# ADDENDUM #1
# TO THE
# TECHNICAL DRAINAGE STUDY
# FOR
# ESTRELLA @ SUNSTONE

**Prepared for:**

**Woodside Homes of Nevada**
**4670 South Fort Apache Road, Suite 200**
**Las Vegas, NV 89147**
**Phone: (702) 889-7824**

**NOVEMBER 2021**

**PROJECT 4320.0014**

**RCI Engineering**
**500 South Rancho Drive, Suite 17**
**Las Vegas, NV 89106**
**www.rcinevada.com**

Print Form

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

# DRAINAGE STUDY INFORMATION FORM

Name of Development: Estrella @ Sunstone Date: September 2021

Location of Development: a) Descriptive (Cross Streets) North/South: Sun Park Drive

East/West: Sunstone Parkway

b) Section: 6 Township: 19 South Range: 60 East

c) APN : 125-06-610-001

Name of Owner: Woodside Homes of Nevada LLC

Telephone No.: 702-889-7824 Fax No.: E-Mail Address:

Address: 4670 South Fort Apache Road, Suite 200, Las Vegas, NV 89147

**Contact Person-Name:** Andrew E. Whittaker, P.E. **Telephone No.:** 702-453-0800

* **E-Mail Address:** awhittaker@rcinevada.com **Fax No.:** 702-453-0801

**Firm:** RCI Engineering

**Address:** 500 South Rancho Drive, Suite 17 Las Vegas, Nevada 89106

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 21.4 acres Being Developed/Disturbed: 21.4 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No
4. Proposed type of development (Residential, Commercial, Etc.): Residential
5. Approximate upstream land area which drains to the subject site: 0 acres
6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: TDS for Sunstone Phase 1 Infrastructure (DS 5135)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Storm drain in Sun Park Drive
8. Briefly describe your proposed schedule for the subject project: ASAP


Engineer's Seal

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

*New Required Field

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

Local Entity File No.

| Revision | Date |
|---|---|
| Addm #1 | 11/03/2021 |
| | |
| | |

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

RCI Engineering

November 3, 2021

**City of Las Vegas**
**Flood Control**
**333 N Rancho Dr.**
**Las Vegas, NV 89106**

**RE: Certification Letter for Paper and Digital Plans for the Addendum #1 to the Technical Drainage Study for Estrella @ Sunstone**

Mr. Sung,

This letter has been provided as certification that the paper version of the plans match the digital PDF plans on the CD submitted with the drainage study.

Sincerely,

RCI Engineering

Andrew E. Whittaker, P.E.

500 S Rancho Drive, Suite 17 - Las Vegas, NV 89106 - Main 702.453.0800
www.RCINEVADA.com

3. **The report states that XOF1 is considered developed in the existing condition but is labeled as existing undeveloped land on Figure 6. The approval of this study is subject to approval pending the construction of the upstream site.**

The existing condition was revised so that basin XOF1 more accurately represents the existing conditions. In the previous submittal, we assumed basin XOF1 was fully developed. In this addendum we basin XOF1 consists of partially developed commercial and partially undeveloped desert.

In the original submittal, basin XOF1, shown on Figure 6, consisted of the area within the existing Sunstone Parcel 3 Clubhouse and the area between the subject site and the Sunstone Parcel 3 Clubhouse. We assumed the entire site was developed as commercial and high density single family so we could size the offsite channel west of the site to adequately protect the site in the event most of the site was developed with exception of the channel. Per your request, we revised the study to provide a separate interim condition (see response to comments 4 and 5) to more accurately account for the flows that drain to the offsite interim channel so that the subject site is not dependent on the construction of the upstream site.

The grading plans were revised to remove the future finish floor elevations and future pad elevations for the future offsite lots on APN 125-06-211-017.

Figure 5, *Existing Conditions Map*, Figure 6, *Ultimate Conditions Map*, and Figure 7, *Interim Conditions Map* were revised accordingly and are provided in Appendix D.

4. **Provide calculations for the proposed rip rap pads used at roadway entrances between Phase 1 and Phase 2 improvements. This should include analysis to determine flows and DxV calculations for the offsite flow.**

Normal depth calculations are provided in Appendix B and the results are shown on a table on Figure 7, *Interim Conditions Map* in Appendix D. The velocity for all sections upstream of the proposed riprap are less than 5 fps (considered non-erosive) however we have chosen to include riprap at the end of the asphalt to provide for interim protection for the asphalt. Since the riprap is not required a calculation was not provided for that area. Riprap with a d50=6" and a thickness of 12" will be provided for interim protection.

5. **Provide an Interim Condition that considers the phasing proposed for the site.**

Per phone conversation with Jennifer Shinn, the main purpose of the Interim Condition was to provide a more accurate analysis of offsite basin XOF1 in the Interim Condition,

(see response to Comment 3); additionally, to provide riprap calculations for the proposed riprap at the ends of the onsite streets (see response to comment 4).

An interim condition is provided in the appendices of this addendum, (See Figure 7 in Appendix D, Hec-1 analysis in Appendix A, and hydraulic sections calculations in Appendix B).

Please note that the HEC-1 analysis for the existing condition was revised to be consistent with the interim condition.

6. **Figure 6: The labels on the map do not match the provided tables, the onsite basin is labeled XON1 on the map, but DON1 in the table.**

The basin label XON1 was revised to DON1 on Figure 6 to match the table.

7. **Figure 6: The Q100 for Inlet 1 is shown as 99 on the figure, and as 9 in the calculations.**

The table on Figure 6, as well as the table below, was revised to show the Q100 of 9 cfs for DI1.

| INLET SUMMARY ONSITE | | | | |
|---|---|---|---|---|
| DROP INLET | BASINS / CONC. PT. | Q100 | Q100 (INTERCEPT) | Q100 (BYPASS) (CFS) |
| DI1 | DI2 BYPASS + DI3 BYPASS+ DI4BYPASS + PR6 | 9 | 9 | 0 |
| DI2 | PR1 + PR3 + PR4 | 16 | 12 | 4 |
| DI3 | PR5 | 5 | 3 | 2 |
| DI4 | PR2 | 8 | 6 | 2 |

8. **Provide the Storm Drain Hydraulics Calculations for DI #2.**

The calculation for DI #2 was provided in the original TDS submittal and provided again in Appendix B of this addendum. The WSPG model includes the storm drain lateral to DI #2. Please note that the invert elevation at the system headworks (SH) was revised slightly to more accurately match the invert provided on the grading plans.

If you have any questions or require additional information please do not hesitate to contact us.

Sincerely,

RCI Engineering

Andrew E. Whittaker, P.E.

500 S. Rancho Drive, Suite 17 - Las Vegas, NV 89106
Main 702.453.0800 www.RCINEVADA.com Fax 702.453.0801

| CITY OF LAS VEGAS<br>INTER-OFFICE MEMORANDUM | | | | DATE:<br><br>October 25, 2021 |
|---|---|---|---|---|
| TO:<br>**Land Development Services**<br>Department of Building & Safety | | | | **FROM:**<br>Jennifer Shinn, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| **SUBJECT:** | Drainage Study for:<br>**Estrella at Sunstone** | | | **COPIES TO:**<br>RCI Engineering |
| **Cross Streets:** | Sun Park Drive and Sunstone Parkway | | | Woodside Homes of Nevada, LLC |
| **File Number:** | F:\Depot\DSMemos\DS5505A.doc | | | Bart Anderson, P.E., DevCo |
| **Parcel Number:** | 125-06-610-001 | | | CCRFCD |
| **Zoning Action:** | | | | |
| **FEMA Flood Zone** | YES | NO **X** | | |
| **Proposed Storm Drain** | YES **X** | NO | | |

| HISTORY | DATE RECEIVED | DATE REVIEWED | COMMENTS | REVIEW FEES | FEES PAID Payment Trn # |
|---|---|---|---|---|---|
| 1st Submittal | 10/4/2021 | 10/25/2021 | See Comments Below | $400.00 | 4481638: $400 |
| | | | **TOTAL FEES (LDDRS):** | **$400.00** | ---- |

**REMARKS:**

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

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

The following are comments pertaining to the subject site specific drainage study and grading plans:

1. Provide a copy of the zoning/planning conditions associated with this site with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
2. The site is adjacent to or crosses an existing or proposed Clark County Regional Flood Control District (CCRFCD) master planned facility. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.

   Please note that effective March 15, 2019, the CCRFCD adopted new requirements for drainage study concurrence submittal. Follow the link below for specific guidance.

   http://gustfront.ccrfcd.org/LandDev/LandDev.aspx
3. The report states that XOF1 is considered developed in the existing condition but is labeled as existing undeveloped land on Figure 6. The approval of this study is subject to approval pending the construction of the upstream site.
4. Provide calculations for the proposed rip rap pads used at roadway entrances between Phase 1 and Phase 2 improvements. This should include analysis to determine flows and DxV calculations for the offsite flow.

5. Provide an Interim Condition that considers the phasing proposed for the site.
6. **Figure 6:** The labels on the map do not match the provided tables, the onsite basin is labeled XON1 on the map, but DON1 in the table.
7. **Figure 6:** The Q 100 for Inlet 1 is shown as 99 on the figure, and as 9 in the calculations.
8. Provide the Storm Drain Hydraulics Calculations for DI #2.

**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**
HDR/JKS

T/R/S: T19S/R60E/S6
AREA G-06

# APPENDIX A – HYDROLOGIC CALCS

Existing Conditions

- Curve Number Calculations
- Standard Form 4
- HEC-1 Model

Ultimate Conditions

- Curve Number Calculations
- Standard Form 4
- HEC-1 Model

Interim Conditions

- Curve Number Calculations
- Standard Form 4
- HEC-1 Model

# EXISTING CONDITIONS
# HEC-1 ANALYSIS

**CN CALCULATIONS - EXISTING CONDITIONS**

| Basin | % SOIL TYPE | HYDRO | CN- DESERT SHRUB POOR CONDITION | | CN- COMMERCIAL | | CN- INDUSTRIAL | | CN - RNP/RURAL (20,000 SF) | | CN- Parks | | WEIGHTED CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | | % | | |
| XON1 | 100 | A | 80 | 63 | | 89 | | 81 | | 54 | | 68 | 50.4 |
| | | B | 5 | 77 | | 92 | | 88 | | 70 | | 79 | 3.9 |
| | | C | | 85 | | 94 | | 91 | | 80 | | 86 | 0.0 |
| | | D | 15 | 88 | | 95 | | 93 | | 85 | | 89 | 13.2 |
| | | | | | | | | | | | | | **67.5** |
| XOF1 | 100 | A | 45.6 | 63 | 34.4 | 89 | | 81 | | 54 | | 68 | 59.3 |
| | | B | 2.2 | 77 | 2.8 | 92 | | 88 | | 70 | | 79 | 4.3 |
| | | C | | 85 | | 94 | | 91 | | 80 | | 86 | 0.0 |
| | | D | 8.6 | 88 | 6.4 | 95 | | 93 | | 85 | | 89 | 13.6 |
| | | | | | | | | | | | | | **77.3** |

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## TIME OF CONCENTRATION

RCI
ENGINEERING

**ESTRELLA - SUNSTONE PARCEL C**
**Existing Conditions**

BY: AW
DATE: 10/29/21

| SUB-BASIN DATA | | | | | | INITIAL / OVERLAND TIME (Ti) | | | TRAVEL TIME (Tt) | | | | | Tc | Tc Check | Tlag | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIG: | DEV./EX. (D or E) | CN | K | AREA Ac | AREA Mi^2 | INITIAL LENGTH Feet | SLOPE % | Ti Min | TRAVEL LENGTH Feet | SLOPE % | V1 VELOCITY FPS | V2 VELOCITY FPS | Tt Min | Min | Min | Tlag= 0.6Tc/60 Hours | |
| (1) | | | (2) | (3) | | (4) | (5) | (6) | (7) | (8) | (9a) | (9b) | (10) | (13) | (14) | | |
| XON1 | E | 67.5 | 0.5010 | 20.01 | 0.0313 | 100 | 5.0 | 6.3 | 1300 | 2.3 | 2.2 | 4.5 | 6.7 | 13.0 | N/A | 0.130 | |
| XOF1 | D | 77.3 | 0.6304 | 20.90 | 0.0327 | 400 | 2.0 | 13.4 | 1800 | 1.6 | 2.5 | 3.8 | 9.0 | 22.4 | 22.2 | 0.222 | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

Tc = Ti + Tt  Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39
Tc Check (Developed) = L/180+10

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

Existing V1 = 14.8*(S/100)^1/2  Developed V1 = 20.2*(S/100)^1/2
Existing V2 = 29.4*(S/100)^1/2  Developed V2 = 30.6*(S/100)^1/2
Minimum Tc (EX) = 10 Min per Section 602  Minimum Tc (DEV) = 5 Min per Section 602.1

**REFERENCE :**

**STANDARD FORM 4**

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN   1998              *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   29OCT21  TIME  14:26:06   *
 *                                       *
 *****************************************
```

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

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

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

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



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

              *DIAGRAM
    1         ID
    2         ID     ESTRELLA - SUNSTONE PARCEL C
    3         ID     EXISTING CONDITION MODEL
    4         ID
    5         ID
    6         ID    INPUT FILE =ESTRELLA-EX.DAT
    7         ID    DESIGN STORM = 100-YEAR 6-HR STORM
    8         ID    STORM DISTRIBUTION = SDN #3
    9         ID
   10         ID    JR CARD RATIOS REPRESENT 100-YEAR (1.0)
   11         ID                              10- YEAR (0.57)
   12         ID
   13         ID
   14         IT       5       0       0     300
   15         IO       5       0       0
   16         IN       5       0       0
   17         JR    PREC     1.0    0.57
              *

   18         KK    XOF1
   19         KM    BASIN PARTIALLY DEVELOPED COMMERCIAL AND UNDEVELOPED DESERT
   20         BA   .0327
   21         PB    2.77
   22         PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
   23         PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
   24         PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
   25         PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   26         PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   27         PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
   28         PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
   29         PC   0.998   0.999       1
   30         LS       0    77.3
   31         UD   0.222
              *

   32         KK    XON1
   33         KM    ONSITE BASIN UNDEVELOPED DESERT
   34         BA   .0313
   35         LS       0    67.5
   36         UD   0.130
              *
```

```
            37           KK     CP1
            38           KM   COMBINE OFFSITE BASIN XOF1 AND ONSITE BASIN XON1
            39           HC       2
                         *
            40           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

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

    18        XOF1
                .
                .
    32          .        XON1
                .          .
                .          .
    37         CP1.............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                  ****************************************
*                                      *                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                  *    U.S. ARMY CORPS OF ENGINEERS      *
*               JUN   1998             *                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1               *                  *         609 SECOND STREET            *
*                                      *                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   29OCT21  TIME  14:26:06  *                  *           (916) 756-1104             *
*                                      *                  *                                      *
****************************************                  ****************************************
```

ESTRELLA - SUNSTONE PARCEL C
EXISTING CONDITION MODEL

INPUT FILE =ESTRELLA-EX.DAT
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3

JR CARD RATIOS REPRESENT 100-YEAR (1.0)
10- YEAR (0.57)

```
  15 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 | RATIO 2 |
|---|---|---|---|---|---|---|
| | | | | | 1.00 | .57 |
| HYDROGRAPH AT | | | | | | |
| + | XOF1 | .03 | 1 | FLOW | 23. | 5. |
| | | | | TIME | 3.67 | 3.75 |
| HYDROGRAPH AT | | | | | | |
| + | XON1 | .03 | 1 | FLOW | 13. | 1. |
| | | | | TIME | 3.58 | 3.75 |
| 2 COMBINED AT | | | | | | |
| + | CP1 | .06 | 1 | FLOW | 34. | 7. |
| | | | | TIME | 3.67 | 3.75 |

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

# ULTIMATE CONDITIONS
# HEC-1 ANALYSIS

**CN CALCULATIONS - ULTIMATE CONDITIONS**

| | | | CN- DESERT SHRUB POOR CONDITION | | CN- COMMERCIAL | | CN- INDUSTRIAL | | CN - TOWNHOUSES / 6,000 SF | | CN- Parks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basin | % SOIL TYPE | HYDRO | % | | % | | % | | % | | % | | WEIGHTED CN |
| DON1 | 100 | A | | 63 | | 89 | | 81 | 80 | 80 | | 68 | 64.0 |
| | | B | | 77 | | 92 | | 88 | 5 | 87 | | 79 | 4.4 |
| | | C | | 85 | | 94 | | 91 | | 90 | | 86 | 0.0 |
| | | D | | 88 | | 95 | | 93 | 15 | 92 | | 89 | 13.8 |
| | | | | | | | | | | | | | **82.2** |
| DOF1 | 100 | A | | 63 | 80 | 89 | | 81 | | 54 | | 68 | 71.2 |
| | | B | | 77 | 5 | 92 | | 88 | | 70 | | 79 | 4.6 |
| | | C | | 85 | | 94 | | 91 | | 80 | | 86 | 0.0 |
| | | D | | 88 | 15 | 95 | | 93 | | 85 | | 89 | 14.3 |
| | | | | | | | | | | | | | **90.1** |

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## TIME OF CONCENTRATION

RCI
ENGINEERING

**ESTRELLA - SUNSTONE PARCEL C**
**Ultimate Conditions**

BY: AW
DATE: 10/29/21

| SUB-BASIN DATA | | | | | | INITIAL / OVERLAND TIME (Ti) | | | TRAVEL TIME (Tt) | | | | | Tc | Tc Check | Tlag | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIG: | DEV./EX. (D or E) | CN | K | AREA Ac | AREA Mi^2 | INITIAL LENGTH Feet | SLOPE % | Ti Min | TRAVEL LENGTH Feet | SLOPE % | V1 VELOCITY FPS | V2 VELOCITY FPS | Tt Min | Min | Min | Tlag= 0.6Tc/60 Hours | |
| (1) | | | (2) | (3) | | (4) | (5) | (6) | (7) | (8) | (9a) | (9b) | (10) | (13) | (14) | | |
| DON1 | D | 82.2 | 0.6950 | 20.01 | 0.0313 | 190 | 1.1 | 9.7 | 1850 | 1.7 | 2.7 | 4.0 | 8.7 | 18.4 | 21.3 | **0.184** | |
| DOF1 | D | 90.1 | 0.7993 | 20.90 | 0.0327 | 400 | 2.0 | 8.6 | 1800 | 1.6 | 2.5 | 3.8 | 9.0 | 17.6 | 22.2 | **0.176** | |
| | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

Tc = Ti + Tt  Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39
Tc Check (Developed) = L/180+10

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

Existing V1 = 14.8*(S/100)^1/2  Developed V1 = 20.2*(S/100)^1/2
Existing V2 = 29.4*(S/100)^1/2  Developed V2 = 30.6*(S/100)^1/2
Minimum Tc (EX) = 10 Min per Section 602  Minimum Tc (DEV) = 5 Min per Section 602.1

**REFERENCE :**

**STANDARD FORM 4**

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   29OCT21  TIME  14:30:42   *
*                                       *
*****************************************
```

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

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

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

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



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

                    *DIAGRAM
              1     ID
              2     ID     ESTRELLA - SUNSTONE PARCEL C
              3     ID     ULTIMATE CONDITION MODEL
              4     ID
              5     ID
              6     ID    INPUT FILE =ESTRELLA-ULT.DAT
              7     ID    DESIGN STORM = 100-YEAR 6-HR STORM
              8     ID    STORM DISTRIBUTION = SDN #3
              9     ID
             10     ID    JR CARD RATIOS REPRESENT 100-YEAR (1.0)
             11     ID                              10- YEAR (0.57)
             12     ID
             13     ID
             14     IT       5       0       0     300
             15     IO       5       0       0
             16     IN       5       0       0
             17     JR    PREC     1.0    0.57
                    *

             18     KK    DOF1
             19     KM    FUTURE FULLY DEVELOPED COMMERCIAL/HIGH DENSITY RESIDENTIAL
             20     BA   .0327
             21     PB    2.77
             22     PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
             23     PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
             24     PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
             25     PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
             26     PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
             27     PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
             28     PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
             29     PC   0.998   0.999       1
             30     LS       0    90.1
             31     UD   0.176
                    *

             32     KK    DON1
             33     KM    DEVELOPED CONDITION SUBBASIN XON1
             34     BA   .0313
             35     LS       0    82.2
             36     UD   0.184
                    *
             37     ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

```
 18        DOF1
             .
             .
 32          .        DON1
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   29OCT21  TIME  14:30:42   *
*                                       *
*****************************************
```

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

ESTRELLA - SUNSTONE PARCEL C
ULTIMATE CONDITION MODEL

INPUT FILE =ESTRELLA-ULT.DAT
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3

JR CARD RATIOS REPRESENT 100-YEAR (1.0)
10- YEAR (0.57)

```
 15 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

RATIOS APPLIED TO PRECIPITATION

| OPERATION | STATION | AREA | PLAN | | RATIO 1 | RATIO 2 |
|---|---|---|---|---|---|---|
| | | | | | 1.00 | .57 |
| HYDROGRAPH AT | | | | | | |
| + | DOF1 | .03 | 1 | FLOW | 46. | 20. |
| | | | | TIME | 3.58 | 3.58 |
| HYDROGRAPH AT | | | | | | |
| + | DON1 | .03 | 1 | FLOW | 30. | 10. |
| | | | | TIME | 3.58 | 3.67 |

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

# INTERIM CONDITIONS
# HEC-1 ANALYSIS

**CN CALCULATIONS - INTERIM CONDITIONS**

| | | | CN- DESERT | | CN- COMMERCIAL | | CN- INDUSTRIAL | | CN - TOWNHOUSES | | CN- Parks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basin | % SOIL TYPE | HYDRO | % | | % | | % | | % | | % | | WEIGHTED CN |
| DON1 | 100 | A | | 63 | | 89 | | 81 | 80 | 80 | | 68 | 64.0 |
| | | B | | 77 | | 92 | | 88 | 5 | 87 | | 79 | 4.4 |
| | | C | | 85 | | 94 | | 91 | | 90 | | 86 | 0.0 |
| | | D | | 88 | | 95 | | 93 | 15 | 92 | | 89 | 13.8 |
| | | | | | | | | | | | | | **82.2** |
| XOF1 | 100 | A | 45.6 | 63 | 34.4 | 89 | | 81 | | 54 | | 68 | 59.3 |
| | | B | 2.2 | 77 | 2.8 | 92 | | 88 | | 70 | | 79 | 4.3 |
| | | C | | 85 | | 94 | | 91 | | 80 | | 86 | 0.0 |
| | | D | 8.6 | 88 | 6.4 | 95 | | 93 | | 85 | | 89 | 13.6 |
| | | | | | | | | | | | | | **77.3** |

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## TIME OF CONCENTRATION

RCI
ENGINEERING

**ESTRELLA - SUNSTONE PARCEL C**
**Interim Conditions**

BY: AW
DATE: 10/29/21

| SUB-BASIN DATA | | | | | | INITIAL / OVERLAND TIME (Ti) | | | TRAVEL TIME (Tt) | | | | | Tc | Tc Check | Tlag | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIG: | DEV./EX. (D or E) | CN | K | AREA Ac | AREA Mi^2 | INITIAL LENGTH Feet | SLOPE % | Ti Min | TRAVEL LENGTH Feet | SLOPE % | V1 VELOCITY FPS | V2 VELOCITY FPS | Tt Min | Min | Min | Tlag= 0.6Tc/60 Hours | |
| (1) | | | (2) | (3) | | (4) | (5) | (6) | (7) | (8) | (9a) | (9b) | (10) | (13) | (14) | | |
| DON1 | D | 82.2 | 0.6950 | 20.01 | 0.0313 | 190 | 1.1 | 9.7 | 1850 | 1.7 | 2.7 | 4.0 | 8.7 | 18.4 | 21.3 | 0.184 | |
| XOF1 | D | 77.3 | 0.6304 | 20.90 | 0.0327 | 400 | 2.0 | 13.4 | 1800 | 1.6 | 2.5 | 3.8 | 9.0 | 22.4 | 22.2 | 0.222 | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

Tc = Ti + Tt  Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39
Tc Check (Developed) = L/180+10

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

Existing V1 = 14.8*(S/100)^1/2  Developed V1 = 20.2*(S/100)^1/2
Existing V2 = 29.4*(S/100)^1/2  Developed V2 = 30.6*(S/100)^1/2
Minimum Tc (EX) = 10 Min per Section 602  Minimum Tc (DEV) = 5 Min per Section 602.1

**REFERENCE :**

**STANDARD FORM 4**

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*             VERSION 4.1               *
*                                       *
*  RUN DATE   29OCT21  TIME  14:28:43   *
*                                       *
*****************************************
```

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

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

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

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



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

              *DIAGRAM
    1         ID
    2         ID     ESTRELLA - SUNSTONE PARCEL C
    3         ID     INTERIM CONDITION MODEL
    4         ID
    5         ID
    6         ID    INPUT FILE =ESTRELLA-INT.DAT
    7         ID    DESIGN STORM = 100-YEAR 6-HR STORM
    8         ID    STORM DISTRIBUTION = SDN #3
    9         ID
   10         ID    JR CARD RATIOS REPRESENT 100-YEAR (1.0)
   11         ID                              10- YEAR (0.57)
   12         ID
   13         ID
   14         IT       5       0       0     300
   15         IO       5       0       0
   16         IN       5       0       0
   17         JR    PREC     1.0    0.57
              *

   18         KK    XOF1
   19         KM    BASIN PARTIALLY DEVELOPED COMMERCIAL AND UNDEVELOPED DESERT
   20         BA   .0327
   21         PB    2.77
   22         PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
   23         PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
   24         PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
   25         PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   26         PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   27         PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
   28         PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
   29         PC   0.998   0.999       1
   30         LS       0    77.3
   31         UD   0.222
              *

   32         KK    DON1
   33         KM    DEVELOPED CONDITION SUBBASIN XON1
   34         BA   .0313
   35         LS       0    82.2
   36         UD   0.184
              *
   37         ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    18        XOF1
                .
                .
    32          .        DON1
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   29OCT21  TIME  14:28:43   *
*                                       *
*****************************************
```

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

ESTRELLA - SUNSTONE PARCEL C
INTERIM CONDITION MODEL

INPUT FILE =ESTRELLA-INT.DAT
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3

JR CARD RATIOS REPRESENT 100-YEAR (1.0)
10- YEAR (0.57)

```
   15 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

RATIOS APPLIED TO PRECIPITATION

| OPERATION | STATION | AREA | PLAN | | RATIO 1 | RATIO 2 |
|---|---|---|---|---|---|---|
| | | | | | 1.00 | .57 |
| HYDROGRAPH AT | | | | | | |
| + | XOF1 | .03 | 1 | FLOW | 23. | 5. |
| | | | | TIME | 3.67 | 3.75 |
| HYDROGRAPH AT | | | | | | |
| + | DON1 | .03 | 1 | FLOW | 30. | 10. |
| | | | | TIME | 3.58 | 3.67 |

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

# APPENDIX B – HYDRAULIC CALCS

Hydraulic Street Cross Sections

Drop Inlet Calculations

WSPG Models

# Worksheet for Irregular Section - 1I

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | |
|---|---|
| Channel Slope | 4.49 % |
| Discharge | 5.00 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.0 | 0.38 |
| 0+01.5 | 0.00 |
| 0+02.5 | 0.08 |
| 0+02.5 | 0.12 |
| 0+18.0 | 0.42 |
| 0+33.0 | 0.12 |
| 0+33.0 | 0.08 |
| 0+34.5 | 0.00 |
| 0+36.0 | 0.38 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.0, 0.38) | (0+02.5, 0.12) | 0.030 |
| (0+02.5, 0.12) | (0+33.0, 0.12) | 0.030 |
| (0+33.0, 0.12) | (0+36.0, 0.38) | 0.030 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | |
|---|---|
| Normal Depth | 0.28 ft |
| Elevation Range | 0.0 to 0.4 ft |
| Flow Area | 2.2 ft² |
| Wetted Perimeter | 20.9 ft |
| Hydraulic Radius | 0.10 ft |
| Top Width | 20.73 ft |
| Normal Depth | 0.28 ft |
| Critical Depth | 0.30 ft |
| Critical Slope | 2.73 % |
| Velocity | 2.31 ft/s |
| Velocity Head | 0.08 ft |

# Worksheet for Irregular Section - 1I

| Results | |
|---|---|
| Specific Energy | 0.36 ft |
| Froude Number | 1.262 |
| Flow Type | Supercritical |

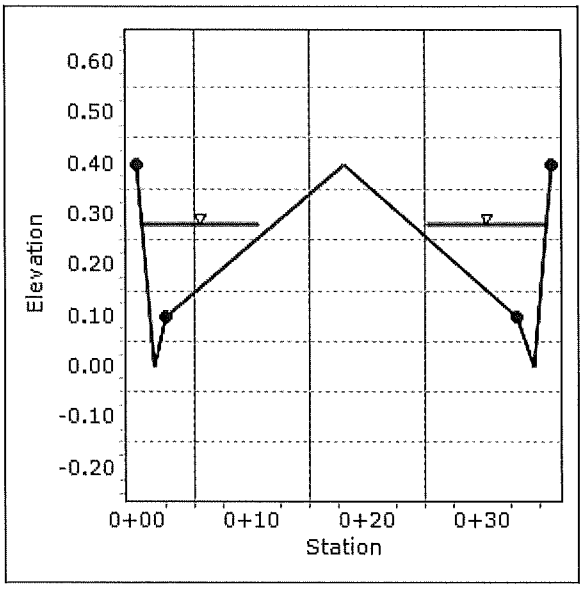
| GVF Input Data | |
|---|---|
| Downstream Depth | 0.00 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.00 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.28 ft |
| Critical Depth | 0.30 ft |
| Channel Slope | 4.49 % |
| Critical Slope | 2.73 % |

# Cross Section for Irregular Section - 1I

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 4.49 % |
| Normal Depth | 0.28 ft |
| Discharge | 5.00 cfs |



# Worksheet for Irregular Section - 2I

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 2.20 % |
| Discharge | 14.00 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.0 | 0.38 |
| 0+01.5 | 0.00 |
| 0+02.5 | 0.08 |
| 0+02.5 | 0.12 |
| 0+18.0 | 0.42 |
| 0+33.0 | 0.12 |
| 0+33.0 | 0.08 |
| 0+34.5 | 0.00 |
| 0+36.0 | 0.38 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.0, 0.38) | (0+02.5, 0.12) | 0.030 |
| (0+02.5, 0.12) | (0+33.0, 0.12) | 0.030 |
| (0+33.0, 0.12) | (0+36.0, 0.38) | 0.030 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.42 ft |
| Elevation Range | 0.0 to 0.4 ft |
| Flow Area | 6.2 ft² |
| Wetted Perimeter | 36.2 ft |
| Hydraulic Radius | 0.17 ft |
| Top Width | 35.91 ft |
| Normal Depth | 0.42 ft |
| Critical Depth | 0.41 ft |
| Critical Slope | 2.39 % |
| Velocity | 2.26 ft/s |
| Velocity Head | 0.08 ft |

# Worksheet for Irregular Section - 2I

| Results | |
|---|---|
| Specific Energy | 0.50 ft |
| Froude Number | 0.962 |
| Flow Type | Subcritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.00 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

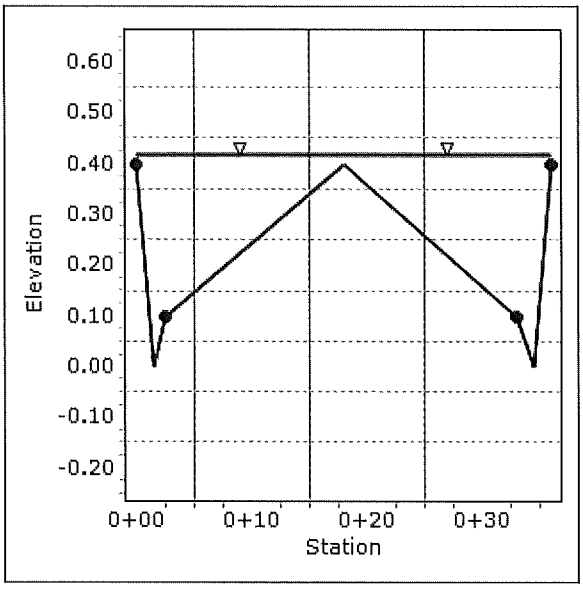
| GVF Output Data | |
|---|---|
| Upstream Depth | 0.00 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.42 ft |
| Critical Depth | 0.41 ft |
| Channel Slope | 2.20 % |
| Critical Slope | 2.39 % |

| Messages | |
|---|---|
| Messages | Water Surface Elevation exceeds lowest end station by 0.039142127 7891224ft. Flow is divided. |

# Cross Section for Irregular Section - 2I

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 2.20 % |
| Normal Depth | 0.42 ft |
| Discharge | 14.00 cfs |



# Worksheet for Irregular Section - 3I

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | |
|---|---|
| Channel Slope | 5.86 % |
| Discharge | 4.00 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.0 | 0.38 |
| 0+01.5 | 0.00 |
| 0+02.5 | 0.08 |
| 0+02.5 | 0.12 |
| 0+18.0 | 0.42 |
| 0+33.0 | 0.12 |
| 0+33.0 | 0.08 |
| 0+34.5 | 0.00 |
| 0+36.0 | 0.38 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.0, 0.38) | (0+02.5, 0.12) | 0.013 |
| (0+02.5, 0.12) | (0+33.0, 0.12) | 0.016 |
| (0+33.0, 0.12) | (0+36.0, 0.38) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | |
|---|---|
| Normal Depth | 0.21 ft |
| Elevation Range | 0.0 to 0.4 ft |
| Flow Area | 1.0 ft² |
| Wetted Perimeter | 13.0 ft |
| Hydraulic Radius | 0.07 ft |
| Top Width | 12.82 ft |
| Normal Depth | 0.21 ft |
| Critical Depth | 0.28 ft |
| Critical Slope | 0.71 % |
| Velocity | 4.20 ft/s |
| Velocity Head | 0.27 ft |

# Worksheet for Irregular Section - 3I

| Results | |
|---|---|
| Specific Energy | 0.48 ft |
| Froude Number | 2.715 |
| Flow Type | Supercritical |

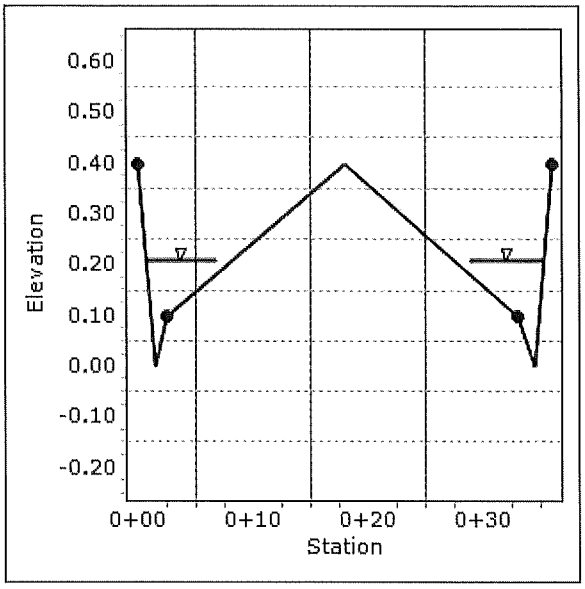
| GVF Input Data | |
|---|---|
| Downstream Depth | 0.00 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.00 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.21 ft |
| Critical Depth | 0.28 ft |
| Channel Slope | 5.86 % |
| Critical Slope | 0.71 % |

# Cross Section for Irregular Section - 3I

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 5.86 % |
| Normal Depth | 0.21 ft |
| Discharge | 4.00 cfs |



# Worksheet for Irregular Section - 7

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 2.40 % |
| Discharge | 9.00 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.0 | 0.38 |
| 0+01.5 | 0.00 |
| 0+02.5 | 0.08 |
| 0+02.5 | 0.12 |
| 0+18.0 | 0.42 |
| 0+33.5 | 0.12 |
| 0+33.5 | 0.08 |
| 0+34.5 | 0.00 |
| 0+36.0 | 0.38 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.0, 0.38) | (0+02.5, 0.12) | 0.013 |
| (0+02.5, 0.12) | (0+33.5, 0.12) | 0.016 |
| (0+33.5, 0.12) | (0+36.0, 0.38) | 0.013 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.30 ft |
| Elevation Range | 0.0 to 0.4 ft |
| Flow Area | 2.6 ft² |
| Wetted Perimeter | 23.5 ft |
| Hydraulic Radius | 0.11 ft |
| Top Width | 23.29 ft |
| Normal Depth | 0.30 ft |
| Critical Depth | 0.36 ft |
| Critical Slope | 0.68 % |
| Velocity | 3.44 ft/s |
| Velocity Head | 0.18 ft |

# Worksheet for Irregular Section - 7

| Results | |
|---|---|
| Specific Energy | 0.49 ft |
| Froude Number | 1.810 |
| Flow Type | Supercritical |

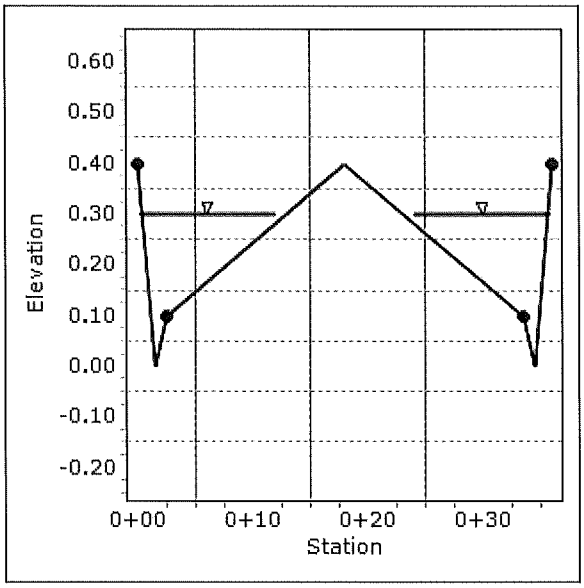
| GVF Input Data | |
|---|---|
| Downstream Depth | 0.00 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.00 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.30 ft |
| Critical Depth | 0.36 ft |
| Channel Slope | 2.40 % |
| Critical Slope | 0.68 % |

# Cross Section for Irregular Section - 7

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 2.40 % |
| Normal Depth | 0.30 ft |
| Discharge | 9.00 cfs |



# Worksheet for Triangular Channel Section- 20

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Roughness Coefficient | 0.030 |
| Channel Slope | 1.00 % |
| Left Side Slope | 3.000 H:V |
| Right Side Slope | 3.000 H:V |
| Discharge | 4.00 cfs |

| Results | |
|---|---|
| Normal Depth | 0.74 ft |
| Flow Area | 1.6 ft² |
| Wetted Perimeter | 4.7 ft |
| Hydraulic Radius | 0.35 ft |
| Top Width | 4.42 ft |
| Critical Depth | 0.64 ft |
| Critical Slope | 2.05 % |
| Velocity | 2.46 ft/s |
| Velocity Head | 0.09 ft |
| Specific Energy | 0.83 ft |
| Froude Number | 0.714 |
| Flow Type | Subcritical |

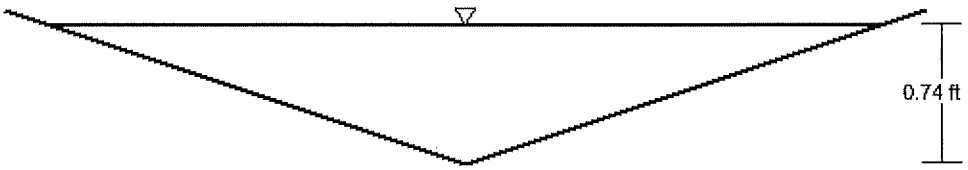
| GVF Input Data | |
|---|---|
| Downstream Depth | 0.00 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

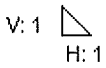
| GVF Output Data | |
|---|---|
| Upstream Depth | 0.00 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | 0.00 ft/s |
| Upstream Velocity | 0.00 ft/s |
| Normal Depth | 0.74 ft |
| Critical Depth | 0.64 ft |
| Channel Slope | 1.00 % |
| Critical Slope | 2.05 % |

# Cross Section for Triangular Channel Section- 20

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Roughness Coefficient | 0.030 |
| Channel Slope | 1.00 % |
| Normal Depth | 0.74 ft |
| Left Side Slope | 3.000 H:V |
| Right Side Slope | 3.000 H:V |
| Discharge | 4.00 cfs |



# Worksheet for Trapezoidal Channel - 21

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Roughness Coefficient | 0.030 |
| Channel Slope | 1.04 % |
| Left Side Slope | 2.000 H:V |
| Right Side Slope | 2.000 H:V |
| Bottom Width | 8.00 ft |
| Discharge | 23.00 cfs |

| Results | |
|---|---|
| Normal Depth | 0.69 ft |
| Flow Area | 6.5 ft² |
| Wetted Perimeter | 11.1 ft |
| Hydraulic Radius | 0.59 ft |
| Top Width | 10.77 ft |
| Critical Depth | 0.60 ft |
| Critical Slope | 1.68 % |
| Velocity | 3.54 ft/s |
| Velocity Head | 0.19 ft |
| Specific Energy | 0.89 ft |
| Froude Number | 0.803 |
| Flow Type | Subcritical |

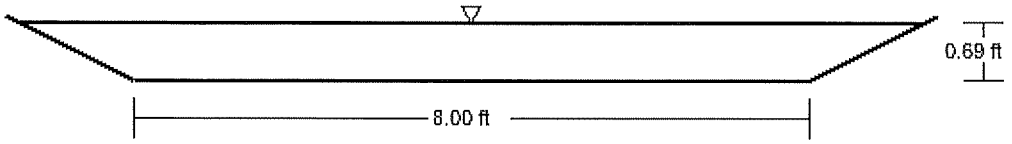
| GVF Input Data | |
|---|---|
| Downstream Depth | 0.00 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

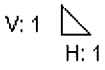
| GVF Output Data | |
|---|---|
| Upstream Depth | 0.00 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | 0.00 ft/s |
| Upstream Velocity | 0.00 ft/s |
| Normal Depth | 0.69 ft |
| Critical Depth | 0.60 ft |
| Channel Slope | 1.04 % |
| Critical Slope | 1.68 % |

# Cross Section for Trapezoidal Channel - 21

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Roughness Coefficient | 0.030 |
| Channel Slope | 1.04 % |
| Normal Depth | 0.69 ft |
| Left Side Slope | 2.000 H:V |
| Right Side Slope | 2.000 H:V |
| Bottom Width | 8.00 ft |
| Discharge | 23.00 cfs |



## Curb and Gutter Analysis: INLET 2

Notes:

### Gutter Input Parameters

Longitudinal Slope of Road: 0.0240 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0160

Gutter Width: 1.5000 ft

Width of Spread: 17.3016 ft

### Gutter Result Parameters

Design Flow: 16.0000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 2.9935 ft^2

Eo (Gutter Flow to Total Flow): 0.2151

Gutter Depth at Curb: 4.1524 in

### Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 11.6700 ft

Length of Inlet: 13.3300 ft

Local Depression: 2.0000 in

INLET 2

**Inlet Result Parameters**

Intercepted Flow: 11.9679 cfs

Bypass Flow: 4.0321 cfs

Approach Velocity: 5.2627 ft/s

Splash-over Velocity: 49.2040 ft/s

Efficiency: 0.7480

Clogging Factor (50%)

Grate, 11.67*1.5=17.5'

Curb Opening, 13.33*1.5=20.0'

Type "CM2" (7 grates)

Intercept 12 cfs

Bypass 4 cfs

```
                                                    ESTR.WSW
T1 ESTRELLA                                                                                                  0
T2 SUNSTONE PARCEL C
T3
SO   1000.0002684.370  1                                  2689.810
R    1067.1602687.137  1       .013                                                .000  54.000 0
WE   1067.1602687.137  2       .013
R    1069.6602687.240  2       .013                                                .000    .000 0
JX   1069.6612687.241  2  2    .013     2.000             2687.241                 90.0
R    1072.1602687.324  2       .013                                                .000    .000 0
WX   1072.1602687.324  5
R    1106.3902690.770  5       .013                                                .000    .000 0
WE   1106.3902690.770  3       .013
R    1108.8902690.850  3       .013                                                .000    .000 0
JX   1108.8902690.851  3  3    .013     9.000             2690.852                 90.0
R    1111.3902690.930  3       .013                                                .000    .000 0
WX   1111.3902690.930  7
R    1204.9002691.160  7       .013                                                .000    .000 0
JX   1204.9002691.161  6  6    .013     6.000             2691.340                 90.0
R    1256.7002691.680  6       .013                                                .000    .000 0
JX   1256.7002691.681  6  6    .013     3.000             2691.681                 45.0
R    1289.9202694.680  6       .013                                                .000    .000 0
SH   1289.9202694.680  6                                  2694.680
CD   1  4   1    .000   4.000     .000  .000  .000   .00
CD   2  3   0    .000   7.500   12.500  .000  .000   .00
CD   3  3   0    .000   5.500    5.000  .000  .000   .00
CD   4  4   1    .000   3.000     .000  .000  .000   .00
CD   5  4   1    .000   2.500     .000  .000  .000   .00
CD   6  4   1    .000   1.500     .000  .000  .000   .00
CD   7  4   1    .000   2.000     .000  .000  .000   .00
Q            12.000   .0
```

| CARD CODE | SECT NO | CHN TYPE | NO OF PIER/PIP | AVE PIER WIDTH | HEIGHT 1 DIAMETER | BASE WIDTH | ZL | ZR | INV DROP | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD | 1 | 4 | 1 | | 4.000 | | | | | | | | | | | | | | |
| CD | 2 | 3 | 0 | .000 | 7.500 | 12.500 | .000 | .000 | .00 | | | | | | | | | | |
| CD | 3 | 3 | 0 | .000 | 5.500 | 5.000 | .000 | .000 | .00 | | | | | | | | | | |
| CD | 4 | 4 | 1 | | 3.000 | | | | | | | | | | | | | | |
| CD | 5 | 4 | 1 | | 2.500 | | | | | | | | | | | | | | |
| CD | 6 | 4 | 1 | | 1.500 | | | | | | | | | | | | | | |
| CD | 7 | 4 | 1 | | 2.000 | | | | | | | | | | | | | | |



WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

ESTRELLA

HEADING LINE NO 2 IS -

SUNSTONE PARCEL C

HEADING LINE NO 3 IS -



WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

| U/S DATA | STATION | INVERT | SECT | W S ELEV |
|---|---|---|---|---|
| | 1000.000 | 2684.370 | 1 | 2689.810 |

ELEMENT NO 2 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 1067.160 | 2687.137 | 1 | .013 | .000 | .000 | 54.000 | 0 |

ELEMENT NO 3 IS A WALL ENTRANCE *

| U/S DATA | STATION | INVERT | SECT | FP |
|---|---|---|---|---|
| | 1067.160 | 2687.137 | 2 | .013 |

ELEMENT NO 4 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 1069.660 | 2687.240 | 2 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 5 IS A JUNCTION * * * * * * *

| U/S DATA | STATION | INVERT | SECT | LAT-1 | LAT-2 | N | Q3 | Q4 | INVERT-3 | INVERT-4 | PHI 3 | PHI 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1069.661 | 2687.241 | 2 | 2 | 0 | .013 | 2.000 | .000 | 2687.241 | .000 | 90.000 | .000 |

| RADIUS | ANGLE |
|---|---|
| .000 | .000 |

ELEMENT NO 6 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 1072.160 | 2687.324 | 2 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 7 IS A WALL EXIT *

| U/S DATA | STATION | INVERT | SECT |
|---|---|---|---|
| | 1072.160 | 2687.324 | 5 |

ELEMENT NO 8 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 1106.390 | 2690.770 | 5 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 9 IS A WALL ENTRANCE *

| U/S DATA | STATION | INVERT | SECT | FP |
|---|---|---|---|---|
| | 1106.390 | 2690.770 | 3 | .013 |

ELEMENT NO 10 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 1108.890 | 2690.850 | 3 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 11 IS A JUNCTION * * * * * * *

| U/S DATA | STATION | INVERT | SECT | LAT-1 | LAT-2 | N | Q3 | Q4 | INVERT-3 | INVERT-4 | PHI 3 | PHI 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1108.890 | 2690.851 | 3 | 3 | 0 | .013 | 9.000 | .000 | 2690.852 | .000 | 90.000 | .000 |

| RADIUS | ANGLE |
|---|---|
| .000 | .000 |

```
ELEMENT NO  12 IS A REACH                *         *     *
               U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          1111.390 2690.930    3              .013                       .000      .000       .000     0
ELEMENT NO  13 IS A  WALL  EXIT                                *
               U/S DATA   STATION    INVERT  SECT
                          1111.390 2690.930    7
ELEMENT NO  14 IS A REACH                *         *     *
               U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          1204.900 2691.160    7              .013                       .000      .000       .000     0
ELEMENT NO  15 IS A JUNCTION             *         *     *     *          *                *                 *
               U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N       Q3       Q4      INVERT-3 INVERT-4  PHI 3  PHI 4
                          1204.900 2691.161    6     6     0   .013     6.000      .000  2691.340      .000  90.000      .000
                                                                                        RADIUS    ANGLE
                                                                                          .000      .000
ELEMENT NO  16 IS A REACH                *         *     *
               U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          1256.700 2691.680    6              .013                       .000      .000       .000     0
ELEMENT NO  17 IS A JUNCTION             *         *     *     *          *                *                 *
               U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N       Q3       Q4      INVERT-3 INVERT-4  PHI 3  PHI 4
                          1256.700 2691.681    6     6     0   .013     3.000      .000  2691.681      .000  45.000      .000
                                                                                        RADIUS    ANGLE
                                                                                          .000      .000
ELEMENT NO  18 IS A REACH                *         *     *
               U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          1289.920 2694.680    6              .013                       .000      .000       .000     0
ELEMENT NO  19 IS A SYSTEM HEADWORKS                           *          *
               U/S DATA   STATION    INVERT  SECT                          W S ELEV
                          1289.920 2694.680    6                         2694.680
```

ESTRELLA
SUNSTONE PARCEL C

| Station / L/Elem | Invert Elev / Ch Slope | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head / SF Ave | Energy Grd.El. / HF | Super Elev / SE Dpth | Critical Depth / Froude N | Flow Top Width / Norm Dp | Height/ Dia.-FT / "N" | Base Wt or I.D. / X-Fall | ZL / ZR | No Wth Prs/Pip / Type Ch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000.000 | 2684.370 | 5.440 | 2689.810 | 32.00 | 2.55 | .10 | 2689.91 | .00 | 1.68 | .00 | 4.000 | .000 | .00 | 1 .0 |
| 35.819 | .0412 | | | | | .0005 | .02 | 5.44 | .00 | .89 | .013 | .00 | .00 | PIPE |
| 1035.819 | 2685.846 | 4.000 | 2689.846 | 32.00 | 2.55 | .10 | 2689.95 | .00 | 1.68 | .00 | 4.000 | .000 | .00 | 1 .0 |
| 8.831 | .0412 | | | | | .0005 | .00 | 4.00 | .00 | .89 | .013 | .00 | .00 | PIPE |
| 1044.650 | 2686.209 | 3.629 | 2689.839 | 32.00 | 2.67 | .11 | 2689.95 | .00 | 1.68 | 2.32 | 4.000 | .000 | .00 | 1 .0 |
| 5.012 | .0412 | | | | | .0004 | .00 | 3.63 | .21 | .89 | .013 | .00 | .00 | PIPE |
| 1049.661 | 2686.416 | 3.414 | 2689.830 | 32.00 | 2.80 | .12 | 2689.95 | .00 | 1.68 | 2.83 | 4.000 | .000 | .00 | 1 .0 |
| 4.066 | .0412 | | | | | .0005 | .00 | 3.41 | .25 | .89 | .013 | .00 | .00 | PIPE |
| 1053.727 | 2686.583 | 3.236 | 2689.820 | 32.00 | 2.94 | .13 | 2689.95 | .00 | 1.68 | 3.14 | 4.000 | .000 | .00 | 1 .0 |
| 3.495 | .0412 | | | | | .0005 | .00 | 3.24 | .28 | .89 | .013 | .00 | .00 | PIPE |
| 1057.221 | 2686.728 | 3.081 | 2689.808 | 32.00 | 3.08 | .15 | 2689.96 | .00 | 1.68 | 3.37 | 4.000 | .000 | .00 | 1 .0 |
| 3.087 | .0412 | | | | | .0006 | .00 | 3.08 | .31 | .89 | .013 | .00 | .00 | PIPE |
| 1060.309 | 2686.855 | 2.941 | 2689.795 | 32.00 | 3.23 | .16 | 2689.96 | .00 | 1.68 | 3.53 | 4.000 | .000 | .00 | 1 .0 |
| 2.763 | .0412 | | | | | .0007 | .00 | 2.94 | .34 | .89 | .013 | .00 | .00 | PIPE |
| 1063.071 | 2686.969 | 2.812 | 2689.781 | 32.00 | 3.39 | .18 | 2689.96 | .00 | 1.68 | 3.66 | 4.000 | .000 | .00 | 1 .0 |
| 2.491 | .0412 | | | | | .0007 | .00 | 2.81 | .37 | .89 | .013 | .00 | .00 | PIPE |
| 1065.562 | 2687.071 | 2.694 | 2689.765 | 32.00 | 3.55 | .20 | 2689.96 | .00 | 1.68 | 3.75 | 4.000 | .000 | .00 | 1 .0 |
| 1.598 | .0412 | | | | | .0008 | .00 | 2.69 | .40 | .89 | .013 | .00 | .00 | PIPE |



ESTRELLA
SUNSTONE PARCEL C

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Station / L/Elem | Invert Elev / Ch Slope | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head / SF Ave | Energy Grd.El. / HF | Super Elev / SE Dpth | Critical Depth / Froude N | Flow Top Width / Norm Dp | Height/ Dia.-FT / "N" | Base Wt or I.D. / X-Fall | ZL / ZR | No Wth Prs/Pip / Type Ch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1067.160 | 2687.137 | 2.616 | 2689.753 | 32.00 | 3.68 | .21 | 2689.96 | .00 | 1.68 | 3.81 | 4.000 | .000 | .00 | 1 .0 |
| WALL ENTRANCE | | | | | | | | | | | | | | |
| 1067.160 | 2687.137 | 2.981 | 2690.118 | 32.00 | .86 | .01 | 2690.13 | .00 | .59 | 12.50 | 7.500 | 12.500 | .00 | 0 .0 |
| 2.500 | .0412 | | | | | .0000 | .00 | 2.98 | .09 | .27 | .013 | .00 | .00 | BOX |
| JUNCT STR | 1.0000 | | | | | .0000 | .00 | 2.88 | .09 | | .013 | .00 | .00 | BOX |
| 1069.661 | 2687.241 | 2.879 | 2690.120 | 30.00 | .83 | .01 | 2690.13 | .00 | .56 | 12.50 | 7.500 | 12.500 | .00 | 0 .0 |
| 2.499 | .0332 | | | | | .0000 | .00 | 2.88 | .09 | .28 | .013 | .00 | .00 | BOX |
| 1072.160 | 2687.324 | 2.795 | 2690.119 | 30.00 | .86 | .01 | 2690.13 | .00 | .56 | 12.50 | 7.500 | 12.500 | .00 | 0 .0 |
| HYDRAULIC JUMP | | | | | | | | | | | | | | |
| 1072.160 | 2687.324 | .996 | 2688.320 | 30.00 | 16.45 | 4.20 | 2692.52 | .00 | 1.87 | 2.45 | 2.500 | .000 | .00 | 1 .0 |
| .755 | .1007 | | | | | .0475 | .04 | 1.00 | 3.36 | .82 | .013 | .00 | .00 | PIPE |
| 1072.914 | 2687.400 | 1.000 | 2688.400 | 30.00 | 16.37 | 4.16 | 2692.56 | .00 | 1.87 | 2.45 | 2.500 | .000 | .00 | 1 .0 |
| 6.056 | .1007 | | | | | .0443 | .27 | 1.00 | 3.33 | .82 | .013 | .00 | .00 | PIPE |
| 1078.970 | 2688.010 | 1.036 | 2689.046 | 30.00 | 15.60 | 3.78 | 2692.83 | .00 | 1.87 | 2.46 | 2.500 | .000 | .00 | 1 .0 |
| 4.945 | .1007 | | | | | .0389 | .19 | 1.04 | 3.11 | .82 | .013 | .00 | .00 | PIPE |
| 1083.915 | 2688.508 | 1.074 | 2689.582 | 30.00 | 14.88 | 3.44 | 2693.02 | .00 | 1.87 | 2.48 | 2.500 | .000 | .00 | 1 .0 |
| 4.099 | .1007 | | | | | .0341 | .14 | 1.07 | 2.90 | .82 | .013 | .00 | .00 | PIPE |



Program Package Serial Number: 7088

WATER SURFACE PROFILE LISTING Date:10-29-2021 Time: 9:29:53

ESTRELLA
SUNSTONE PARCEL C

| Station / L/Elem | Invert Elev / Ch Slope | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head / SF Ave | Energy Grd.El. / HF | Super Elev / SE Dpth | Critical Depth / Froude N | Flow Top Width / Norm Dp | Height/ Dia.-FT / "N" | Base Wt or I.D. / X-Fall | ZL / ZR | No Wth Prs/Pip / Type Ch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1088.014 | 2688.920 | 1.114 | 2690.034 | 30.00 | 14.18 | 3.12 | 2693.16 | .00 | 1.87 | 2.49 | 2.500 | .000 | .00 | 1 .0 |
| 3.432 | .1007 | | | | | .0300 | .10 | 1.11 | 2.71 | .82 | .013 | .00 | .00 | PIPE |
| 1091.446 | 2689.266 | 1.155 | 2690.421 | 30.00 | 13.52 | 2.84 | 2693.26 | .00 | 1.87 | 2.49 | 2.500 | .000 | .00 | 1 .0 |
| 2.893 | .1007 | | | | | .0264 | .08 | 1.16 | 2.53 | .82 | .013 | .00 | .00 | PIPE |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1094.339 | 2689.557 | 1.199 | 2690.756 | 30.00 | 12.90 | 2.58 | 2693.34 | .00 | 1.87 | 2.50 | 2.500 | .000 | .00 | 1 | .0 |
| 2.443 | .1007 | | | | | .0232 | .06 | 1.20 | 2.35 | .82 | .013 | .00 | .00 | PIPE | |
| 1096.782 | 2689.803 | 1.244 | 2691.047 | 30.00 | 12.30 | 2.35 | 2693.39 | .00 | 1.87 | 2.50 | 2.500 | .000 | .00 | 1 | .0 |
| 2.067 | .1007 | | | | | .0204 | .04 | 1.24 | 2.19 | .82 | .013 | .00 | .00 | PIPE | |
| 1098.849 | 2690.011 | 1.292 | 2691.302 | 30.00 | 11.72 | 2.13 | 2693.44 | .00 | 1.87 | 2.50 | 2.500 | .000 | .00 | 1 | .0 |
| 1.741 | .1007 | | | | | .0180 | .03 | 1.29 | 2.04 | .82 | .013 | .00 | .00 | PIPE | |
| 1100.590 | 2690.186 | 1.342 | 2691.528 | 30.00 | 11.18 | 1.94 | 2693.47 | .00 | 1.87 | 2.49 | 2.500 | .000 | .00 | 1 | .0 |
| 1.460 | .1007 | | | | | .0159 | .02 | 1.34 | 1.90 | .82 | .013 | .00 | .00 | PIPE | |
| 1102.049 | 2690.333 | 1.395 | 2691.728 | 30.00 | 10.66 | 1.76 | 2693.49 | .00 | 1.87 | 2.48 | 2.500 | .000 | .00 | 1 | .0 |
| 1.210 | .1007 | | | | | .0140 | .02 | 1.39 | 1.76 | .82 | .013 | .00 | .00 | PIPE | |
| 1103.259 | 2690.455 | 1.450 | 2691.905 | 30.00 | 10.16 | 1.60 | 2693.51 | .00 | 1.87 | 2.47 | 2.500 | .000 | .00 | 1 | .0 |
| .987 | .1007 | | | | | .0124 | .01 | 1.45 | 1.64 | .82 | .013 | .00 | .00 | PIPE | |
| 1104.247 | 2690.554 | 1.509 | 2692.063 | 30.00 | 9.69 | 1.46 | 2693.52 | .00 | 1.87 | 2.45 | 2.500 | .000 | .00 | 1 | .0 |
| .784 | .1007 | | | | | .0110 | .01 | 1.51 | 1.52 | .82 | .013 | .00 | .00 | PIPE | |



Program Package Serial Number: 7088

WATER SURFACE PROFILE LISTING Date:10-29-2021 Time: 9:29:53

ESTRELLA
SUNSTONE PARCEL C

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
| 1105.031 | 2690.633 | 1.571 | 2692.204 | 30.00 | 9.24 | 1.33 | 2693.53 | .00 | 1.87 | 2.42 | 2.500 | .000 | .00 | 1 | .0 |
| .598 | .1007 | | | | | .0097 | .01 | 1.57 | 1.40 | .82 | .013 | .00 | .00 | PIPE | |
| 1105.628 | 2690.693 | 1.637 | 2692.330 | 30.00 | 8.81 | 1.20 | 2693.53 | .00 | 1.87 | 2.38 | 2.500 | .000 | .00 | 1 | .0 |
| .422 | .1007 | | | | | .0087 | .00 | 1.64 | 1.30 | .82 | .013 | .00 | .00 | PIPE | |
| 1106.050 | 2690.736 | 1.708 | 2692.443 | 30.00 | 8.40 | 1.10 | 2693.54 | .00 | 1.87 | 2.33 | 2.500 | .000 | .00 | 1 | .0 |
| .253 | .1007 | | | | | .0077 | .00 | 1.71 | 1.19 | .82 | .013 | .00 | .00 | PIPE | |
| 1106.304 | 2690.761 | 1.784 | 2692.545 | 30.00 | 8.01 | 1.00 | 2693.54 | .00 | 1.87 | 2.26 | 2.500 | .000 | .00 | 1 | .0 |
| .086 | .1007 | | | | | .0069 | .00 | 1.78 | 1.10 | .82 | .013 | .00 | .00 | PIPE | |
| 1106.390 | 2690.770 | 1.867 | 2692.637 | 30.00 | 7.63 | .90 | 2693.54 | .00 | 1.87 | 2.17 | 2.500 | .000 | .00 | 1 | .0 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WALL ENTRANCE | | | | | | | | | | | | | | |
| 1106.390 | 2690.770 | 3.262 | 2694.032 | 30.00 | 1.84 | .05 | 2694.08 | .00 | 1.04 | 5.00 | 5.500 | 5.000 | .00 | 0 .0 |
| 2.500 | .0320 | | | | | .0002 | .00 | 3.26 | .18 | .52 | .013 | .00 | .00 | BOX |
| 1108.890 | 2690.850 | 3.180 | 2694.030 | 30.00 | 1.89 | .06 | 2694.09 | .00 | 1.04 | 5.00 | 5.500 | 5.000 | .00 | 0 .0 |
| JUNCT STR | .0000 | | | | | .0001 | .00 | 3.18 | .19 | | .013 | .00 | .00 | BOX |
| 1108.890 | 2690.851 | 3.235 | 2694.086 | 21.00 | 1.30 | .03 | 2694.11 | .00 | .82 | 5.00 | 5.500 | 5.000 | .00 | 0 .0 |
| 2.500 | .0315 | | | | | .0001 | .00 | 3.24 | .13 | .41 | .013 | .00 | .00 | BOX |
| 1111.390 | 2690.930 | 3.156 | 2694.085 | 21.00 | 1.33 | .03 | 2694.11 | .00 | .82 | 5.00 | 5.500 | 5.000 | .00 | 0 .0 |
| WALL EXIT | | | | | | | | | | | | | | |



| Station / L/Elem | Invert Elev / Ch Slope | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head / SF Ave | Energy Grd.El. / HF | Super Elev / SE Dpth | Critical Depth / Froude N | Flow Top Width / Norm Dp | Height/ Dia.-FT / "N" | Base Wt or I.D. / X-Fall | ZL / ZR | No Wth Prs/Pip / Type Ch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1111.390 | 2690.930 | 3.156 | 2694.086 | 21.00 | 6.68 | .69 | 2694.78 | .00 | 1.64 | .00 | 2.000 | .000 | .00 | 1 .0 |
| 93.510 | .0025 | | | | | .0086 | .81 | 3.16 | .00 | 2.00 | .013 | .00 | .00 | PIPE |
| 1204.900 | 2691.160 | 3.732 | 2694.891 | 21.00 | 6.68 | .69 | 2695.59 | .00 | 1.64 | .00 | 2.000 | .000 | .00 | 1 .0 |
| JUNCT STR | .0000 | | | | | .0145 | .00 | 3.73 | .00 | | .013 | .00 | .00 | PIPE |
| 1204.900 | 2691.161 | 3.896 | 2695.057 | 15.00 | 8.49 | 1.12 | 2696.18 | .00 | 1.41 | .00 | 1.500 | .000 | .00 | 1 .0 |
| 51.800 | .0100 | | | | | .0204 | 1.06 | 3.90 | .00 | 1.50 | .013 | .00 | .00 | PIPE |
| 1256.700 | 2691.680 | 4.433 | 2696.113 | 15.00 | 8.49 | 1.12 | 2697.23 | .00 | 1.41 | .00 | 1.500 | .000 | .00 | 1 .0 |
| JUNCT STR | .0000 | | | | | .0167 | .00 | 4.43 | .00 | | .013 | .00 | .00 | PIPE |
| 1256.700 | 2691.681 | 5.174 | 2696.855 | 12.00 | 6.79 | .72 | 2697.57 | .00 | 1.31 | .00 | 1.500 | .000 | .00 | 1 .0 |
| 33.220 | .0903 | | | | | .0131 | .43 | 5.17 | .00 | .64 | .013 | .00 | .00 | PIPE |
| 1289.920 | 2694.680 | 2.609 | 2697.289 | 12.00 | 6.79 | .72 | 2698.00 | .00 | 1.31 | .00 | 1.500 | .000 | .00 | 1 .0 |

# APPENDIX C – LAND PLAN CONDITIONS

Zoning/Planning Conditions

October 13, 2021

Mr. Robert Johnson
Northland, LLC
9275 W. Russell Road, Ste. 400
Las Vegas, Nevada 89148

***RE: 21-0453-TMP1***
***PLANNING COMMISSION MEETING OF OCTOBER 12, 2021***

Dear Applicant:

The Planning Commission at a regular meeting held on *October 12, 2021* voted to ***APPROVE*** a request FOR A 106-LOT SINGLE-FAMILY RESIDENTIAL SUBDIVISION on 21.40 acres at the northwest corner of Sunstone Parkway and Sun Park Drive (APN 125-06-610-001), T-D (Traditional Development) Zone [L (Residential Low) Sunstone Special Land Use Designation], Ward 6 (Fiore).

This approval is subject to the following conditions:

Planning

1. Approval of the Tentative Map shall be for no more than four (4) years. If a Final Map is not recorded on all or a portion of the area embraced by the Tentative Map within four (4) years of the approval of the Tentative Map, this action is void.

2. Street names must be provided in accordance with the City's Street Naming Regulations.

3. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

4. In conjunction with creation, declaration and recordation of the subject common-interest community, and prior to recordation of the Covenants, Codes and Restrictions ("CC&R"), or conveyance of any unit within the community, the Developer is required to record a Declaration of Private Maintenance Requirements ("DPMR") as a covenant on all associated properties, and on behalf of all current and future property owners. The DPMR is to include a listing of all

privately owned and/or maintained infrastructure improvements, along with assignment of maintenance responsibility for each to the common interest community or the respective individual property owners, and is to provide a brief description of the required level of maintenance for privately maintained components. The DPMR must be reviewed and approved by the City of Las Vegas Department of Field Operations prior to recordation, and must include a statement that all properties within the community are subject to assessment for all associated costs should private maintenance obligations not be met, and the City of Las Vegas be required to provide for said maintenance. Also, the CC&R are to include a statement of obligation of compliance with the DPMR. Following recordation, the Developer is to submit copies of the recorded DPMR and CC&R documents to the City of Las Vegas Department of Field Operations.

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

Public Works

6. Prior to the recordation of a Final Map that includes lot 15, a determination of whether or not an Order of Vacation is needed prior to recordation of the Final Map shall be made by Public Works staff. If so, the Order of Vacation shall record prior to or concurrent with the recordation of a Final Map that includes Lot 15.

7. Private streets must be granted and labeled on the Final Map for this site as Public Utility Easements (P.U.E.), Public Sewer Easements, and Public Drainage Easements with private surface maintenance by the Homeowner's Association.

8. In accordance with condition #10 of TMP-76718 and section 3.04 of the Sunstone Development Agreement, if not already constructed or guaranteed by the master developer, a minimum two lanes of asphalt pavement on village streets providing the main access to this site and a working sanitary sewer connection shall be provided prior to a final inspection of any dwelling units within this Tentative Map. Complete construction of Village streets shall conform to section 3.04 of the Sunstone Development Agreement. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

9. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.

10. Prior to the submittal of construction drawings for this site, submit a pedestrian circulation and safety plan to identify nearby pedestrian attractors and recommend measures to accommodate pedestrians, such as but not limited to pedestrian access, crosswalk, pedestrian activated flashers and temporary sidewalks. Comply with the recommendation of the approved pedestrian circulation plan.

11. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building, grading permits or the recordation of a Final Map, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

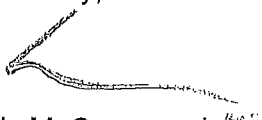
12. The approval of all Public Works related improvements shown on this Tentative Map is in concept only. Specific design and construction details relating to size, type and/or alignment of improvements, including but not limited to street, sewer and drainage improvements, shall be resolved prior to approval of the construction plans by the City. No deviations from adopted City Standards shall be allowed unless specific written approval for such is received from the City Engineer prior to the recordation of a Final Map or the approval of subdivision-related construction plans, whichever may occur first. Approval of this Tentative Map does not constitute approval of any deviations. If such approval cannot be obtained, a revised Tentative Map must be submitted showing elimination of such deviations. Roadway locations and parcel entries are schematic and final studies and engineering improvements designs. Geometric design of Parcel entry points must be approved through the development review of each parcel.

13. Site development to comply with all applicable conditions of approval for the Sunstone Master Tentative Map (TMP-76718) and any other site related actions.

This action by the Planning Commission on **October 12, 2021** is final unless a written appeal is filed with the City Clerk within seven days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status, or contact the Department of Planning and Development at 702.229.6301 after ***October 19, 2021***.

No building permits or business licenses related to these items shall be issued prior to the expiration of the required seven day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,



Eric McCammond
Senior Management Analyst
Case Planning Division

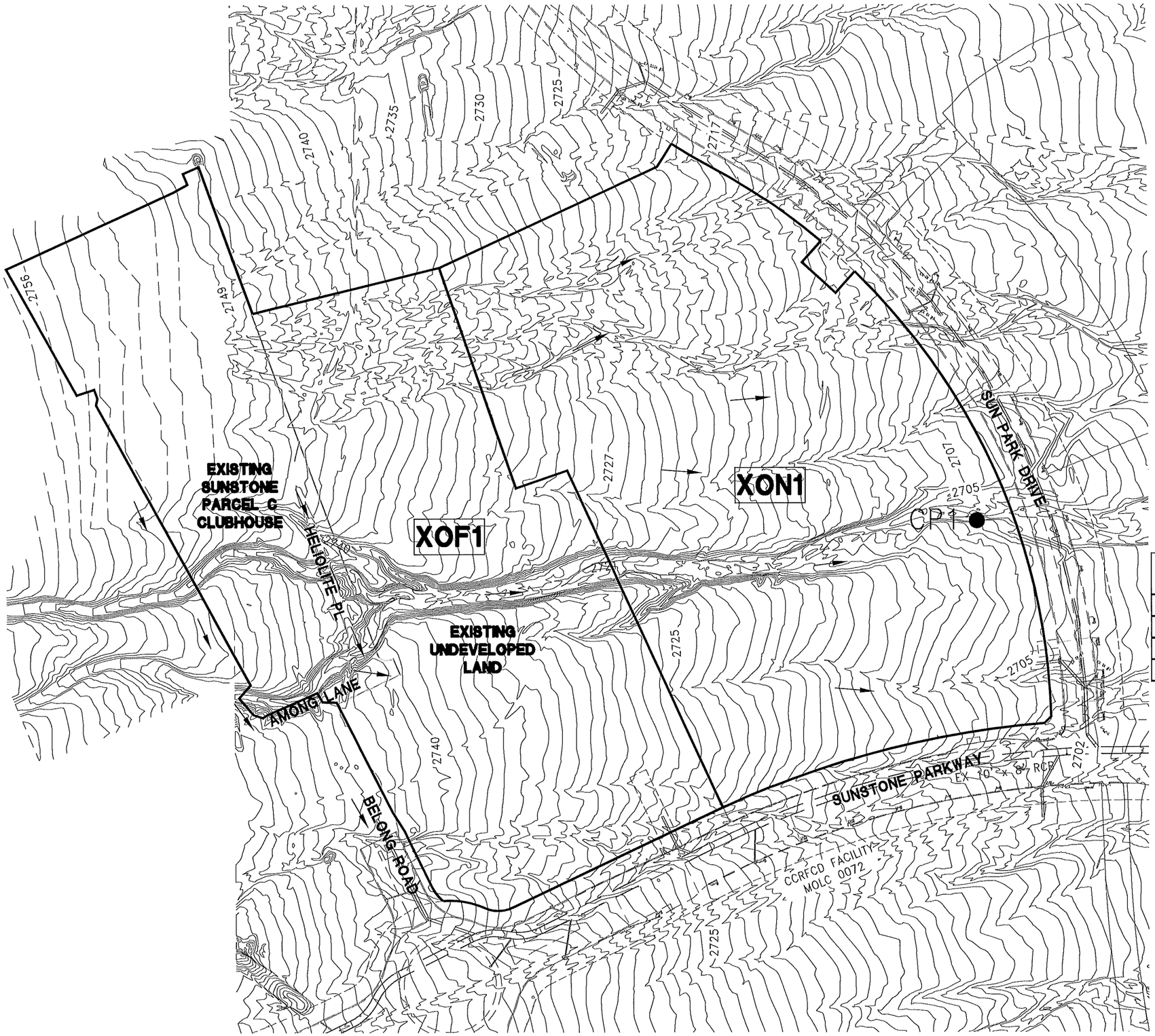
EM:nl

cc:

Mr. Scott Anderson
Woodside Homes of Nevada, LLC
7895 W. Sunset Road, Ste. 110
Las Vegas, Nevada 89113

Ms. Amber Dolce
RCI Engineering
500 S. Rancho Drive, Ste. 17
Las Vegas, Nevada 89106

# APPENDIX D – FIGURES




N

200' 0' 200' 400'

SCALE: 1" = 200'

**LEGEND**

- PROPOSED FLOW DIRECTION
- PROPOSED SUBBASIN BOUNDARY
- DON1 — PROPOSED DRAINAGE SUBBASIN
- CP1 — CONCENTRATION POINT

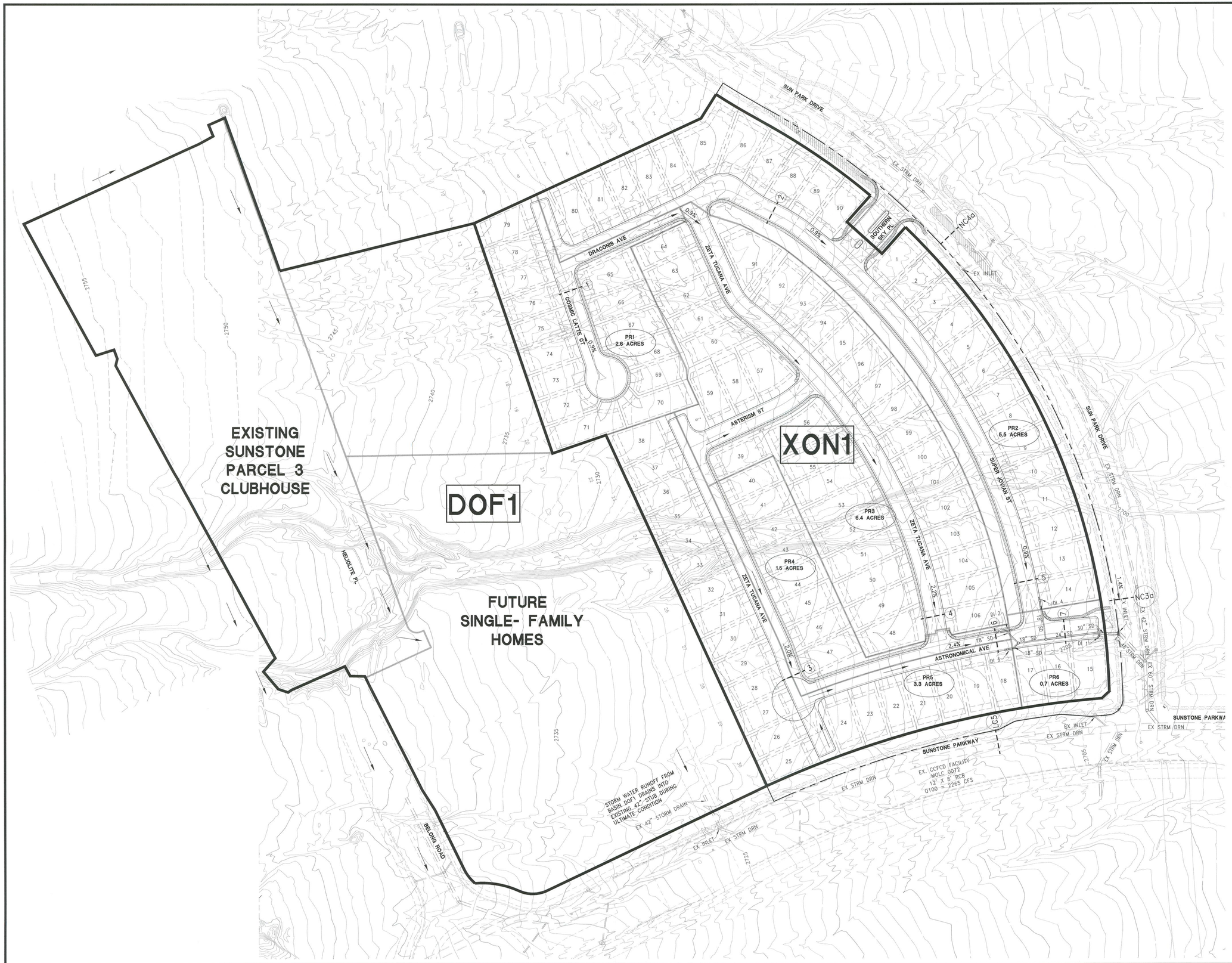
**EXISTING CONDITIONS**
**HEC-1 MODEL SUMMARY**

| SUBBASIN OR CP | BASIN AREA (AC) | 100 YR (cfs) | 10 YR (cfs) |
|---|---|---|---|
| XOF1 | 20.9 | 23 | 5 |
| XON1 | 20.0 | 13 | 1 |
| CP1 | - | 34 | 7 |

# ESTRELLA
# SUNSTONE
WOODSIDE HOMES

## FIGURE 5
EXISTING CONDITIONS

RCI Engineering
500 S. Rancho Drive, Suite 17
LAS VEGAS, NV 89106
PH#702.453.0800 FAX#702.453.0801




## LEGEND

- PROPOSED FLOW DIRECTION
- PROPOSED SUBBASIN BOUNDARY
- PRORATED BASIN BOUNDARY
- ON1 — PROPOSED DRAINAGE SUBBASIN
- PR X — PRORATED DRAINAGE BASIN
- (5) — HYDRAULIC SECTION

| ULTIMATE CONDITIONS HEC-1 MODEL SUMMARY | | | |
|---|---|---|---|
| SUBBASIN OR CP | BASIN AREA (AC) | 100 YR (cfs) | 10 YR (cfs) |
| DOF1 | 20.9 | 46 | 20 |
| DON1 | 20.0 | 30 | 10 |

| PRORATED BASIN STORM FLOW SUMMARY | | | |
|---|---|---|---|
| BASIN | BASIN AREA (AC) | % OF DON1 | 100 YR (CFS) |
| PR1 | 2.6 | 13 | 4 |
| PR2 | 5.5 | 27.5 | 8 |
| PR3 | 6.4 | 32 | 10 |
| PR4 | 1.5 | 7.5 | 2 |
| PR5 | 3.3 | 16.5 | 5 |
| PR6 | 0.7 | 3.5 | 1 |

| 100-YEAR HYDRAULIC SECTIONS ONSITE STREETS | | | | | | |
|---|---|---|---|---|---|---|
| Location | Slope (%) | BASIN | $Q_{100}$ (cfs) | $D_{100}$ (ft) | $V_{100}$ (ft/sec) | $D^*V_{100}$ |
| SECTION 1 | 0.9 | PR1 | 4 | 0.27 | 1.98 | 0.5 |
| SECTION 2 | 0.9 | 1/4 OF PR2 | 2 | 0.23 | 1.69 | 0.4 |
| SECTION 3 | 2 | 1/2 PR5 + PR4 | 11 | 0.33 | 3.37 | 1.1 |
| SECTION 4 | 2.2 | PR1 + PR3 | 14 | 0.35 | 3.7 | 1.3 |
| SECTION 5 | 0.9 | PR2 | 8 | 0.34 | 2.31 | 0.8 |
| SECTION 6 | 2.4 | PR1 + PR3 + PR4 + PR5 | 21 | 0.39 | 4.21 | 1.6 |
| SECTION 7 | 2.4 | BYPASS FLOW FROM DI2, DI3, AND DI4 + PR6 | 9 | 0.30 | 3.44 | 1.0 |

| 100-YEAR HYDRAULIC SECTIONS OFFSITE STREETS | | | | | | |
|---|---|---|---|---|---|---|
| Location | Slope (%) | BASIN | $Q_{100}$ (cfs) | $D_{100}$ (ft) | $V_{100}$ (ft/sec) | $D^*V_{100}$ |
| LC5 * | 2.95 | REF. FLOWS | 11 | 0.36 | 3.97 | 1.4 |
| NC3a | 1.4 | REF. FLOWS | 3 | 0.34 | 2.61 | 0.9 |
| NC4a* | 1 | REF. FLOWS | 2 | 0.27 | 1.83 | 0.5 |

* HYDRAULIC SECTIONS REFERENCED FROM "TDS FOR SUNSTONE PHASE 1 INFRASTRUCTURE"

| INLET SUMMARY ONSITE | | | | |
|---|---|---|---|---|
| DROP INLET | BASINS / CONC. PT. | Q100 | Q100 (INTERCEPT) | Q100 (BYPASS) (CFS) |
| DI1 | DI2 BYPASS + DI3 BYPASS+ DI4BYPASS + PR6 | 9 | 9 | 0 |
| DI2 | PR1 + PR3 + PR4 | 16 | 12 | 4 |
| DI3 | PR5 | 5 | 3 | 2 |
| DI4 | PR2 | 8 | 6 | 2 |

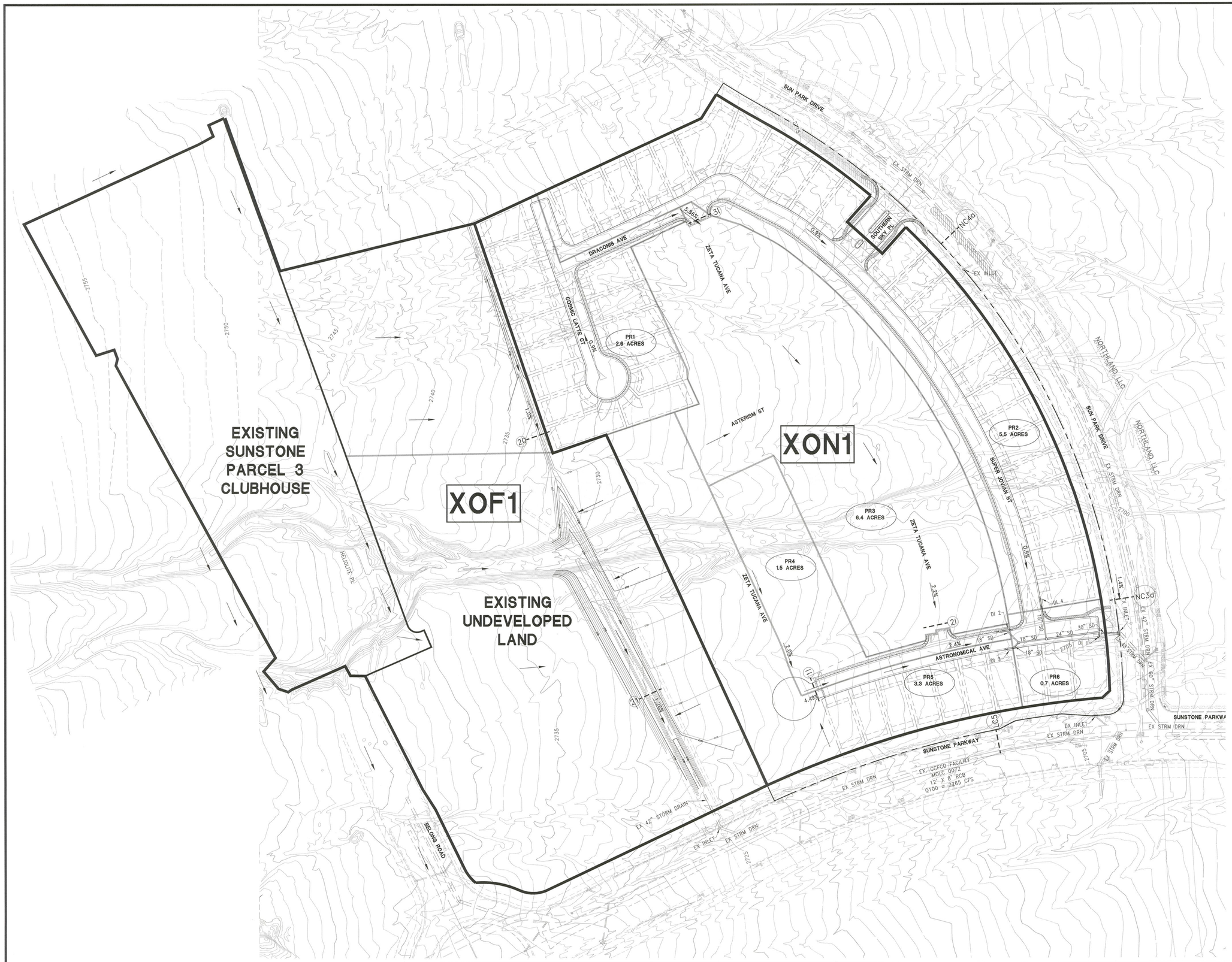
40' 0' 40' 80'
SCALE: 1" = 80'

**ESTRELLA @ SUNSTONE**
WOODSIDE

**FIGURE 6**
ULTIMATE CONDITIONS MAP

RCI Engineering
500 South Rancho Drive,suite 17
LAS VEGAS, NV 89106
PH#702.453.0800 FAX#702.453.0801

01_4320_Woodside\0014_Sunstone C_DRAIN\FIGURES\ADD_1\figure6.dwg owilfinker 10/29/21 4:27pm




## LEGEND

- PROPOSED FLOW DIRECTION
- PROPOSED SUBBASIN BOUNDARY
- PRORATED BASIN BOUNDARY
- ON1 — PROPOSED DRAINAGE SUBBASIN
- PR X — PRORATED DRAINAGE BASIN
- (5) — HYDRAULIC SECTION

| ULTIMATE CONDITIONS HEC-1 MODEL SUMMARY | | | |
|---|---|---|---|
| SUBBASIN OR CP | BASIN AREA (AC) | 100 YR (cfs) | 10 YR (cfs) |
| XOF1 | 20.9 | 23 | 5 |
| DON1 | 20.0 | 30 | 10 |

| PRORATED BASIN STORM FLOW SUMMARY | | | |
|---|---|---|---|
| BASIN | BASIN AREA (AC) | % OF DON1 | 100 YR (CFS) |
| PR1 | 2.6 | 13 | 4 |
| PR2 | 5.5 | 27.5 | 8 |
| PR3 | 6.4 | 32 | 10 |
| PR4 | 1.5 | 7.5 | 2 |
| PR5 | 3.3 | 16.5 | 5 |
| PR6 | 0.7 | 3.5 | 1 |

| INTERIM CONDITIONS 100-YEAR HYDRAULIC SECTIONS ONSITE STREETS | | | | | | |
|---|---|---|---|---|---|---|
| Location | Slope (%) | BASIN | $Q_{100}$ (cfs) | $D_{100}$ (ft) | $V_{100}$ (ft/sec) | $D^*V_{100}$ |
| SECTION 1I | 4.49 | PR5 | 5 | 0.28 | 2.31 | 0.6 |
| SECTION 2I | 2.20 | PR1+PR3 | 14 | 0.42 | 2.26 | 0.9 |
| SECTION 3I | 5.86 | PR1 | 4 | 0.21 | 4.2 | 0.9 |

NOTES:
ALL INTERIM CONDITIONS HYDRAULIC SECTIONS ARE CALCULATED TO DETERMINE THE VELOCITY FOR RIPRAP CALCULATIONS. FLOWS IN ALL UNDEVELOPED ONSITE STREETS ARE NON-EROSIVE.

SEE FIGURE 6 FOR ONSITE STREET HYDRAULIC SECTIONS FOR DEVELOPED STREETS.

| 100-YEAR HYDRAULIC SECTIONS OFFSITE STREETS AND SWALES | | | | | | |
|---|---|---|---|---|---|---|
| Location | Slope (%) | BASIN | $Q_{100}$ (cfs) | $D_{100}$ (ft) | $V_{100}$ (ft/sec) | $D^*V_{100}$ |
| SECTION 20 | 1 | 18% XOF1 | 4 | 0.74 | 2.46 | 1.8 |
| SECTION 21 | 1.04 | XOF1 | 23 | 0.69 | 3.54 | 2.4 |
| LC5 * | 2.95 | REF. FLOWS | 11 | 0.36 | 3.97 | 1.4 |
| NC3a | 1.4 | REF. FLOWS | 3 | 0.34 | 2.61 | 0.9 |
| NC4a* | 1 | REF. FLOWS | 2 | 0.27 | 1.83 | 0.5 |

* HYDRAULIC SECTIONS REFERENCED FROM "TDS FOR SUNSTONE PHASE 1 INFRASTRUCTURE"

| INLET SUMMARY ONSITE | | | | |
|---|---|---|---|---|
| DROP INLET | BASINS / CONC. PT. | Q100 | Q100 (INTERCEPT) | Q100 (BYPASS) (CFS) |
| DI1 | DI2 BYPASS + DI3 BYPASS+ DI4BYPASS + PR6 | 9 | 9 | 0 |
| DI2 | PR1 + PR3 + PR4 | 16 | 12 | 4 |
| DI3 | PR5 | 5 | 3 | 2 |
| DI4 | PR2 | 8 | 6 | 2 |

N

40' 0' 40' 80'

SCALE: 1" = 80'

**ESTRELLA @ SUNSTONE**
WOODSIDE

**FIGURE 7**
INTERIM CONDITIONS MAP

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