HYDROLOGY REPORT

FOR

THE VILLAGES UNIT 2 & 3

INCLUDE IN TITLE: DONNER SPRINGS
RIO POCO

PREPARED FOR

Di Loreto
Construction and
Development Inc.

JUL 1988
Engr. Dept.
Reno

PREPARED BY

SUMMIT ENGINEERING CORPORATION

REGISTERED PROFESSIONAL ENGINEER - STATE OF NEVADA
GERALD J. WALSH
CIVIL
No. 6475

JOB NO. 3274

JULY 1988

INTRODUCTION

The Villages Units 2 and 3 are located on the south side of Rio Poco Road. Creekside Circle intersects Rio Poco Road and runs through The Villages Unit 2. Bayride Circle intersects Rio Poco Road and runs through The Villages Unit 3. The Villages Units 2 and 3 are contained within Assessor's Parcel Number 21-047-06. The Villages Units 2 and 3 are located in portions of sections 32 and 33 T19N, R20E. (Reference Figure 1 for a vicinity map)

The Villages Unit 1 is located north of The Villages Unit 2. Donner Springs Subdivision Unit No. 3A, Unit No. 5, and Donner Creek Village Condominiums are located to the northeast across Rio Poco Road from The Villages Units 2 and 3. The Bella Vista Ranch lies to the east of The Villages Unit 3. Rattlesnake Mountain lies to the south of The Villages Units 2 and 3.

The site is presently covered by weeds and sagebrush. The site generally slopes toward Rio Poco Road with steeper terrain toward the south. There are dirt piles scattered throughout the site. There are two buildings on the site which will be removed.

There are some minor ditches on the site. All but a portion of one of these will be filled in. The portion of the one that is not filled will be connected to the ditch that will be constructed with The Villages Unit 3. The existing channel that runs parallel to Rio Poco Road in The Villages Unit 2 will remain undisturbed. This

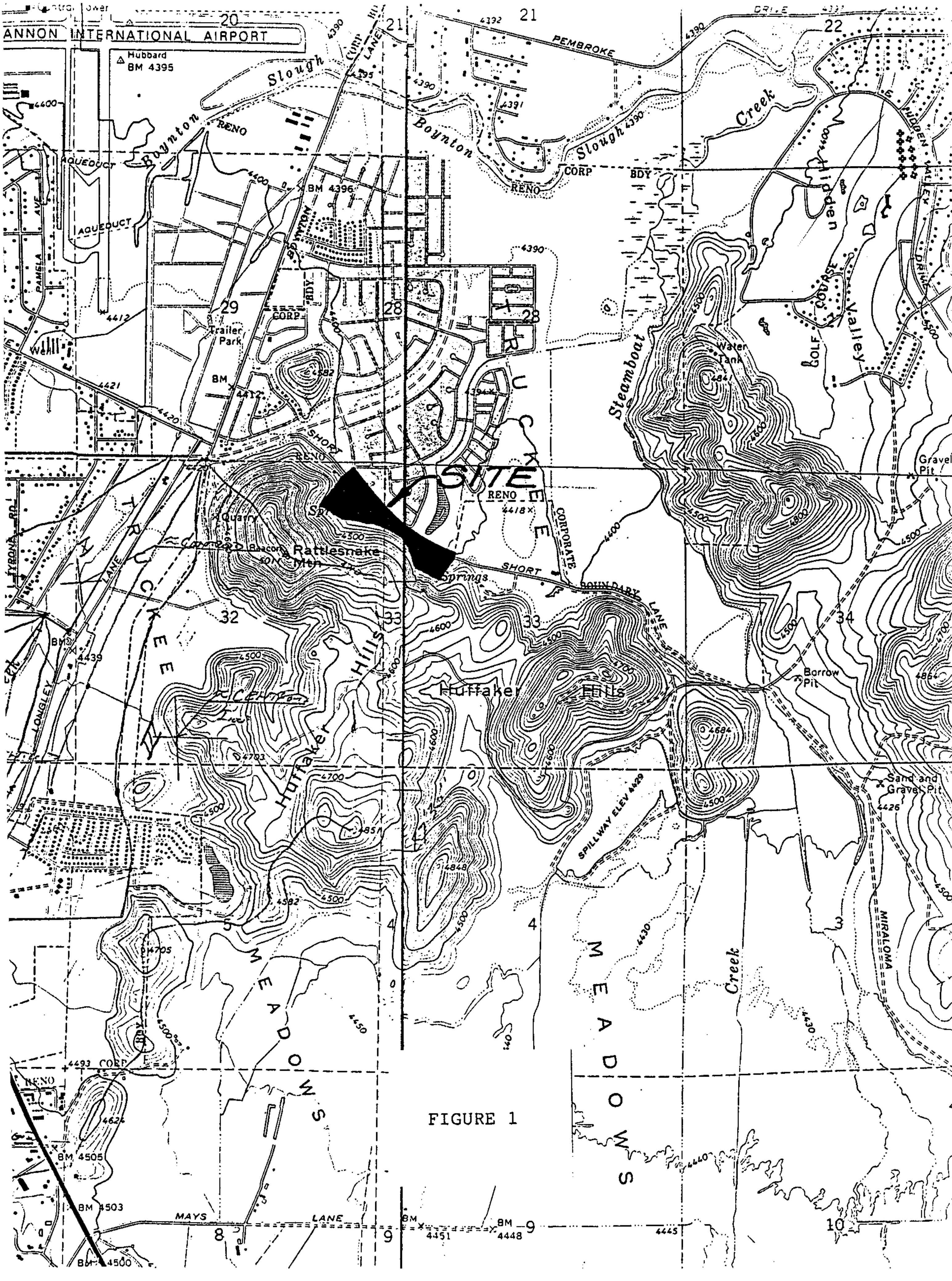

ANNON INTERNATIONAL AIRPORT
Hubbard
BM 4395
Slough
Boynton
RENO
AQUEDUCT
PEMBROKE
Creek
CORP
BDY
Hidden
Valley
GOLF COURSE
Water Tank
Steamboat
Trailer Park
SITE
RENO
SHORT
Springs
CORPORATE
BOUNDARY
LANE
Quarry
Rattlesnake Mtn
TRUCKEE
Huffaker Hills
Gravel Pit
Borrow Pit
Sand and Gravel Pit
SPILLWAY ELEV 4429
MEADOWS
MIRALOMA
LONGLEY
MAYS
BM 4451
BM 4448
BM 4505
BM 4503
BM 4500

FIGURE 1

channel exits the site through 4 30-inch RCP's under Rio Poco Road. There are 2 existing catch basins on Rio Poco Road that will collect runoff from The Villages Units 2 and 3. The Villages Unit 2 and 3 are not shown to be in a Flood Hazard Zone on any FEMA map. The channel that runs parallel to Rio Poco Road is used to convey water to the pond in the Donner Creek Village Condominiums.

The Villages Units 2 and 3 will consist of 128 duplex dwelling units. A ditch to collect surface runoff from Rattlesnake Mountain will be constructed along the south side of the project. A french sub-drain will be constructed there also. The hydrology of nearby developments was studied in the various hydrology reports for those developments.

HYDROLOGIC ANALYSIS METHODS

Two methods of hydrologic analysis were employed in this report. SCS methods were used to study the existing state hydrology and the overall proposed state hydrology. The ditches on the south side of the project were also analyzed using SCS methods. The individual catch basins located on the streets within the project were analyzed using the Rational Method.

SCS METHODOLOGY

The SCS method for analyzing urban hydrology, uses the "unit hydrograph concept". This concept uses two major assumptions: (1)

For a given basin similar types of storms will produce runoff hydrographs of similar shapes, and (2) that the hydrologic system described by the unit hydrograph is a linear system. These assumptions imply that by knowing the ordinates for a unit hydrograph, (a storm which produces one inch of runoff), a hydrograph for a storm which produces two inches can be determined by multiplying all the known ordinates by two. The definition of the unit hydrograph, is a hydrograph representing one unit (one inch) of direct runoff from a rainfall excess of some unit duration and specific area distribution. The SCS has developed a typical unit hydrograph for use with a 3-hour, 6-hour, and 24-hour duration storm. This SCS unit hydrograph also pertains to a rainfall that falls over the entire watershed; not parts of it, but over the whole area.

Also, to be able to attenuate the flows from one subarea to and through another subarea, a flood routing process is performed with the hydrograph. The Muskingum routing method was used for channel routing and the Modified Puls routing method was used for the storage or detention routing. These flood routing procedures define a process of tracing, by calculation, the course and character of a flood wave as it progresses through a channel reach or storage pond. This attenuation of the flood wave actually produces a longer and lower flood wave as it moves downstream.

The SCS method requires three calculated items for analyzing each subarea: (1) The total area of the subarea; (2) the weighted

curve number of the subarea, and (3) the lag time derived form the channel lengths velocity.

The subarea weighted curve numbers were derived from combining the various improved and unimproved areas within each subarea pertaining to the different soil types as established by the SCS Soil Survey of Washoe County, Nevada, South Part, and calculating the average of the different condition curve numbers.

The subarea lag time was calculated using channel lengths and velocity charts. The SCS velocity chart was utilized. The precipitation values were taken from National Oceanic and Atmospheric Administration (NOAA) Atlas II Isopluvials, dated 1973.

The channel routing process and the reservoir routing process were calculated by using the Muskingum method and the Modified Puls method, respectively. The Muskingum method requires a storage constant (k), and an inflow, outflow constant (x) for each channel reach. The Modified Puls method requires the storage-discharge curve data for each reservoir (detention pond).

THE RATIONAL METHOD

The Rational Method has been in widespread use for smaller areas (i.e. less than 20 acres) for many years. The parameters for this method are:

1. Drainage Area - A
2. Time of Concentration - Tc
3. Runoff Coefficient - C
4. Rainfall Intensity - I

A weighted runoff coefficient (c) was developed using C values for different areas given in the City of Reno Policy and Procedures. This was calculated using the following equation:

$$C_{weighted} = \frac{A^1C^1 + A^2C^2 + A^3C^3}{A^1 + A^2 + A^3}$$

where:

A = Area in acres

C = Runoff coefficient corresponding to that area

Average velocities for estimating travel time for overland flow were used to develop a time of concentration (reference Section 3.2 of Urban Hydrology for Small Watersheds, Technical Release No. 55). The following are the parameters used to calculate the velocity over a given watershed.

1. Watercourse slope in percent
2. Length of watercourse in feet
3. Type of watercourse

Once the velocities have been calculated, the following equation is used to determine the appropriate time of concentration (Tc).

$$Tc = L_1/V_1 + L_2/V_2 + L_3/V_3 + \ldots$$

Where:

L = Length of a given section of a watercourse

V = Velocity over that given section

The time of concentration for a given area was then added to a ten-minute minimum buildup time to achieve the final time of concentration. The ten-minute buildup time was based on the City of Reno Policy and Procedures.

Using this time of concentration, an average rainfall intensity is calculated using the rainfall intensity-duration-frequency curves for the general Reno area.

The flow for each Subarea is then calculated using the rational formula:

$$Q = CIA$$

Where:

Q = Flow in CFS
C = Weighted Runoff Coefficient
I = Rainfall Intensity
A = Area in Acres

EXISTING STATE HYDROLOGY

In its existing state The Villages Unit 2 drains into the channel that runs parallel to Rio Poco Road. The peak flow including the contributing runoff from Rattlesnake Mountain and The Villages Unit 1 is 232 cfs during a 100-year storm and 33 cfs during a 5-year storm.

In its existing state The Villages Unit 3 drains onto Rio Poco Road. The peak flow including the contributing runoff from Rattlesnake Mountain is 39.6 cfs during a 100-year storm and 8.7 cfs during a 5-year storm.

The runoff from The Villages Units 2 and 3 passes over and under Rio Poco Road and all ends up in the Donner Creek Village Condominium Pond. During a 5-year storm the peak flow to this pond

is 35.6 cfs. The 100-year flow is 247 cfs. The 5-year flow is contained in the culverts under Rio Poco Road. The 100-year overflow of 47 cfs flows over the low point in Rio Poco Road.

The computer runs for the Existing State Hydrology can be found in Appendix A.

PROPOSED STATE HYDROLOGY

In the developed state the off-site runoff from Rattlesnake Mountain and the on-site runoff from the common area on the south side of project will be collected in v-ditches. These ditches were sized to carry the 100-year storm flow. These ditches flow into pipes designed for the 100-year storm. These pipes carry the flow underground to the channel which runs parallel to Rio Poco Road. A french drain will be provided under the v-ditches to collect groundwater flow from Rattlesnake Mountain.

Three catch basins will be constructed in the interior streets of the project. These catch basins will have the capacity to carry the 5-year storm flow generated within the project.

Catch Basin No. 1 (Reference Appendix B for a map showing the location of all catch basins and drainage facilities) will have a 5-year flow of 1.94 cfs. The 5-year capacity will be 2.34 cfs so there will be no 5-year overflow. The 100-year flow will be 5.53 cfs. This includes 0.26 cfs of overflow from Catch Basin No. 2. The 100-year capacity will be 3.79 cfs. The overflow of 1.74 cfs will flow onto Rio Poco Road toward existing Catch Basin No. 6.

Catch Basin No. 2 will have a 5-year flow of 1.32 cfs. The 5-year capacity will be 2.03 cfs so there will be no overflow. The 100-year flow will be 3.37 cfs. The 100-year capacity will be 3.11 cfs. The overflow of 0.26 cfs will flow toward Catch Basin No. 1.

Catch Basin No. 3 will have a 5-year flow of 1.21 cfs. The 5-year

Existing Catch Basin No. 9 will have a 5-year flow of 0.33 cfs. This Type I catch basin in a sump condition will have a 5-year capacity of 0.33 cfs with a water depth of 0.2 feet. The 100-year flow will be 0.87 cfs. The 100-year capacity will be 0.87 cfs with a water depth of 0.4 cfs.

The 5-year flow to the 4 30-inch diameter RCP culverts under Rio Poco Road is 41 cfs. The culverts have a combined capacity of 200 cfs. The 100-year flow will be 265 cfs. The 65 cfs overflow will flow over the low point in Rio Poco Road and into the pond in the Donner Creek Village Condominiums.

The hydraulic and hydrologic computations for the proposed state can be found in Appendix A.

CONCLUSIONS

The construction of The Villages Units 2 and 3 will have a minimal effect on the hydrology in the area. The development of The Villages Units 2 and 3 will reduce the amount of flow reaching Rio Poco Road during a 5-year storm. This is due to the fact that ditch section HC-HC and HD-HD diverts the flow from Rattlesnake Mountain away from Rio Poco Road and into the channel that runs parallel to Rio Poco Road. The 5-year flow will be reduced from 8.7 cfs to 5.8 cfs.

The flow to the 4 existing 30-inch O RCP culverts will be increased by the development of The Villages Units 2 and 3. The 5-year flow will be increased from 33 cfs to 41 cfs. The 100-year flow will be increased from 232 cfs to 265 cfs. The culverts have a combined capacity of 200 cfs so there will be no overflow during a 5-year storm. The sag vertical curve in Rio Poco Road was designed to handle an overflow of 500 cfs. Since the overflow will only be 65 cfs, therefore, no mitigating measures will be necessary.

The development of The Villages Units 2 and 3 will increase the flow to the pond in Donner Creek Village Condominiums. The 5-year contribution will be increased form 36 cfs to 45 cfs. The 100-year contribution will be increased from 247 cfs to 279 cfs. The pond was designed to handle flows in excess of 700 cfs. Therefore, no mitigating measures are necessary. Furthermore, the detention effects of the pond will serve to decrease flows downstream.

APPENDIX A

5-YEAR HYDROLOGY

EXISTING AND PROPOSED STATE

SCS METHODS

```
---------------------------------------------------------------------------

TIME INCREMENT, MIN, =            5.00
---------------------------------------------------------------------------

DISCHARGE DIMENSION =           500.00
---------------------------------------------------------------------------

COMPUTE RAINFALL 5 YR
          STORM DURATION 24 HOURS WITH  1.34 " RAINFALL - TYPE II DISTRIBUTION
---------------------------------------------------------------------------

    STATION       WEIGHT
        1          1.00

AVERAGE RAINFALL, IN =            1.34
---------------------------------------------------------------------------

    STATION       WEIGHT
        1          1.00

---------------------------------------------------------------------------

********** ---------------------- **********
---------------------------------------------------------------------------

********** ---------------------- **********
---------------------------------------------------------------------------

********** EXISTING STATE HYDROLOGY **********
---------------------------------------------------------------------------

********** EXISTING FLOW FROM THE VILLAGES UNIT 1 **********
---------------------------------------------------------------------------

CATCHMENT AREA 1 , SQ. MI. =  .1
---------------------------------------------------------------------------

SCS CURVE NUMBER =               85.00

---------------------------------------------------------------------------

SCS LAG, HRS =                    .27

---------------------------------------------------------------------------

COMPUTE RUNOFF @  1

MAXIMUM FLOW =          17.73 CFS
TIME @ MAX FLOW =     730.00 MINUTES
---------------------------------------------------------------------------

VOLUME IN AC. FT. @ CP #  1  =  1.89027986807
---------------------------------------------------------------------------

CATCHMENT AREA 2 , SQ. MI. =  .0156
---------------------------------------------------------------------------

SCS CURVE NUMBER =               85.00
```

SCS LAG, HRS = .10

COMPUTE RUNOFF @ 2

MAXIMUM FLOW = 4.13 CFS
TIME @ MAX FLOW = 720.00 MINUTES

VOLUME IN AC. FT. @ CP # 2 = .292731576277

MUSKINGUM K, HRS. = 0.00

MUSKINGUM X = .25

MUSKINGUM ROUTE FROM 1 TO 2

MAXIMUM CONTRIBUTION = 17.73
MAXIMUM FLOW = 19.88
TIME @ MAX FLOW = 730.00 MINUTES

********** EXISTING FLOW FROM THE VILLAGES **********

********** UNIT 2 INCLUDING RATTLESNAKE **********

********** MTN. TO THE CHANNEL RUNNING **********

********** PARALLEL TO RIO POCO ROAD **********

CATCHMENT AREA 3 , SQ. MI. = .1

SCS CURVE NUMBER = 85.00

SCS LAG, HRS = .39

COMPUTE RUNOFF @ 3

MAXIMUM FLOW = 14.18 CFS
TIME @ MAX FLOW = 740.00 MINUTES

```
VOLUME IN AC. FT. @ CP #  3  =  1.89042143355
---------------------------------------------------------------------------

********** ROUTE UNIT 1 TO UNIT 2 **********
---------------------------------------------------------------------------

********** TOTAL EXISTING STATE FLOW TO EXISTING **********
---------------------------------------------------------------------------

********** 4-30 INCH RCP CULVERTS UNDER RIO POCO ROAD **********
---------------------------------------------------------------------------

MUSKINGUM K, HRS. =                .13
---------------------------------------------------------------------------

MUSKINGUM X =                      .25
---------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  2  TO  3


MAXIMUM CONTRIBUTION =    18.59
MAXIMUM FLOW         =    32.77
TIME @ MAX FLOW =      740.00 MINUTES
---------------------------------------------------------------------------

********** EXISTING STATE FLOW FROM THE VILLAGES **********
---------------------------------------------------------------------------

********** UNIT 2 AND 3 TO RIO POCO ROAD **********
---------------------------------------------------------------------------

CATCHMENT AREA 4 , SQ. MI. =  .0356
---------------------------------------------------------------------------

SCS CURVE NUMBER =              85.00

---------------------------------------------------------------------------

SCS LAG, HRS =                     .12

---------------------------------------------------------------------------

COMPUTE RUNOFF @  4


MAXIMUM FLOW =          8.71 CFS
TIME @ MAX FLOW =     725.00 MINUTES
---------------------------------------------------------------------------

VOLUME IN AC. FT. @ CP #  4  =  .66735800492
---------------------------------------------------------------------------

********** TOTAL EXISTING STATE FLOW TO THE **********
---------------------------------------------------------------------------

********** POND IN DONNER CREEK VILLAGE CONDOMINIUNS **********
---------------------------------------------------------------------------
```

```
MUSKINGUM K, HRS. =                0.00
--------------------------------------------------------------------------------

MUSKINGUM X =                       .25
--------------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  3  TO  4


MAXIMUM CONTRIBUTION =    32.77
MAXIMUM FLOW         =    35.57
TIME @ MAX FLOW =      740.00 MINUTES
--------------------------------------------------------------------------------

********** ------------------------------ **********
--------------------------------------------------------------------------------

********** ------------------------------ **********
--------------------------------------------------------------------------------

********** PROPOSED STATE HYDROLOGY **********
--------------------------------------------------------------------------------

********** FLOW TO DITCH SECTION HA-HA **********
--------------------------------------------------------------------------------

********** TOTAL FLOW TO 30 INCH RCP INLET **********
--------------------------------------------------------------------------------

CATCHMENT AREA 5 , SQ. MI. =  .0382
--------------------------------------------------------------------------------

SCS CURVE NUMBER =               85.00

--------------------------------------------------------------------------------

SCS LAG, HRS =                    .07

--------------------------------------------------------------------------------

COMPUTE RUNOFF @  5


MAXIMUM FLOW =          11.91 CFS
TIME @ MAX FLOW =      720.00 MINUTES
--------------------------------------------------------------------------------

VOLUME IN AC. FT. @ CP #  5  =  .737787354258
--------------------------------------------------------------------------------

********** FLOW TO DITCH SECTION HB-HB **********
--------------------------------------------------------------------------------

CATCHMENT AREA 6 , SQ. MI. =  .0447
--------------------------------------------------------------------------------

SCS CURVE NUMBER =               85.00

--------------------------------------------------------------------------------
```

SCS LAG, HRS = .08

COMPUTE RUNOFF @ 6

MAXIMUM FLOW = 13.30 CFS
TIME @ MAX FLOW = 720.00 MINUTES

VOLUME IN AC. FT. @ CP # 6 = .860149860669

********** FLOW TO DITCH SECTION HC-HC AND HD-HD **********

CATCHMENT AREA 7 , SQ. MI. = .0279

SCS CURVE NUMBER = 85.00

SCS LAG, HRS = .14

COMPUTE RUNOFF @ 7

MAXIMUM FLOW = 6.75 CFS
TIME @ MAX FLOW = 725.00 MINUTES

VOLUME IN AC. FT. @ CP # 7 = .52466926409

********** PROPOSED STATE FLOW FROM THE VILLAGES **********

********** UNIT 1 AND 2 AND RIO POCO ROAD TO THE **********

********** EXISTING CHANNEL RUNNING PARALLEL TO RIO POCO ROAD **********

CATCHMENT AREA 8 , SQ. MI. = .0225

SCS CURVE NUMBER = 92.00

SCS LAG, HRS = .31

COMPUTE RUNOFF @ 8

```
MAXIMUM FLOW =          7.69 CFS
TIME @ MAX FLOW =     730.00 MINUTES
-------------------------------------------------------------------------------

VOLUME IN AC. FT. @ CP #  8  =  .802316131595
-------------------------------------------------------------------------------

********** PROPOSED STATE FLOW FROM THE VILLAGES **********
-------------------------------------------------------------------------------

********** UNIT 2 AND 3 TO RIO POCO ROAD **********
-------------------------------------------------------------------------------

CATCHMENT AREA 9 , SQ. MI. =  .0108
-------------------------------------------------------------------------------

SCS CURVE NUMBER =              92.00

-------------------------------------------------------------------------------

SCS LAG, HRS =                   .10

-------------------------------------------------------------------------------

COMPUTE RUNOFF @  9

MAXIMUM FLOW =          5.78 CFS
TIME @ MAX FLOW =     720.00 MINUTES
-------------------------------------------------------------------------------

VOLUME IN AC. FT. @ CP #  9  =  .382342218658
-------------------------------------------------------------------------------

********** ROUTE FLOW FROM THE VILLAGES UNIT 1 **********
-------------------------------------------------------------------------------

********** TO THE 4 EXISTING 30 INCH RCP CULVERTS **********
-------------------------------------------------------------------------------

********** UNDER RIO POCO ROAD **********
-------------------------------------------------------------------------------

MUSKINGUM K, HRS. =              .13
-------------------------------------------------------------------------------

MUSKINGUM X =                    .25
-------------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  2  TO  8

MAXIMUM CONTRIBUTION =    18.59
MAXIMUM FLOW         =    25.29
TIME @ MAX FLOW =     740.00 MINUTES
-------------------------------------------------------------------------------

********** ROUTE FLOW FROM DITCH SECTION HA-HA **********
-------------------------------------------------------------------------------
```

********** TO THE 4 EXISTING 30 INCH RCP **********

********** CULVERTS UNDER RIO POCO ROAD **********

MUSKINGUM K, HRS. = .13

MUSKINGUM X = .25

MUSKINGUM ROUTE FROM 5 TO 8

MAXIMUM CONTRIBUTION = 9.47
MAXIMUM FLOW = 32.38
TIME @ MAX FLOW = 735.00 MINUTES

********** ROUTE FLOW FROM DITCH SECTION HB-HB, **********

********** HC-HC AND HD-HD TO 36 INCH RCP INLET **********

********** TOTAL FLOW TO PROPOSED 36 INCH RCP INLET **********

MUSKINGUM K, HRS. = 0.00

MUSKINGUM X = .25

MUSKINGUM ROUTE FROM 6 TO 7

MAXIMUM CONTRIBUTION = 13.30
MAXIMUM FLOW = 19.28
TIME @ MAX FLOW = 720.00 MINUTES

********** ROUTE FLOW FROM 36 INCH RCP INLET **********

********** TO THE 4 EXISTING 30 INCH **********

********** RCP CULVERTS UNDER RIO POCO ROAD **********

********** TOTAL FLOW TO 4 EXISTING 30 INCH CULVERTS **********

MUSKINGUM K, HRS. = 0.00

MUSKINGUM X = .25

```
--------------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  7  TO  8


MAXIMUM CONTRIBUTION =    19.28
MAXIMUM FLOW         =    41.11
TIME @ MAX FLOW =      730.00 MINUTES
--------------------------------------------------------------------------------

********** TOTAL PROPOSED STATE CONTRIBUTION **********
--------------------------------------------------------------------------------

********** TO THE POND IN DONNER CREEK **********
--------------------------------------------------------------------------------

********** VILLAGE CONDOMINIUMS FROM THE VILLAGES 1,2 AND 3 **********
--------------------------------------------------------------------------------

MUSKINGUM K, HRS. =                0.00
--------------------------------------------------------------------------------

MUSKINGUM X =                       .25
--------------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  8  TO  9


MAXIMUM CONTRIBUTION =    41.11
MAXIMUM FLOW         =    45.23
TIME @ MAX FLOW =      725.00 MINUTES
--------------------------------------------------------------------------------

NORMAL TERMINATION
TIME FOR THIS RUN 00:03:53
```

100-YEAR HYDROLOGY

EXISTING AND PROPOSED STATE

SCS METHODS

TIME INCREMENT, MIN, = 5.00

DISCHARGE DIMENSION = 500.00

COMPUTE RAINFALL 100 YR
STORM DURATION 24 HOURS WITH 2.88 " RAINFALL - TYPE II DISTRIBUTION

STATION	WEIGHT
1	1.00

AVERAGE RAINFALL, IN = 2.88

STATION	WEIGHT
1	1.00

********** ---------- **********

********** ---------- **********

********** EXISTING STATE HYDROLOGY **********

********** EXISTING FLOW FROM THE VILLAGES UNIT 1 **********

CATCHMENT AREA 1 , SQ. MI. = .1

SCS CURVE NUMBER = 85.00

SCS LAG, HRS = .27

COMPUTE RUNOFF @ 1

MAXIMUM FLOW = 83.47 CFS
TIME @ MAX FLOW = 730.00 MINUTES

VOLUME IN AC. FT. @ CP # 1 = 7.9441261789

CONTROL POINT = 1.00
BASEFLOW, CFS = 79.00

```
CATCHMENT AREA 2 , SQ. MI. =  .0156
-------------------------------------------------------------------------------

SCS CURVE NUMBER =                85.00

-------------------------------------------------------------------------------

SCS LAG, HRS =                     .10

-------------------------------------------------------------------------------

COMPUTE RUNOFF @  2


MAXIMUM FLOW =          18.60 CFS
TIME @ MAX FLOW =      720.00 MINUTES
-------------------------------------------------------------------------------

VOLUME IN AC. FT. @ CP #  2  =  1.23023929831
-------------------------------------------------------------------------------

MUSKINGUM K, HRS. =               0.00
-------------------------------------------------------------------------------

MUSKINGUM X =                      .25
-------------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  1  TO  2


MAXIMUM CONTRIBUTION =   162.47
MAXIMUM FLOW         =   171.13
TIME @ MAX FLOW =      730.00 MINUTES
-------------------------------------------------------------------------------

********** EXISTING FLOW FROM THE VILLAGES **********
-------------------------------------------------------------------------------

********** UNIT 2 INCLUDING RATTLESNAKE **********
-------------------------------------------------------------------------------

********** MTN. TO THE CHANNEL RUNNING **********
-------------------------------------------------------------------------------

********** PARALLEL TO RIO POCO ROAD **********
-------------------------------------------------------------------------------

CATCHMENT AREA 3 , SQ. MI. =  .1
-------------------------------------------------------------------------------

SCS CURVE NUMBER =                85.00

-------------------------------------------------------------------------------

SCS LAG, HRS =                     .39

-------------------------------------------------------------------------------

COMPUTE RUNOFF @  3
```

```
MAXIMUM FLOW =          67.21 CFS
TIME @ MAX FLOW =      735.00 MINUTES
-------------------------------------------------------------------------------

VOLUME IN AC. FT. @ CP #  3  =  7.94472112468
-------------------------------------------------------------------------------

********** ROUTE UNIT 1 TO UNIT 2 **********
-------------------------------------------------------------------------------

********** TOTAL EXISTING STATE FLOW TO EXISTING **********
-------------------------------------------------------------------------------

********** 4-30 INCH RCP CULVERTS UNDER RIO POCO ROAD **********
-------------------------------------------------------------------------------

MUSKINGUM K, HRS. =                .13
-------------------------------------------------------------------------------

MUSKINGUM X =                      .25
-------------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  2  TO  3

MAXIMUM CONTRIBUTION =   165.73
MAXIMUM FLOW         =   232.06
TIME @ MAX FLOW =      740.00 MINUTES
-------------------------------------------------------------------------------

********** EXISTING STATE FLOW FROM THE VILLAGES **********
-------------------------------------------------------------------------------

********** UNIT 2 AND 3 TO RIO POCO ROAD **********
-------------------------------------------------------------------------------

CATCHMENT AREA 4 , SQ. MI. =  .0356
-------------------------------------------------------------------------------

SCS CURVE NUMBER =             85.00

-------------------------------------------------------------------------------

SCS LAG, HRS =                     .12

-------------------------------------------------------------------------------

COMPUTE RUNOFF @  4

MAXIMUM FLOW =          39.61 CFS
TIME @ MAX FLOW =      720.00 MINUTES
-------------------------------------------------------------------------------

VOLUME IN AC. FT. @ CP #  4  =  2.80465146307
-------------------------------------------------------------------------------

********** TOTAL EXISTING STATE FLOW TO THE **********
-------------------------------------------------------------------------------
```

********** POND IN DONNER CREEK VILLAGE CONDOMINIUNS **********

MUSKINGUM K, HRS. = 0.00

MUSKINGUM X = .25

MUSKINGUM ROUTE FROM 3 TO 4

MAXIMUM CONTRIBUTION = 232.06
MAXIMUM FLOW = 246.81
TIME @ MAX FLOW = 735.00 MINUTES

********** ---------- **********

********** ---------- **********

********** PROPOSED STATE HYDROLOGY **********

********** FLOW TO DITCH SECTION HA-HA **********

********** TOTAL FLOW TO 30 INCH RCP INLET **********

CATCHMENT AREA 5 , SQ. MI. = .0382

SCS CURVE NUMBER = 85.00

SCS LAG, HRS = .07

COMPUTE RUNOFF @ 5

MAXIMUM FLOW = 51.01 CFS
TIME @ MAX FLOW = 720.00 MINUTES

VOLUME IN AC. FT. @ CP # 5 = 3.10063918811

********** FLOW TO DITCH SECTION HB-HB **********

CATCHMENT AREA 6 , SQ. MI. = .0447

SCS CURVE NUMBER = 85.00

SCS LAG, HRS = .08

COMPUTE RUNOFF @ 6

MAXIMUM FLOW = 57.93 CFS
TIME @ MAX FLOW = 720.00 MINUTES

VOLUME IN AC. FT. @ CP # 6 = 3.61488218827

********** FLOW TO DITCH SECTION HC-HC AND HD-HD **********

CATCHMENT AREA 7 , SQ. MI. = .0279

SCS CURVE NUMBER = 85.00

SCS LAG, HRS = .14

COMPUTE RUNOFF @ 7

MAXIMUM FLOW = 29.57 CFS
TIME @ MAX FLOW = 725.00 MINUTES

VOLUME IN AC. FT. @ CP # 7 = 2.20498504297

********** PROPOSED STATE FLOW FROM THE VILLAGES **********

********** UNIT 1 AND 2 AND RIO POCO ROAD TO THE **********

********** EXISTING CHANNEL RUNNING PARALLEL TO RIO POCO ROAD **********

CATCHMENT AREA 8 , SQ. MI. = .0225

SCS CURVE NUMBER = 92.00

SCS LAG, HRS = .31

COMPUTE RUNOFF @ 8

MAXIMUM FLOW = 23.61 CFS
TIME @ MAX FLOW = 730.00 MINUTES

VOLUME IN AC. FT. @ CP # 8 = 2.4598886745

********** PROPOSED STATE FLOW FROM THE VILLAGES **********

********** UNIT 2 AND 3 TO RIO POCO ROAD **********

CATCHMENT AREA 9 , SQ. MI. = .0108

SCS CURVE NUMBER = 92.00

SCS LAG, HRS = .10

COMPUTE RUNOFF @ 9

MAXIMUM FLOW = 17.17 CFS
TIME @ MAX FLOW = 720.00 MINUTES

VOLUME IN AC. FT. @ CP # 9 = 1.17225524506

********** ROUTE FLOW FROM THE VILLAGES UNIT 1 **********

********** TO THE 4 EXISTING 30 INCH RCP CULVERTS **********

********** UNDER RIO POCO ROAD **********

MUSKINGUM K, HRS. = .13

MUSKINGUM X = .25

MUSKINGUM ROUTE FROM 2 TO 8

MAXIMUM CONTRIBUTION = 165.73
MAXIMUM FLOW = 187.58
TIME @ MAX FLOW = 735.00 MINUTES

********** ROUTE FLOW FROM DITCH SECTION HA-HA **********

********** TO THE 4 EXISTING 30 INCH RCP **********

********** CULVERTS UNDER RIO POCO ROAD **********

MUSKINGUM K, HRS. = .13

MUSKINGUM X = .25

MUSKINGUM ROUTE FROM 5 TO 8

MAXIMUM CONTRIBUTION = 41.62
MAXIMUM FLOW = 218.49
TIME @ MAX FLOW = 735.00 MINUTES

********** ROUTE FLOW FROM DITCH SECTION HB-HB, **********

********** HC-HC AND HD-HD TO 36 INCH RCP INLET **********

********** TOTAL FLOW TO PROPOSED 36 INCH RCP INLET **********

MUSKINGUM K, HRS. = 0.00

MUSKINGUM X = .25

MUSKINGUM ROUTE FROM 6 TO 7

MAXIMUM CONTRIBUTION = 57.93
MAXIMUM FLOW = 86.87
TIME @ MAX FLOW = 720.00 MINUTES

********** ROUTE FLOW FROM 36 INCH RCP INLET **********

********** TO THE 4 EXISTING 30 INCH **********

********** RCP CULVERTS UNDER RIO POCO ROAD **********

********** TOTAL FLOW TO 4 EXISTING 30 INCH CULVERTS **********

```
MUSKINGUM K, HRS. =                0.00
--------------------------------------------------------------------------------

MUSKINGUM X =                       .25
--------------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  7  TO  8


MAXIMUM CONTRIBUTION =    86.87
MAXIMUM FLOW         =   264.87
TIME @ MAX FLOW =      725.00 MINUTES
--------------------------------------------------------------------------------

********** TOTAL PROPOSED STATE CONTRIBUTION **********
--------------------------------------------------------------------------------

********** TO THE POND IN DONNER CREEK **********
--------------------------------------------------------------------------------

********** VILLAGE CONDOMINIUMS FROM THE VILLAGES 1,2 AND 3 **********
--------------------------------------------------------------------------------

MUSKINGUM K, HRS. =                0.00
--------------------------------------------------------------------------------

MUSKINGUM X =                       .25
--------------------------------------------------------------------------------

MUSKINGUM ROUTE FROM  8  TO  9


MAXIMUM CONTRIBUTION =   264.87
MAXIMUM FLOW         =   278.78
TIME @ MAX FLOW =      725.00 MINUTES
--------------------------------------------------------------------------------

NORMAL TERMINATION
TIME FOR THIS RUN 00:03:54
```

RATIONAL METHOD CALCULATION

CATCH BASINS NO.'S 1, 2, 3, 6, 7, AND 8

Catch Basin No.	A Acres	TC Minute	I5	I100	C	Q5	Q100
1	3.8	18.9	0.93	2.52	.55	1.94	5.27
2	1.97	12.7	1.22	3.11	.55	1.32	3.37
3	1.77	12.5	1.24	3.3	.55	1.21	3.21
6	0.70	14.0	1.14	3.0	.55	0.44	1.16
7	6.89	20.5	0.895	2.45	.55	3.39	9.28
8	3.8	20.0	0.90	2.48	.55	1.88	5.18
9	0.53	14.0	1.14	3.0	.55	0.33	0.87

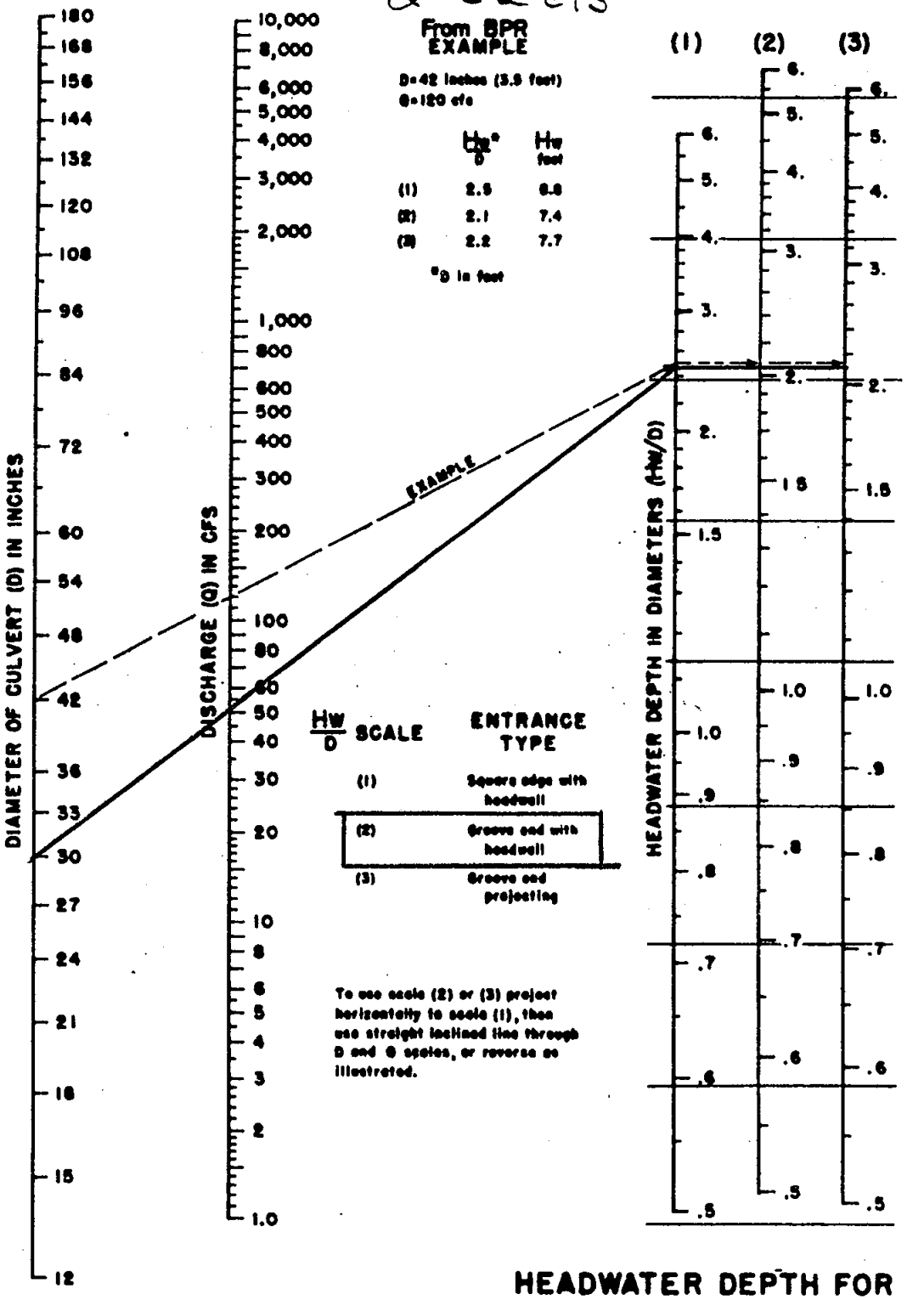
HYDRAULIC CALCULATIONS

Analysis Points 4 and 5
Storm Drain Pipes
Ditch Sections HA-HA, HB-HB, HC-HC, and HD-HD
Channel Running Parallel to Rio Poco Road
Inlet Capacity of 4 30-inch Ø RCP Culverts
Depth of Flow in Streets
Capacity of Catch Basins 1, 2, 43, 6, 7, 8, and 9

Analysis Point #4

$HW = (2.1)(2.5') = 5.25'$

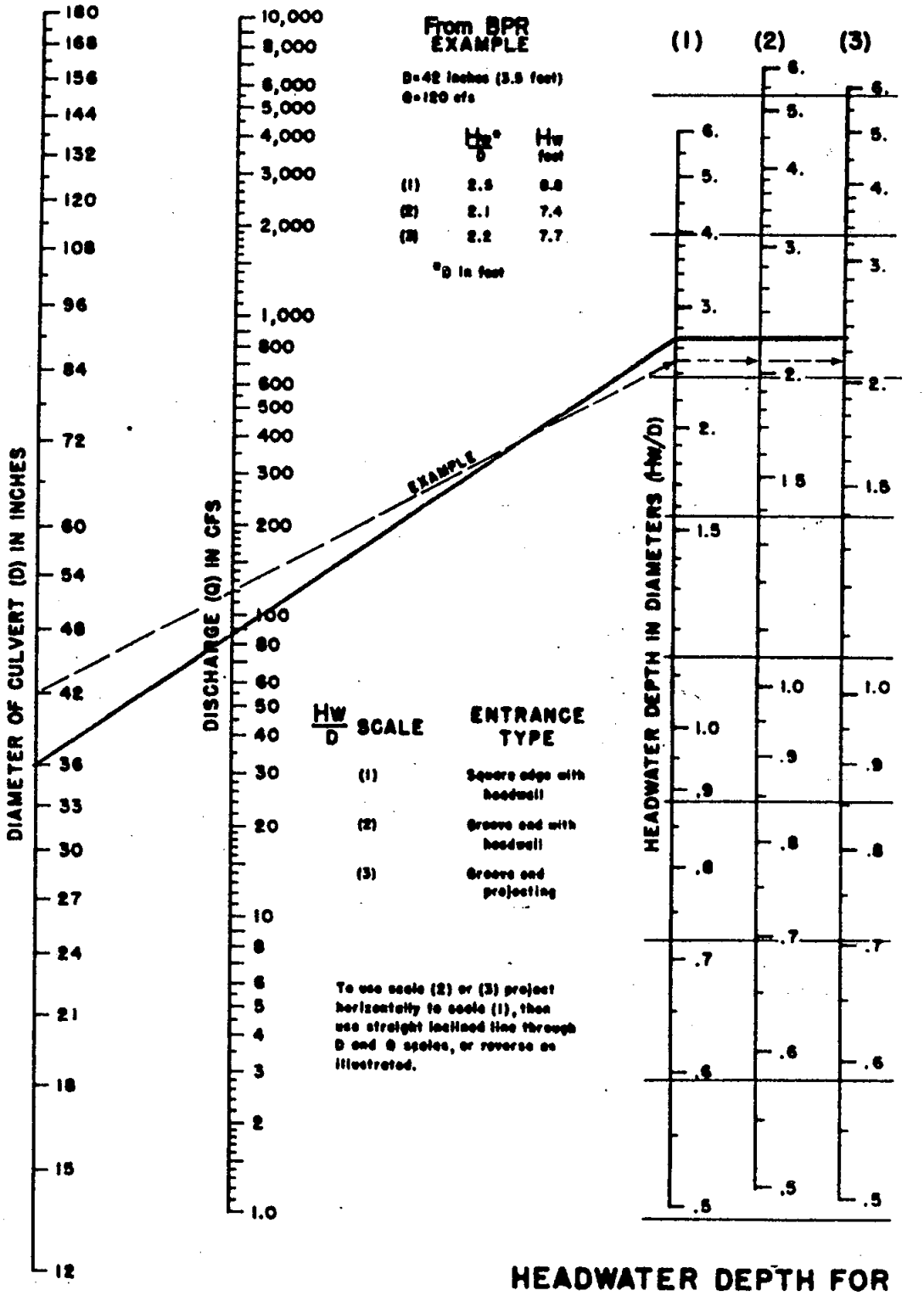
$Q = 52$ cfs



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

FIGURE 10-10.

Analysis Point #5
Q = 87 cfs HW = (2.2)(3') = 6.6'



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

FIGURE 10-10.

STORM DRAIN PIPE ANALYSIS

Pipe Reach Description	Pipe Size	Pipe Slope	Q5	5-Year Depth of Flow	Q100	100-Year Depth of Flow
Analysis Point #4 to SDMH #1	30"	2.52%	11.9	8.7"	51.0	20.0"
Catch Basin #1 to SDMH #1	12"	1.2 %	1.94	6.0"	3.79	9.6"
Catch Basin #2 to SDMH #1	10"	12.6 %	1.32	2.8"	3.11	4.4"
SDMH #1 to SDMH #2	36"	0.8 %	15.16	12.6"	57.9	28.8"
SDMH #2 TO Outlet	36"	1.33%	15.16	11.2"	57.9	23.4"
Catch Basin to SDMH #3	10"	9.42%	1.21	2.9"	3.08	4.8"
SDMH #3 to SDMH #4	12"	2.3 %	1.21	4.0"	3.08	6.5"
SDMH #4 to SDMH #5	15"	0.25%	1.21	6.5"	3.08	11.7"
Analysis Point #5 to SDMH #5	36"	5.22%	19.3	8.6"	86.9	19.8"
SDMH #5 to Outlet	36"	1.56%	20.51	12.2"	89.98	33.8"

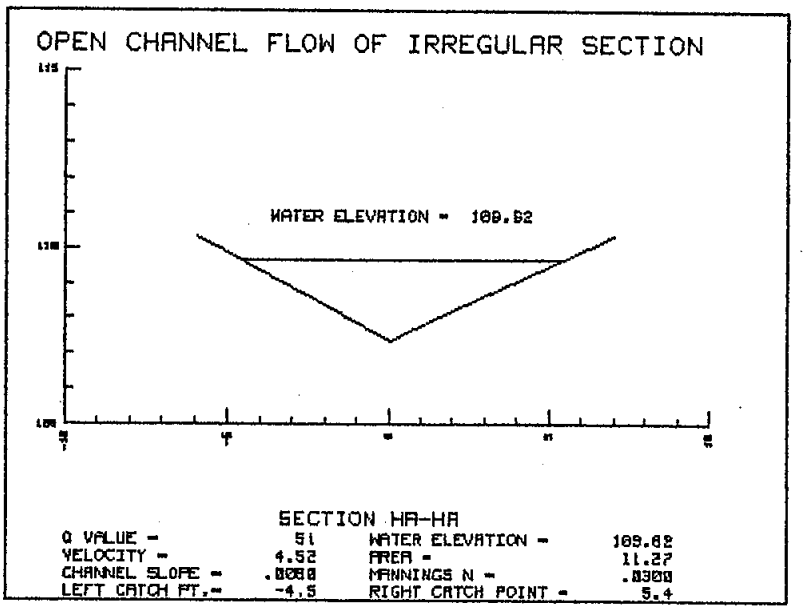
All pipes will be concrete with N = 0.013

Q VALUE = 51.0082898964
WATER ELEVATION = 109.620771232
VELOCITY = 4.52435107897
AREA = 11.2741670587
WETTED PERIMETER = 10.9248087126
CHANNEL SLOPE IN Ft/Ft= .008
MANNINGS N = .03
CATCH POINT ON LEFT SIDE =-4.541542464
CATCH POINT ON RIGHT SIDE = 5.38827072

CHANNEL COORDINATES

ELEVATION	DISTANCE
110.30	-5.90
107.35	0.00
110.30	7.00

****

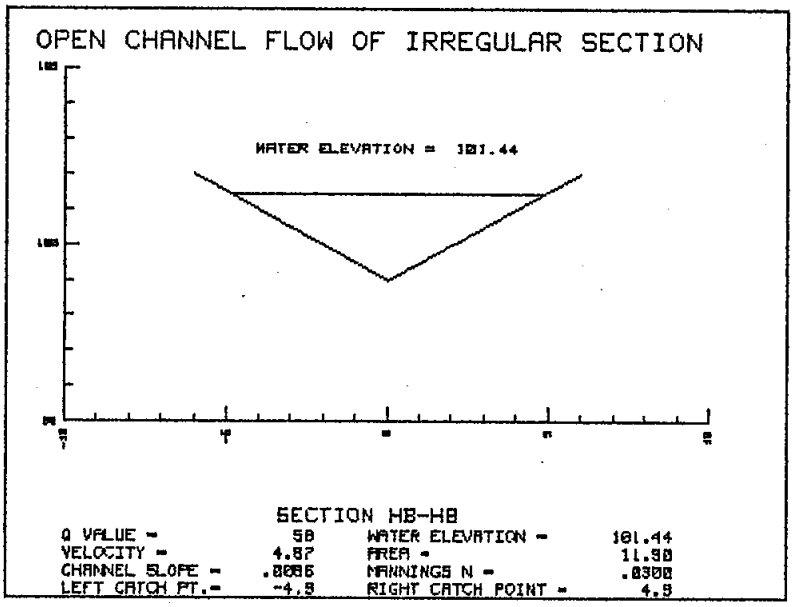


Q VALUE = 57.9256106139
WATER ELEVATION = 101.439250722
VELOCITY = 4.86774411481
AREA = 11.8998881715
WETTED PERIMETER = 10.908660858
CHANNEL SLOPE IN Ft/Ft= .0086
MANNINGS N = .03
CATCH POINT ON LEFT SIDE =-4.8785014444
CATCH POINT ON RIGHT SIDE = 4.8785014444

CHANNEL COORDINATES

ELEVATION	DISTANCE
102.00	-6.00
99.00	0.00
102.00	6.00

****

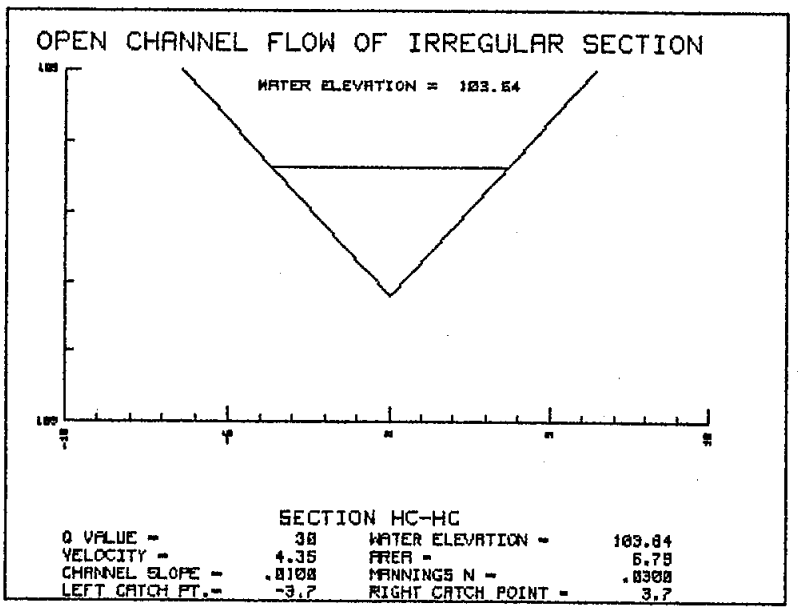


Q VALUE = 29.5758246998
WATER ELEVATION = 103.642891398
VELOCITY = 4.35419005857
AREA = 6.79249741101
WETTED PERIMETER = 8.24166088298
CHANNEL SLOPE IN Ft/Ft= .01
MANNINGS N = .03
CATCH POINT ON LEFT SIDE =-3.68578279637
CATCH POINT ON RIGHT SIDE = 3.68578279637

CHANNEL COORDINATES

ELEVATION	DISTANCE
105.00	-6.40
101.80	0.00
105.00	6.40

****

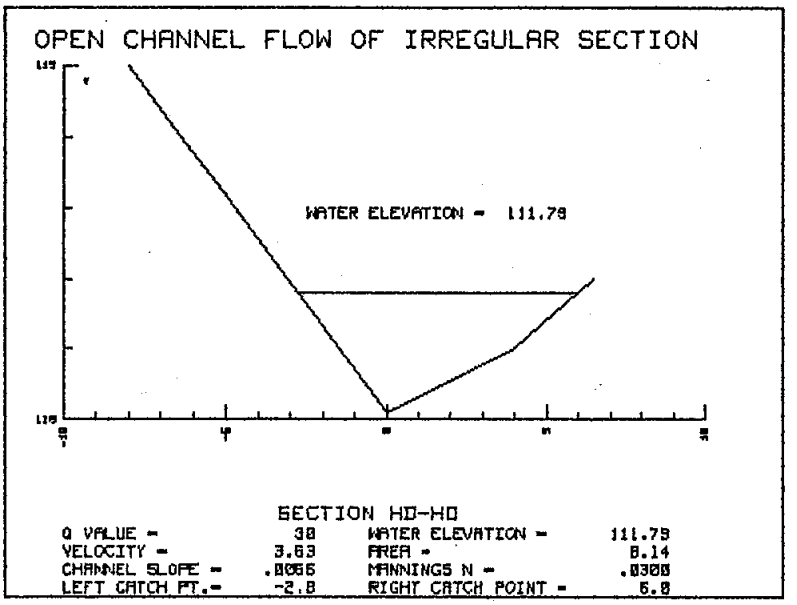


Q VALUE = 29.5760787973
WATER ELEVATION = 111.787962923
VELOCITY = 3.63359675881
AREA = 8.13961503175
WETTED PERIMETER = 9.48643542174
CHANNEL SLOPE IN Ft/Ft= .0066
MANNINGS N = .03
CATCH POINT ON LEFT SIDE =-2.77717548466
CATCH POINT ON RIGHT SIDE = 5.96990730766

CHANNEL COORDINATES

ELEVATION	DISTANCE
115.00	-8.00
110.08	0.00
111.00	4.00
112.00	6.50

****

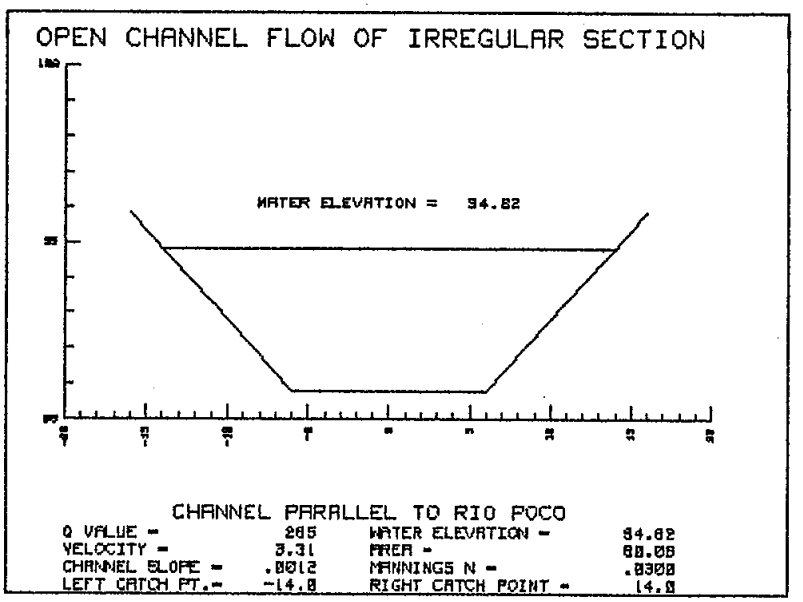


Q VALUE = 264.993334206
WATER ELEVATION = 94.8228576372
VELOCITY = 3.30910632313
AREA = 80.0800301744
WETTED PERIMETER = 29.9013235622
CHANNEL SLOPE IN Ft/Ft= .0012
MANNINGS N = .03
CATCH POINT ON LEFT SIDE =-14.0057152744
CATCH POINT ON RIGHT SIDE = 14.0057152744

CHANNEL COORDINATES

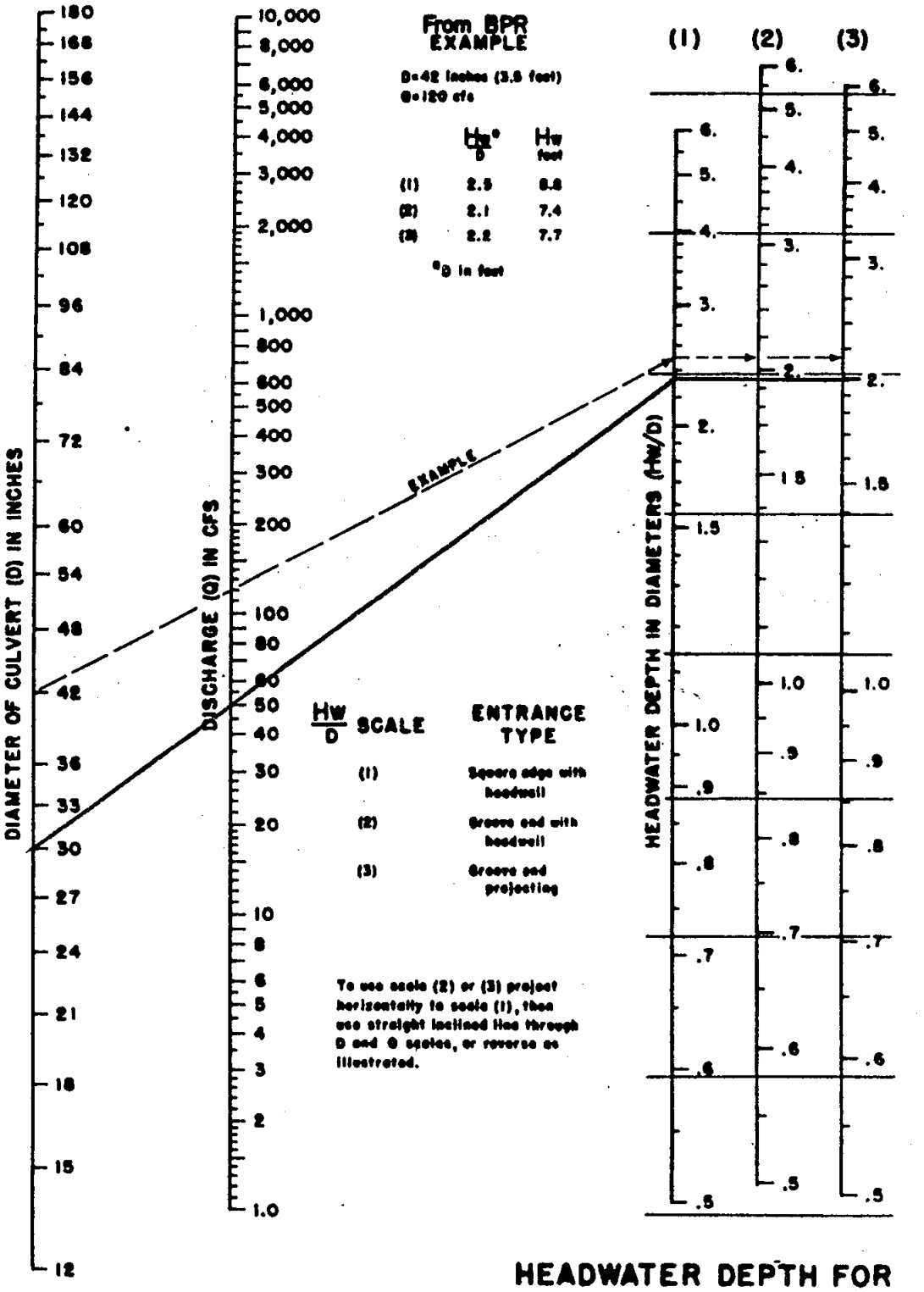
ELEVATION	DISTANCE
95.82	-16.00
90.82	-6.00
90.82	0.00
90.82	6.00
95.82	16.00

****



4-30 ø RCP CULVERTS
Q=200 cfs ⇒ 50 cfs each

HW=(2)(2.5')=5'



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

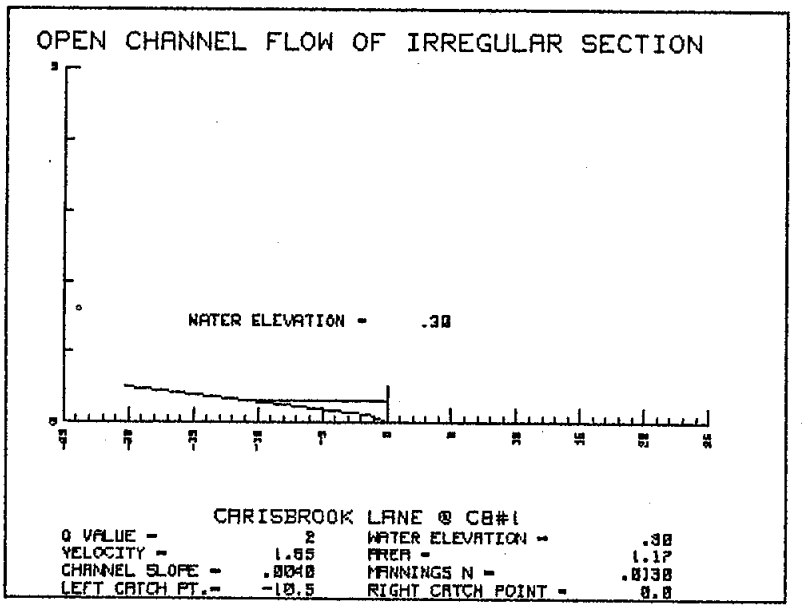
FIGURE 10-10.

Q VALUE = 1.93412341998
WATER ELEVATION = .30425952
VELOCITY = 1.64831460721
AREA = 1.17339457621
WETTED PERIMETER = 10.7780971693
CHANNEL SLOPE IN Ft/Ft= .004
MANNINGS N = .013
CATCH POINT ON LEFT SIDE =-10.462976
CATCH POINT ON RIGHT SIDE = .0486815232

CHANNEL COORDINATES

ELEVATION	DISTANCE
.50	-20.25
.13	-1.50
0.00	0.00
.50	.08

****

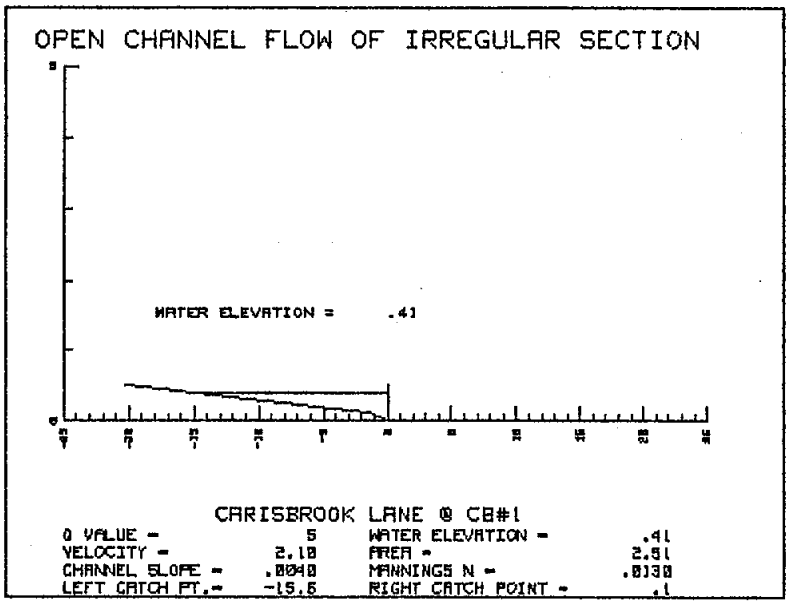


Q VALUE = 5.27508600565
WATER ELEVATION = .40638072576
VELOCITY = 2.1029595979
AREA = 2.50841053291
WETTED PERIMETER = 15.988598664
CHANNEL SLOPE IN Ft/Ft= .004
MANNINGS N = .013
CATCH POINT ON LEFT SIDE =-15.569036288
CATCH POINT ON RIGHT SIDE = .0650209161216

CHANNEL COORDINATES

ELEVATION	DISTANCE
.50	-20.25
.13	-1.50
0.00	0.00
.50	.08

****



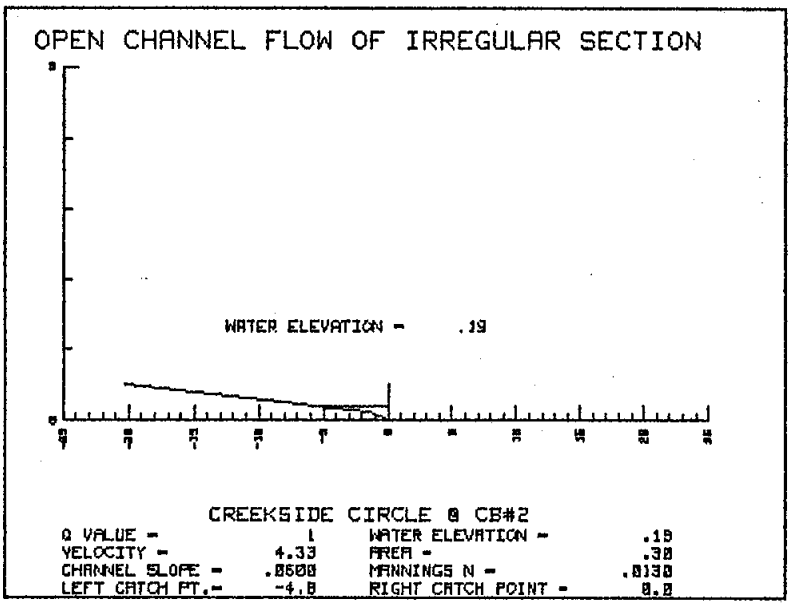
±

Q VALUE = 1.31880239545
WATER ELEVATION = .19094048
VELOCITY = 4.33415876035
AREA = .304281053918
WETTED PERIMETER = 4.99625173459
CHANNEL SLOPE IN Ft/Ft= .06
MANNINGS N = .013
CATCH POINT ON LEFT SIDE =-4.797024
CATCH POINT ON RIGHT SIDE = .0305504768

CHANNEL COORDINATES

ELEVATION	DISTANCE
.50	-20.25
.13	-1.50
0.00	0.00
.50	.08

****

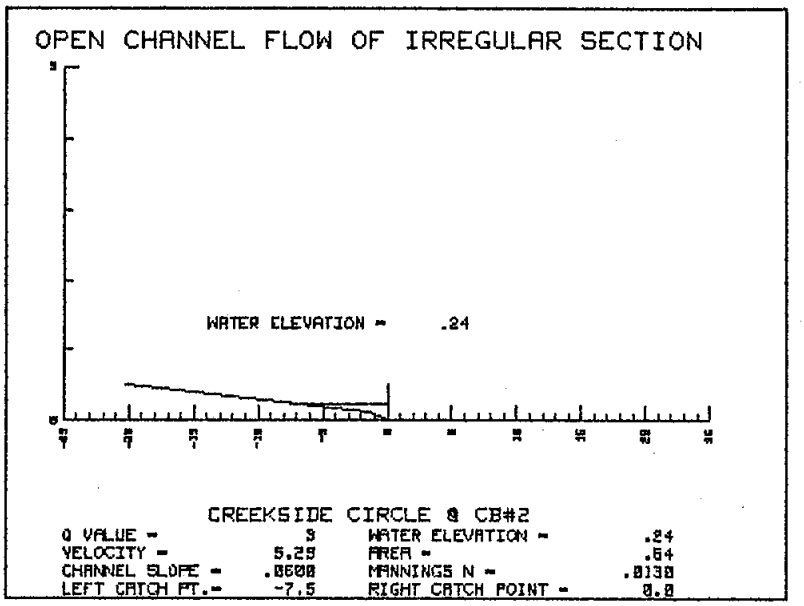


Q VALUE = 3.36980260144
WATER ELEVATION = .24472352
VELOCITY = 5.29452347983
AREA = .636469479129
WETTED PERIMETER = 7.74040862373
CHANNEL SLOPE IN Ft/Ft= .06
MANNINGS N = .013
CATCH POINT ON LEFT SIDE =-7.486176
CATCH POINT ON RIGHT SIDE = .0391557632

CHANNEL COORDINATES

ELEVATION	DISTANCE
.50	-20.25
.13	-1.50
0.00	0.00
.50	.08

****

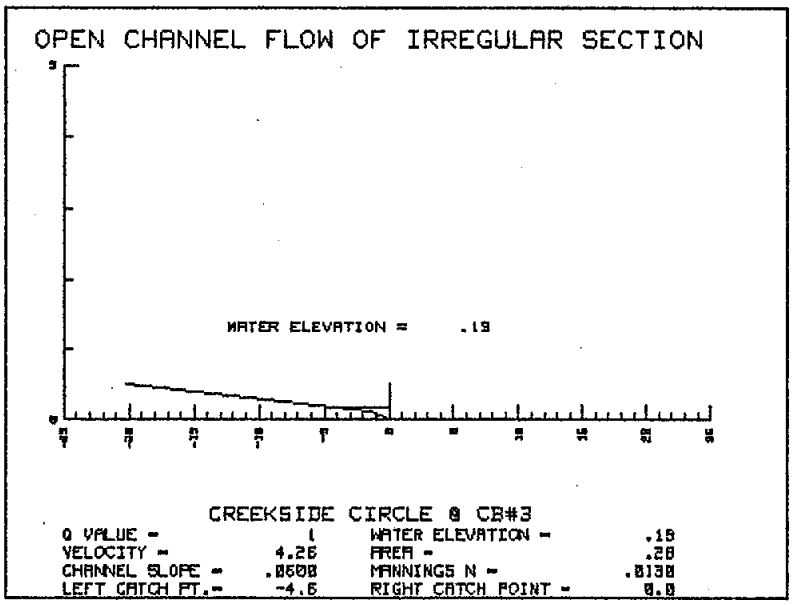


Q VALUE = 1.21100258749
WATER ELEVATION = .186632
VELOCITY = 4.26488794016
AREA = .283947105874
WETTED PERIMETER = 4.77642137406
CHANNEL SLOPE IN Ft/Ft= .06
MANNINGS N = .013
CATCH POINT ON LEFT SIDE =-4.5816
CATCH POINT ON RIGHT SIDE = .02986112

CHANNEL COORDINATES

ELEVATION	DISTANCE
.50	-20.25
.13	-1.50
0.00	0.00
.50	.08

****

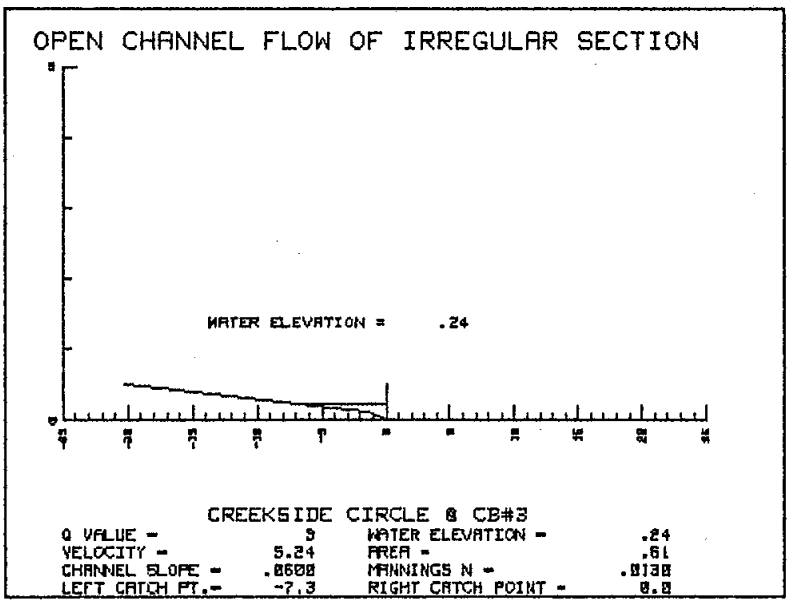


Q VALUE = 3.21999839653
WATER ELEVATION = .2417744
VELOCITY = 5.24007682758
AREA = .614494501224
WETTED PERIMETER = 7.58993650529
CHANNEL SLOPE IN Ft/Ft= .06
MANNINGS N = .013
CATCH POINT ON LEFT SIDE =-7.33872
CATCH POINT ON RIGHT SIDE = .038683904

CHANNEL COORDINATES

ELEVATION	DISTANCE
.50	-20.25
.13	-1.50
0.00	0.00
.50	.08

****

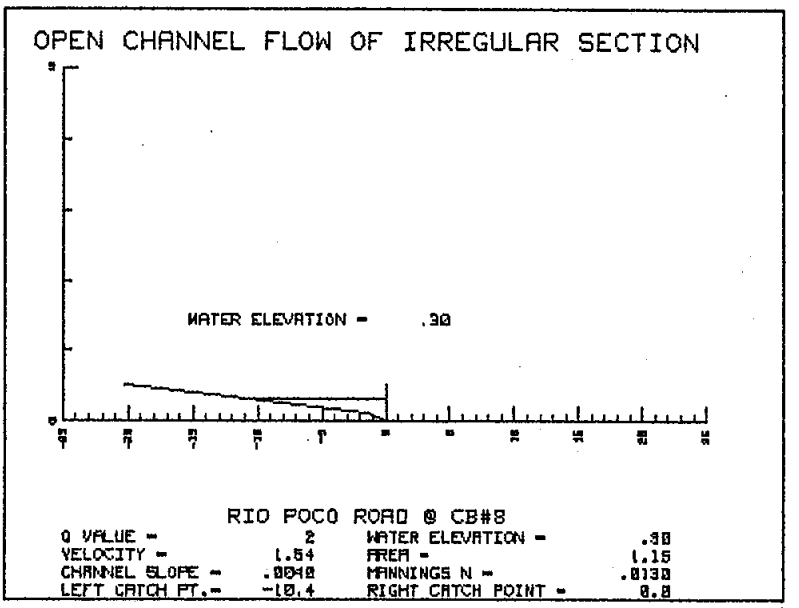


Q VALUE = 1.88400995802
WATER ELEVATION = .30204
VELOCITY = 1.63800275799
AREA = 1.15018729293
WETTED PERIMETER = 10.664851226
CHANNEL SLOPE IN Ft/Ft= .004
MANNINGS N = .013
CATCH POINT ON LEFT SIDE =-10.352
CATCH POINT ON RIGHT SIDE = .0483264

CHANNEL COORDINATES

ELEVATION	DISTANCE
.50	-20.25
.13	-1.50
0.00	0.00
.50	.08

****

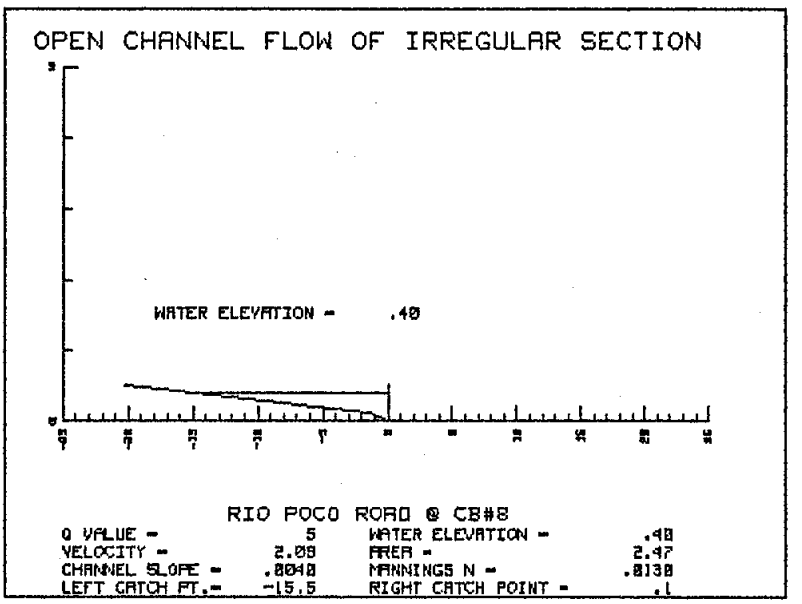


Q VALUE = 5.17529098916
WATER ELEVATION = .40407648
VELOCITY = 2.09312487293
AREA = 2.47251898636
WETTED PERIMETER = 15.8710297822
CHANNEL SLOPE IN Ft/Ft= .004
MANNINGS N = .013
CATCH POINT ON LEFT SIDE =-15.453824
CATCH POINT ON RIGHT SIDE = .0646522368

CHANNEL COORDINATES

ELEVATION	DISTANCE
.50	-20.25
.13	-1.50
0.00	0.00
.50	.08

****



CATCH BASIN CAPACITIES

From Neenah $Q = K' D^{5/3}$ (non-sump condition)

K' is dependent on grate size and type, slope of street and cross slope of street. K' is taken from charts provided by Neenah.

D is depth of flow in gutter (determined using Manning's equation)

For sump condition low flow is determined from weir flow equation:

$$Q = \frac{2}{3} C b \sqrt{2g} (H)^{3/2}$$

Where: C = 0.5
b = effective width of opening
g = 32.2 ft/sec^2
H = water depth at catch basin

For sump condition high flow is determined from orifice flow equation:

$$Q = C A \sqrt{2g H}$$

Where: C = 0.6
A = Open area of grate and curb inlet
g = 32.2 ft/sec^2
H = Depth of water over catch basin

Catch Basin No. 1 Type 4-R

$Q = K' D^{5\backslash 3}$
K' = 17
$D_{5\text{-Year}} = .304$ ft
$D_{100\text{-Year}} = .406$ ft

Q_5 Capacity $= (17)(.304)^{5\backslash 3} = 2.34$ cfs

Q_{100} Capacity $= (17)(.406)^{5/3} = 3.79$ cfs

Catch Basin No. 2 Type 4-R

$Q = K' D^{5/3}$
K' = 32
$D_{5\text{-Year}} = .191$ ft
$D_{100\text{-Year}} = .245$ ft

Q_5 Capacity $= (32)(.191)^{5/3} = 2.03$ cfs
Q_{100} Capacity $= (32)(.242)^{5/3} = 3.11$ cfs

Catch Basin No. 3 Type 4-R

$Q = K' D^{5/3}$

$K' = 32$

$D_{5\text{-Year}} = .19$ ft

$D_{100\text{-Year}} = .242$ ft

Q_5 Capacity $= (32)(.19)^{5/3} = 2.01$ cfs

Q_{100} Capacity $= (32)(.242)^{5/3} = 3.08$ cfs

Catch Basin No. 6 Type I

Q_5 Capacity $= \frac{2}{3} C b \sqrt{2g} (H)^{3/2}$

$.44 = \frac{2}{3} (0.5)(1.71)\sqrt{(2)(32.2)} (H)^{3/2}$

$H = .21$

Q_{100} Capacity $= C A \sqrt{2gh}$

Q_{100} Capacity $= (0.6)(.875)\sqrt{(2)(3.2)(.42)}$

Q_{100} Capacity $= 2.72$ cfs

Catch Basin No. 7 Type 3

Q_5 Capacity $= C A \sqrt{2gh}$

Q_5 Capacity $= (0.6)(1.1)\sqrt{(2)(32.2)(0.41)}$

Q_5 Capacity $= 3.39$

Q_{100} Capacity $= C A \sqrt{2gh}$

Q_{100} Capacity $= (0.6)(1.1)\sqrt{(2)(32.2)(0.65)}$

Q_{100} Capacity $= 4.27$

Catch Basin No. 8 Type 3

$Q = K' D^{5/3}$

$K' = 16$

$D_{5\text{-Year}} = .31$ ft

$D_{100\text{-Year}} = .4$ ft

Q_5 Capacity $= (16)(.3)^{5/3} = 2.12$

Q_{100} Capacity $= (16)(.4)^{5/3} = 3.48$

Catch Basin No. 9 Type I

$$Q_5 \text{ Capacity} = \frac{2}{3} C\, b \sqrt{2g}\ (H)^{3/2}$$

$$0.33 = \left(\frac{2}{3}\right)(0.5)(1.71)\sqrt{(2)(32.2)}\ H^{3/2}$$

$$H = .17 \text{ ft}$$

$$Q_{100} \text{ Capacity} = \frac{2}{3} C\, b \sqrt{2g}\ H^{3/2}$$

$$0.87 = \frac{2}{3}(0.5)1.67)\sqrt{2(32.2)}\ H^{3/2}$$

$$H = .34 \text{ ft}$$

APPENDIX B

EXIST. TYPE 3 C.B.

MATCH EXIST. ELEVATIONS WITH NEW REAR SWALE

36" Ø S.D. OUTLET - PROVIDE 30' FES. + 100 S.F. OF GROUTED ROCK RIP RAP

EXIST. TYPE I C.B.

R10 POOO ROAD

CB #8

CB #6

CB #9

EXIST. TYPE I C.B.

MATCH LINE (SEE SHEET 2)

NEW 3:1 SLOPE TO MATCH EXIST. 3:1 SLOPE

EXIST. 18" CMP (EXIST.)

CB #F

THE VILLAGES UNIT NO 1

CARIBBEAN LANE

CB #7

CB #5

24" Ø S.D. INLET W/ GROOVE END HEADWALL - I.E. 1033 (REF. DET. SHT.)

ANALYSIS POINT #4

REMOVE EXIST. FENCE AND FILL TO MATCH PROPOSED GRADING

1" = 40'

LEGEND:

DRAINAGE BOUNDARY

CB CATCH BASIN

CONST. 144 L.F. OF ROCK RIP-RAPPED SURFACE DRAINAGE DITCH WITH UNDERGROUND FRENCH DRAIN (REF. DET. SHT.)

RATTLESNAKE MOUNTAIN

EXIST. OVERHEAD POWER LINE TO BE ROUTED UNDERGROUND THROUGH UNIT 2 AND EXIST. TO BE ABANDONED

EXIST. POLE

CONST. 755 L.F. OF ROCK RIP - RAPPED SURFACE DRAINAGE DITCH WITH UNDERGROUND FRENCH DRAIN (REF. DET. SHT.)

NOTES:

1) THE CONTRACTOR SHALL MAINTAIN A DUST CONTROL PROGRAM, INCLUDING WATERING OF OPEN AREAS. THE CONTRACTOR SHALL ALSO MAINTAIN CONFORMITY WITH SECTION 040.030 OF THE WASHOE COUNTY AIR POLLUTION REGULATIONS.

2) THE CONTRACTOR SHALL MAINTAIN AN ON-GOING PROCESS OF REMOVAL OF ALL SPILLAGE OF EXCAVATION MATERIAL ON ALL PAVED STREETS.

3) THE INSPECTION AND TESTING OF SOILS SHALL BE TO THE CITY OF RENO STANDARDS.

4) ALL AREAS DISTURBED AND LEFT UNDEVELOPED FOR A PERIOD OF MORE THAN 30 DAYS SHALL BE STABILIZED BY THE APPLICATION OF A DUST PALLIATIVE.

5) LAND GRADING SHALL BE DONE IN A METHOD TO PREVENT DUST FROM TRAVERSING THE PROPERTY LINE.

6) THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED FOR CONSTRUCTION.

7) THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PUBLIC ENTITIES 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.

8) THE CONTRACTOR SHALL VERIFY IN FIELD, ALL ELEVATIONS, DIMENSIONS, FLOW LINES, EXISTING CONDITIONS, AND POINTS OF CONNECTIONS WITH ADJOINING PROPERTY (PUBLIC OR PRIVATE). ANY DISCREPANCIES SHALL BE CALLED TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

9) THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER, THE SOILS ENGINEER, THE CITY OF RENO, AND SIERRA PACIFIC POWER COMPANY 48 HOURS PRIOR TO COMMENCEMENT OF WORK.

10) THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES FOR LOCATIONS OR POTHOLING PRIOR TO CONSTRUCTION.

11) PRIOR TO ACCEPTANCE OF FINAL IMPROVEMENTS BY THE CITY OF RENO, ALL SLOPES STEEPER THAN 3:1 WITHIN PRIVATE YARDS SHALL BE STABILIZED ACCORDING TO THE SLOPE STABILIZATION PROCEDURES NOTED ON THIS SHEET. AFTER PLANTING, THE INDIVIDUAL LOT OWNERS WILL BE RESPONSIBLE TO IRRIGATE AND MAINTAIN THEIR SLOPES

12) ALL SLOPES STEEPER THAN 3:1 AND GREATER THAN 3 FEET VERICAL SHALL BE MECHANICALLY STBILIZED WITH ROCK RIP-RAP.

13) ALL DISTURBED AREAS LEFT UNDEVELOPED SHALL BE HYDRO-SEEDED PRIOR TO ISSUANCE OF LAST C. OF O.

14) ADD 4300 FEET TO ALL SPOT ELEVATIONS.

15) BASIS OF ELEVATIONS - U.S.C. & G.S. SEA-LEVEL DATUM OF 1929, WITH SUPPLEMENTAL ADJUSTMENT OF 1956.

SHEET 1 OF 3

SUMMIT ENGINEERING CORPORATION
CONSULTING ENGINEERS AND SURVEYORS
5405 MAE ANNE AVENUE, RENO, NEVADA 89523
228 FIFTH STREET, ELKO, NEVADA 89801
PHONE (702) 747-8500 FAX (702) 738-8604

SCALE HORIZ 1"=40' VERT
JOB No 3274
DRAWING No

NO.	DATE	DESCRIPTION	BY	APP'D

DESIGNED BY JNM
DRAWN BY HP7580A
CHECKED BY JW
DATE: JULY 1988

THE VILLAGES UNIT NO. 2
DRAINAGE PLAN
WASHOE COUNTY, NEVADA
RENO,

D-6

NOTES:

1) THE CONTRACTOR SHALL MAINTAIN A DUST CONTROL PROGRAM, INCLUDING WATERING OF OPEN AREAS. THE CONTRACTOR SHALL ALSO MAINTAIN CONFORMITY WITH SECTION 040.030 OF THE WASHOE COUNTY AIR POLLUTION REGULATIONS.

2) THE CONTRACTOR SHALL MAINTAIN AN ON-GOING PROCESS OF REMOVAL OF ALL SPILLAGE OF EXCAVATION MATERIAL ON ALL PAVED STREETS.

3) THE INSPECTION AND TESTING OF SOILS SHALL BE TO THE CITY OF RENO STANDARDS.

4) ALL AREAS DISTURBED AND LEFT UNDEVELOPED FOR A PERIOD OF MORE THAN 30 DAYS SHALL BE STABILIZED BY THE APPLICATION OF A DUST PALLIATIVE.

5) LAND GRADING SHALL BE DONE IN A METHOD TO PREVENT DUST FROM TRAVERSING THE PROPERTY LINE.

6) THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED FOR CONSTRUCTION.

7) THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PUBLIC ENTITIES 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.

8) THE CONTRACTOR SHALL VERIFY IN FIELD, ALL ELEVATIONS, DIMENSIONS, FLOW LINES, EXISTING CONDITIONS, AND POINTS OF CONNECTIONS WITH ADJOINING PROPERTY (PUBLIC OR PRIVATE). ANY DISCREPANCIES SHALL BE CALLED TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

9) THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER, THE SOILS ENGINEER, THE CITY OF RENO, AND SIERRA PACIFIC POWER COMPANY 48 HOURS PRIOR TO COMMENCEMENT OF WORK.

10) THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES FOR LOCATIONS OR POTHOLI PRIOR TO CONSTRUCTION.

11) PRIOR TO ACCEPTANCE OF FINAL IMPROVEMENTS BY THE CITY OF RENO, ALL SLOPES STEEPER THAN 3:1 WITHIN PRIVATE YARDS SHALL BE STABILIZED ACCORDING TO THE SLOPE STABILIZATION PROCEDURES NOTED ON THIS SHEET. AFTER PLANTING, THE INDIVIDUAL LOT OWNERS WILL BE RESPONSIBLE TO IRRIGATE AND MAINTAIN THEIR SLOPES

12) ALL SLOPES STEEPER THAN 3:1 AND GREATER THAN 3 FEET VERICAL SHALL BE MECHANICALLY STBILIZED WITH ROCK RIP-RAP.

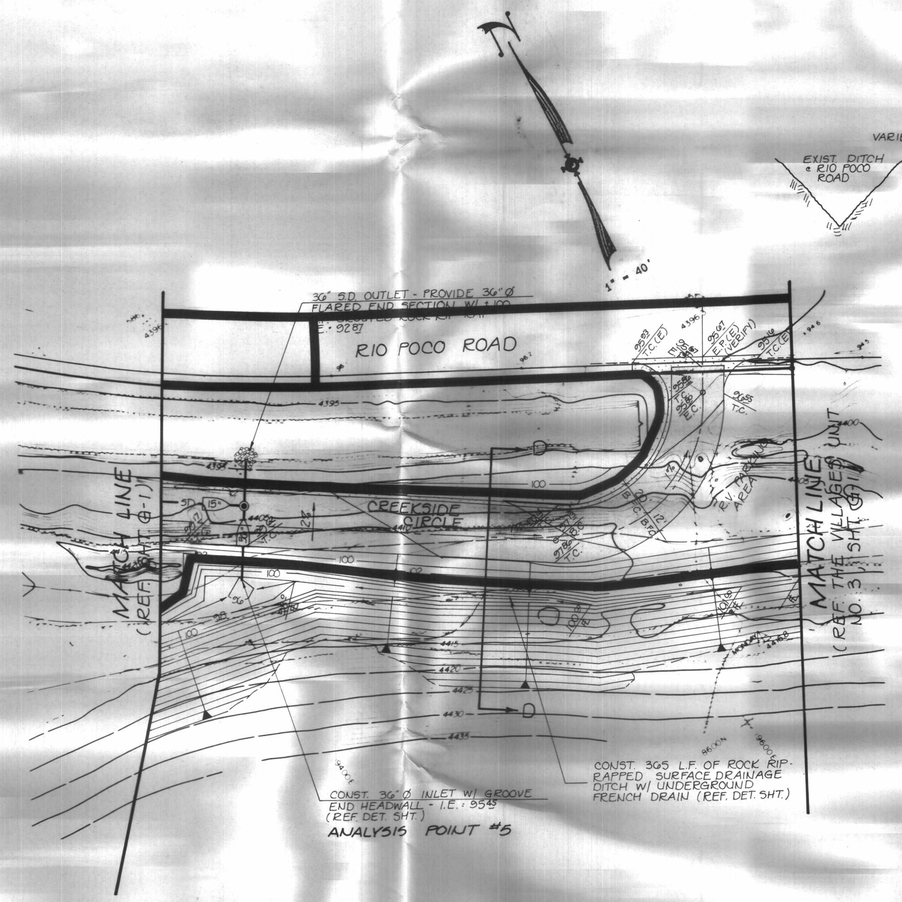
13) ALL DISTURBED AREAS LEFT UNDEVELOPED SHALL BE HYDRO-SEEDED PRIOR TO ISSUANCE OF LAST C. OF O.

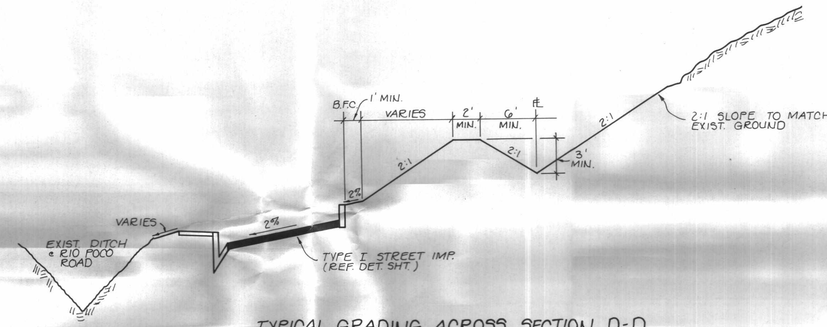
14) ADD 4300 FEET TO ALL SPOT ELEVATIONS.

15) BASIS OF ELEVATIONS - U.S.C. & G.S. SEA-LEVEL DATUM OF 1929, WITH SUPPLEMENTAL ADJUSTMENT OF 1956.

LEGEND:

- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- A.C. PAVEMENT AREA
- CONCRETE AREA
- EXISTING A.C. OR CONCRETE AREA
- PROPOSED TOP OF CURB ELEV.
- PROPOSED FLOWLINE ELEV.
- PROPOSED ELEV. @ GRADE BREAKE
- PROPOSED ELEV. @ FINISHED GRADE
- PROPOSED PAD ELEV
- EXISTING GRADE ELEV.
- GRADE BREAK
- MANHOLE (DASHED IF EXISTING)
- CATCH BASIN (DASHED IF EXISTING)
- SS - 8" SANITARY SEWER W/ SIZE AND DIRECT. INDICATOR (DASHED IF EXISTING)
- SD - 36" STORM DRAIN W/ SIZE AND DIRECTION INDICATOR (DASHED IF EXISTING)
- FLOW LINE
- CUT OR FILL SLOPE





TYPICAL GRADING ACROSS SECTION D-D
N.T.S.

SHEET 2 OF 3

SUMMIT ENGINEERING CORPORATION
CONSULTING ENGINEERS AND SURVEYORS
5405 MAE ANNE AVENUE, RENO, NEVADA 89523
228 E. 4TH STREET, ELKO, NEVADA 89801
PHONE: RENO (702) 747-8550 ELKO (702) 738-8086

SCALE: HORIZ 1"=40' VERT
JOB No. 3274
DRAWING No.

THE VILLAGES UNIT NO. 2
DRAINAGE PLAN
WASHOE COUNTY, NEVADA
RENO,

REV	DATE	DESCRIPTION	BY	APP'D

DESIGNED BY JNM
DRAWN BY
CHECKED BY
DATE JULY 1988

NOTES:

1) THE CONTRACTOR SHALL MAINTAIN A DUST CONTROL PROGRAM, INCLUDING WATERING OF OPEN AREAS. THE CONTRACTOR SHALL ALSO MAINTAIN CONFORMITY WITH SECTION 040.030 OF THE WASHOE COUNTY AIR POLLUTION REGULATIONS.

2) THE CONTRACTOR SHALL MAINTAIN AN ON-GOING PROCESS OF REMOVAL OF ALL SPILLAGE OF EXCAVATION MATERIAL ON ALL PAVED STREETS.

3) THE INSPECTION AND TESTING OF SOILS SHALL BE TO THE CITY OF RENO STANDARDS.

4) ALL AREAS DISTURBED AND LEFT UNDEVELOPED FOR A PERIOD OF MORE THAN 30 DAYS SHALL BE STABILIZED BY THE APPLICATION OF A DUST PALLIATIVE.

5) LAND GRADING SHALL BE DONE IN A METHOD TO PREVENT DUST FROM TRAVERSING THE PROPERTY LINE.

6) THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED FOR CONSTRUCTION.

7) THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PUBLIC ENTITIES 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.

8) THE CONTRACTOR SHALL VERIFY IN FIELD, ALL ELEVATIONS, DIMENSIONS, FLOW LINES, EXISTING CONDITIONS, AND POINTS OF CONNECTIONS WITH ADJOINING PROPERTY (PUBLIC OR PRIVATE). ANY DISCREPANCIES SHALL BE CALLED TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

9) THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER, THE SOILS ENGINEER, THE CITY OF RENO, AND SIERRA PACIFIC POWER COMPANY 48 HOURS PRIOR TO COMMENCEMENT OF WORK.

10) THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES FOR LOCATIONS OR POTHOLING PRIOR TO CONSTRUCTION.

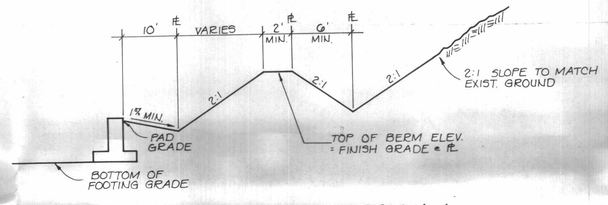
11) PRIOR TO ACCEPTANCE OF FINAL IMPROVEMENTS BY THE CITY OF RENO, ALL SLOPES STEEPER THAN 3:1 WITHIN PRIVATE YARDS SHALL BE STABILIZED ACCORDING TO THE SLOPE STABILIZATION PROCEDURES NOTED ON THIS SHEET. AFTER PLANTING, THE INDIVIDUAL LOT OWNERS WILL BE RESPONSIBLE TO IRRIGATE AND MAINTAIN THEIR SLOPES

12) ALL SLOPES STEEPER THAN 3:1 AND GREATER THAN 3 FEET VERICAL SHALL BE MECHANICALLY STBILIZED WITH ROCK RIP-RAP.

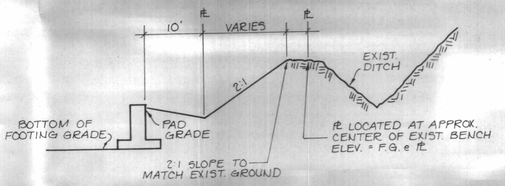
13) ALL DISTURBED AREAS LEFT UNDEVELOPED SHALL BE HYDRO-SEEDED PRIOR TO ISSUANCE OF LAST C. OF O.

14) ADD 4300 FEET TO ALL SPOT ELEVATIONS.

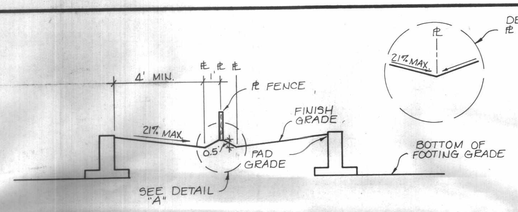
15) BASIS OF ELEVATIONS - U.S.C. & G.S. SEA-LEVEL DATUM OF 1929, WITH SUPPLEMENTAL ADJUSTMENT OF 1956.



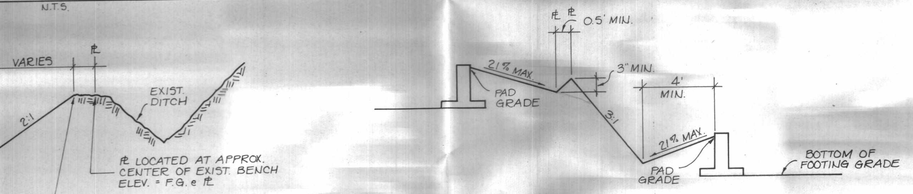
TYPICAL GRADING ACROSS SECTION A-A
N.T.S.



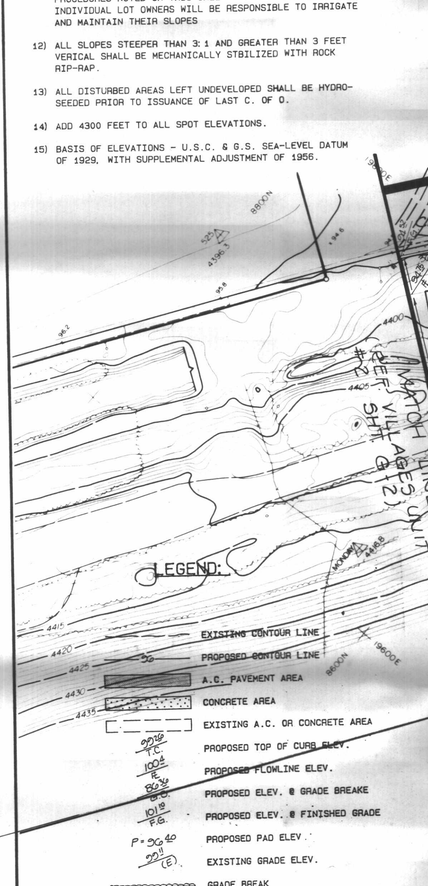
TYPICAL GRADING ACROSS SECTION B-B
N.T.S.



TYPICAL GRADING ACROSS SECTION C-C
N.T.S.



TYPICAL GRADING ACROSS SECTION D-D
N.T.S.



SHEET 3 OF 3

SUMMIT ENGINEERING CORPORATION
CONSULTING ENGINEERS AND SURVEYORS
5405 MAE ANNE AVENUE, RENO, NEVADA 89523
ALSO AT 5TH STREET, ELKO, NEVADA 89801
PHONE (702) 786-6500 ELKO (702) 738-8086
RENO (702) 747-8550

SCALE: HORIZ 1"=40' VERT
JOB No. 3274
DRAWING No.

BY	DATE	REVISION

DESIGNED BY JNM
DRAWN BY HP7580A
CHECKED BY JW
DATE: JULY 1988

THE VILLAGES UNIT NO. 3

DRAINAGE PLAN

RENO, WASHOE COUNTY, NEVADA

D-6