

DS #: 4612

APN: 125-01-402-020

PROJECT: Iron Mountain / Bradley - Update #3

SUBMITTAL: 5<sup>th</sup>

SCANNED BY/DATE: \_\_\_\_\_

CHECKED BY/DATE: \_\_\_\_\_





**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

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

TRANSMISSION OK

JOB NO. 4412  
DESTINATION ADDRESS 7022845399  
PSWD/SUBADDRESS  
DESTINATION ID  
ST. TIME 08/28 11:42  
USAGE T 00' 31  
PGS. 2  
RESULT OK

|                                                                     |                                               |                                                                                            |  |
|---------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------|--|
| <b>CITY OF LAS VEGAS</b>                                            |                                               | DATE:                                                                                      |  |
| <b>INTER-OFFICE MEMORANDUM</b>                                      |                                               | August 28, 2014                                                                            |  |
| TO:<br>Land Development Services<br>Department of Building & Safety |                                               | FROM:<br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |  |
| SUBJECT: Drainage Study for:                                        |                                               | COPIES TO:                                                                                 |  |
| Iron Mountain / Bradley – Update #3                                 |                                               | Slater Hanifan Group                                                                       |  |
| Cross Streets:                                                      | NEC of Iron Mountain Rd. & Leon Ave.          | Richmond American Homes                                                                    |  |
| File Number:                                                        | F:\Depot\DSMemos\DS4612E.doc                  | Bart Anderson, P.E., DevCo                                                                 |  |
| Parcel Number:                                                      | 125-01-402-020                                |                                                                                            |  |
| Zoning Action:                                                      | TMP-49575; ZON-48851 & VAR-49577 to VAR-49617 |                                                                                            |  |
| FEMA Flood Zone                                                     | YES NO <b>X</b>                               |                                                                                            |  |
| Proposed Storm Drain                                                | YES <b>X</b> NO                               |                                                                                            |  |

| HISTORY                   | DATE RECEIVED | DATE REVIEWED | COMMENTS             | REVIEW FEES | FEES PAID<br>Payment Trn # |
|---------------------------|---------------|---------------|----------------------|-------------|----------------------------|
| 1 <sup>st</sup> Submittal | 7/8/2013      | 7/22/2013     | Not Approved         | \$400.00    | 325434: \$400              |
| 2 <sup>nd</sup> Submittal | 8/5/2013      | 8/19/2013     | Conditional Approval | \$400.00    | 328831: \$400              |
| 3 <sup>rd</sup> Submittal | 11/21/2013    | 12/4/2013     | Conditional Approval | \$100.00    | 340078: \$100              |
| 4 <sup>th</sup> Submittal | 3/4/2014      | 3/18/2014     | Conditional Approval | \$100.00    | 349703: \$100              |
| 5 <sup>th</sup> Submittal | 8/21/2014     | 8/28/2014     | See Comments Below   | \$100.00    | 367786: \$100              |
|                           |               |               | TOTAL FEES (LDDRS):  | \$1,100.00  | ----                       |

REMARKS:

5<sup>th</sup> Submittal: Update #3 for the Vacation of the east half of Leon Avenue

4<sup>th</sup> Submittal: Update #2 to revise pad and finish floor elevations for the whole site

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 receipt of a notarized letter of permission from adjacent property owner to the north of the subject site. |
| <b>X</b> | is conditionally approved subject to documentation of drainage easement grant from BLM                                                          |



**UPDATE No.3 TO THE  
TECHNICAL DRAINAGE STUDY**

**Iron Mountain/ Bradley**

City of Las Vegas, Nevada

Job No.: RAH1305.000

Date: August 2014

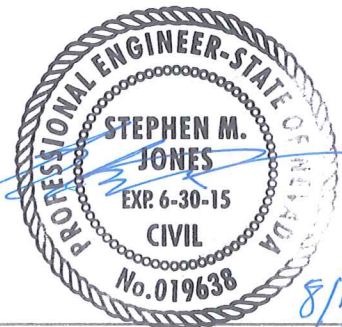
**Prepared By:**

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 410  
Las Vegas, Nevada 89139  
Phone: 702-617-8439 • Fax: 702-617-8499



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

Assisted by: Erick Mata, E.I.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL  
**DRAINAGE STUDY INFORMATION FORM**

Name of Development: Iron Mountain / Bradley (Update No.3) Date: August 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: 125-01-414-001 thru 125-01-414-057 and 125-01-499-010

Name of Owner: Richmond American Homes  
 Telephone No.: 702-617-8439 Fax No.: 702-617-8499 E-mail Address: Brian.Walsh@mdch.com  
 Address: 7770 S. Dean Martin Drive, Suite 410 Las Vegas, Nevada 89118

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:

|                                           |                                                              |                                                       |
|-------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> Rezoning         | <input type="checkbox"/> Subdivision Map                     | <input type="checkbox"/> Clearing and grading Only    |
| <input type="checkbox"/> Parcel Map       | <input checked="" type="checkbox"/> Planned Unit Development | <input type="checkbox"/> Other (Please specify below) |
| <input type="checkbox"/> Large Parcel Map | <input type="checkbox"/> Building Permit                     | <input type="checkbox"/>                              |

1. Total Owned Land Area: At Site: 11.5 +/- 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  
3 acres (North)

5. Approximate upstream land area which drains to the subject site: 40 acres + NWNS Area (Iron Mountain Road)

6. Has the site drainage been evaluated in the past? ☒ Yes ☐ No If yes, please identify documentation:  
The Technical Drainage Study, Update No.1 and Update No.2 for Iron Mountain/ Bradley (CLV# DS4612)

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: 1 Phase



Engineer's Seal 8/11/2014

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 RAH1305.000

STANDARD FORM 1

Updated 05/01/2008

RAH1305.000

August 18, 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: Update No. 3 to the Technical Drainage Study for Iron Mountain/Bradley  
(CLV# DS4612)**

Dear Mr. Sung:

This letter is intended to serve as an update letter to the subject study and support the vacation of the east half of Leon Avenue. The project has been previously analyzed by the initial *Technical Drainage Study, Update No.1 to the Technical Drainage Study* that addressed changes to the storm drain schematic and *Update No.2 to the Technical Drainage Study* that revised onsite finished floors.

As a result of this Update No.3, various hydrologic and hydraulic calculations were revised due to change in flow rates from Leon Avenue (Basin LEO-D) and onsite basin ON1-D. The following is a summary of the revised calculations.

### Hydrology

The hydrology established in the existing condition has remained the same as identified by the initial technical drainage study. However in the proposed and ultimate conditions, hydrology was revised due to the vacation of the east half of Leon Avenue and consequently a new delineation of Basin LEO-D and Basin ON1-D. The table below illustrates the difference in flow rates for both basins.

| Summary of Revised Basins                                                    |              |                                   |
|------------------------------------------------------------------------------|--------------|-----------------------------------|
| Previously Established Basins                                                | Area (Acres) | Basin Flow $Q_{100}/Q_{10}$ (cfs) |
| LEO-D                                                                        | 1.3          | 4/2                               |
| ON1-D                                                                        | 11.0         | 23/10                             |
| Revised Basins                                                               | Area (Acres) | Basin Flow $Q_{100}/Q_{10}$ (cfs) |
| *LEO-E                                                                       | 0.7          | 2/1                               |
| ON1-D                                                                        | 11.6         | 25/10                             |
| *Basin remains with the same area and geometry as in the existing condition. |              |                                   |

After reviewing the table above it has been concluded the basins ultimately convey the same flow when combined downstream. Therefore the updated flows are acceptable and in



conformance with previously established flow rates downstream of the project site. However, additional Flowmaster revisions have been done for the new flow rates generated. The revised drainage exhibits and hydrology have been provided in Appendix B and C, respectively for reference.

### Hydraulics

As stated above, Flowmaster calculations were revised to adequately illustrate the new flows conveyed with their pertinent street sections. Below is a summary of the sections revised.

#### **Proposed Condition**

| Revised Proposed Condition Street Flow Hydraulics |                     |                        |           |                    |               |             |
|---------------------------------------------------|---------------------|------------------------|-----------|--------------------|---------------|-------------|
| Street Cross Section ID                           | Contributing Basins | Q <sub>100</sub> (cfs) | Slope (%) | Velocity, V (ft/s) | Depth, D (ft) | DxV Product |
| LEO                                               | LEO-E               | 2                      | 0.56      | 1.62               | 0.28          | 0.45        |
| ON1 (MIN)                                         | ON1-D               | 25                     | 0.50      | 2.51               | 0.58          | 1.45        |
| ON1 (MAX)                                         | ON1-D               | 25                     | 1.80      | 4.27               | 0.47          | 2.00        |

#### **Ultimate Condition**

| Revised 100-Yr Ultimate Condition Street Flow Hydraulics |                                     |                        |           |                    |               |             |
|----------------------------------------------------------|-------------------------------------|------------------------|-----------|--------------------|---------------|-------------|
| Street Cross Section ID                                  | Contributing Basins                 | Q <sub>100</sub> (cfs) | Slope (%) | Velocity, V (ft/s) | Depth, D (ft) | DxV Product |
| IMT0                                                     | (CP0 – (67 cfs Upstream DIs + LEO-E | 122                    | 0.9       | 4.41               | 0.84          | 3.7         |

| Revised 10-Yr Ultimate Condition Street Flow Hydraulics |                                           |                       |           |                    |               |               |
|---------------------------------------------------------|-------------------------------------------|-----------------------|-----------|--------------------|---------------|---------------|
| Street Cross Section ID                                 | Contributing Basins                       | Q <sub>10</sub> (cfs) | Slope (%) | Velocity, V (ft/s) | Depth, D (ft) | Dry Lane (ft) |
| IMT0                                                    | 1/2 (CP0 – (67 cfs Upstream DIs)) + LEO-E | 5.5                   | 0.9       | 2.77               | 0.41          | 21            |

Review of the above tables shows street flow criteria is met within Leon Avenue and Iron Mountain Bradley Road. Note onsite flow has increased by 3 cfs from the original study therefore finished floors were reanalyzed. See Appendix D for all hydraulic revisions.

Due to flow changes finished floors were analyzed and still meet the minimum criteria; therefore, the proposed revisions are considered acceptable. See Appendix E for finished floor calculations.

The revised improvement plans are provided in Appendix F.

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 T. Mata, E.  
Flood Control Division

cc: Steve Jones, P.E. – SHG  
Todd Steadham, P.E., LEED-AP – SHG



**LIST OF APPENDICES**

|                   |                                |
|-------------------|--------------------------------|
| <b>Appendix A</b> | Approval Letter                |
| <b>Appendix B</b> | Revised Drainage Exhibits      |
| <b>Appendix C</b> | Revised Hydrology              |
| <b>Appendix D</b> | Revised Hydraulic Calculations |
| <b>Appendix E</b> | Revised Finished Floors        |
| <b>Appendix F</b> | Revised Improvement Plans      |

## APPENDIX A

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### Approval Letter

|                                                                            |                                               |                                                                                                   |
|----------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>CITY OF LAS VEGAS</b>                                                   |                                               | <b>DATE:</b>                                                                                      |
| <b>INTER-OFFICE MEMORANDUM</b>                                             |                                               | March 18, 2014                                                                                    |
| <b>TO:</b><br>Land Development Services<br>Department of Building & Safety |                                               | <b>FROM:</b><br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| <b>SUBJECT:</b>                                                            | Drainage Study for:                           |                                                                                                   |
|                                                                            | Iron Mountain / Bradley – Update #2           |                                                                                                   |
| <b>Cross Streets:</b>                                                      | NEC of Iron Mountain Rd. & Leon Ave.          |                                                                                                   |
| <b>File Number:</b>                                                        | F:\Depot\DSMemos\DS4612D.doc                  |                                                                                                   |
| <b>Parcel Number:</b>                                                      | 125-01-402-020                                |                                                                                                   |
| <b>Zoning Action:</b>                                                      | TMP-49575; ZON-48851 & VAR-49577 to VAR-49617 |                                                                                                   |
| <b>FEMA Flood Zone</b>                                                     | YES                                           | NO <b>X</b>                                                                                       |
| <b>Proposed Storm Drain</b>                                                | YES <b>X</b>                                  | NO                                                                                                |
| <b>COPIES TO:</b>                                                          |                                               |                                                                                                   |
| Slater Hanifan Group                                                       |                                               |                                                                                                   |
| Richmond American Homes                                                    |                                               |                                                                                                   |
| Bart Anderson, P.E., DevCo                                                 |                                               |                                                                                                   |

| HISTORY                   | DATE RECEIVED | DATE REVIEWED | COMMENTS                   | REVIEW FEES       | FEES PAID<br>Payment Trn # |
|---------------------------|---------------|---------------|----------------------------|-------------------|----------------------------|
| 1 <sup>st</sup> Submittal | 7/8/2013      | 7/22/2013     | Not Approved               | \$400.00          | 325434: \$400              |
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| 4 <sup>th</sup> Submittal | 3/4/2014      | 3/18/2014     | See Comments Below         | \$100.00          | 349703: \$100              |
|                           |               |               | <b>TOTAL FEES (LDDRS):</b> | <b>\$1,000.00</b> | ****                       |

#### REMARKS:

#### 4<sup>th</sup> Submittal: Update #2 to revise pad and finish floor elevations for the whole site

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 receipt of a notarized letter of permission from adjacent property owner to the north of the subject site. |
| <b>X</b> | is conditionally approved subject to documentation of drainage easement grant from BLM                                                          |

1. The drainage study is conditionally approved subject to documentation of drainage easement grant obtained from BLM prior to the final approval of the improvement plans.
2. All solid grouted walls must be of 8"-Thickness CMU. Revise all pertinent details and/or construction notes accordingly.

**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**

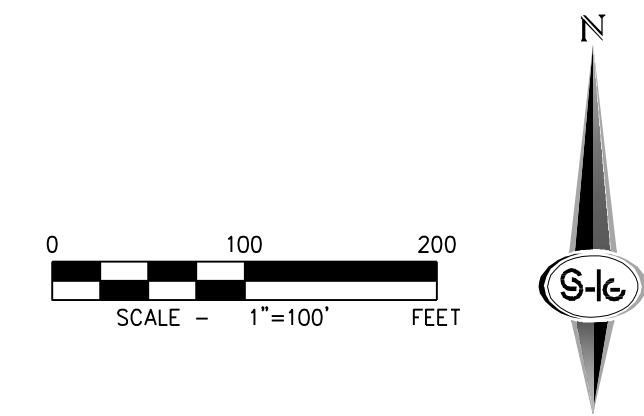
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T/R/S: T19S/R60E/01  
AREA G-01

## APPENDIX B

### Revised Drainage Exhibits





**LEGEND**

|                                                                                     |                                |
|-------------------------------------------------------------------------------------|--------------------------------|
|  | <b>BASIN BOUNDARY</b>          |
|  | <b>BASIN ID</b>                |
|  | <b>FLOW DIRECTION</b>          |
|  | <b>CONCENTRATION POINT</b>     |
|  | <b>FLOWMASTER SECTION</b>      |
| <b>XXX CFS</b>                                                                      | <b>100-YR STREET FLOW</b>      |
| <b>(XXX CFS)</b>                                                                    | <b>100-YR STORM DRAIN FLOW</b> |

| Basin ID/ Concentration Point ID            | Area (acres) | Q100 (cfs) | Q10 (cfs) |
|---------------------------------------------|--------------|------------|-----------|
| OFF1-E                                      | 1.8          | 3          | 1         |
| OFF2-E                                      | 1.2          | 2          | 1         |
| OFF1                                        | 1.5          | 4          | 2         |
| OFF2                                        | 3.4          | 10         | 5         |
| OFF3                                        | 33.2         | 57         | 22        |
| OFF4                                        | 1.8          | 4          | 1         |
| ON1-D                                       | 11.6         | 25         | 10        |
| LEO-E                                       | 0.7          | 2          | 1         |
| IMT-D                                       | 1.8          | 6          | 3         |
| CP0<br>(OFF1 + OFF2 + OFF3 + OFF4 + 93/20") | N/A          | 165        | 50        |
| CP1<br>(CP0 + ON1-D + LEO-E + IMT-D)        | N/A          | 197        | 64        |

\* REFERENCED FLOWS IN IRON MOUNTAIN PER NORTHWEST NEIGHBORHOOD STUDY- EXISTING CONDITION

| Hydraulic Street Flow Summary           |            |                        |            |                |                                     |
|-----------------------------------------|------------|------------------------|------------|----------------|-------------------------------------|
| Proposed Condition - 100-Yr Storm Flows |            |                        |            |                |                                     |
| Section                                 | Slope (%)  | Q <sub>100</sub> (cfs) | Depth (ft) | Velocity (fps) | D <sub>100</sub> X V <sub>100</sub> |
| LEO<br>(Q = LEQ-E)                      | 0.56       | 2                      | 0.35       | 1.67           | 0.6                                 |
| IMT1<br>(Q = CP1)                       | 0.73       | 197                    | 0.98       | 4.98           | 4.9                                 |
| ON1<br>(Q = ON1-D)                      | 0.5 (min.) | 25                     | 0.58       | 2.51           | 1.5                                 |
|                                         | 1.8 (max.) | 25                     | 0.47       | 4.27           | 2.0                                 |

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

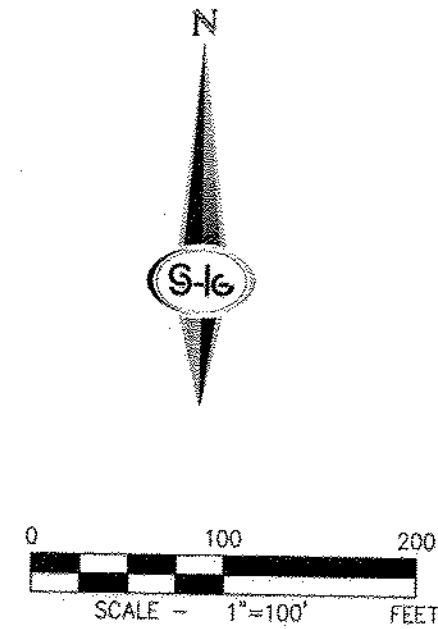
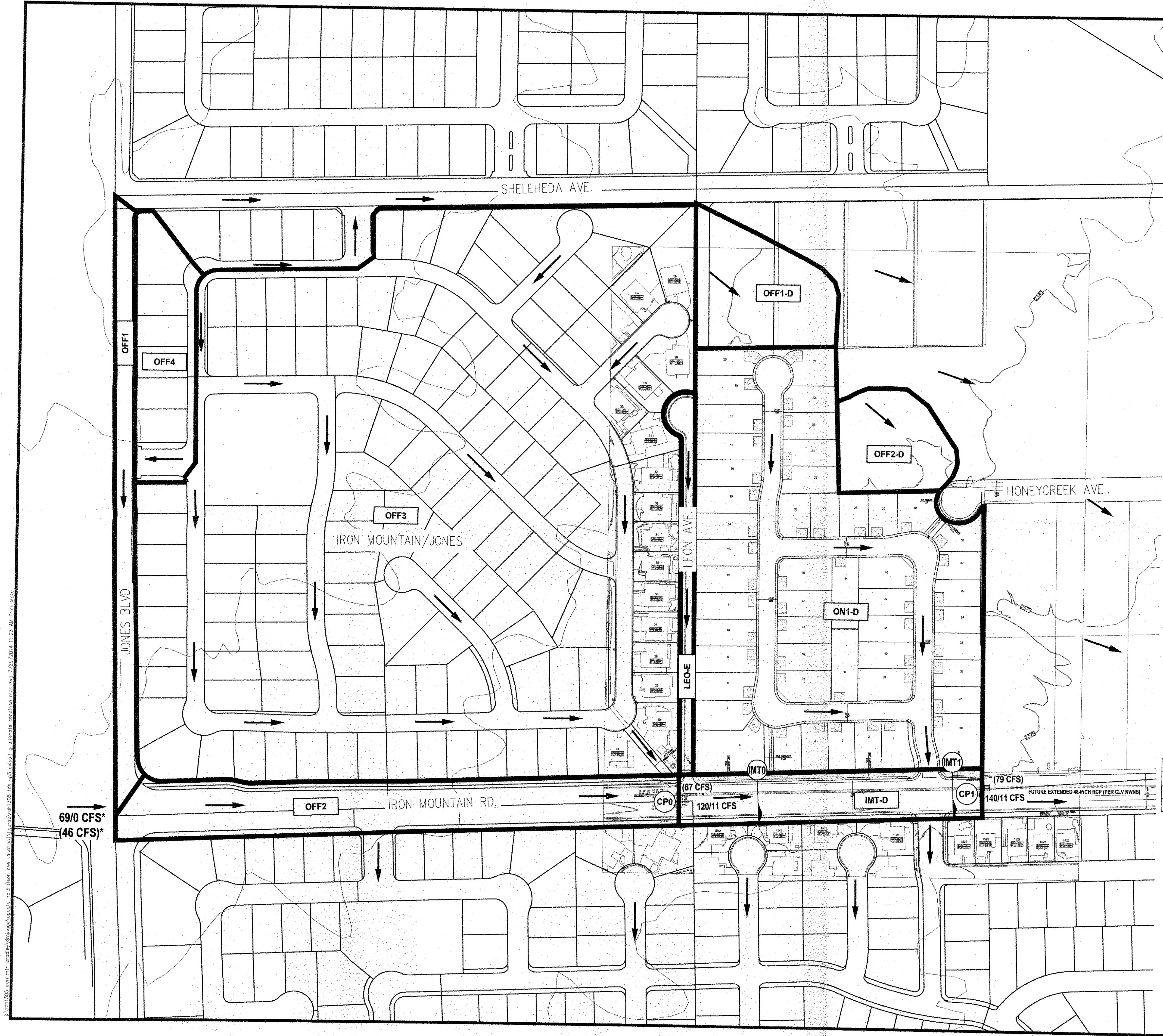
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**RICHMOND AMERICAN HOMES  
IRON MOUNTAIN/BRADLEY  
PROPOSED CONDITION MAP**

|                    |             |
|--------------------|-------------|
| DATE:              | AUGUST 2014 |
| DRAFTER:           | ETM         |
| DESIGNER:          | ETM         |
| CHECKED:           | SMJ         |
| PROJECT NO.        |             |
| <b>RAH1305.000</b> |             |



\\net1305-lee.mtn-bradley\workspace\projects\1305\_05\_02\exhibit\ultimate condition map.dwg 7/23/2014 11:23 AM Eric Molo



| LEGEND      |                          |
|-------------|--------------------------|
|             | BASIN BOUNDARY           |
|             | BASIN ID                 |
|             | FLOW DIRECTION           |
|             | CONCENTRATION POINT      |
|             | FLOWMASTER SECTION       |
| XXX/XXX CFS | 100-YR/10-YR STREET FLOW |
| (XXX CFS)   | STORM DRAIN FLOW         |

NOTE: STORM DRAIN IN IRON MOUNTAIN IS DESIGNED FOR 10-YEAR FLOW CONVEYANCE, PER THE CLV NNWS, THEREFORE, EQUIVALENT 100-YEAR FLOW AND 10-YEAR FLOWS ASSUMED AS STORM DRAIN FLOW.

| FLOW RATE SUMMARY TABLE                        |              |            |           |
|------------------------------------------------|--------------|------------|-----------|
| ULTIMATE CONDITION                             |              |            |           |
| Basin ID/ Concentration Point ID               | Area (acres) | Q100 (cfs) | Q10 (cfs) |
| OFF1-D                                         | 1.8          | 5          | 2         |
| OFF2-D                                         | 1.2          | 3          | 1         |
| OFF1                                           | 1.5          | 4          | 2         |
| OFF2                                           | 3.4          | 10         | 5         |
| OFF3                                           | 33.2         | 57         | 22        |
| OFF4                                           | 1.8          | 4          | 1         |
| ON1-D                                          | 11.6         | 25         | 10        |
| LEO-E                                          | 0.7          | 2          | 1         |
| IMT-D                                          | 1.8          | 6          | 3         |
| CP0                                            |              |            |           |
| (OFF1 + OFF2 + OFF3 + OFF4 + 69/0* + (46/46)*) | N/A          | 187        | 76        |
| CP1                                            |              |            |           |
| (CP0 + ON1-D + LEO-E + IMT-D)                  | N/A          | 219        | 90        |

\* REFERENCED FLOWS IN IRON MOUNTAIN PER NORTHWEST NEIGHBORHOOD STUDY - FUTURE CONDITION

| Hydraulic Street Flow Summary            |           |                        |            |                |                                     |
|------------------------------------------|-----------|------------------------|------------|----------------|-------------------------------------|
| Ultimate Condition - 100-Yr Storm Flows  |           |                        |            |                |                                     |
| Section                                  | Slope (%) | Q <sub>100</sub> (cfs) | Depth (ft) | Velocity (fps) | D <sub>100</sub> X V <sub>100</sub> |
| IMT0                                     |           |                        |            |                |                                     |
| $Q = (CP0 - (67 \text{ cfs})^2) + LEO-E$ | 0.90      | 122                    | 0.84       | 4.41           | 3.7                                 |
| IMT1                                     |           |                        |            |                |                                     |
| $Q = CP1 - (67 \text{ cfs})^2$           | 0.73      | 152                    | 0.91       | 4.50           | 4.1                                 |

| Hydraulic Street Flow Summary                                    |           |                       |            |                |                                   |
|------------------------------------------------------------------|-----------|-----------------------|------------|----------------|-----------------------------------|
| Ultimate Condition - 10-Yr Storm Flows                           |           |                       |            |                |                                   |
| Section                                                          | Slope (%) | Q <sub>10</sub> (cfs) | Depth (ft) | Velocity (fps) | D <sub>10</sub> X V <sub>10</sub> |
| IMT0                                                             |           |                       |            |                |                                   |
| $Q = 1/2(CP0 - (67 \text{ cfs})^2) + LEO-E$                      | 0.90      | 5.5                   | 0.41       | 2.77           | 1.1                               |
| IMT1                                                             |           |                       |            |                |                                   |
| $Q = 1/2(CP1 - (67 \text{ cfs})^2) + LEO-E + ON1-D + 1/2(IMT-D)$ | 0.73      | 17                    | 0.60       | 3.03           | 1.8                               |

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## APPENDIX C

### Revised Hydrology



## Soil & Curve Number Computation

Project Name: Iron Mt./Bradley Update No.3

Date: #####

File Name: RAH1305 TDS Composite\_CN\_Calculation.xlsx

By: ETM

### Data:

### Reference:

| Soil Type & Description                              | A  | B   | C  | D   |
|------------------------------------------------------|----|-----|----|-----|
| 305 Las Vegas-Destazo complex, 0 to 2 percent slopes | 5% | 30% | 5% | 60% |

Exhibit D  
SCS Soil Data

| Land Use               | A  | B  | C  | D  |
|------------------------|----|----|----|----|
| Residential (7,000 sf) | 76 | 84 | 89 | 91 |
| Residential (8,000 sf) | 73 | 82 | 88 | 90 |
| Desert Shrub (poor)    | 63 | 77 | 85 | 88 |
| Roadway                | 98 | 98 | 98 | 98 |

### EXISTING CONDITION

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE            | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|---------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                     | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| OFF1-E        | 305       | 100.0%          | Desert Shrub (poor) | 5%                    | 30% | 5% | 60% | 63          | 77 | 85 | 88 | 1.8           | 83.30         |
| TOTAL PERCENT | 100.0%    |                 |                     |                       |     |    |     | TOTAL AREA  |    |    |    | 1.8           | 83.30         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE            | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|---------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                     | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| OFF2-E        | 305       | 100.0%          | Desert Shrub (poor) | 5%                    | 30% | 5% | 60% | 63          | 77 | 85 | 88 | 1.2           | 83.30         |
| TOTAL PERCENT | 100.0%    |                 |                     |                       |     |    |     | TOTAL AREA  |    |    |    | 1.2           | 83.30         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE            | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|---------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                     | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| ON1-E         | 305       | 100.0%          | Desert Shrub (poor) | 5%                    | 30% | 5% | 60% | 63          | 77 | 85 | 88 | 6.2           | 83.30         |
| TOTAL PERCENT | 100.0%    |                 |                     |                       |     |    |     | TOTAL AREA  |    |    |    | 6.2           | 83.30         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE            | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|---------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                     | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| ON2-E         | 305       | 100.0%          | Desert Shrub (poor) | 5%                    | 30% | 5% | 60% | 63          | 77 | 85 | 88 | 5.3           | 83.30         |
| TOTAL PERCENT | 100.0%    |                 |                     |                       |     |    |     | TOTAL AREA  |    |    |    | 5.3           | 83.30         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE            | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|---------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                     | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| ON3-E         | 305       | 100.0%          | Desert Shrub (poor) | 5%                    | 30% | 5% | 60% | 63          | 77 | 85 | 88 | 1.0           | 83.30         |
| TOTAL PERCENT | 100.0%    |                 |                     |                       |     |    |     | TOTAL AREA  |    |    |    | 1.0           | 83.30         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|----------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |          | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| OFF1          | 305       | 100.0%          | Roadway  | 5%                    | 30% | 5% | 60% | 98          | 98 | 98 | 98 | 1.5           | 98.00         |
| TOTAL PERCENT | 100.0%    |                 |          |                       |     |    |     | TOTAL AREA  |    |    |    | 1.5           | 98.00         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|----------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |          | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| OFF2          | 305       | 100.0%          | Roadway  | 5%                    | 30% | 5% | 60% | 98          | 98 | 98 | 98 | 3.4           | 98.00         |
| TOTAL PERCENT | 100.0%    |                 |          |                       |     |    |     | TOTAL AREA  |    |    |    | 3.4           | 98.00         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE               | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|------------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                        | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| OFF3          | 305       | 100.0%          | Residential (8,000 sf) | 5%                    | 30% | 5% | 60% | 73          | 82 | 88 | 90 | 33.2          | 86.65         |
| TOTAL PERCENT | 100.0%    |                 |                        |                       |     |    |     | TOTAL AREA  |    |    |    | 33.2          | 86.65         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE               | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|------------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                        | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| OFF4          | 305       | 100.0%          | Residential (8,000 sf) | 5%                    | 30% | 5% | 60% | 73          | 82 | 88 | 90 | 1.8           | 86.65         |
| TOTAL PERCENT | 100.0%    |                 |                        |                       |     |    |     | TOTAL AREA  |    |    |    | 1.8           | 86.65         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|----------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |          | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| LEO-E         | 305       | 100.0%          | Roadway  | 5%                    | 30% | 5% | 60% | 98          | 98 | 98 | 98 | 0.7           | 98.00         |
| TOTAL PERCENT | 100.0%    |                 |          |                       |     |    |     | TOTAL AREA  |    |    |    | 0.7           | 98.00         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|----------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |          | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| IMT-E         | 305       | 100.0%          | Roadway  | 5%                    | 30% | 5% | 60% | 98          | 98 | 98 | 98 | 0.9           | 98.00         |
| TOTAL PERCENT | 100.0%    |                 |          |                       |     |    |     | TOTAL AREA  |    |    |    | 0.9           | 98.00         |

### PROPOSED CONDITION



| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE               | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|------------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                        | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| ON1-D         | 305       | 100.0%          | Residential (7,000 sf) | 5%                    | 30% | 5% | 60% | 76          | 84 | 89 | 91 | 11.6          | 88.05         |
| TOTAL PERCENT |           | 100.0%          |                        | TOTAL AREA            |     |    |     |             |    |    |    | 11.6          | 88.05         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|----------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |          | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| IMT-D         | 305       | 100.0%          | Roadway  | 5%                    | 30% | 5% | 60% | 98          | 98 | 98 | 98 | 1.8           | 98.00         |
| TOTAL PERCENT |           | 100.0%          |          | TOTAL AREA            |     |    |     |             |    |    |    | 1.8           | 98.00         |

#### ULTIMATE CONDITION

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE               | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|------------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                        | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| OFF1-D        | 305       | 100.0%          | Residential (7,000 sf) | 5%                    | 30% | 5% | 60% | 76          | 84 | 89 | 91 | 1.8           | 88.05         |
| TOTAL PERCENT |           | 100.0%          |                        | TOTAL AREA            |     |    |     |             |    |    |    | 1.8           | 88.05         |

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE               | HYDROLOGIC SOIL GROUP |     |    |     | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|------------------------|-----------------------|-----|----|-----|-------------|----|----|----|---------------|---------------|
|               |           |                 |                        | A                     | B   | C  | D   | A           | B  | C  | D  |               |               |
| OFF2-D        | 305       | 100.0%          | Residential (7,000 sf) | 5%                    | 30% | 5% | 60% | 76          | 84 | 89 | 91 | 1.2           | 88.05         |
| TOTAL PERCENT |           | 100.0%          |                        | TOTAL AREA            |     |    |     |             |    |    |    | 1.2           | 88.05         |

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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## TIME OF CONCENTRATION

Project Name: Iron Mt./Bradley Update No.3  
Description: All Conditions  
File Name: RAH1305 TDS Composite\_CN\_Calculation.xlsx  
By: ETM  
Date: 7/29/2014

| SUB-BASIN DATA |  |                  |  |    |  |     |  |         |  |           |  |                     |  |         |  |        | INITIAL / OVERLAND TIME (Ti) |                    |  |         | TRAVEL TIME (Tt) |              |  |                 | Tc |        | Tc Check |          | Tlag |                |  |          |  |            |  |
|----------------|--|------------------|--|----|--|-----|--|---------|--|-----------|--|---------------------|--|---------|--|--------|------------------------------|--------------------|--|---------|------------------|--------------|--|-----------------|----|--------|----------|----------|------|----------------|--|----------|--|------------|--|
| DESIG:         |  | DEV/EX. (D or E) |  | CN |  | K   |  | AREA Ac |  | AREA Mi^2 |  | INITIAL LENGTH Feet |  | SLOPE % |  | Ti Min |                              | TRAVEL LENGTH Feet |  | SLOPE % |                  | VELOCITY FPS |  | V2 VELOCITY FPS |    | Tt Min |          | Tc Calc. |      | Tc Length Feet |  | Tc Check |  | Tlag Hours |  |
|                |  |                  |  |    |  | [1] |  | [2]     |  |           |  |                     |  |         |  | [3]    |                              |                    |  |         |                  | [4]          |  | [5]             |    | [6]    |          | [7]      |      | [8]            |  | [9]      |  | [10]       |  |

### Existing Condition

|        |   |      |       |      |        |     |      |      |      |      |      |      |       |       |        |        |       |
|--------|---|------|-------|------|--------|-----|------|------|------|------|------|------|-------|-------|--------|--------|-------|
| OFF1-E | E | 83.3 | 0.710 | 1.8  | 0.0028 | 46  | 2.18 | 3.68 | 403  | 1.24 | 1.65 | 3.27 | 4.07  | 7.75  |        |        | 0.100 |
| OFF2-E | E | 83.3 | 0.710 | 1.2  | 0.0019 | 75  | 2.68 | 4.37 | 308  | 1.62 | 1.89 | 3.75 | 2.72  | 7.09  |        |        | 0.100 |
| ON1-E  | E | 83.3 | 0.710 | 6.2  | 0.0097 | 161 | 1.87 | 7.24 | 844  | 1.42 | 1.77 | 3.51 | 6.36  | 13.59 |        |        | 0.136 |
| ON2-E  | E | 83.3 | 0.710 | 5.3  | 0.0083 | 153 | 1.96 | 6.94 | 857  | 1.17 | 1.60 | 3.18 | 7.08  | 14.03 |        |        | 0.140 |
| ON3-E  | E | 83.3 | 0.710 | 1.0  | 0.0016 | 88  | 2.27 | 5.01 | 313  | 1.28 | 1.67 | 3.32 | 3.12  | 8.14  |        |        | 0.100 |
| OFF1   | D | 98.0 | 0.904 | 1.5  | 0.0023 | 45  | 2.00 | 1.88 | 1390 | 0.63 | 1.60 | 2.42 | 11.34 | 13.22 | 1435   | 17.972 | 0.132 |
| OFF2   | D | 98.0 | 0.904 | 3.4  | 0.0053 | 60  | 2.00 | 2.17 | 1262 | 0.69 | 1.68 | 2.54 | 9.96  | 12.14 | 1321.9 | 17.344 | 0.121 |
| OFF3   | D | 86.7 | 0.754 | 33.2 | 0.0519 | 110 | 1.00 | 6.54 | 2085 | 0.66 | 1.64 | 2.49 | 15.69 | 22.23 | 2195   | 22.194 | 0.222 |
| OFF4   | D | 86.7 | 0.754 | 1.8  | 0.0028 | 110 | 1.00 | 6.54 | 526  | 0.87 | 1.88 | 2.85 | 4.58  | 11.12 | 636    | 13.533 | 0.111 |
| LEO-E  | D | 98.0 | 0.904 | 0.7  | 0.0011 | 30  | 2.00 | 1.54 | 850  | 0.60 | 1.56 | 2.37 | 7.79  | 9.32  | 880    | 14.889 | 0.093 |
| IMT-E  | D | 98.0 | 0.904 | 0.9  | 0.0014 | 30  | 2.00 | 1.54 | 682  | 0.60 | 1.56 | 2.37 | 6.61  | 8.14  | 712.23 | 13.957 | 0.081 |

### Proposed Condition

|       |   |      |       |      |        |     |      |      |      |      |      |      |       |       |         |        |       |
|-------|---|------|-------|------|--------|-----|------|------|------|------|------|------|-------|-------|---------|--------|-------|
| ON1-D | D | 88.1 | 0.772 | 11.6 | 0.0182 | 100 | 2.00 | 4.68 | 1220 | 0.61 | 1.58 | 2.39 | 10.30 | 14.98 | 1320.47 | 17.336 | 0.150 |
| IMT-D | D | 98.0 | 0.904 | 1.8  | 0.0028 | 40  | 2.00 | 1.77 | 682  | 0.60 | 1.56 | 2.37 | 6.60  | 8.38  | 721.66  | 14.009 | 0.084 |

### Ultimate Condition

|        |   |      |       |     |        |    |      |      |     |      |      |      |      |      |        |        |       |
|--------|---|------|-------|-----|--------|----|------|------|-----|------|------|------|------|------|--------|--------|-------|
| OFF1-D | D | 88.1 | 0.773 | 1.8 | 0.0028 | 46 | 2.18 | 3.08 | 403 | 1.24 | 2.25 | 3.41 | 2.99 | 6.06 | 448.95 | 12.494 | 0.061 |
| OFF2-D | D | 88.1 | 0.773 | 1.2 | 0.0019 | 75 | 2.68 | 3.66 | 308 | 1.62 | 2.57 | 3.90 | 1.99 | 5.65 | 382.55 | 12.125 | 0.057 |

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

REFERENCE :

STANDARD FORM 4

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 29JUL14 TIME 10:25:11
*
*****

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PRO.OUT

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

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X X XXXXXXX XXXX X
X X X X X XX
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XXXXXX XXXX X XXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXX XXX

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION

NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION

KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

HEC-1 INPUT

PAGE 1

```

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

*DIAGRAM
1 ID SLATER HANIFAN GROUP
2 ID IRON MT./BRADLEY UPDATE NO.3
3 ID RICHMOND AMERICAN HOMES
4 ID PROPOSED CONDITION
5 ID
6 ID RETURN PERIOD ----- 100-YR & 10-YR
7 ID DISTRIBUTION ----- 6-HOUR SDN3
8 ID PROJECT NO. ----- RAH1305.000
9 ID FILENAME ----- PRO.H1
10 ID DATE ----- 07/29/2014
11 ID MODELED BY ----- ETM
12 ID
13 ID PRECIPITATION STORM EVENT RATIOS
14 ID STORM EVENT RATIO
15 ID 100-YR 1.00
16 ID 10-YR 0.57
17 ID
18 IT 5 0 0 300
19 IO 5 0 0
20 IN 5 0 0
21 JR PREC 1.00 0.57
*

22 KK OFF1-E
23 KM UNDEVELOPED OFFSITE BASIN
24 BA 0.0028
25 PB 2.77
26 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
27 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
28 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
29 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
30 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
31 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
32 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
33 PC 0.998 0.999 1
34 LS 0 83.3
35 UD 0.100
*

36 KK OFF2-E
37 KM UNDEVELOPED OFFSITE BASIN
38 BA .0019
39 LS 0 83.3
40 UD 0.100
*

41 KK OFF4
42 KM DEVELOPED OFFSITE BASIN PART OF IRON MOUNTAIN/JONES
43 BA .0028
44 LS 0 86.7
45 UD 0.111
*

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1

HEC-1 INPUT

PAGE 2

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

46 KK OFF1
47 KM DEVELOPED OFFSITE STREET BASIN FOR JONES
48 BA .0023
49 LS 0 98.0
50 UD 0.132
*

51 KK OFF3
52 KM DEVELOPED OFFSITE BASIN PART OF IRON MOUNTAIN/JONES
53 BA .0519

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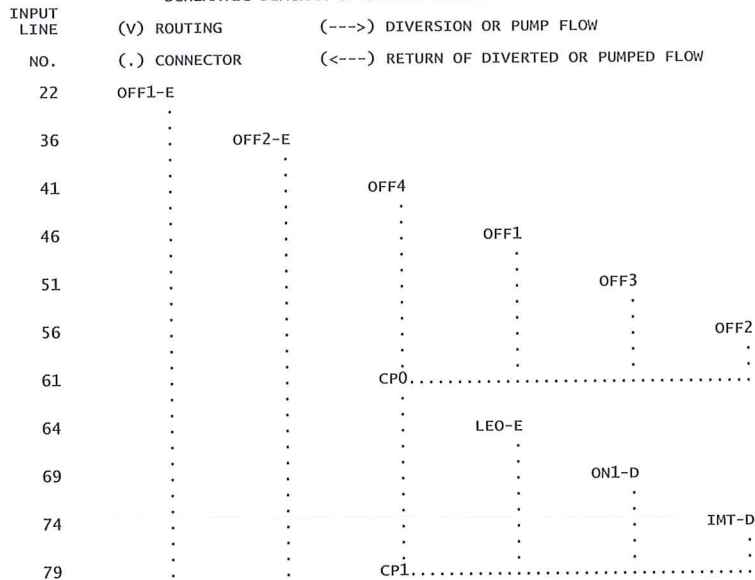


PRO.OUT

|    |    |                                                                    |      |
|----|----|--------------------------------------------------------------------|------|
| 54 | LS | 0                                                                  | 86.7 |
| 55 | UD | 0.222                                                              |      |
|    | *  |                                                                    |      |
| 56 | KK | OFF2                                                               |      |
| 57 | KM | DEVELOPED STREET BASIN FOR IRON MOUNTAIN                           |      |
| 58 | BA | .0053                                                              |      |
| 59 | LS | 0                                                                  | 98.0 |
| 60 | UD | 0.121                                                              |      |
|    | *  |                                                                    |      |
| 61 | KK | CP0                                                                |      |
| 62 | KM | COMBINE OFFSITE FLOWS FROM WEST                                    |      |
| 63 | HC | 4                                                                  |      |
|    | *  |                                                                    |      |
| 64 | KK | LEO-E                                                              |      |
| 65 | KM | DEVELOPED STREET BASIN FOR LEON AVENUE                             |      |
| 66 | BA | .0011                                                              |      |
| 67 | LS | 0                                                                  | 98.0 |
| 68 | UD | 0.093                                                              |      |
|    | *  |                                                                    |      |
| 69 | KK | ON1-D                                                              |      |
| 70 | KM | DEVELOPED ONSITE BASIN                                             |      |
| 71 | BA | .0182                                                              |      |
| 72 | LS | 0                                                                  | 88.1 |
| 73 | UD | 0.150                                                              |      |
|    | *  |                                                                    |      |
| 74 | KK | IMT-D                                                              |      |
| 75 | KM | DEVELOPED STREET BASIN FOR IRON MOUNTAIN                           |      |
| 76 | BA | .0028                                                              |      |
| 77 | LS | 0                                                                  | 98.0 |
| 78 | UD | 0.084                                                              |      |
|    | *  |                                                                    |      |
| 79 | KK | CP1                                                                |      |
| 80 | KM | COMBINE OFFSITE FLOWS FROM WEST AND ONSITE FLOWS AT SE CORNER SITE |      |
| 81 | HC | 4                                                                  |      |
|    | *  |                                                                    |      |
| 82 | ZZ |                                                                    |      |

1

# SCHEMATIC DIAGRAM OF STREAM NETWORK



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

1\*\*\*\*\*  
 \*  
 \* FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 \* JUN 1998  
 \* VERSION 4.1  
 \*  
 \* RUN DATE 29JUL14 TIME 10:25:11  
 \*  
 \*\*\*\*\*

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

SLATER HANIFAN GROUP  
 IRON MT./BRADLEY UPDATE NO.3  
 RICHMOND AMERICAN HOMES  
 PROPOSED CONDITION

RETURN PERIOD ----- 100-YR & 10-YR  
 DISTRIBUTION ----- 6-HOUR SDN3  
 PROJECT NO. ----- RAH1305.000  
 FILENAME ----- PRO.H1  
 DATE ----- 07/29/2014

MODELED BY ----- ETM

PRO.OUT

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

19 IO OUTPUT CONTROL VARIABLES

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

IT

HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS  
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP

MULTI-PLAN OPTION  
NPLAN 1 NUMBER OF PLANS

JR

MULTI-RATIO OPTION  
RATIOS OF PRECIPITATION  
1.00 .57

1

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

| OPERATION     | STATION | AREA | PLAN |           | RATIOS APPLIED TO PRECIPITATION |                |
|---------------|---------|------|------|-----------|---------------------------------|----------------|
|               |         |      |      |           | RATIO 1<br>1.00                 | RATIO 2<br>.57 |
| HYDROGRAPH AT | OFF1-E  | .00  | 1    | FLOW TIME | 3.<br>3.50                      | 1.<br>3.58     |
| HYDROGRAPH AT | OFF2-E  | .00  | 1    | FLOW TIME | 2.<br>3.50                      | 1.<br>3.58     |
| HYDROGRAPH AT | OFF4    | .00  | 1    | FLOW TIME | 4.<br>3.58                      | 1.<br>3.58     |
| HYDROGRAPH AT | OFF1    | .00  | 1    | FLOW TIME | 4.<br>3.58                      | 2.<br>3.58     |
| HYDROGRAPH AT | OFF3    | .05  | 1    | FLOW TIME | 57.<br>3.67                     | 22.<br>3.67    |
| HYDROGRAPH AT | OFF2    | .01  | 1    | FLOW TIME | 10.<br>3.58                     | 5.<br>3.58     |
| 4 COMBINED AT | CP0     | .06  | 1    | FLOW TIME | 72.<br>3.58                     | 30.<br>3.58    |
| HYDROGRAPH AT | LEO-E   | .00  | 1    | FLOW TIME | 2.<br>3.50                      | 1.<br>3.50     |
| HYDROGRAPH AT | ON1-D   | .02  | 1    | FLOW TIME | 25.<br>3.58                     | 10.<br>3.58    |
| HYDROGRAPH AT | INT-D   | .00  | 1    | FLOW TIME | 6.<br>3.50                      | 3.<br>3.50     |
| 4 COMBINED AT | CP1     | .08  | 1    | FLOW TIME | 104.<br>3.58                    | 44.<br>3.58    |

+ 93/20 (CLV NWNS) = 165/50 CFS

+ 93/20 (CLV NWNS) = 197/64 CFS

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

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 29JUL14 TIME 10:25:15
*
*****

```

ULT.OUT

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

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

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

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

1

HEC-1 INPUT

PAGE 1

```

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

*DIAGRAM
1 ID SLATER HANIFAN GROUP
2 ID IRON MT./BRADLEY UPDATE NO.3
3 ID RICHMOND AMERICAN HOMES
4 ID ULTIMATE CONDITION
5 ID
6 ID RETURN PERIOD ----- 100-YR & 10-YR
7 ID DISTRIBUTION ----- 6-HOUR SDN3
8 ID PROJECT NO. ----- RAH1305.000
9 ID FILENAME ----- ULT.H1
10 ID DATE ----- 07/29/2014
11 ID MODELED BY ----- ETM
12 ID
13 ID PRECIPITATION STORM EVENT RATIOS
14 ID STORM EVENT RATIO
15 ID 100-YR 1.00
16 ID 10-YR 0.57
17 ID
18 IT 5 0 0 300
19 IO 5 0 0
20 IN 5 0 0
21 JR PREC 1.00 0.57
*

22 KK OFF1-D
23 KM DEVELOPED OFFSITE BASIN
24 BA 0.0028
25 PB 2.77
26 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
27 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
28 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
29 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
30 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
31 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
32 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
33 PC 0.998 0.999 1
34 LS 0 88.1
35 UD 0.061
*

36 KK OFF2-D
37 KM DEVELOPED OFFSITE BASIN
38 BA .0019
39 LS 0 88.1
40 UD 0.057
*

41 KK OFF4
42 KM DEVELOPED OFFSITE BASIN PART OF IRON MOUNTAIN/JONES
43 BA .0028
44 LS 0 86.7
45 UD 0.111
*

```

1

HEC-1 INPUT

PAGE 2

```

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

46 KK OFF1
47 KM DEVELOPED OFFSITE STREET BASIN FOR JONES
48 BA .0023
49 LS 0 98.0
50 UD 0.132
*

51 KK OFF3
52 KM DEVELOPED OFFSITE BASIN PART OF IRON MOUNTAIN/JONES
53 BA .0519

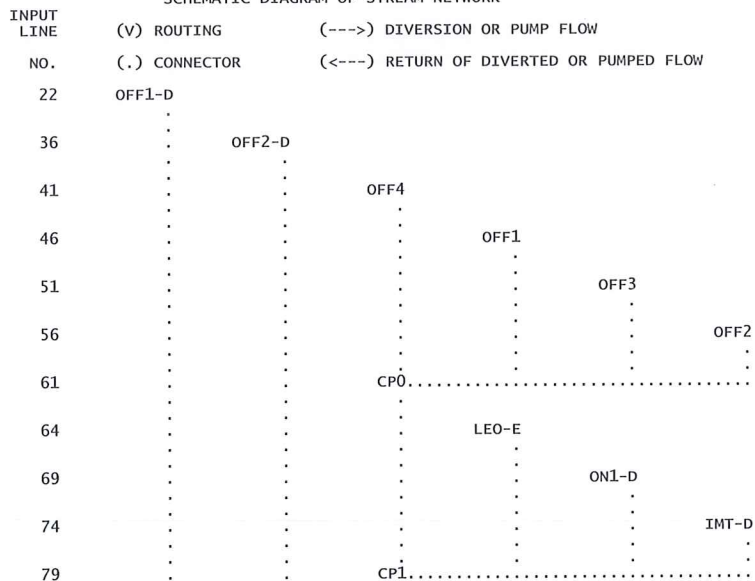
```



|    |    |                                                                    |      |         |
|----|----|--------------------------------------------------------------------|------|---------|
| 54 | LS | 0                                                                  | 86.7 | ULT.OUT |
| 55 | UD | 0.222                                                              |      |         |
|    | *  |                                                                    |      |         |
| 56 | KK | OFF2                                                               |      |         |
| 57 | KM | DEVELOPED STREET BASIN FOR IRON MOUNTAIN                           |      |         |
| 58 | BA | .0053                                                              |      |         |
| 59 | LS | 0                                                                  | 98.0 |         |
| 60 | UD | 0.121                                                              |      |         |
|    | *  |                                                                    |      |         |
| 61 | KK | CP0                                                                |      |         |
| 62 | KM | COMBINE OFFSITE FLOWS FROM WEST                                    |      |         |
| 63 | HC | 4                                                                  |      |         |
|    | *  |                                                                    |      |         |
| 64 | KK | LEO-E                                                              |      |         |
| 65 | KM | DEVELOPED STREET BASIN FOR LEON AVENUE                             |      |         |
| 66 | BA | .0011                                                              |      |         |
| 67 | LS | 0                                                                  | 98.0 |         |
| 68 | UD | 0.093                                                              |      |         |
|    | *  |                                                                    |      |         |
| 69 | KK | ON1-D                                                              |      |         |
| 70 | KM | DEVELOPED ONSITE BASIN                                             |      |         |
| 71 | BA | .0182                                                              |      |         |
| 72 | LS | 0                                                                  | 88.1 |         |
| 73 | UD | 0.150                                                              |      |         |
|    | *  |                                                                    |      |         |
| 74 | KK | IMT-D                                                              |      |         |
| 75 | KM | DEVELOPED STREET BASIN FOR IRON MOUNTAIN                           |      |         |
| 76 | BA | .0028                                                              |      |         |
| 77 | LS | 0                                                                  | 98.0 |         |
| 78 | UD | 0.084                                                              |      |         |
|    | *  |                                                                    |      |         |
| 79 | KK | CP1                                                                |      |         |
| 80 | KM | COMBINE OFFSITE FLOWS FROM WEST AND ONSITE FLOWS AT SE CORNER SITE |      |         |
| 81 | HC | 4                                                                  |      |         |
|    | *  |                                                                    |      |         |
| 82 | ZZ |                                                                    |      |         |

1

# SCHEMATIC DIAGRAM OF STREAM NETWORK



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

1 \*\*\*\*\*  
 \* FLOOD HYDROGRAPH PACKAGE (HEC-1) \*  
 \* JUN 1998 \*  
 \* VERSION 4.1 \*  
 \* RUN DATE 29JUL14 TIME 10:25:15 \*  
 \* \*\*\*\*\*

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

SLATER HANIFAN GROUP  
 IRON MT./BRADLEY UPDATE NO.3  
 RICHMOND AMERICAN HOMES  
 ULTIMATE CONDITION

RETURN PERIOD ----- 100-YR & 10-YR  
 DISTRIBUTION ----- 6-HOUR SDN3  
 PROJECT NO. ----- RAH1305.000  
 FILENAME ----- ULT.H1  
 DATE ----- 07/29/2014

MODELED BY ----- ETM

ULT.OUT

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

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

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

COMPUTATION INTERVAL .08 HOURS  
TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION  
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION  
RATIOS OF PRECIPITATION  
1.00 .57

1

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

| OPERATION     | STATION | AREA | PLAN |           | RATIOS APPLIED TO PRECIPITATION |                |                                                   |
|---------------|---------|------|------|-----------|---------------------------------|----------------|---------------------------------------------------|
|               |         |      |      |           | RATIO 1<br>1.00                 | RATIO 2<br>.57 |                                                   |
| HYDROGRAPH AT | OFF1-D  | .00  | 1    | FLOW TIME | 5.<br>3.50                      | 2.<br>3.50     |                                                   |
| HYDROGRAPH AT | OFF2-D  | .00  | 1    | FLOW TIME | 3.<br>3.50                      | 1.<br>3.50     |                                                   |
| HYDROGRAPH AT | OFF4    | .00  | 1    | FLOW TIME | 4.<br>3.58                      | 1.<br>3.58     |                                                   |
| HYDROGRAPH AT | OFF1    | .00  | 1    | FLOW TIME | 4.<br>3.58                      | 2.<br>3.58     |                                                   |
| HYDROGRAPH AT | OFF3    | .05  | 1    | FLOW TIME | 57.<br>3.67                     | 22.<br>3.67    |                                                   |
| HYDROGRAPH AT | OFF2    | .01  | 1    | FLOW TIME | 10.<br>3.58                     | 5.<br>3.58     |                                                   |
| 4 COMBINED AT | CP0     | .06  | 1    | FLOW TIME | 72.<br>3.58                     | 30.<br>3.58    | + 69/0 (CLW NWWS) + 46/46 (CLW NWWS) = 187/76     |
| HYDROGRAPH AT | LEO-E   | .00  | 1    | FLOW TIME | 2.<br>3.50                      | 1.<br>3.50     |                                                   |
| HYDROGRAPH AT | ON1-D   | .02  | 1    | FLOW TIME | 25.<br>3.58                     | 10.<br>3.58    |                                                   |
| HYDROGRAPH AT | IMT-D   | .00  | 1    | FLOW TIME | 6.<br>3.50                      | 3.<br>3.50     |                                                   |
| 4 COMBINED AT | CP1     | .08  | 1    | FLOW TIME | 104.<br>3.58                    | 44.<br>3.58    | + 69/0 (CLW NWWS) + 46/46 (CLW NWWS) = 219/90 CFS |

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

## APPENDIX D

---

### Revised Hydraulic Calculations



# SECTION LEO PROPOSED (100-YR)

## Worksheet for Irregular Channel

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

| Input Data    |          |
|---------------|----------|
| Channel Slope | 0.56 %   |
| Discharge     | 2.00 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 | 0.35 ft             |
| Elevation Range         | 0.00 to 0.83        |
| Flow Area               | 1.2 ft <sup>2</sup> |
| Wetted Perimeter        | 10.91 ft            |
| Top Width               | 10.50 ft            |
| Actual Depth            | 0.35 ft             |
| Critical Elevation      | 0.33 ft             |
| Critical Slope          | 0.75 %              |
| Velocity                | 1.67 ft/s           |
| Velocity Head           | 0.04 ft             |
| Specific Energy         | 0.39 ft             |
| Froude Number           | 0.87                |
| 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+23.5      | 0.016                |
| 0+23.5             | 0+25.5      | 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+23.5                 | 0.46           |
| 0+25.0                 | 0.33           |

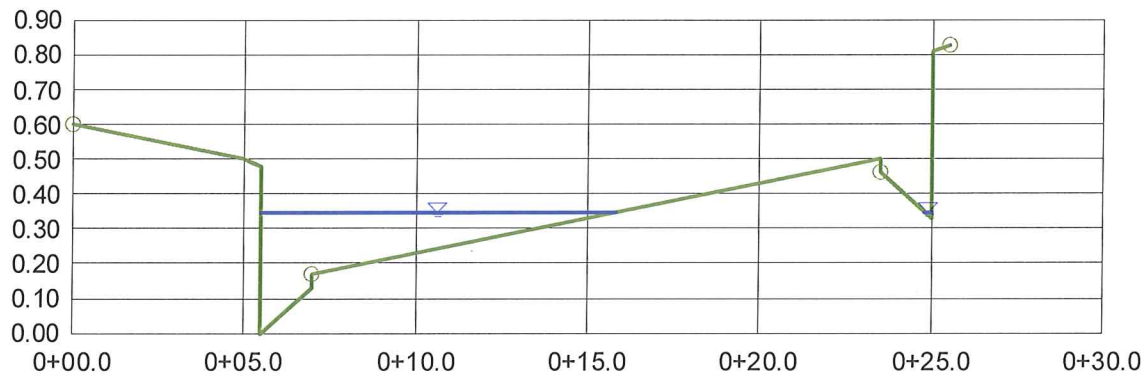
**SECTION LEO PROPOSED (100-YR)**  
**Worksheet for Irregular Channel**

| Natural Channel Points |                   |
|------------------------|-------------------|
| Station<br>(ft)        | Elevation<br>(ft) |
| 0+25.0                 | 0.81              |
| 0+25.5                 | 0.83              |

# SECTION LEO PROPOSED (100-YR) Cross Section for Irregular Channel

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

| Section Data            |              |
|-------------------------|--------------|
| Mannings Coefficient    | 0.015        |
| Channel Slope           | 0.56 %       |
| Water Surface Elevation | 0.35 ft      |
| Elevation Range         | 0.00 to 0.83 |
| Discharge               | 2.00 cfs     |



V:10.0  
H:1  
NTS



# SECTION ON1 PROPOSED (100-YR MAX SLOPE)

## Worksheet for Irregular Channel

| Project Description |                                         |
|---------------------|-----------------------------------------|
| Worksheet           | SECTION ON1 PROPOSED (100-YR MAX SLOPE) |
| Flow Element        | Irregular Channel                       |
| Method              | Manning's Formula                       |
| Solve For           | Channel Depth                           |

| Input Data    |           |
|---------------|-----------|
| Channel Slope | 1.80 %    |
| Discharge     | 25.00 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               | 5.9 ft <sup>2</sup> |
| Wetted Perimeter        | 34.48 ft            |
| Top Width               | 33.43 ft            |
| Actual Depth            | 0.47 ft             |
| Critical Elevation      | 0.57 ft             |
| Critical Slope          | 0.52 %              |
| Velocity                | 4.27 ft/s           |
| Velocity Head           | 0.28 ft             |
| Specific Energy         | 0.76 ft             |
| Froude Number           | 1.80                |
| 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 ON1 PROPOSED (100-YR MAX SLOPE)**  
**Worksheet for Irregular Channel**

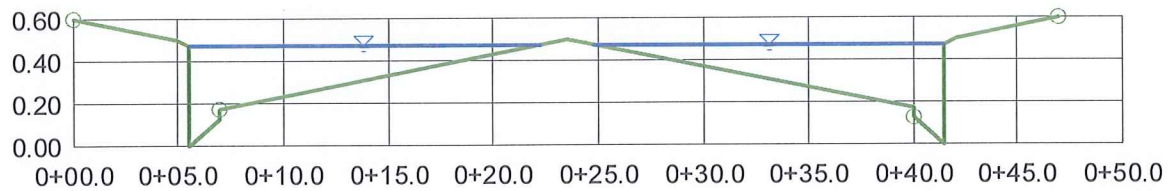
| Natural Channel Points |                   |
|------------------------|-------------------|
| Station<br>(ft)        | Elevation<br>(ft) |
| 0+41.5                 | 0.00              |
| 0+41.5                 | 0.48              |
| 0+42.0                 | 0.50              |
| 0+47.0                 | 0.60              |

# SECTION ON1 PROPOSED (100-YR MAX SLOPE)

## Cross Section for Irregular Channel

| Project Description |                                         |
|---------------------|-----------------------------------------|
| Worksheet           | SECTION ON1 PROPOSED (100-YR MAX SLOPE) |
| Flow Element        | Irregular Channel                       |
| Method              | Manning's Formula                       |
| Solve For           | Channel Depth                           |

| Section Data            |              |
|-------------------------|--------------|
| Mannings Coefficient    | 0.014        |
| Channel Slope           | 1.80 %       |
| Water Surface Elevation | 0.47 ft      |
| Elevation Range         | 0.00 to 0.60 |
| Discharge               | 25.00 cfs    |



V:10.0  
H:1  
NTS

# SECTION ON1 PROPOSED (100-YR MIN SLOPE)

## Worksheet for Irregular Channel

### Project Description

|              |                                         |
|--------------|-----------------------------------------|
| Worksheet    | SECTION ON1 PROPOSED (100-YR MIN SLOPE) |
| Flow Element | Irregular Channel                       |
| Method       | Manning's Formula                       |
| Solve For    | Channel Depth                           |

### Input Data

|               |           |
|---------------|-----------|
| Channel Slope | 0.50 %    |
| Discharge     | 25.00 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               | 10.0 ft <sup>2</sup> |
| Wetted Perimeter        | 45.92 ft             |
| Top Width               | 44.86 ft             |
| Actual Depth            | 0.58 ft              |
| Critical Elevation      | 0.57 ft              |
| Critical Slope          | 0.58 %               |
| Velocity                | 2.51 ft/s            |
| Velocity Head           | 0.10 ft              |
| Specific Energy         | 0.68 ft              |
| Froude Number           | 0.94                 |
| 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 ON1 PROPOSED (100-YR MIN SLOPE)**  
**Worksheet for Irregular Channel**

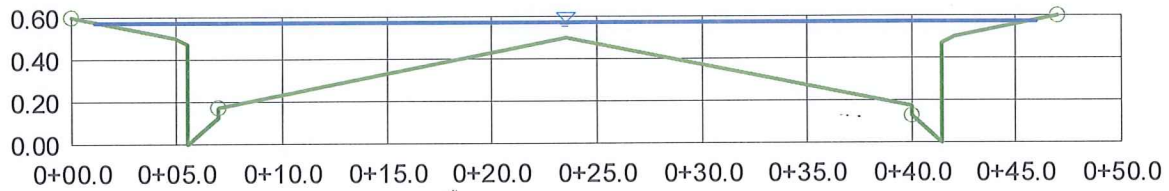
| Natural Channel Points |                   |
|------------------------|-------------------|
| Station<br>(ft)        | Elevation<br>(ft) |
| 0+47.0                 | 0.60              |

# SECTION ON1 PROPOSED (100-YR MIN SLOPE)

## Cross Section for Irregular Channel

| Project Description |                                         |
|---------------------|-----------------------------------------|
| Worksheet           | SECTION ON1 PROPOSED (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 | 0.58 ft      |
| Elevation Range         | 0.00 to 0.60 |
| Discharge               | 25.00 cfs    |



V:10.0  
H:1  
NTS

# SECTION IMT0 ULTIMATE (10-YR)

## Worksheet for Irregular Channel

| Project Description |                               |
|---------------------|-------------------------------|
| Worksheet           | SECTION IMT0 ULTIMATE (10-YR) |
| Flow Element        | Irregular Channel             |
| Method              | Manning's Formula             |
| Solve For           | Channel Depth                 |

| Input Data    |          |
|---------------|----------|
| Channel Slope | 0.90 %   |
| Discharge     | 5.50 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    | 0.014               |
| Water Surface Elevation | 0.41 ft             |
| Elevation Range         | 0.00 to 0.83        |
| Flow Area               | 2.0 ft <sup>2</sup> |
| Wetted Perimeter        | 14.07 ft            |
| Top Width               | 13.61 ft            |
| Actual Depth            | 0.41 ft             |
| Critical Elevation      | 0.44 ft             |
| Critical Slope          | 0.53 %              |
| Velocity                | 2.77 ft/s           |
| Velocity Head           | 0.12 ft             |
| Specific Energy         | 0.53 ft             |
| Froude Number           | 1.28                |
| 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                |

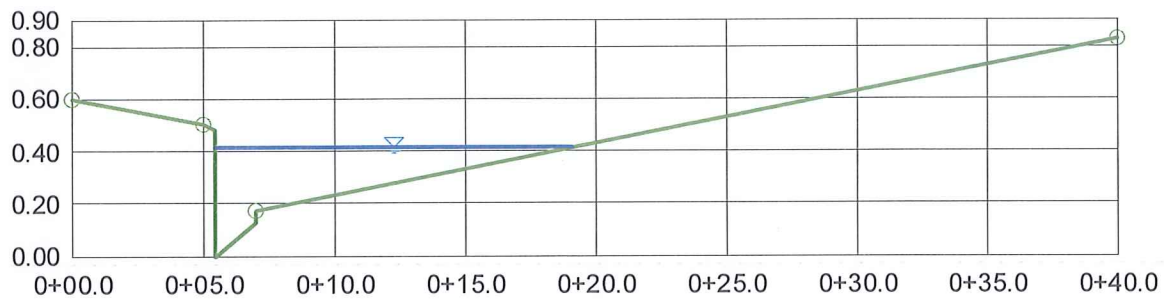
| Natural Channel Points |                |
|------------------------|----------------|
| Station (ft)           | Elevation (ft) |
| 0+00.0                 | 0.60           |
| 0+05.0                 | 0.50           |
| 0+05.5                 | 0.48           |
| 0+05.5                 | 0.00     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

# SECTION IMT0 ULTIMATE (10-YR) Cross Section for Irregular Channel

| Project Description |                               |
|---------------------|-------------------------------|
| Worksheet           | SECTION IMT0 ULTIMATE (10-YR) |
| Flow Element        | Irregular Channel             |
| Method              | Manning's Formula             |
| Solve For           | Channel Depth                 |

| Section Data            |              |
|-------------------------|--------------|
| Mannings Coefficient    | 0.014        |
| Channel Slope           | 0.90 %       |
| Water Surface Elevation | 0.41 ft      |
| Elevation Range         | 0.00 to 0.83 |
| Discharge               | 5.50 cfs     |

$$\text{DRY LANE} = \frac{.83 - .41}{.02} = 21\text{-ft}$$



V: 10.0  
H: 1  
NTS



# SECTION IMT0 ULTIMATE (100-YR)

## Worksheet for Irregular Channel

| Project Description |                                |
|---------------------|--------------------------------|
| Worksheet           | SECTION IMT0 ULTIMATE (100-YR) |
| Flow Element        | Irregular Channel              |
| Method              | Manning's Formula              |
| Solve For           | Channel Depth                  |

| Input Data    |            |
|---------------|------------|
| Channel Slope | 0.90 %     |
| Discharge     | 122.00 cfs |

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

| Results                 |                      |
|-------------------------|----------------------|
| Mannings Coefficient    | 0.016                |
| Water Surface Elevation | 0.84 ft              |
| Elevation Range         | 0.00 to 0.83         |
| Flow Area               | 27.7 ft <sup>2</sup> |
| Wetted Perimeter        | 81.54 ft             |
| Top Width               | 80.00 ft             |
| Actual Depth            | 0.84 ft              |
| Critical Elevation      | 0.91 ft              |
| Critical Slope          | 0.48 %               |
| Velocity                | 4.41 ft/s            |
| Velocity Head           | 0.30 ft              |
| Specific Energy         | 1.14 ft              |
| Froude Number           | 1.32                 |
| Flow Type               | Supercritical        |

### Calculation Messages:

Water elevation exceeds lowest end station by 0.23558562 ft.

| 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+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           |

**SECTION IMT0 ULTIMATE (100-YR)**  
**Worksheet for Irregular Channel**

| Natural Channel Points |                   |
|------------------------|-------------------|
| Station<br>(ft)        | Elevation<br>(ft) |
| 0+73.0                 | 0.13              |
| 0+74.5                 | 0.00              |
| 0+74.5                 | 0.48              |
| 0+75.0                 | 0.50              |
| 0+80.0                 | 0.60              |

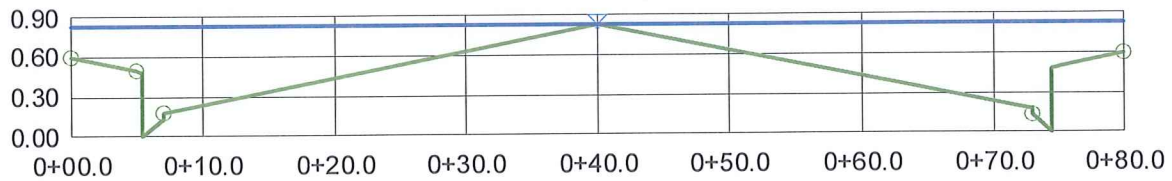
# SECTION IMT0 ULTIMATE (100-YR) Cross Section for Irregular Channel

## Project Description

|              |                                |
|--------------|--------------------------------|
| Worksheet    | SECTION IMT0 ULTIMATE (100-YR) |
| Flow Element | Irregular Channel              |
| Method       | Manning's Formula              |
| Solve For    | Channel Depth                  |

## Section Data

|                         |              |
|-------------------------|--------------|
| Mannings Coefficient    | 0.016        |
| Channel Slope           | 0.90 %       |
| Water Surface Elevation | 0.84 ft      |
| Elevation Range         | 0.00 to 0.83 |
| Discharge               | 122.00 cfs   |



V:10.0  
H:1  
NTS

## APPENDIX E

### Revised Finished Floors



| IRON MT./BRADLEY UPDATE NO.3<br>FINISH FLOOR ANALYSIS - CITY OF LAS VEGAS JURISDICTION                                                                                                               |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------|-----------------------|-----------------------|------------------------------------------------|------------------------------------------------|------------------|----------------|----------------|------------------------------|
| INPUT INFORMATION                                                                                                                                                                                    |                            |                       |                       |                       | FINISHED FLOORS                                |                                                |                  |                |                | NOTES                        |
| Lot Number                                                                                                                                                                                           | Hydraulic Section Utilized | T/C <sup>1</sup> (ft) | F/L <sup>2</sup> (ft) | D <sub>100</sub> (ft) | Flowline F.F. <sub>min</sub> <sup>3</sup> (ft) | T/C + 6" F.F. <sub>min</sub> <sup>4</sup> (ft) | F.F.-Design (ft) | Flowline Check | T/C + 6" Check | See References on Last Sheet |
| 1                                                                                                                                                                                                    | ON1                        | 2376.57               | 2376.07               | 0.58                  | 2377.23                                        | 2377.07                                        | 2378.6           | OK             | OK             |                              |
| 2                                                                                                                                                                                                    | ON1                        | 2377.17               | 2376.67               | 0.58                  | 2377.83                                        | 2377.67                                        | 2379.2           | OK             | OK             |                              |
| 3                                                                                                                                                                                                    | ON1                        | 2377.77               | 2377.27               | 0.58                  | 2378.43                                        | 2378.27                                        | 2379.8           | OK             | OK             |                              |
| 4                                                                                                                                                                                                    | ON1                        | 2378.29               | 2377.79               | 0.58                  | 2378.95                                        | 2378.79                                        | 2380.0           | OK             | OK             |                              |
| 5                                                                                                                                                                                                    | ON1                        | 2378.61               | 2378.11               | 0.58                  | 2379.27                                        | 2379.11                                        | 2380.9           | OK             | OK             |                              |
| 6                                                                                                                                                                                                    | ON1                        | 2378.84               | 2378.34               | 0.58                  | 2379.50                                        | 2379.34                                        | 2382.1           | OK             | OK             |                              |
| 7                                                                                                                                                                                                    | ON1                        | 2379.00               | 2378.50               | 0.58                  | 2379.66                                        | 2379.50                                        | 2381.6           | OK             | OK             |                              |
| 8                                                                                                                                                                                                    | ON1                        | 2379.32               | 2378.82               | 0.58                  | 2379.98                                        | 2379.82                                        | 2381.6           | OK             | OK             |                              |
| 9                                                                                                                                                                                                    | ON1                        | 2379.62               | 2379.12               | 0.58                  | 2380.28                                        | 2380.12                                        | 2381.9           | OK             | OK             |                              |
| 10                                                                                                                                                                                                   | ON1                        | 2379.92               | 2379.42               | 0.58                  | 2380.58                                        | 2380.42                                        | 2382.2           | OK             | OK             |                              |
| 11                                                                                                                                                                                                   | ON1                        | 2380.22               | 2379.72               | 0.58                  | 2380.88                                        | 2380.72                                        | 2382.5           | OK             | OK             |                              |
| 12                                                                                                                                                                                                   | ON1                        | 2380.53               | 2380.03               | 0.58                  | 2381.19                                        | 2381.03                                        | 2382.8           | OK             | OK             |                              |
| 13                                                                                                                                                                                                   | ON1                        | 2380.83               | 2380.33               | 0.58                  | 2381.49                                        | 2381.33                                        | 2383.1           | OK             | OK             |                              |
| 14                                                                                                                                                                                                   | ON1                        | 2381.13               | 2380.63               | 0.58                  | 2381.79                                        | 2381.63                                        | 2383.4           | OK             | OK             |                              |
| 15                                                                                                                                                                                                   | ON1                        | 2381.41               | 2380.91               | 0.58                  | 2382.07                                        | 2381.91                                        | 2383.7           | OK             | OK             |                              |
| 16                                                                                                                                                                                                   | ON1                        | 2381.74               | 2381.24               | 0.58                  | 2382.40                                        | 2382.24                                        | 2384.0           | OK             | OK             |                              |
| 17                                                                                                                                                                                                   | ON1                        | 2382.04               | 2381.54               | 0.58                  | 2382.70                                        | 2382.54                                        | 2384.4           | OK             | OK             |                              |
| 18                                                                                                                                                                                                   | ON1                        | 2382.34               | 2381.84               | 0.58                  | 2383.00                                        | 2382.84                                        | 2384.7           | OK             | OK             |                              |
| 19                                                                                                                                                                                                   | ON1                        | 2382.81               | 2382.31               | 0.58                  | 2383.47                                        | 2383.31                                        | 2385.2           | OK             | OK             |                              |
| 20                                                                                                                                                                                                   | ON1                        | 2383.22               | 2382.72               | 0.58                  | 2383.88                                        | 2383.72                                        | 2385.7           | OK             | OK             |                              |
| 21                                                                                                                                                                                                   | ON1                        | 2383.22               | 2382.72               | 0.58                  | 2383.88                                        | 2383.72                                        | 2385.7           | OK             | OK             |                              |
| 22                                                                                                                                                                                                   | ON1                        | 2382.46               | 2381.96               | 0.58                  | 2383.12                                        | 2382.96                                        | 2384.9           | OK             | OK             |                              |
| 23                                                                                                                                                                                                   | ON1                        | 2382.28               | 2381.78               | 0.58                  | 2382.94                                        | 2382.78                                        | 2384.6           | OK             | OK             |                              |
| 24                                                                                                                                                                                                   | ON1                        | 2381.98               | 2381.48               | 0.58                  | 2382.64                                        | 2382.48                                        | 2384.3           | OK             | OK             |                              |
| 25                                                                                                                                                                                                   | ON1                        | 2381.67               | 2381.17               | 0.58                  | 2382.33                                        | 2382.17                                        | 2384.0           | OK             | OK             |                              |
| 26                                                                                                                                                                                                   | ON1                        | 2380.51               | 2380.01               | 0.58                  | 2381.17                                        | 2381.01                                        | 2382.8           | OK             | OK             |                              |
| 27                                                                                                                                                                                                   | ON1                        | 2380.17               | 2379.67               | 0.58                  | 2380.83                                        | 2380.67                                        | 2382.4           | OK             | OK             |                              |
| 28                                                                                                                                                                                                   | ON1                        | 2379.80               | 2379.30               | 0.58                  | 2380.46                                        | 2380.30                                        | 2382.0           | OK             | OK             |                              |
| 29                                                                                                                                                                                                   | ON1                        | 2379.43               | 2378.93               | 0.58                  | 2380.09                                        | 2379.93                                        | 2381.7           | OK             | OK             |                              |
| 30                                                                                                                                                                                                   | ON1                        | 2379.07               | 2378.57               | 0.58                  | 2379.73                                        | 2379.57                                        | 2381.4           | OK             | OK             |                              |
| 31                                                                                                                                                                                                   | ON1                        | 2378.69               | 2378.19               | 0.58                  | 2379.35                                        | 2379.19                                        | 2381.1           | OK             | OK             |                              |
| 32                                                                                                                                                                                                   | ON1                        | 2378.54               | 2378.04               | 0.58                  | 2379.20                                        | 2379.04                                        | 2380.8           | OK             | OK             |                              |
| 33                                                                                                                                                                                                   | ON1                        | 2378.22               | 2377.72               | 0.58                  | 2378.88                                        | 2378.72                                        | 2380.4           | OK             | OK             |                              |
| 34                                                                                                                                                                                                   | ON1                        | 2377.80               | 2377.30               | 0.58                  | 2378.46                                        | 2378.30                                        | 2379.9           | OK             | OK             |                              |
| 35                                                                                                                                                                                                   | ON1                        | 2377.32               | 2376.82               | 0.58                  | 2377.98                                        | 2377.82                                        | 2379.4           | OK             | OK             |                              |
| 36                                                                                                                                                                                                   | ON1                        | 2376.83               | 2376.33               | 0.58                  | 2377.49                                        | 2377.33                                        | 2379.0           | OK             | OK             |                              |
| 37                                                                                                                                                                                                   | ON1                        | 2376.35               | 2375.85               | 0.58                  | 2377.01                                        | 2376.85                                        | 2378.5           | OK             | OK             |                              |
| 38                                                                                                                                                                                                   | ON1                        | 2375.86               | 2375.36               | 0.58                  | 2376.52                                        | 2376.36                                        | 2377.9           | OK             | OK             |                              |
| 39                                                                                                                                                                                                   | ON1                        | 2376.66               | 2376.16               | 0.58                  | 2377.32                                        | 2377.16                                        | 2378.8           | OK             | OK             |                              |
| 40                                                                                                                                                                                                   | ON1                        | 2377.15               | 2376.65               | 0.58                  | 2377.81                                        | 2377.65                                        | 2379.3           | OK             | OK             |                              |
| 41                                                                                                                                                                                                   | ON1                        | 2377.63               | 2377.13               | 0.58                  | 2378.29                                        | 2378.13                                        | 2379.8           | OK             | OK             |                              |
| 42                                                                                                                                                                                                   | ON1                        | 2378.11               | 2377.61               | 0.58                  | 2378.77                                        | 2378.61                                        | 2380.2           | OK             | OK             |                              |
| 43                                                                                                                                                                                                   | ON1                        | 2378.46               | 2377.96               | 0.58                  | 2379.12                                        | 2378.96                                        | 2380.7           | OK             | OK             |                              |
| 44                                                                                                                                                                                                   | ON1                        | 2379.90               | 2379.40               | 0.58                  | 2380.56                                        | 2380.40                                        | 2382.2           | OK             | OK             |                              |
| 45                                                                                                                                                                                                   | ON1                        | 2380.54               | 2380.04               | 0.58                  | 2381.20                                        | 2381.04                                        | 2382.9           | OK             | OK             |                              |
| 46                                                                                                                                                                                                   | ON1                        | 2380.26               | 2379.76               | 0.58                  | 2380.92                                        | 2380.76                                        | 2382.6           | OK             | OK             |                              |
| 47                                                                                                                                                                                                   | ON1                        | 2379.95               | 2379.45               | 0.58                  | 2380.61                                        | 2380.45                                        | 2382.3           | OK             | OK             |                              |
| 48                                                                                                                                                                                                   | ON1                        | 2379.65               | 2379.15               | 0.58                  | 2380.31                                        | 2380.15                                        | 2382.0           | OK             | OK             |                              |
| 49                                                                                                                                                                                                   | ON1                        | 2379.33               | 2378.83               | 0.58                  | 2379.99                                        | 2379.83                                        | 2381.6           | OK             | OK             |                              |
| 50                                                                                                                                                                                                   | ON1                        | 2377.69               | 2377.19               | 0.58                  | 2378.35                                        | 2378.19                                        | 2379.7           | OK             | OK             |                              |
| Where:                                                                                                                                                                                               |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |
| 1: Top of Curb at High Side of Lot                                                                                                                                                                   |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |
| 2: TC-0.5 (For L Curb)                                                                                                                                                                               |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |
| 3: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = ( 2 x D <sub>100</sub> ) + F/L                                                                           |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |
| 4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches                                                                                                 |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |
| City of Las Vegas Finished Floor Criteria:                                                                                                                                                           |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |
| -The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street. |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |
| -The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb.                                                                                    |                            |                       |                       |                       |                                                |                                                |                  |                |                |                              |

## APPENDIX F

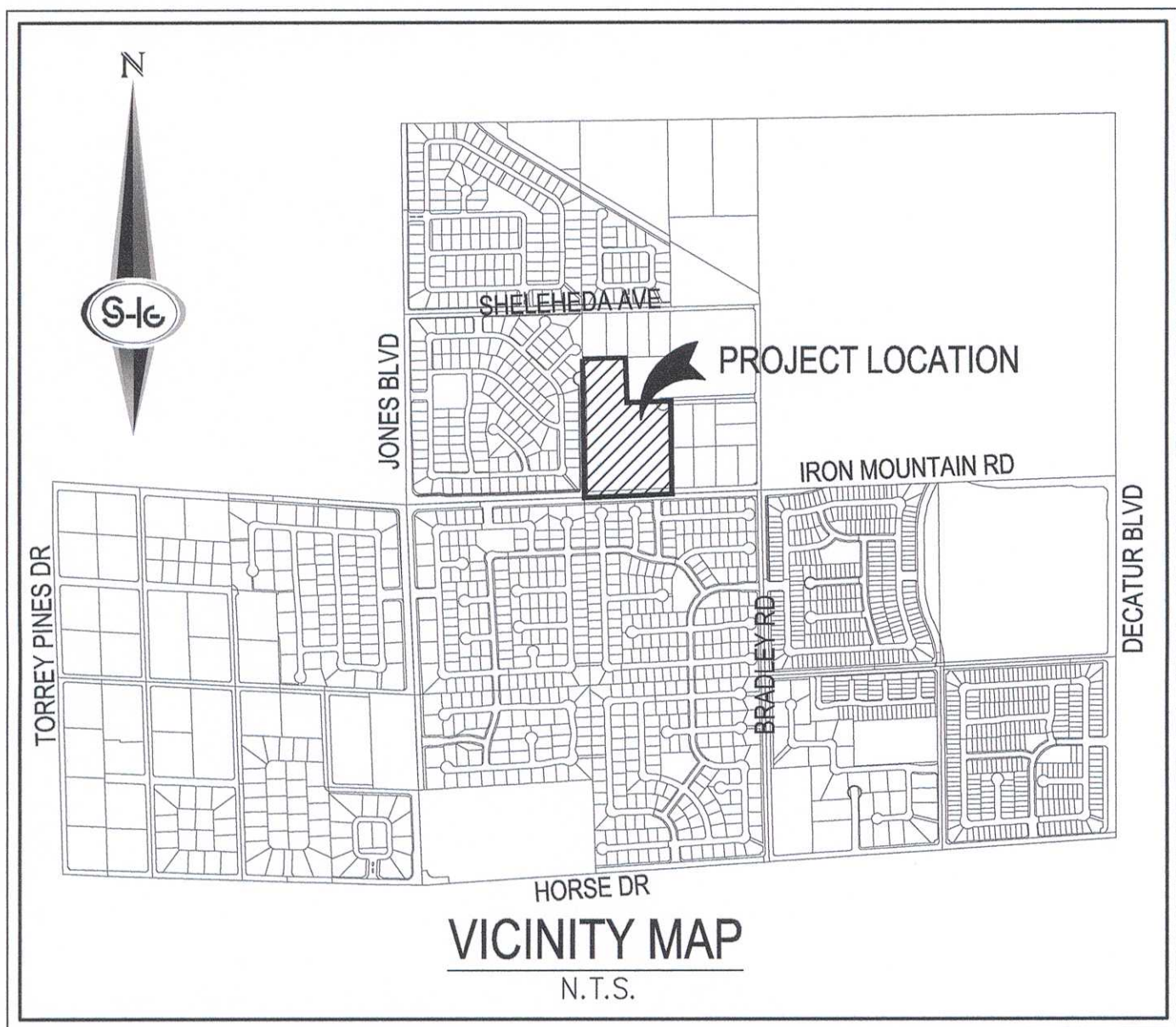
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### Revised Improvement Plans





IMPROVEMENT PLANS  
FOR  
IRON MOUNTAIN/BRADLEY  
APN 125-01-402-020



**LEGAL DESCRIPTION**  
THAT PORTION OF THE SOUTHEAST QUARTER (SE 1/4) OF 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.

**BASIS OF BEARING**  
SOUTH 00°23'54" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF 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, AS SHOWN BY MAP THEREOF IN FILE 117, PAGE 43 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

**BENCHMARK**  
BENCHMARK NUMBER: 6LV9012NNW6  
RIVET AND PLATE IN TOP OF CURB ON THE SOUTH SIDE OF IRON MOUNTAIN ROAD, 35'± SOUTHEAST OF THE PT OF LEON DRIVE AND IRON MOUNTAIN ROAD.  
ELEVATION=2378.776 FEET, 725.053 METERS  
N.A.V.D. 88 DATUM  
PER THE CITY OF LAS VEGAS BENCHMARKS - 2008 ADJUSTMENT (UPDATED 5/94/2010)

| Sheet List Table |                                                                       |
|------------------|-----------------------------------------------------------------------|
| Sheet Number     | Sheet Title                                                           |
| 1                | COVER SHEET                                                           |
| 2                | GENERAL NOTES SHEET                                                   |
| 3                | GRADING PLAN                                                          |
| 4                | GRADING PLAN                                                          |
| 5                | DETAIL SHEET                                                          |
| 6                | UTILITY PLAN AND PROFILE - IRON MOUNTAIN ROAD                         |
| 7                | UTILITY PLAN AND PROFILE - IRON MOUNTAIN ROAD                         |
| 8                | UTILITY PLAN AND PROFILE - IRON MOUNTAIN ROAD                         |
| 9                | UTILITY PLAN AND PROFILE - ETHAN HAWKE AVENUE AND SOPHIE BELLE AVENUE |
| 10               | UTILITY PLAN AND PROFILE - KENZIE COVE STREET                         |
| 11               | UTILITY PLAN AND PROFILE - NOLENE STREAM STREET                       |
| 12               | UTILITY PLAN AND PROFILE - WATER PROFILES                             |
| 13               | STREET PLAN AND PROFILE - IRON MOUNTAIN ROAD                          |
| 14               | STREET PLAN AND PROFILE - ETHAN HAWKE AVENUE AND SOPHIE BELLE AVENUE  |
| 15               | STREET PLAN AND PROFILE - LEON AVENUE                                 |
| 16               | STREET PLAN AND PROFILE - KENZIE COVE STREET                          |
| 17               | STREET PLAN AND PROFILES - NOLENE STREAM STREET                       |
| 18               | MASTER UTILITY PLAN                                                   |
| 19               | UTILITY PLAN                                                          |
| 20               | UTILITY PLAN                                                          |
| 21               | TRAFFIC PLAN                                                          |
| 22               | TRAFFIC PLAN                                                          |
| 23               | LANDSCAPE PLAN                                                        |

| Dry Utility Sheet Index |                                   |
|-------------------------|-----------------------------------|
| No.                     | Sheet Title                       |
| 24                      | SWG COVER SHEET                   |
| 25                      | SWG MATERIALS AND SIGNATURE SHEET |
| 26                      | SWG DESIGN PLAN                   |
| 27                      | SWG DESIGN PLAN                   |

**APPROVALS**

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 DATE \_\_\_\_\_  
BUILDING AND SAFETY DEPARTMENT  
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

CENTRAL TELEPHONE COMPANY D/B/A CENTURYLINK DATE \_\_\_\_\_

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

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER  
PROJECT NO. 122205, DATE: \_\_\_\_\_  
SHEETS: C-1, C-2, PP-1 THRU PP-7, MU-1, U-1, AND U-2  
LVWD APPROVED FIREFLOW: 1250 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  
PH (702) 617-8464  
FX (702) 617-8499  
CONTACT: BRIAN WALSH

**DEVELOPER**  
RICHMOND AMERICAN HOMES  
7770 DEAN MARTIN DR #308  
LAS VEGAS, NV 89139  
PH (702) 617-8464  
FX (702) 617-8499  
CONTACT: BRIAN WALSH

**ENGINEER**  
SLATER HANIFAN GROUP  
5740 S. ARVILLE STREET SUITE 216  
LAS VEGAS, NV 89118  
PH (702) 284-5300  
FX (702) 284-5399

**PROJECT INFORMATION**

|                        |             |
|------------------------|-------------|
| EXISTING ZONING:       | R-PD4       |
| PROPOSED ZONING:       | R-1         |
| ACREAGE (GROSS):       | 12.67 AC    |
| ACREAGE (NET):         | 11.44 AC    |
| TOTAL DWELLING UNITS:  | 50          |
| TYP. LOT SIZE:         | 60'x100'    |
| MIN. LOT WIDTH:        | 60'         |
| MIN. LOT SQFT:         | 6,000 SQFT  |
| MAX LOT SQFT:          | 13,586 SQFT |
| DENSITY (NET ACREAGE): | 4.37 DU/AC  |
| MAX. LOT COVERAGE:     | 50%         |



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

**RICHMOND AMERICAN HOMES**  
IRON MOUNTAIN/BRADLEY  
COVER SHEET

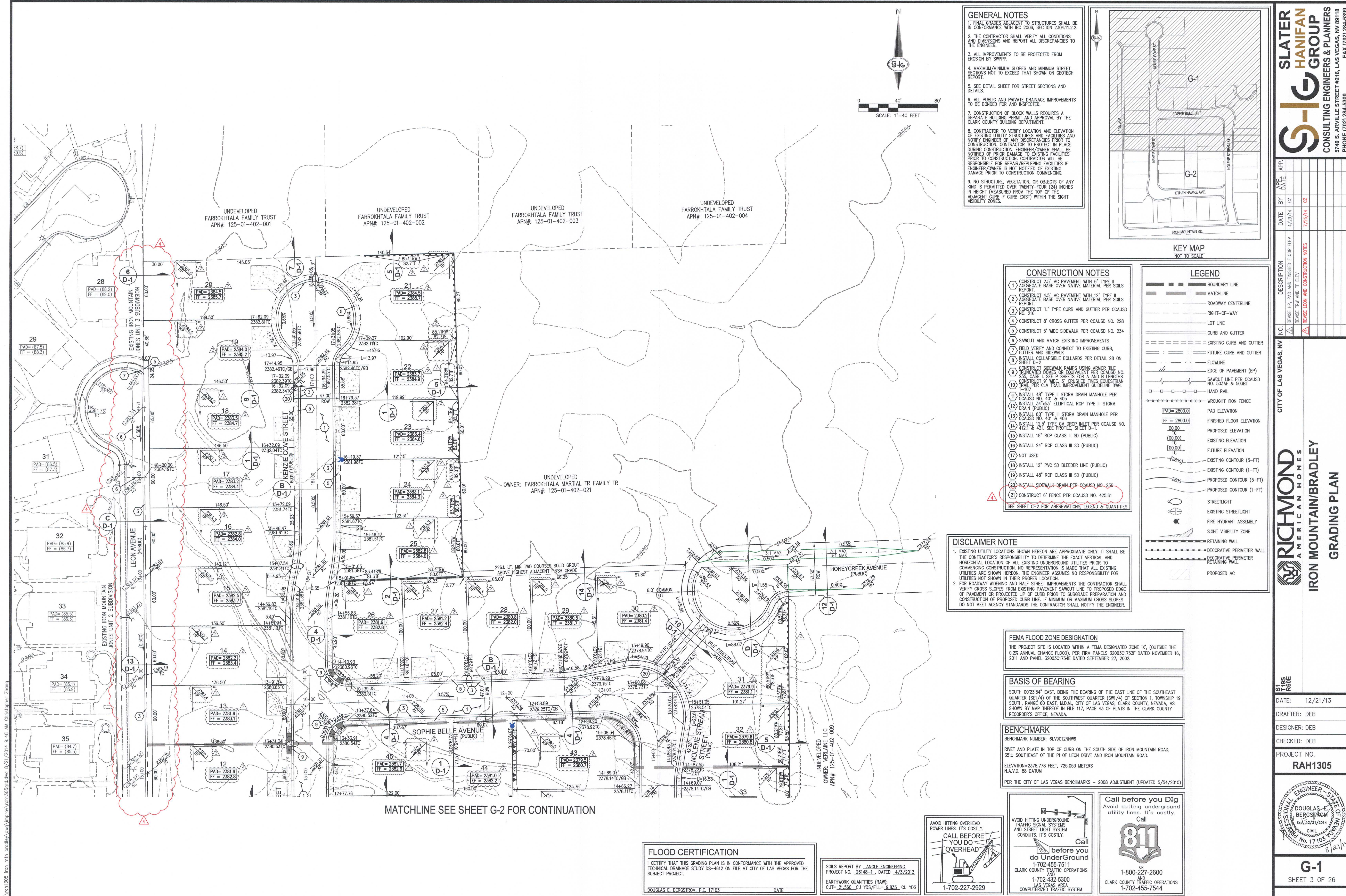
**PROFESSIONAL ENGINEER - STATE OF NEVADA**  
DOUGLAS J. BERGSTROM  
Exp. 12/31/2014  
Civil  
No. 17103 NVCE  
8/21/14

**C-1**  
SHEET 1 OF 26

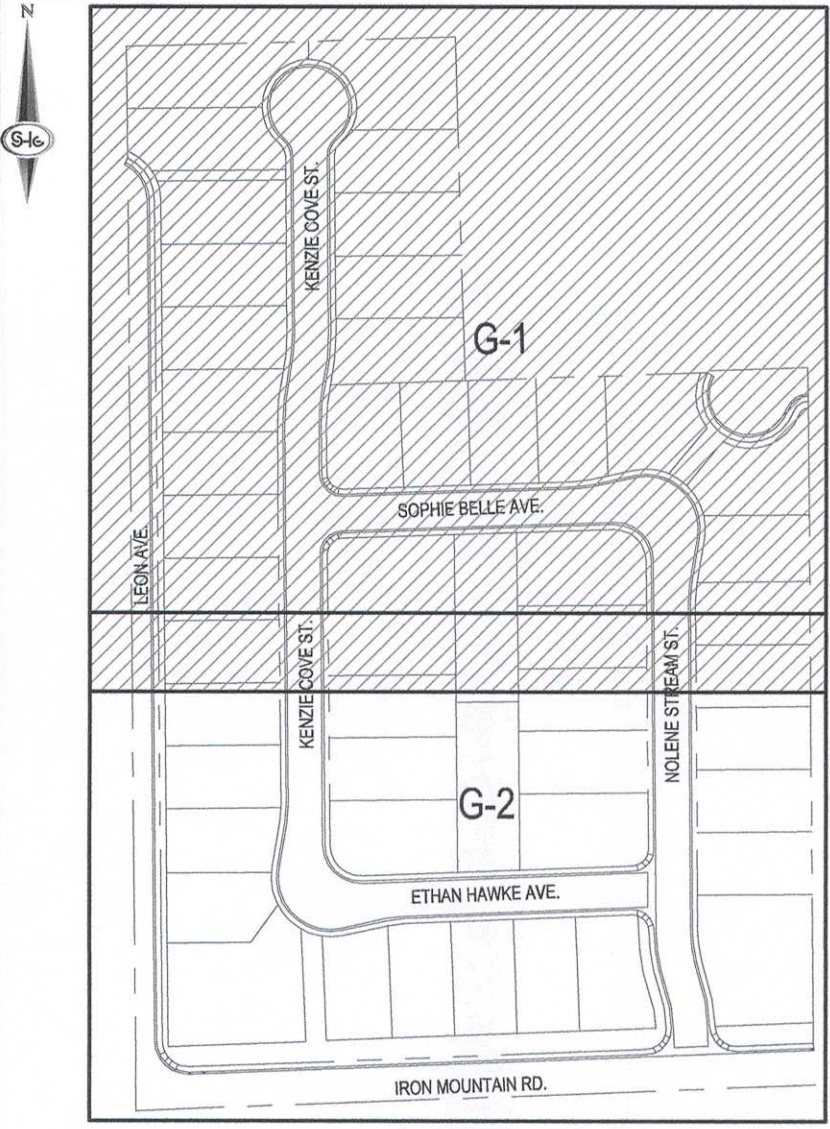
**STOS R60E**

DATE: 12/21/13  
DRAFTER: DEB  
DESIGNER: DEB  
CHECKED: DEB  
PROJECT NO.  
**RAH1305**

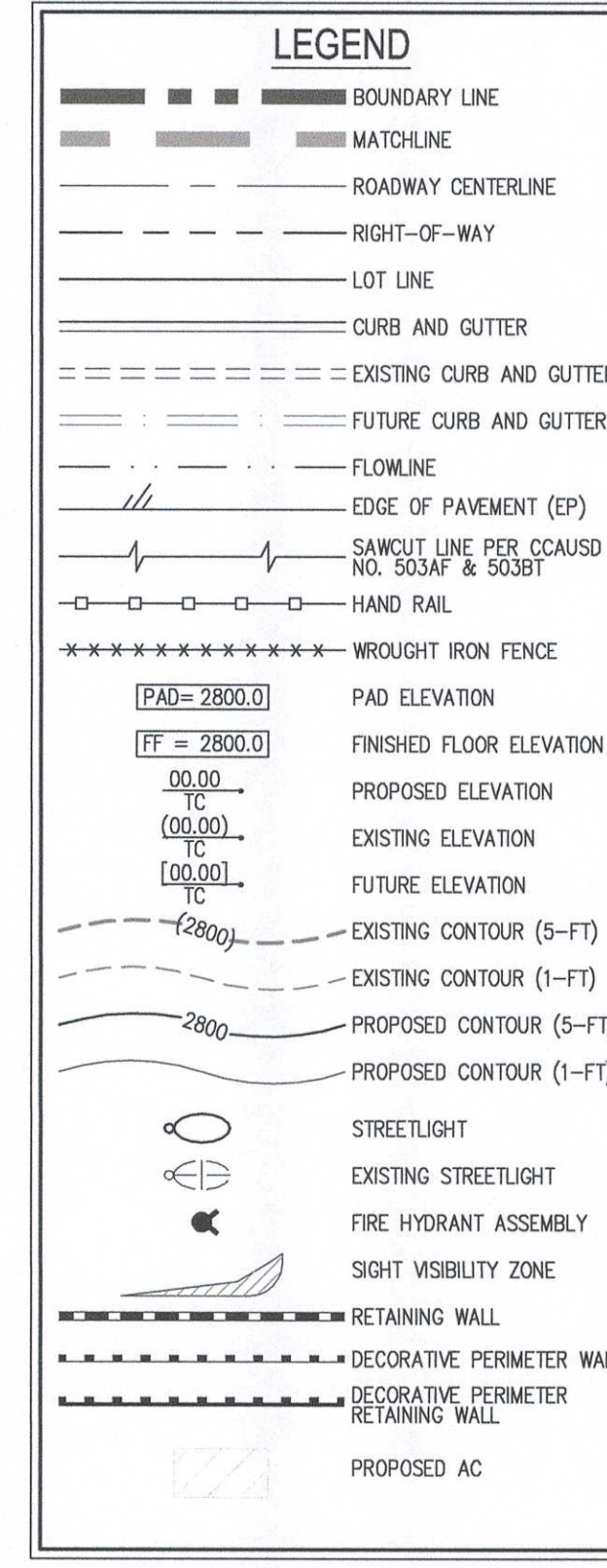




- GENERAL NOTES**
1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IRC 2008, SECTION 2304.11.2.2.
  2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
  3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
  4. MAXIMUM MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
  5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
  6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
  7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CLARK COUNTY BUILDING DEPARTMENT.
  8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLENISHING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
  9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.



- CONSTRUCTION NOTES**
1. CONSTRUCT 2.5" AC PAVEMENT WITH 6" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
  2. CONSTRUCT 4.5" AC PAVEMENT WITH 12" TYPE II AGGREGATE BASE OVER NATIVE MATERIAL PER SOILS REPORT.
  3. CONSTRUCT 1" TYPE CURB AND GUTTER PER CCAUSD NO. 216.
  4. CONSTRUCT 8" CROSS GUTTER PER CCAUSD NO. 228.
  5. CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234.
  6. SAWCUT AND MATCH EXISTING IMPROVEMENTS.
  7. FIELD VERIFY AND CONNECT TO EXISTING CURB, GUTTER AND SIDEWALK.
  8. INSTALL COLLAPSIBLE BOLLARDS PER DETAIL 28 ON SHEET D-2.
  9. TRUNCATED DOWNS OR EQUIVALENT PER CCAUSD NO. 235, CASE I. SEE P SHEETS FOR A AND B LENGTHS.
  10. CONSTRUCT 6" WIDE 3" CRUSHED FINES EQUESTRIAN TRAIL PER CLV TRAIL IMPROVEMENT GUIDELINE DWG. E-107.
  11. INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CCAUSD NO. 401 & 405.
  12. INSTALL 34" CLASS III SD (PUBLIC) STORM DRAIN (PUBLIC).
  13. INSTALL 60" TYPE III STORM DRAIN MANHOLE PER CCAUSD NO. 401 & 405.
  14. INSTALL 12" TYPE CM DROP INLET PER CCAUSD NO. 412.1 & 421. SEE PROFILE, SHEET D-1.
  15. INSTALL 18" RCP CLASS III SD (PUBLIC).
  16. INSTALL 24" RCP CLASS III SD (PUBLIC).
  17. NOT USED.
  18. INSTALL 12" PVC SD BLEEDER LINE (PUBLIC).
  19. INSTALL 48" RCP CLASS III SD (PUBLIC).
  20. INSTALL SIDEWALK DRAIN PER CCAUSD NO. 236.
  21. CONSTRUCT 6" FENCE PER CCAUSD NO. 425.S1.



**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 CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROPOSED LINE 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.

**FEMA FLOOD ZONE DESIGNATION**

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X', (OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD), PER FIRM PANELS 32003C1753F DATED NOVEMBER 16, 2011 AND PANEL 32003C1754E DATED SEPTEMBER 27, 2002.

**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 PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

**BENCHMARK**

BENCHMARK NUMBER: 6LV8012NNW

RIVET AND PLATE IN TOP OF CURB ON THE SOUTH SIDE OF IRON MOUNTAIN ROAD, 35'± SOUTHEAST OF THE PI OF LEON DRIVE AND IRON MOUNTAIN ROAD.

ELEVATION=2378.778 FEET, 725.053 METERS

N.A.S.D. 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARKS - 2008 ADJUSTMENT (UPDATED 5/5/2010)



Call before you dig

1-702-455-7511

CLARK COUNTY TRAFFIC OPERATIONS

1-702-432-5300

LAS VEGAS AREA

COMPUTERIZED TRAFFIC SYSTEM



**FLOOD CERTIFICATION**

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS-4612 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

DOUGLAS E. BERGSTROM, P.E. 17103

DATE

SOILS REPORT BY: ANGLE ENGINEERING

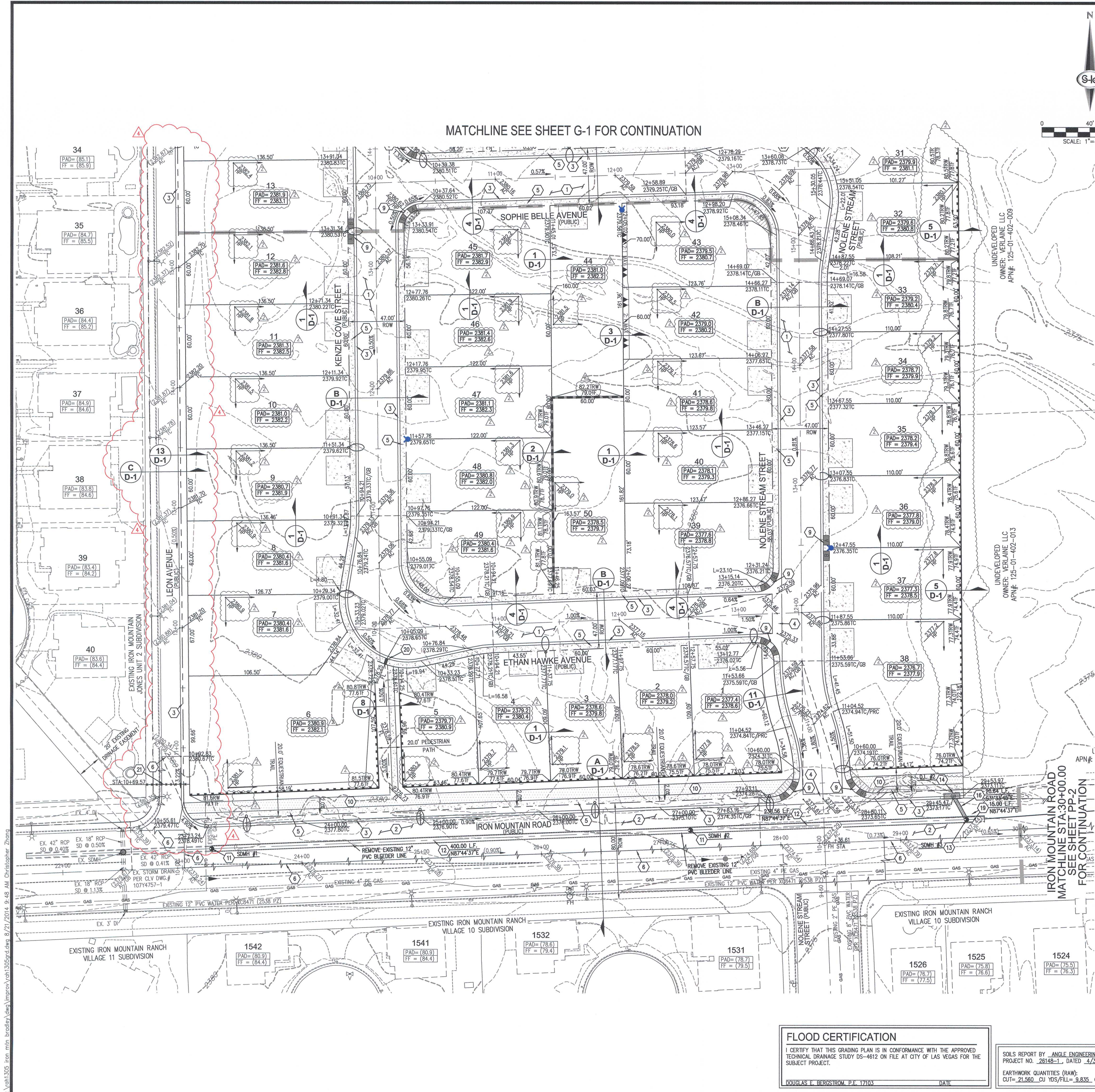
PROJECT NO. 26148-1, DATED 4/3/2013

EARTHWORK QUANTITIES (RAW):

CUT=21,560 CU YDS/FILL=9,835 CU YDS

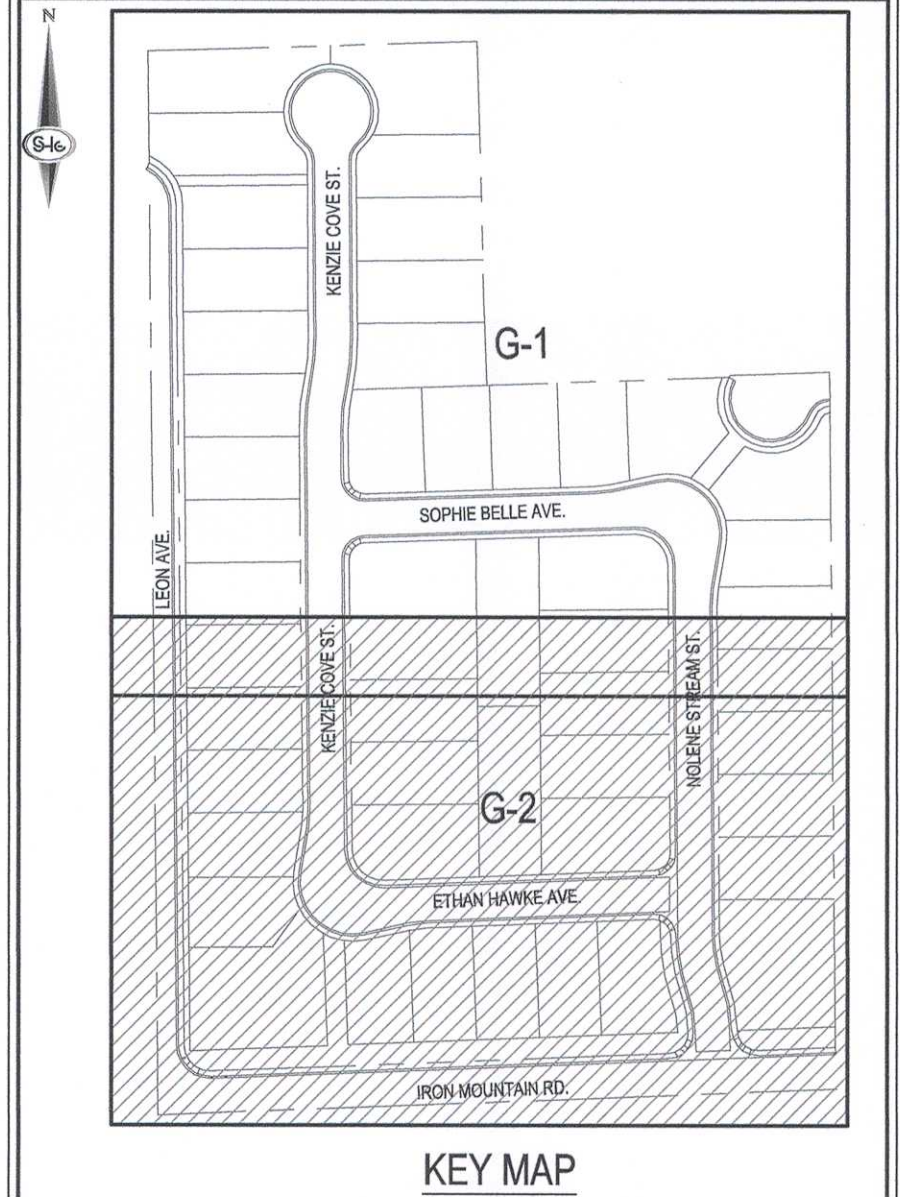
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**GENERAL NOTES**

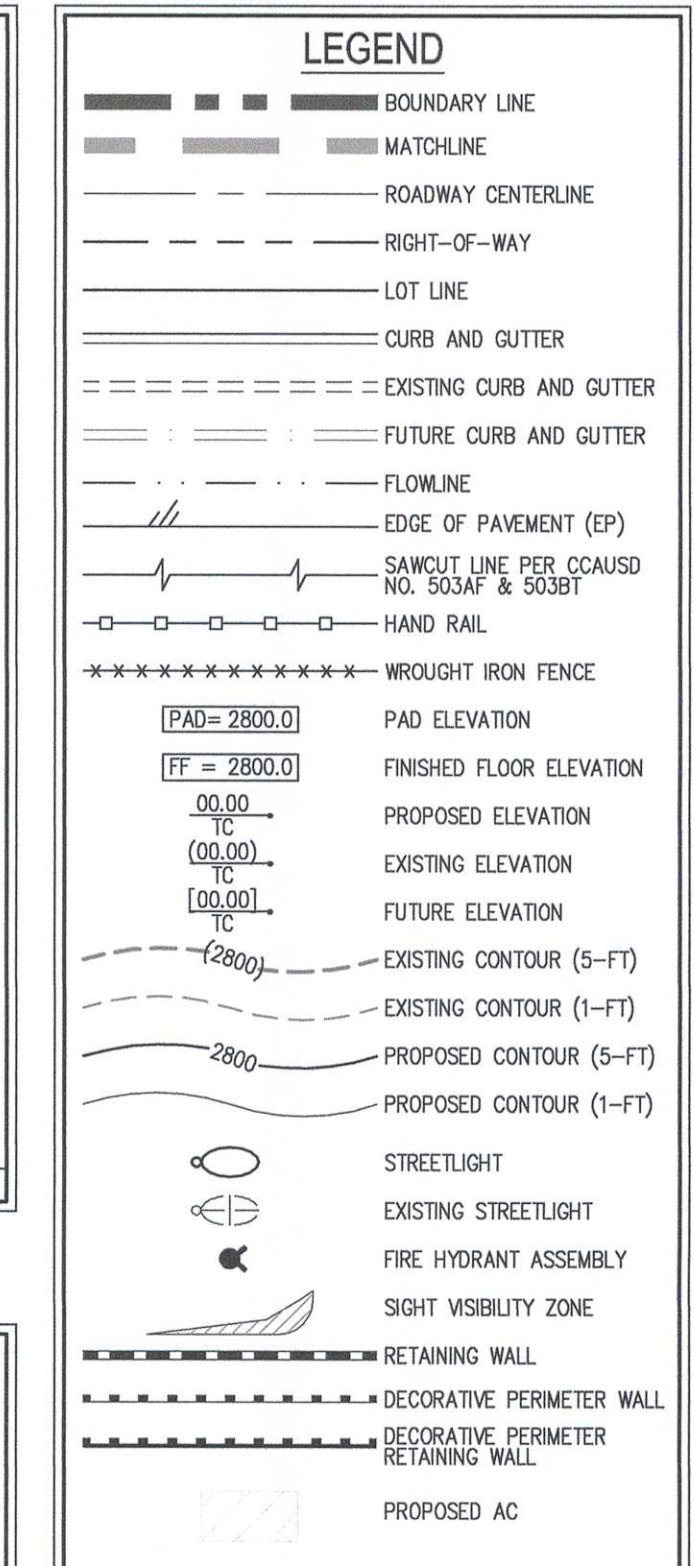
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**CONSTRUCTION NOTES**

1. CONSTRUCT 2.5" AC PAVEMENT WITH 6" TYPE II SOILS REPORT.
2. CONSTRUCT 4.5" AC PAVEMENT WITH 10" TYPE II SOILS REPORT.
3. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216.
4. CONSTRUCT 6" CROSS GUTTER PER CCAUSD NO. 228.
5. CONSTRUCT 5" WIDE SIDEWALK PER CCAUSD NO. 234.
6. SAWCUT AND MATCH EXISTING IMPROVEMENTS.
7. FIELD VERIFY AND CONNECT TO EXISTING CURB, GUTTER AND SIDEWALK.
8. INSTALL COLLAPSIBLE BOLLARDS PER DETAIL 28 ON SHEET D-2.
9. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DUMPS OR EQUIVALENT PER CCAUSD NO. 235, CASE 1. SEE P SHEETS FOR A AND B LENGTHS.
10. CONSTRUCT 6" WIDE 3" CRUSHED LINES EQUESTRIAN TRAIL PER CLV TRAIL IMPROVEMENT GUIDELINE DWG. 107.
11. INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CCAUSD NO. 401 & 405.
12. INSTALL 34" TYPE III ELLIPTICAL RCP TYPE III STORM DRAIN (PUBLIC).
13. INSTALL 60" TYPE III STORM DRAIN MANHOLE PER CCAUSD NO. 401 & 405.
14. INSTALL 12" 5" TYPE CM DROP INLET PER CCAUSD NO. 4121 & 421. SEE PROFILE, SHEET D-1.
15. INSTALL 18" RCP CLASS III SD (PUBLIC).
16. INSTALL 24" RCP CLASS III SD (PUBLIC).
17. NOT USED.
18. INSTALL 12" PVC SD BLEEDER LINE (PUBLIC).
19. INSTALL 48" RCP CLASS III SD (PUBLIC).
20. INSTALL SIDEWALK DRAIN PER CCAUSD NO. 236.
21. CONSTRUCT 6" FENCE PER CCAUSD NO. 425.51.

SEE SHEET C-2 FOR ABBREVIATIONS, LEGEND & QUANTITIES.



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2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SANCTUARY LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LINE 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.

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**BENCHMARK**

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ELEVATION=2378.778 FEET, 725.053 METERS

N.A.V.D. 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARKS - 2008 ADJUSTMENT (UPDATED 5/54/2010)

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

1-702-432-5300

LAS VEGAS ARE COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig

Avoid cutting underground utility lines. It's costly.

**811**

Call

1-800-227-2600

OR

CLARK COUNTY TRAFFIC OPERATIONS

1-702-455-7544

**FLOOD CERTIFICATION**

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS-4612 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

DOUGLAS E. BERGSTROM, P.E. 17103 DATE

SOILS REPORT BY: ANGLE ENGINEERING

PROJECT NO. 26148-1, DATED 4/3/2013

EARTHWORK QUANTITIES (RAW):

CUT=21,560 CU YDS/FILL=9,835 CU YDS

**SLATER HANIFAN GROUP**

**CONSULTING ENGINEERS & PLANNERS**

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

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

| NO. | DESCRIPTION                             | DATE    | BY | APP. |
|-----|-----------------------------------------|---------|----|------|
| 1   | REVISE APP. PAD AND FINISHED FLOOR ELEV | 4/29/14 | C2 |      |
| 2   | REVISE TRW AND F ELEV                   | 7/25/14 | C2 |      |
| 3   | REVISE LEON AND CONSTRUCTION NOTES      |         |    |      |

**RICHMOND AMERICAN HOMES**

**IRON MOUNTAIN/BRADLEY**

**GRADING PLAN**

DATE: 12/21/13

DRAFTER: DEB

DESIGNER: DEB

CHECKED: DEB

PROJECT NO. RAH1305

PROFESSIONAL ENGINEER - STATE OF NEVADA

DOUGLAS E. BERGSTROM

12/21/2014

17103

12/14/14

**G-2**

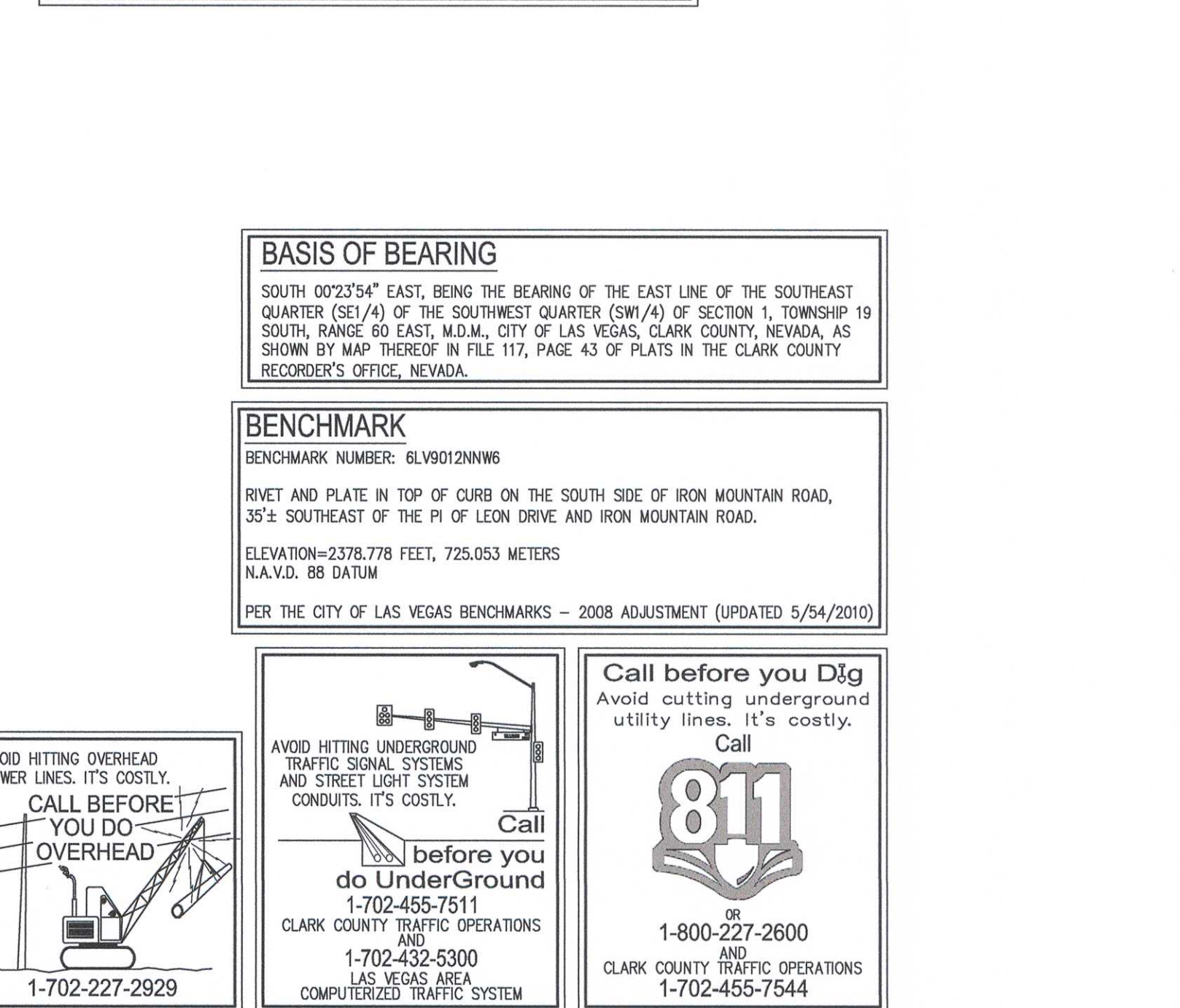
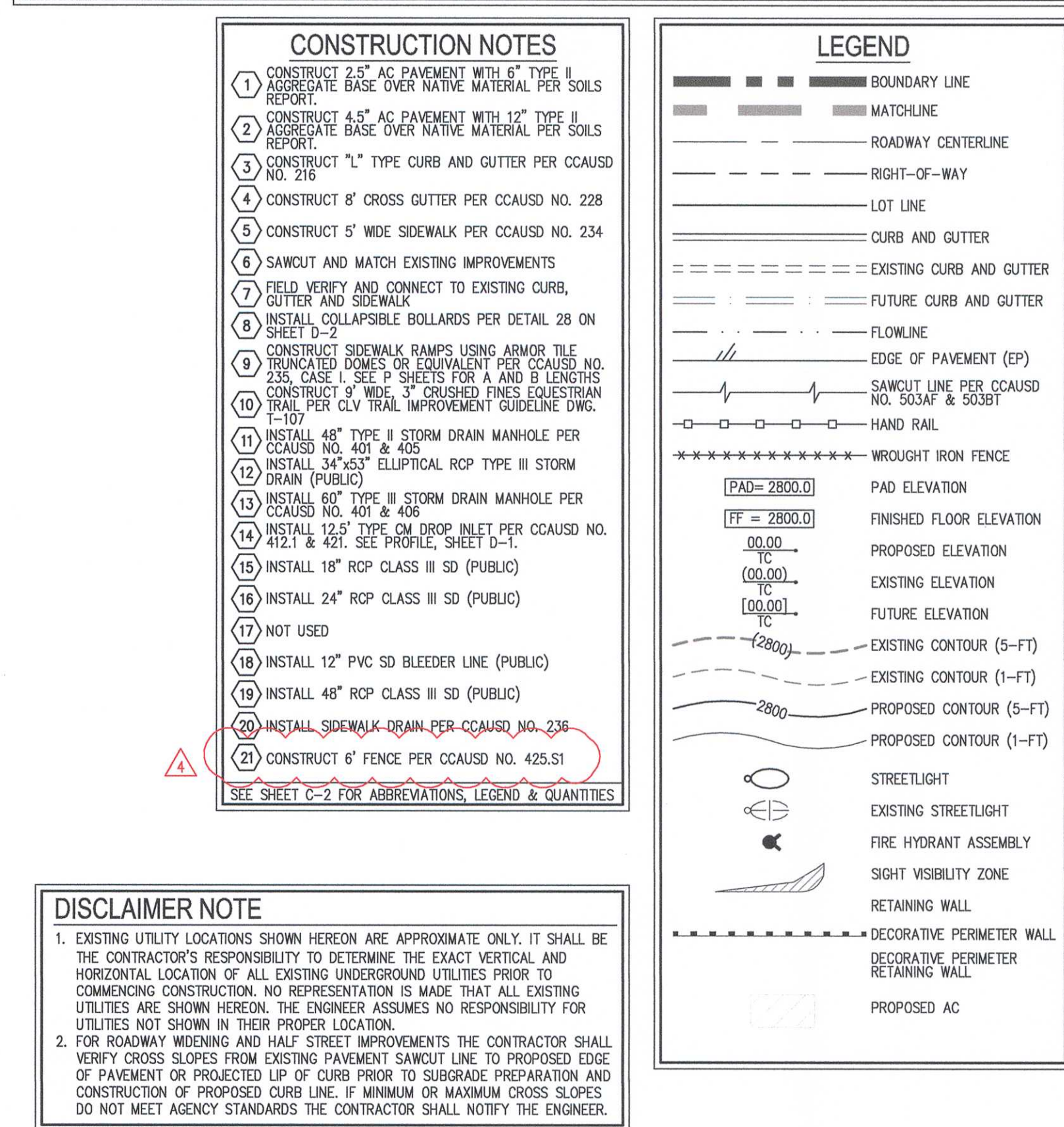
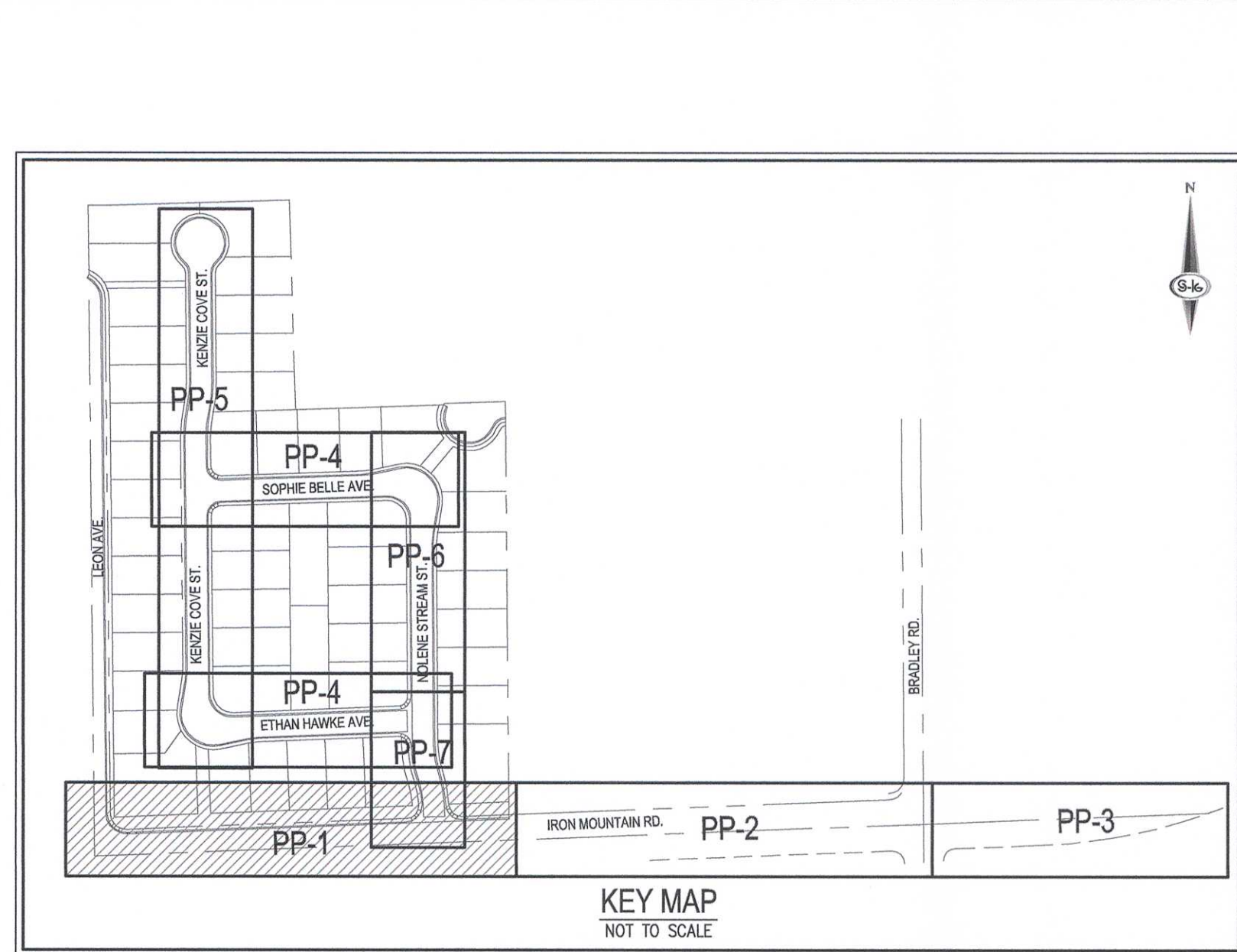
SHEET 4 OF 26

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