

Rocklin Crossing

Rocklin Placer County California

PRELIMINARY DRAINAGE REPORT

October 30, 2006

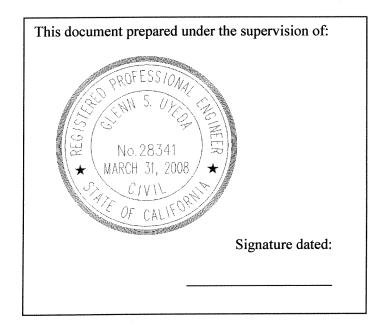
Prepared For RSC ENGINEERING INC

Prepared By:



CIVIL ENGINEERING SOLUTIONS, INC. 1325 Howe Avenue Suite 202 Sacramento, CA 95825 (916) 563-7300

JOB # 2005.08



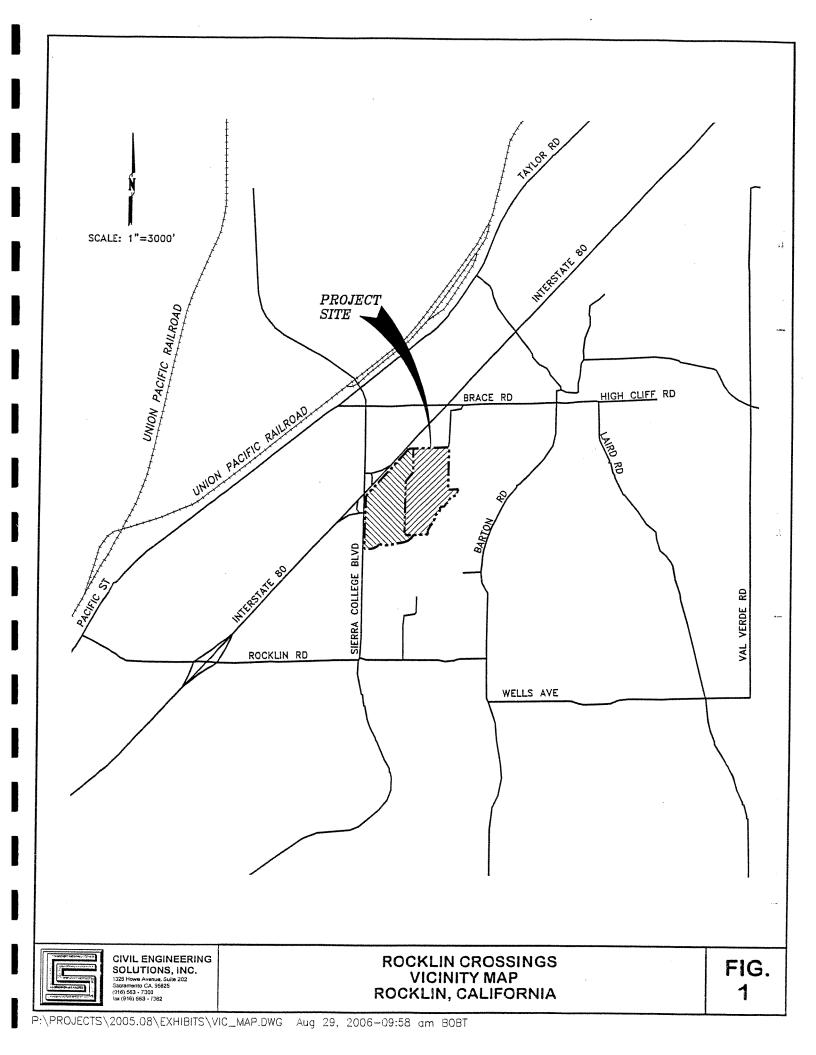
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ROCKLIN CROSSING

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1.0 Introduction

The purpose of this analysis is to determine the detention volume and to size an outlet configuration required to attenuate the post project peak flows to pre project peak flows. This analysis includes the development of HEC-1 models in conformance with the Placer County Flood Control & Water Conservation Districts (PCFC&WCD) Stormwater Management Manual (SWMM).

2.0 Site

The project is located in the southeast quadrant, adjacent to Interstate-80 and Sierra College Blvd. The site in situated at the base of the foothills along the Interstae-80 corridor between Rocklin and Penryn. The terrain is grass covered rolling hills with granite outcrops, scattered oak trees and manzanita. The site ranges in elevation from 310-msl to 340-msl. A Vicinity/ Location Map is provided on Figure 1.

Secret Ravine borders the south side of the project and has a detailed floodplain study. The FEMA FIRM Panel (6061C0418F) indicates the site is in an area designated Zone-X; "OTHER AREAS, Areas determined to be outside 500-year floodplain". The Regulatory Base Flood Elevation is 299 immediately upstream of Sierra College Blvd and 303 at the farthest upstream boundary of the project. Based on the site topo and the FEMA BFE, the site is not within the designated 100-year Floodplain.

3.0 Project Description

The project includes a 52-acre regional shopping center and a 58+-acres of single-family residential development. The commercial site proposes to include 23 buildings totaling approximately 543,500 square-feet. The residential site consists of 179 single-family lots. In addition, a 5.6-acre detention site is located along the southeast side of the commercial site.

4.0 Methodology

The hydrologic analysis for this project was performed in accordance with the requirements of the PCFC&WCD Stormwater Management Manual (SWMM). The Army Corp of Engineers HEC-1 program and Placers County's Precipitation Distribution Program (PDP) were used to create the hydrologic models. The Kinematic Wave Method is the prescribed methodology in Placer County.

Assumptions

This analysis includes only the sheds and flows from the proposed projects. Shed boundaries and areas were determined from the site topo and Tentative Map provided by the Engineers. The Pre and Post condition shed boundaries and areas are shown on Exhibit SH-1 and SH-2, included in APPENDIX-A. The existing condition land use assumed opens space with 2 percent impervious cover. The proposed condition assumed commercial and residential land use densities (4 du/ac). The commercial and residential

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flows are assumed to be routed to the proposed "Detention" parcel located near the southeast corner of the commercial site, just north of the Secret Ravine channel..

The proposed drainage model assumed routing paths for both the commercial and residential sites, as final grading and drainage patterns have not been determined at this time

The combined shed area of the commercial and residential sites at the detention basin is approximately 120-acres.

5.0 Analysis

The Army Corp of Engineers HEC-1 program was used to develop the pre, post and post-mitigated flows. Models of the proposed system are based on the proposed commercial and residential land use. The base condition data files and the PDP "batch files are include on the CD included in APPENDIX-B. Table-A lists the HEC-1 models created for this analysis.

The resultant flows for the Pre, Post and Post-Mitigated conditions are shown on the Storm Drain Map SD-1, SD-2 and SD-3, respectively (**APPENDIX-A**).

TABLE-A HEC-1 MODELS

HEC-1 Model	STORM EVENTS	Description
RCKPRE.DAT	2, 5, 10, 25, 50, 100, 200, 500-yr	Pre-Condition Land Use
RCKPOST.DAT	2, 5, 10, 25, 50, 100, 200, 500-yr	Post Condition
RKP1A.DAT	2, 5, 10, 25, 50, 100, 200, 500-yr	Post-Mitigated Alt A

Overland Flow

The Overland Flow paths for each sub-shed are shown on Exhibits SH-1 and SH-2. These length and slopes were input as basin parameters to create the basin models.

Pre-Project

The Pre-project model consists of 7-sheds which drain to a point above Sierra College Blvd. The Pre-project shed area is approximately 121-acres. The resultant 10 and 100-year peak flows are 121-cfs and 233-cfs respectively.

Post-Project

The Post-project model consists of 9 shed that drain to the proposed detention site. The total Shed area is approximately 111-acres. The CALTRAN on-ramp drainage area is assumed to be drained in a separate system. The 10 and 100-year peak flows from the proposed site, increase to 151-cfs and 280-cfs respectively. See **TABLE-B** for a summary of the project flows.

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Post-Mitigated Project

The Post-Mitigate project drains to the detention basin which has been sized to attenuate the 2-year through the 500-year Post-project flows to Pre-project flows. The proposed basin is located towards the northeast half of the proposed parcel. An outlet structure consisting of a single 30-inch diameter "weep-hole" with a 48-in diameter Riserwill control the releases through the detention basin. The Riser will have a top weir elevation of 315.5. A 72-inch diameter culvert will connect the outlet structure and basin to the downstream side of the proposed Residential entry road. The culvert will be aligned to discharge to an existing swale connected to Secret Ravine. **FIGURE-2** shows a schematic of the proposed outlet riser and culvert.

TABLE-B ROCKLINCROSSING Summary-Project Peak Flow Rates 23-Sep-05

		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	200-yr	500-yr
	NODE	Q	Q	Q	Q	Q	Q	Q	Q
PRE	CAB	55	93	121	163	197	233	269	329
POST	CABCD	74	119	151	201	240	280	320	38
ALT-A	Storg	56	75	113	161	181	201	218	24

Source: P:/projects/2005.08/drainage/hec1/Summayr-RKLN-X2.wb3 (QPRO spread sheet)

6.0 Summary

The Detention Volume required to attenuate the project flows is less than 5-ac-ft. The bottom elevation of the basin is based on the outfall elevation downstream of the proposed roadway.

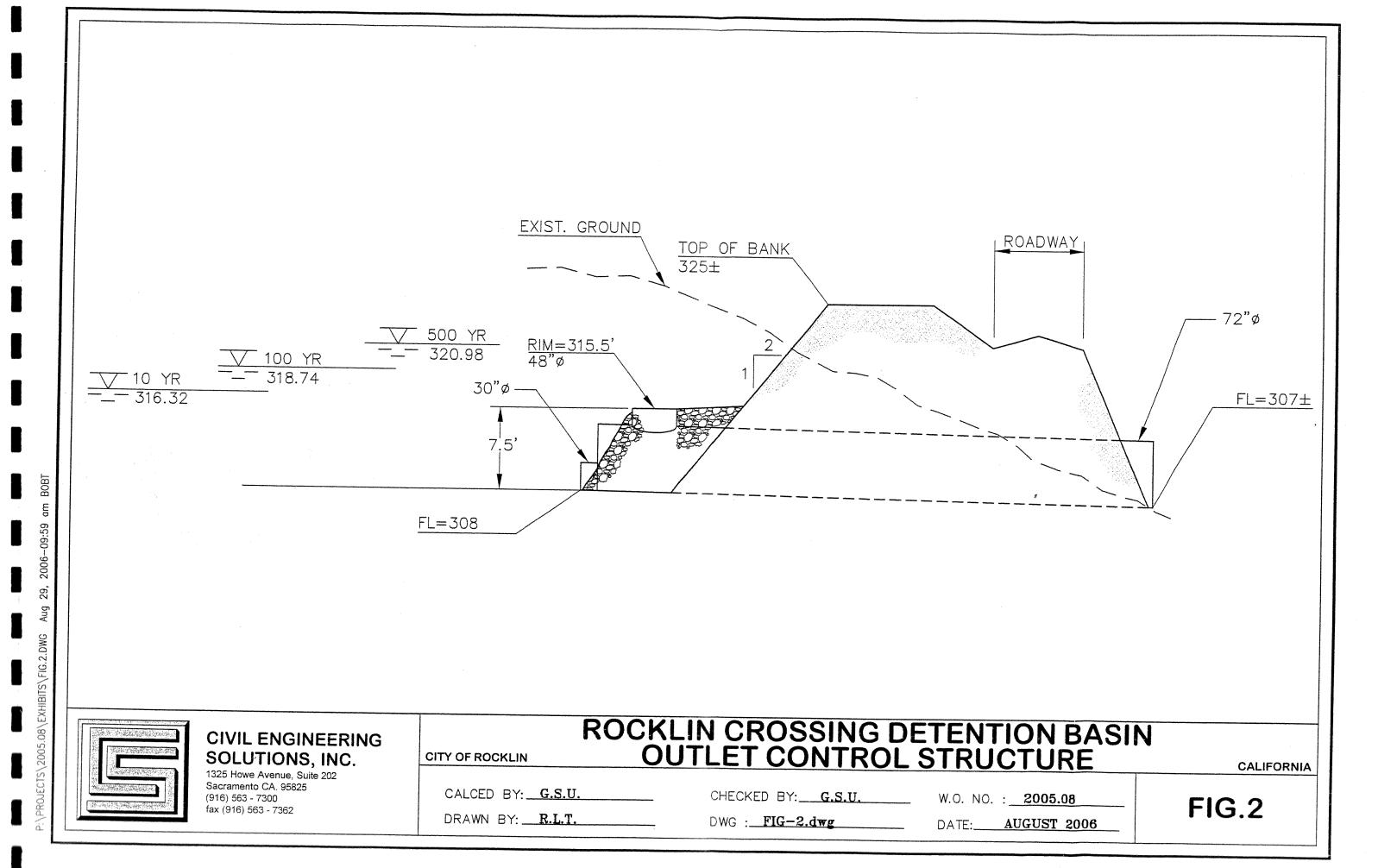
TABLE-C presents the maximum stage and storage volume for each event. A maximum water surface elevation for the 500-year event is 320.98 with a storage volume of 4.8-acft. The existing outfall elevation downstream of the proposed roadway is 307±. Final design will consider the need for bank and channel protection downstream of the outfall culvert.

TABLE-C
ROCKLIN CROSSING
SUMMARY
FLOW-STAGE-VOLUME

1								
	2 YEAR	5 YEAR	10 YEAR	25 YEAR	50 YEAR	100 YEAR	200 YEAR	500 YEAR
PRE Qpeak	55	93	121	163	197	233	269	329
	ALT. A							
Q peak - cfs	56	75	113	161	181	201	218	245
STAGE	312.75	315.59	316.32	317.16	317.9	318.74	319.58	320.98
VOLUME -								
Ac-Ft	0.9	1.9	2.2	2.6	3.0	3.4	3.9	4.8

7.0 Water Quality

The Water Quality treatment is not part of this analysis.



APPENDIX A

OVERSIZED EXHIBITS

SH-1 – Pre-Project SHED MAP

SH-2 – Post-Project SHED MAP

APPENDIX B

HEC-1

INPUT DATA FILES

RCKPRE.DAT

RCKPOST.DAT

RCP1A.DAT

CD HEC-1 DATA FILES

```
ID ROCKLIN CROSSING
ID EXISTING CONDITIONS
ID FILE: RCKPRE.DAT: 03/21/05
ID PDP HEC-1 PRELIMINARY DRAINAGE STUDY
ID CIVIL SOLUTIONS
ID PRE PROJECT CONDITIONS
* THIS FILE PREPARED USING THE PKLACER COUNTY HEC-1 PRE-PROSSOR
* A CIVIL SOLUTIONS PRODUCT
*DISPLAY
IT 1 01JAN97 0 1440
IO 3 0 0
KK EA1
KM RUNOFF FROM SUB-BASIN EA1, 22.71 AC.
BA .035
PB
* PI
                 2
.4
.075
         .07
.05
     . 1
LU
   300
                        100
UK
   500
                         .014
RD
RD 1300
         .028
                 .065
                                 TRAP
                                      10 20
   EA2
KK
KM RUNOFF FROM SUB-BASIN EA2, 29.68 AC.
BA .046
* PI
                 .4
.075
         .07
.05
LU .1
                       100
    300
UK
                       .018
   300
RD
RD 1400
                                 TRAP 10 20
                 .065
         .012
KK CEA2
KM COMBINE EA1 & EA2
   2
HC
KK REA2
KM ROUTE COMBINED EA2 THRU EA3
                                TRAP 10
                                                 20
RD 380
         .026 .065
KK
   EA3
KM RUNOFF FROM EA3, 36.65 AC.
BA .057
PB
* PI
                .4 100
.075 .023
         .07
.05
LU .1
UK
   300
RD 1300
                                TRAP 10
                .065
RD 400
         .015
                                                 20
KK CEA3
KM COMBINE EA3 & EA2
HC 2
KK
   EB1
KM RUNOFF FROM EB1, 5.82 AC.
BA .009
PB
* PI
         .07
.05
                2
.4
.075
.065
LU
     . 1
                        100
    300
UK
                         .004
RD
    450
                                TRAP 10
                                                 20
RD
   300
          .007
KK REB1
```

```
KM ROUTE EB1 THRU EB2
RD 380 .026 .065
                        TRAP 10 20
 *
KK EB2
KM RUNOFF FROM EB2, 13.73 AC.
BA .021
PB
* PI
               2
.4 100
.075 .008
.065
        .07
.05
.029
.010
LU
    . 1
   300
UK
RD 1100
RD 100
                              TRAP 10 20
KK CEB2
KM COMBINE EB2 & EB1
   2
HC
*
KK REB2
KM ROUTE SUB-BASIN EB2 THRU EB3
RD 380 .026 .065 TRAP 10 20
*
KK
   EB3
KM RUNOFF FROM EB3, 3.72 AC.
BA .006
PΒ
* PI
        .07 2
.05 .4 100
.050 .075 .002
.020 .065
LU .1
   300
UK
RD 470
RD
   100
                               TRAP 10 20
KK CEB3
KM COMBINE EB3 & EB2
HC 2
KK EB4
KM RUNOFF FROM EB4, 8.74 AC.
BA .014
PΒ
* PI
        .07 2
.05 .4 100
.020 .075 .006
   .1
LU
   300
UK
RD 800
RD 450
        .024
                             TRAP 10 20
               .065
KK CAB
KM COMBINE EB4, EB3, & EA3
HC 3
ZZ
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ID ROCKLIN CROSSING
ID FILE: RCKPOST.DAT: 21/03/05
ID PDP HEC-1 PRELIMINARY DRAINAGE STUDY
ID CIVIL SOLUTIONS
ID POST PROJECT CONDITIONS
* THIS FILE PREPARED USING THE PLACER COUNTY HEC-1 PRE-PROCESSOR
* A CIVIL SOLUTIONS PRODUCT
*D
   1 22MAR05 0 1440
1 0 0
IT
IO
KK
     A1
KM RUNOFF FROM A1, 32.06 AC.
BA .050
PB
* PI
                70
.45
.035
.035
         .09
.05
.018
LU
   . 1
                        100
.02
   150
RD 400
RD 1700
                                 TRAP
                                          3 20
KK
   RA1
KM ROUTE A1 THRU A2
                        CIRC
        .008 .035
RD 500
KK
    A2 '
KM RUNOFF FROM A2, 17.55 AC.
BA .027
PB
* PI
        .09
.05
.017
                 70
.45
LU
    . 1
                        100
UK
   150
                .035
                        .011
RD 1800
                                         3
   125
                                 TRAP
                                                 20
RD
KK CA2
KM COMBINE A2 & A1
HC
   2
*
KK
   RA2
KM ROUTE A2 THRU A3
RD 500 .020 .035
                            CIRC
KK
    A3
KM RUNOFF FROM A3, 8.5 AC.
BA .013
PB
* PI
        .09
.05
.028
.022
                80
.45
.035
.035
    .1
LU
                        100
UK
   150
                         .005
   800
RD
                                 TRAP
                                       3
                                                 20
RD
   320
KK
   CA3
KM COMBINE A3 & A2
НÇ
   2
   RA3
KK
KM ROUTE A3 THRU A4
                                CIRC
RD
   400 .005 .035
KK A4
KM RUNOFF FROM A4, 5.56 AC.
BA .009
PB
* PI
LU .1 .09 2
```

```
.05 .4 100
.057 .075 .004
.037 .065
     300
RD
     300
RD
                                  TRAP
                                        5
                                                  20
     300
KK
    CA4
KM COMBINE A4 & A3
HC
*
KK
    В1
KM RUNOFF FROM B1, 7.26 AC.
BA .011
PB
* PI
                85
.15 100
.035 .004
         .09
.05
.034
    .1
LU
UK
     150
RD
     300
                .035
         .011
                                 TRAP
                                           3
RD
    350
                                                  20
*
KK
   RB1
KM ROUTE B1 THRU B2
RD 475 .017 .035
                               CIRC2
*
KK B2
KM RUNOFF FROM B2, 8.02 AC.
BA .013
PB
* PI
LU .1
         .09 85
.05 .15
.029 .035
.010 .035
                       100
.005
UK
   200
RD 750
                                        3
                                 TRAP
                                                  20
RD 100
*
KK
   CB2
KM COMBINE B2 & B1
HC
   . 2
*
KK
   RB2
KM ROUTE B2 THRU B3
                            CIRC
                                           2
RD 420
        .010 .035
*
KK
    В3
KM RUNOFF FROM B3, 5.0 AC.
BA .008
PΒ
* PI
                85
.15
.035
.035
          .09
.05
    . 1
LU
                       100
UK 150
         .038
RD
   400
           .016
                                TRAP
                                      3
                                                 20
RD
   320
*
KK
    CB3
KM COMBINE B3 & B2
HC
    2
*
KK
  RB3
KM ROUTE B3 THRU B4
   800 .014 .035 CIRC
                                      2
RD
    B4
KM RUNOFF FROM B4, 6.32 AC.
BA .010
PΒ
* PI
        .09 85
.05 .15 100
.028 .035 .004
.006 .035
    . 1
LU
UK 150
RD 500
                                TRAP 3
                                                 20
RD 350
```

```
KK CB4
 KM COMBINE B4 & B3
 HC 2
 KK
    RB4
 KM ROUTE B4 THRU B5
 RD 320 .050 .035
                             CIRC
                                        2
 KK
      B5
 KM RUNOFF FROM B5, 4.40 AC.
 BA .007
 PΒ
 * PI
         .09 85
.05 .15 100
.028 .035 .003
.010 .035
 LU .1
 UK
    200
 RD
    500
 RD
     100
                                   TRAP
                                        3
                                                   20
 KK
    CB5
 KM COMBINE B5 & B4
 HС
    2
 *
 KK
    RB5
KM ROUTE B5 THRU A4
RD 450
         .022 .035
                                  TRAP
                                        10
                                                   20
KK C1
KM RUNOFF FROM C1, 5.82 AC.
BA .009
PB
* PI
         .09
.05
.014
                 85
.15
.035
.035
LU .1
                        100
.004
UK
   150
RD 350
RD 100
                                  TRAP
                                            3
                                                   20
*
KK
   RC1
KM ROUTE C1 THRU C2
RD 1000
         .018 .035
                                  CIRC
KK C2
KM RUNOFF FROM C2, 13.73 AC.
BA .021
PB
* PI
         .09
.05
.023
.019
                 85
.15
.035
.035
LU .1
   200
                        100
UK
RD
    350
RD
   750
                                       3
                                  TRAP
                                                   20
KK
   CC2
KM COMBINE C2 & C1
HС
    2
KK
   RC2
KM ROUTE C2 THRU C3
RD
   750
         .017 .035
                             CIRC
                                            2
KK
KM RUNOFF FROM C3, 3.72 AC.
BA
   .006
PΒ
* PI
         .09 94
.05 .15
.028 .035
.010 .035
LU
     . 1
                        100
.002
    200
UK
RD
    250
RD
    250
                                 TRAP
                                      3
                                                  20
```

```
CC3
    COMBINE C3 & C2
HC
       2
KK
     RC3
    ROUTE C3 THRU C4
    1070
RD
           .010 .035
                                       CIRC
                                                   2
KK
      C4
KM RUNOFF FROM C4, 8.74 AC.
    .014
PB
* PI
             .09
LU
      . 1
      200
             .05
                      .15
                              100
UK
            .032
                     .035
                              .006
     750
RD
RD
     230
             .010
                      .035
                                       TRAP
                                                   3
                                                           20
KK
     CC4
    COMBINE C4 &C3
KM
HС
       2
KK
     RC4
    ROUTE C4 TO DETENTION POND
KM
RD
    550
           .018 .035
                                       TRAP
                                                 10
                                                          20
KK CABC
KO
    1
                                         21
KM COMBINE C4 & B5 & A4
HC
   3
KK Storg
RS 1
            Stor
                       -1
* Basin; Btm@308
SA 1.64
            2.60
SE 310
            320
* 60" x 5.5'RISER W/ 8-4" HOLES @ 6" O.C. RIM=313.5 BTM @ EL=308.0
* SQ 0 13.82 26.76 50.77 69.38 93.27 131.95 201.74 275.52 * SE 308 309.65 310.75 312.4 313.5 314.0 314.5 315.2 316.5
                                                                                310.82
                                            314.0
  60" X 4.0 RISER W/16-4" WEEP HOLE 6" O.C. RIM=313.0 BTM @ EL=308.5
 SQ 0.0 20.14 65.49 103.64 124.74 139.50 174.47 226.33 283.89
E308.5 309.85 311.65 313.00 313.4 313.60 314.0 314.5 315
                                                                                331.12
                                                                                   316
  60" X 3.5' rISER W/ 16-4" WEEP HOLE @ 6" O.C. RIM=311.5 BTM @ EL=308
                   54.41 72.10
310.8 311.5
                                     80.26 98.94 140.14 190.61 246.81
311.7 312.0 312.5 313.0 313.5
           20.73
* SQ 0.0
                                                                                  291
  SE 308
           309.4
                                                                                 314.5
  60" X 3' RISER W/ 16-4" WEEP HOLES @ 6" O.C. RIM=313 BTM=310
                   52.62
                                     83.88 124.30 174.01 229.47 247.69
* SO 0.0
           21.85
                            57.81
                                                                                309.63
* SE 310
           311.5
                    312.7
                             313.0
                                     313.5 314.0 314.5 315.0
                                                                       316.0
                                                                                317.0
  60" X2'RISEER W. 16-4" WEEP HOLES @ 6" O.C. RIM=312 BTM=310
                           20.73 32.57 56.87 95.54 143.54 197.36 237.46
311.4 312.0 312.5 313.0 313.5 314.0 315.0
   0.0
                  12.61
SO
           8.62
     310
           310.6
                    311.0
SE
ZZ
```

i I				
i I				
i B				
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ID ROCKLIN CROSSING
  ID FILE: RP1.DAT: 20/09/05
  ID PDP HEC-1 PRELIMINARY DRAINAGE STUDY
  ID CIVIL SOLUTIONS
  ID POST PROJECT CONDITIONS
  * THIS FILE PREPARED USING THE PLACER COUNTY HEC-1 PRE-PROCESSOR
    A CIVIL SOLUTIONS PRODUCT
  *D
  ΙT
       1 22MAR05
                      0
                            1440
  IO
       1
            0
                       0
  KK
      A1
  KM RUNOFF FROM A1, 32.06 AC.
     .050
  PB
  * PI
            .09
.05
.018
 LU
      . 1
                     70
                    .45
 UK
      150
                             100
 RD
                    .035
     400
                             .02
 RD 1700
            .011
                    .035
                                    TRAP
                                              3
                                                     20
 KK
     RA1
 KM ROUTE A1 THRU A2
 RD
     500
          .008 .035
                                    CIRC
                                              2
 KK
      A2
 KM RUNOFF FROM A2, 17.55 AC.
 BA .027
 PB
 * PI
            .09
                    70
.45
 LU
      . 1
 UK
    150
                            100
           .017
 RD 1800
                   .035
                            .011
 RD
    125
            .016
                    .035
                                   TRAP
                                              3
                                                    20
 *
KK
     CA2
KM
    COMBINE A2 & A1
HC
     2
KK
    RA2
KM ROUTE A2 THRU A3
RD
    500
          .020 .035
                                 CIRC
                                             2
KK
     А3
KM RUNOFF FROM A3, 8.5 AC.
BA
    .013
PB
* PI
                  80
.45
.035
          .09
.05
.028
LU
     . 1
UK
     150
                         100
.005
RD
     800
RD
           .022
     320
                  .035
                                   TRAP
                                           3
                                                    20
KK
    CA3
ΚM
   COMBINE A3 & A2
HС
KK
   RA3
KM ROUTE A3 THRU A4
RD
   400
         .005 .035
                                  CIRC
                                        2
KK A4
KM RUNOFF FROM A4, 5.56 AC.
BA
   .009
PB
* PI
LU
    . 1
          .09
                      2
```

```
.05 .4 100
.057 .075 .004
.037 .065
     300
UK
RD
    300
RD
     300
                                   TRAP
                                         5 20
KK
    CA4
KM COMBINE A4 & A3
HC
    2
KK
     В1
KM RUNOFF FROM B1, 6.02336 AC.
BA.00941
PB
* PI
          .09
.013
.007
.004
                  85
.15
.035
LU
     . 1
                          100
UK
     150
RD
     300
                           .004
                  .035
RD
    825
                                   TRAP
                                          3
                                                    20
*
KK
   RB1
KM ROUTE B1 THRU B2
RD 1450
         .005 .035
                                  CIRC2
KK
     В2
KM RUNOFF FROM B2, 9.55232 AC.
BA.01493
PB
* PI
         .09
.007
.007
                 85
.15
.035
.035
LU .1
                         100
.005
   150
UK
RD 300
RD 1150
                                  TRAP 3
                                                    20
KK
   CB2
KM COMBINE B2 & B1
HC 2
KK
    C1
KM RUNOFF FROM C1, 15.5675 AC.
BA.02432
PΒ
* PI
         .09 85
.02 .15
.007 .035
.003 .035
LU .1
                         100
   150
UK
RD 300
RD 1335
                                  TRAP
                                            3
                                                    20
KK
   RC1
KM ROUTE C1 THRU C2
RD 1150 .012 .035
                                  CIRC
                                             2
    C2
KM RUNOFF FROM C2, 11.6563 AC.
BA.01821
PB
* PI
         .09 85
.015 .15 100
.020 .035 .008
LU
   . 1
UK
    150
         .020
RD
    300
                                 TRAP 3
          .012
                  .035
                                                    20
RD
   850
KK
   CC2
KM COMBINE C2 & C1
HC 2
KK
    D1
KM RUNOFF FROM D1, 12.1424 AC.
BA.01897
PB
```

```
* PI
            85
.15
.035
.035
       .09
.025
.010
LU .1
                 100
UK
  150
RD
   300
RD
   900
                        TRAP 3 20
*
KK
  RD1
KM ROUTE D1 THRU C2
RD 380 .010 .035
                   CIRC
                               2
*
KK
  CD1
KM COMBINE D1 & C2
HС
  2
*
KK
  RD1
KM ROUTE D1 THRU B2, DETENTION BASIN
RD 545 .010 .035 CIRC 2
KK CABCD
KO 1
                         21
KM COMBINE D1, C2 & B2 & A4
HC 3
KK Storg
* 48X7.5 RISER W/1-30"
* ALT A DET BASIN AREA-ELEV TABLE
SA .135 .195 .228 .341 .426 .518 .616 .720 .828 .942
SE 308 310 312 314 316 318 320 322 324 326
ZZ
```

FIGURE 2 DENTENTION BASIN OUTLET CONTROL STRUCTURE

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Figure 2 Dete	ention Basin – Outlet Control Structure	1-copies
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Date:	November 2, 2006	
Job Number:	2005.08 Rocklin Crossing	
From:	Glenn Uyeda	•
To: Of:	Rick Chavez RSC Engineers 2270 Douglas Blvd Suite 205 Roseville, CA 95661	

Mailed:

COMMENTS:

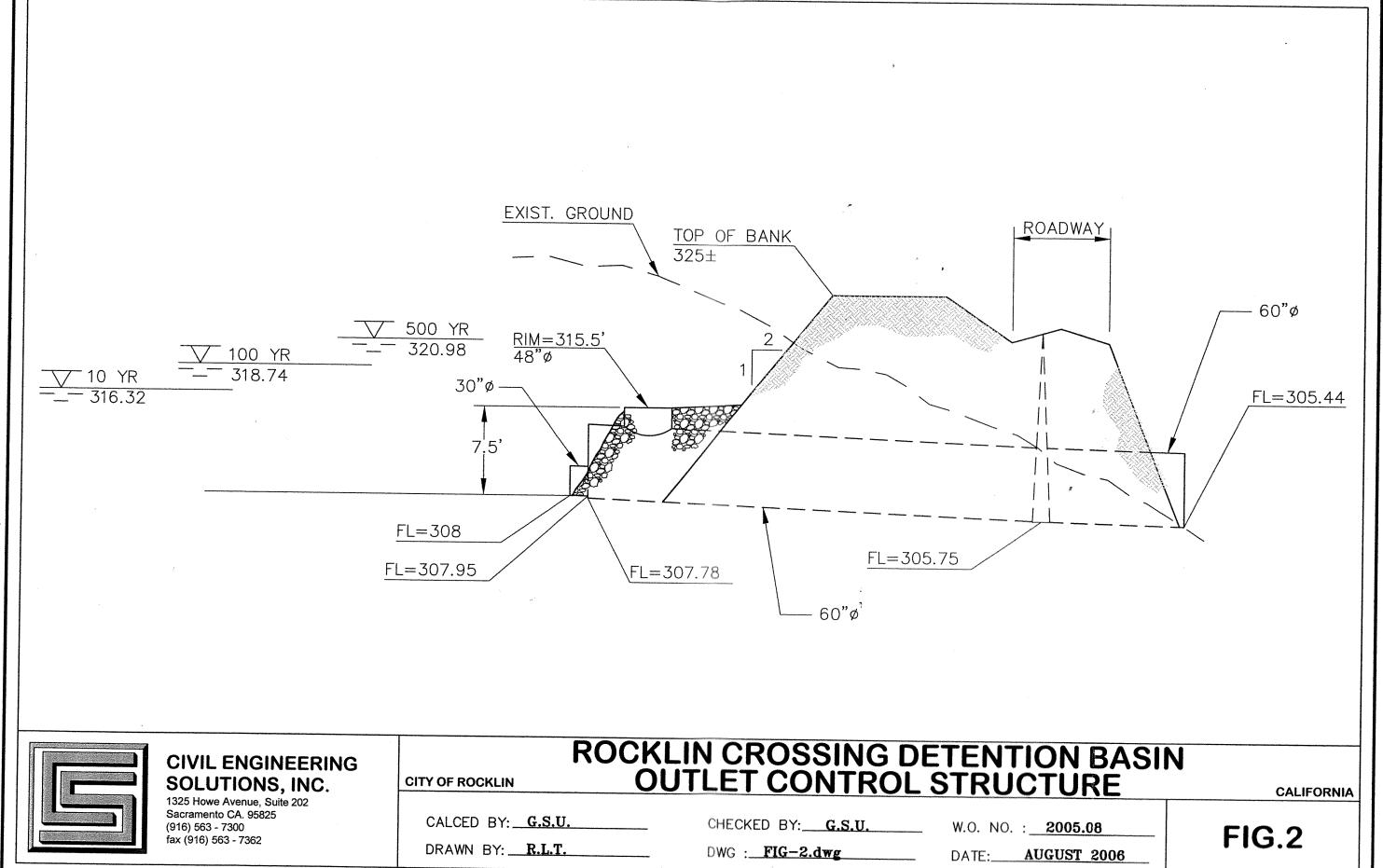
Checked if:

Rick,

Attached is a copy of the revised Detention Basin – Outlet Control Structure. Based on the preliminary improvement plans provided, the 60" diameter culvert will operate adequately, it the distance from the basin to the roadway manhole is not too far. I noted the elevation of the downstream end of the culvert was set at 305.44. This is different that the 307.0 elevation I was able to determine from the project topo.

The distance from upstream end of the control structure and the manhole is unknown. The slope of the pipe segment between the Manhole and the basin outlet structure needs to be determined so that the basin invert of 308.0 can be maintained.

Sent By: Glenn Uyeda



P:\PROJECTS\2005.08\EXHIBITS\FIG.2.DWG Nov 02, 2006-03:58 pm BOBI

