	

Where:
1: Top of Curb at High Side of Lot
2: TC-0.38 (For Roll Curb), TC-0.5 (For L Curb)
3: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = (2 x D₁₀₀) + F/L
4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches
5: These lots have an adjacent solid grouted wall that protects the FF.

City of Las Vegas Finished Floor Criteria:
-The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street.
-The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb.

APPENDIX D

Additional Revisions

Drop Inlet Computations

Project:	GRANITE FALLS 2 - SOUTH	
Title:	Type C Drop Inlet (Continuous Grade)	
Subtitle:	5-ft Drop Inlet Section IRN0	
By:	ETM	
Date:	5/23/2014	

Input:	Variable:	Input:
Street Flow (cfs)	Q	8.5
Longitudinal Slope (ft/ft)	S _o	0.0074
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	2.74
Street Flow Depth (ft)	D	0.48
Street Cross Slope (ft/ft)	S _x	0.02
Grate Width (ft)	W	1.5
Grate Depression (in)	D _g	2.0
Length of Grate (ft)	L _g	2.5
Length of Curb Opening (ft)	L _c	5.0
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	1.3
Effective Curb Opening Length (ft)	L _{ce}	2.50

Output (Grate):	Equation:	Output (Grate):
¹ R _f - Frontal Flow Factor	1-0.09*(V-V _{xi}) if V>V _{xi} ; else Frontal Flow Factor=1	1.00
² V _o - Splash Over Velocity (fps)	V _x =p+q*L _g -r*L _{ge} ² +sy*L _{ge} ³ ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	4.61
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.24
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	2.00
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	6.5
T - Side Flow Spread (ft)	(D-D _g)/S _x	15.67
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.04
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	2.2

Output (Curb):	Equation:	Output (Curb):
¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.046
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	6.269
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.111
¹ L _t - Effective Interception Length (ft)	0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _e) ^{0.6}	22.52
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _t) ^{1.8})*Q _{sx}	1.2
	or Q _{sx} if L _t is less than L _{ce}	

Output (Combination):		Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	3.4
<i>Actual Collected = 20cfs</i>		

¹ Formula referenced from the CCRFCD Manual
² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Project:	GRANITE FALLS 2 - SOUTH	
Title:	Type C Drop Inlet (Continuous Grade)	
Subtitle:	19-ft Drop Inlet Section IRN1	
By:	ETM	
Date:	5/23/2014	
Input:	Variable:	Input:
Street Flow (cfs)	Q	13.0
Longitudinal Slope (ft/ft)	S _o	0.0074
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	2.91
Street Flow Depth (ft)	D	0.55
Street Cross Slope (ft/ft)	S _x	0.02
Grate Width (ft)	W	1.5
Grate Depression (in)	D _g	2.0
Length of Grate (ft)	L _g	2.5
Length of Curb Opening (ft)	L _c	19.0
Clogging Factor - Grate (%)	CF _g	50%
Clogging Factor - Curb (%)	CF _c	50%
Effective Grate Length (ft)	L _{ge}	1.3
Effective Curb Opening Length (ft)	L _{ce}	9.50
Output (Grate):	Equation:	Output (Grate):
¹ R _f - Frontal Flow Factor	1-0.09*(V-V _x) if V>V _x ; else Frontal Flow Factor=1	1.00
² V _o - Splash Over Velocity (fps)	V _x =p+q*L _g -r*L _{ge} ² +sy*L _{ge} ³ ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	4.61
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.20
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	2.54
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	10.5
T - Side Flow Spread (ft)	(D-D _g)/S _x	19.17
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.03
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	2.9
Output (Curb):	Equation:	Output (Curb):
¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.042
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	10.128
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.111
¹ L _t - Effective Interception Length (ft)	0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _e) ^{0.6}	29.28
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _t) ^{1.8})*Q _{sx}	5.1
	or Q _{sx} if L _t is less than L _{ce}	
Output (Combination):		Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	8.0

¹ Formula referenced from the CCRFCD Manual

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

¹ Formula referenced from the CCRFCD Manual

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

Project:			GRANITE FALLS 2 - SOUTH
Title:			Type C Drop Inlet (Continuous Grade)
Subtitle:			28-ft Drop Inlet @ Street Section IMT1 (Revised from Iron Mt/ Bradley Study)
By:			ETM
Date:			5/23/2014
Input:	Variable:	Input:	
Street Flow (cfs)	Q	17.0	
Longitudinal Slope (ft/ft)	S _o	0.0073	
Manning's Coefficient	n	0.016	
Street Flow Velocity (fps)	V	3.03	
Street Flow Depth (ft)	D	0.60	
Street Cross Slope (ft/ft)	S _x	0.02	
Gate Width (ft)	W	1.5	
Gate Depression (in)	D _g	2.0	
Length of Gate (ft)	L _g	2.5	
Length of Curb Opening (ft)	L _c	28.0	
Clogging Factor - Grate (%)	CF _g	50%	
Clogging Factor - Curb (%)	CF _c	50%	
Effective Grate Length (ft)	L _{ge}	1.3	
Effective Curb Opening Length (ft)	L _{ce}	14.00	
Output (Grate):	Equation:	Output (Grate):	
¹ R _f - Frontal Flow Factor	1-0.09*(V-V _x) if V>V _x ; else Frontal Flow Factor=1	1.00	
² V _o - Splash Over Velocity (fps)	V _x =p+q*L _g -r*L _{ge} ² +sy*L _{ge} ³ ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	4.61	
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.17	
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	2.96	
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	14.0	
T - Side Flow Spread (ft)	(D-D _g)/S _x	21.67	
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.03	
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	3.4	
Output (Curb):	Equation:	Output (Curb):	
¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.039	
Q _{sx} - Remaining Flow After Grate Interception (cfs)	Q-Q _{gi}	13.624	
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.111	
¹ L _t - Effective Interception Length (ft)	0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _e) ^{0.6}	34.20	
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _t) ^{1.8})*Q _{sx}	8.3	
	or Q _{sx} if L _t is less than L _{ce}		
Output (Combination):		Output (Combination):	
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	12	

¹ Formula referenced from the CCRFCD Manual

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

SECTION IMT1 ULTIMATE (10-YR)

Worksheet for Irregular Channel

Project Description

Worksheet	SECTION IMT1 ULTIMATE (10-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data

Channel Slope	0.73 %
Discharge	17.00 cfs

Options

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

Results

Mannings Coefficient "	0.014
Water Surface Elevation	0.60 ft
Elevation Range	0.00 to 0.83
Flow Area	5.6 ft ²
Wetted Perimeter	28.63 ft
Top Width	28.10 ft
Actual Depth	0.60 ft
Critical Elevation	0.62 ft
Critical Slope	0.50 %
Velocity	3.03 ft/s
Velocity Head	0.14 ft
Specific Energy	0.74 ft
Froude Number	1.19
Flow Type	Supercritical

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.0	0+05.0	0.025
0+05.0	0+07.0	0.013
0+07.0	0+40.0	0.016

Natural Channel Points

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.48
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+40.0	0.83

SECTION IMT1 ULTIMATE (10-YR) Cross Section for Irregular Channel

Project Description

Worksheet	SECTION IMT1 ULTIMATE (10-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

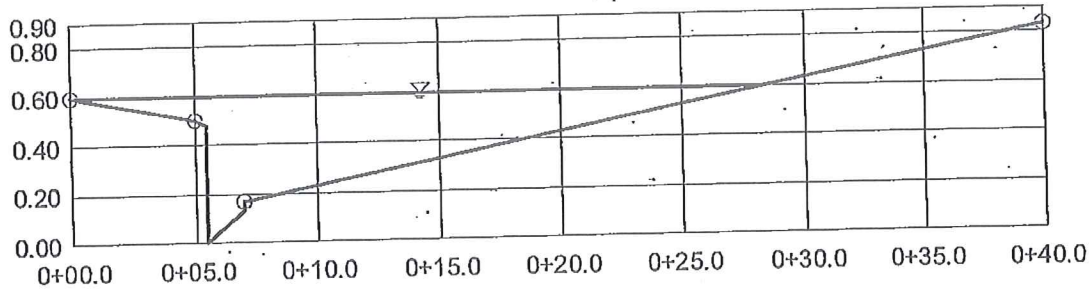
Section Data

Mannings Coefficient	0.014
Channel Slope	0.73 %
Water Surface Elevation	0.60 ft
Elevation Range	0.00 to 0.83
Discharge	17.00 cfs

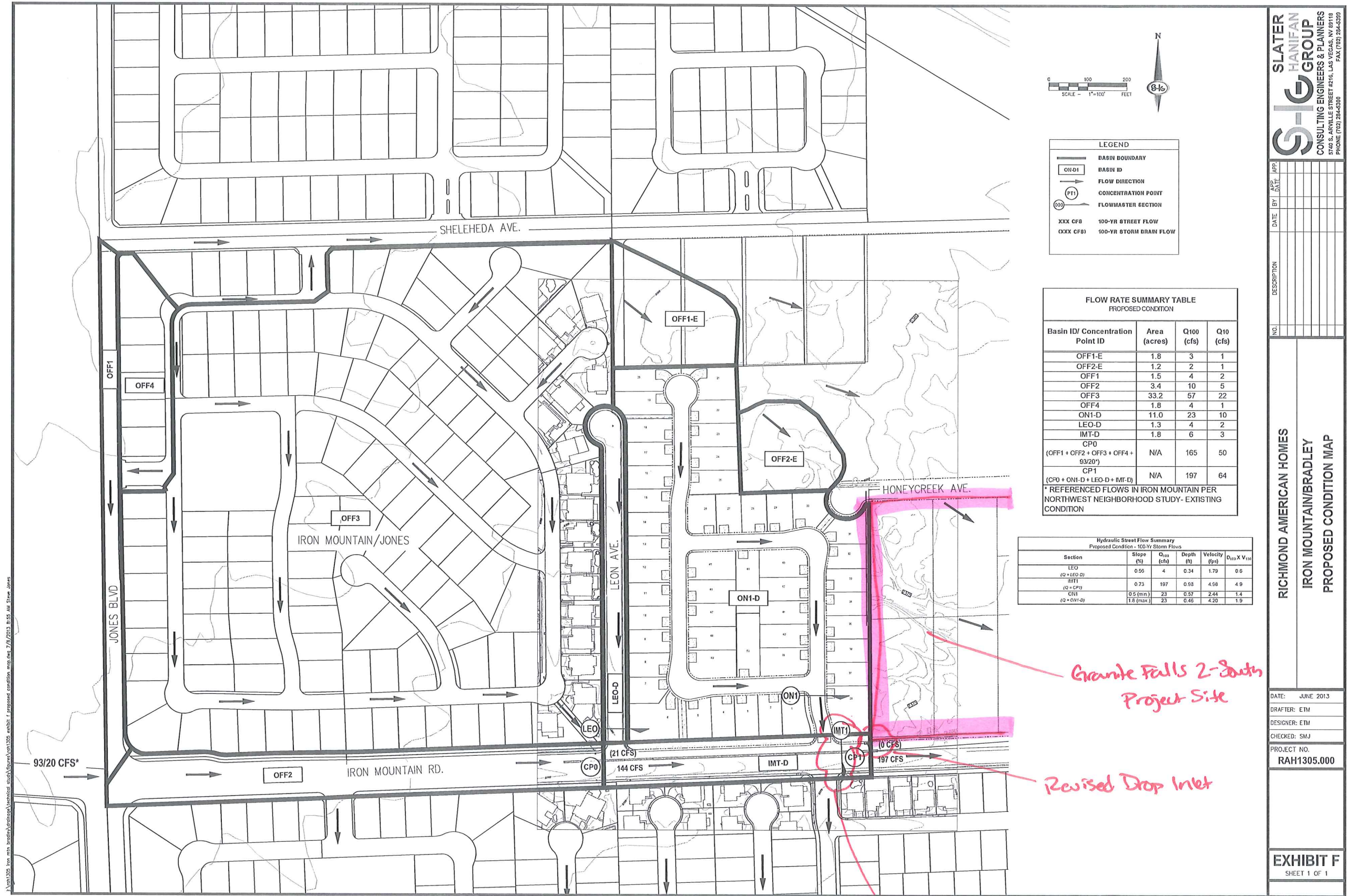
$$(0.83' - 0.60') / 0.02 \text{ FT}$$

11.5' DRY LANE

DROP INLET REQUIRED
TO PROVIDE 19' DRY LANE



V:10.0
H:1
NTS.



WSPG Model

	IRN-S.WSW										0	
T1	GRANITE FALLS 2 - SOUTH, BY RICHMOND AMERICAN HOMES											
T2	TECHNICAL DRAINAGE STUDY ADDENDUM NO.1 (RAH1322.001)											
T3	PROPOSED IRON MOUNTAIN STORM DRAIN											
SO	-1785.20	64.69	6									67.69
R	-1407.13	67.34	6		.013					.000	.000	1
R	-1223.96	68.63	6		.013					.000	.000	1
JX	-1218.96	68.66	4	2	.013	12.000				63.0		.000
R	-0988.40	70.07	4		.013					.000	.000	1
R	-0588.40	73.03	4		.013					.000	.000	1
R	-0514.39	73.53	4		.013					.000	.000	1
SH	-0514.39	73.53	4									
CD	1	4	1	1.500		.000	.000	.000	.000			
CD	2	4	1	.000		.000	.000	.000	.000			
CD	3	4	1	.000		.000	.000	.000	.000			
CD	4	4	1	.000		.000	.000	.000	.000			
CD	5	4	1	.000		.000	.000	.000	.000			
CD	6	4	2	.000		.000	.000	.000	.000			
Q				67.000	.0							

CD	1	4	1	1.500
CD	2	4	1	2.000
CD	3	4	1	3.000
CD	4	4	1	3.500
CD	5	4	1	4.000
CD	6	4	2	3.000

W S P G W
 WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
 HEADING LINE NO 2 IS -
 HEADING LINE NO 3 IS -

GRANITE FALLS 2 - SOUTH, BY RICHMOND AMERICAN HOMES
 TECHNICAL DRAINAGE STUDY ADDENDUM NO.1 (RAH1322.001)

PROPOSED IRON MOUNTAIN STORM DRAIN
 W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1	IS	A	SYSTEM OUTLET	STATION	INVERT	SECT	W S ELEV	ANGLE	ANG PT	MAN H
				U/S DATA	-1785.200	64.690	6	67.690	.000	.000	1
ELEMENT NO	2	IS	A	REACH	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
				U/S DATA	-1407.130	67.340	6	.000	.000	.000	1
ELEMENT NO	3	IS	A	REACH	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
				U/S DATA	-1223.960	68.630	6	.000	.000	.000	1
ELEMENT NO	4	IS	A	JUNCTION	STATION	INVERT	SECT	INVERT-3 INVERT-4	PHI 3 PHI 4	ANG PT	MAN H
				U/S DATA	-1218.960	68.660	4	67.490 63.000	.000 .000	.000	.000
ELEMENT NO	5	IS	A	REACH	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
				U/S DATA	-988.400	70.070	4	.000	.000	.000	1
ELEMENT NO	6	IS	A	REACH	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
				U/S DATA	-588.400	73.030	4	.000	.000	.000	1
ELEMENT NO	7	IS	A	REACH	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
				U/S DATA	-514.390	73.530	4	.000	.000	.000	1
ELEMENT NO	8	IS	A	SYSTEM HEADWORKS	STATION	INVERT	SECT	W S ELEV			
				U/S DATA	-514.390	73.530	4	.000			

Station	Invert Elev	Depth (ft)	Water Elev	Q (cfs)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Base Wt Dia.-Ft or I.D.	No With Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N" X-Fall	ZL ZR Type Ch
-1785.200	64.690	1.862	66.552	79.00	8.57	1.14	67.69	.00	2.05	2.91	3.000	.00 2 .0
298.040	.0070					.0070	2.09	1.86	.85	1.86	.013	.00 PIPE
-1487.160	66.779	1.862	68.641	79.00	8.57	1.14	69.78	.00	2.05	2.91	3.000	.00 2 .0
80.030	.0070					.0071	.57	1.86	.85	1.86	.013	.00 PIPE
-1407.130	67.340	1.849	69.189	79.00	8.64	1.16	70.35	.00	2.05	2.92	3.000	.00 2 .0
64.912	.0070					.0075	.49	1.85	.86	1.86	.013	.00 PIPE
-1342.218	67.797	1.798	69.595	79.00	8.93	1.24	70.83	.00	2.05	2.94	3.000	.00 2 .0
42.895	.0070					.0083	.36	1.80	.91	1.86	.013	.00 PIPE
-1299.322	68.099	1.728	69.827	79.00	9.36	1.36	71.19	.00	2.05	2.97	3.000	.00 2 .0
29.940	.0070					.0094	.28	1.73	.98	1.86	.013	.00 PIPE
-1269.382	68.310	1.662	69.972	79.00	9.82	1.50	71.47	.00	2.05	2.98	3.000	.00 2 .0
24.443	.0070					.0106	.26	1.66	1.05	1.86	.013	.00 PIPE
-1244.939	68.482	1.600	70.082	79.00	10.30	1.65	71.73	.00	2.05	2.99	3.000	.00 2 .0
20.979	.0070					.0121	.25	1.60	1.13	1.86	.013	.00 PIPE
-1223.960	68.630	1.541	70.171	79.00	10.80	1.81	71.98	.00	2.05	3.00	3.000	.00 2 .0
JUNCT STR	.0060					.0095	.05	1.54	1.22		.013	.00 PIPE
-1218.960	68.660	2.482	71.142	67.00	9.18	1.31	72.45	.00	2.57	3.18	3.500	.00 1 .0
127.753	.0061					.0061	.78	2.48	1.07	2.48	.013	.00 PIPE

Station	Invert Elev	Depth (ft)	Water Elev	Q (cfs)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Base Wt Dia.-Ft or I.D.	No With Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N" X-Fall	ZL ZR Type Ch
-1091.207	69.441	2.482	71.924	67.00	9.18	1.31	73.23	.00	2.57	3.18	3.500	.00 1 .0
57.493	.0061					.0063	.37	2.48	1.07	2.48	.013	.00 PIPE
-1033.713	69.793	2.412	72.205	67.00	9.47	1.39	73.60	.00	2.57	3.24	3.500	.00 1 .0
45.313	.0061					.0070	.32	2.41	1.13	2.48	.013	.00 PIPE
-988.400	70.070	2.313	72.383	67.00	9.93	1.53	73.91	.00	2.57	3.31	3.500	.00 1 .0
301.347	.0074					.0074	2.23	2.31	1.23	2.31	.013	.00 PIPE
-687.053	72.300	2.313	74.613	67.00	9.93	1.53	76.14	.00	2.57	3.31	3.500	.00 1 .0
98.653	.0074					.0071	.70	2.31	1.23	2.31	.013	.00 PIPE

[illegible]

[illegible]NOTES
1. GLOSSARY

- GLOSSARY**
I = INVERT ELEVATION
C = CRITICAL DEPTH
W = WATER SURFACE ELEVATION
S = SUPER-ELEVATION
H = HEIGHT OF CHANNEL
E = ENERGY GRADE LINE
X = CURVES CROSSING OVER
B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT

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

APPENDIX E

Revised Grading Plan, Profile and Detail Sheets

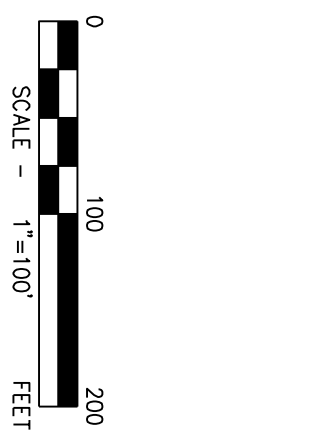


Overflow Hydraulic Street Flow Summary					
Overflow Evaluation - 100-Yr Storm Flows					
Section	Slope (%)	Q ₁₀₀ (cfs)	D ₁₀₀ (ft)	V ₁₀₀ (fps)	D ₁₀₀ x V ₁₀₀
DEV1	0.50	40	0.65	2.98	1.9
	1.33	40	0.58	4.06	2.4

Developed Condition 100-Year Street Flow Summary					
Cross Section	Slope (%)	Q _{ave} (cfs)	Depth (ft)	Velocity (ft/s)	Dx/V
DE11	1.33	21	0.47	3.65	1.7
(Q = DE1 + OFR24)	0.50	21	0.55	2.38	1.3
HN11	1.26	2	0.31	2.29	0.7
(Q = OFR24)					
HN22	1.26	19	0.60	3.70	2.2
(Q = OFR2)					
BR4D	0.40	20	0.57	2.02	1.2
(Q = OFR + PR4D)					
IR11	0.74	187	0.96	4.97	4.8
(Q = OFR1 + DE1 + PR4D + OFR24 - Drop Losses)					

Developed Condition Flow Rate Summary			
Basin/Concentration Point ID	Area (ha)	Q _{in} (cfs)	Q _o (cfs)
ORF1-E	1.8	2	1
ORF2-E	1.3	3	1
ORF3-E	2.8	14	5
DEV1	8.5	19	8
DEV2	1.0	4	2
BRAD	0.4	1	1
RRD1	1.8	3	3
(A) Combining Basins: Balanced from NW Branch)			
CP2	N/A	19	7
CP3	N/A	242	82
Q = ORF1-E + ORF2-E + ORF3-E + DEV1 + BRAD + RRD1 + ORF2-E			

LEGEND	
	BASIN BOUNDARY
	BASIN ID
	FLOW DIRECTION
	CONCENTRATION POINT
	FLOWMASTER SECTION
	100-YR STREET FLOW
	100-YR STORM DRAIN FLOW

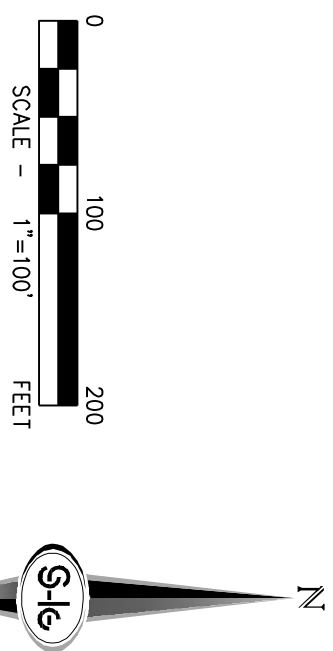
[illegible]

[illegible]

Ultimate Condition 100-year Street Flow Summary						
Cross Section	Slope (%)	Q _{ave} (cfs)	Depth (ft)	Velocity (fps)	Day	
HN17 (Q = 0.072 U)	1.26	3	0.28	2.43	0.7	
HN2 (Q = 0.025 OF+U)	1.26	24	0.50	3.54	1.8	
(Q = 1.0058 OF+U + DB1/4)	0.74	148	0.90	4.53	4.1	
IRN1 (Q = 1.4058 + IRN0 + DE1)	0.74	167	0.93	4.76	4.4	
BRAD (Q = 0.25 + BRAD + 1.750CS)	0.40	191	1.09	4.67	5.1	

Ultimate Condition Flow Rate Summary			
Basin/Condition Point ID	Area (ac)	Q _{ave} (cfs)	Q ₁₀ (cfs)
OffF-U	1.8	5	2
OffF2-U	1.3	3	1
OffF3-U	7.8	17	7
OffF4-U	5.4	12	5
OffF5-U	8.5	19	8
HN1	1.0	4	2
HN2	1.9	5	3
BRAD	3	5	3
RND	1.6	5	3
*CP1			
		219	90
(A) Combining Basins Referenced from Item 11a (Basins)			
CP2			
		36	15
Q = CP1 + CP2 + DE1 + BRAD + RND + OffF-U			
CP3			
		N/A	433
Q = CP1 + CP2 + DE1 + BRAD + RND + OffF-U + Grate Flow 2 Item 11a(2)(3)			181

	LEGEND ———— BASIN BOUNDARY ON-CT BASIN ID → FLOW DIRECTION P(T) CONCENTRATION POINT ● FLOWMASTER SECTION —+— 100YR/10YR STREET FLOW 100YR/10YR STORM DRAIN FLOW
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RICHMOND AMERICAN HOMES

GRANITE FALLS 2 - SOUTH

ULTIMATE CONDITION DRAINAGE MAP

DATE:	MAY
DRAFTER:	ETM
DESIGNER:	ETM
CHECKED:	SMJ
PROJECT NO.	

RAH1322.001

EXHIBIT G
SHEET 1 OF 1