HYDROLOGIC – HYDRAULIC STUDY

El Nuevo Comandante
Canóvanas, Puerto Rico

February 2007

CMA ARCHITECTS & ENGINEERS LLP
San Juan, Puerto Rico

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SECTION 1.0

INTRODUCTION

Land Development Associates, S.E. (LDA) proposes the construction of a development in a 79.22 "cuerdas" (76.94 acres) parcel located in the municipality of Canovanas. The proposed development consists on 34.158 "cuerdas" for commercial use, 11.908 "cuerdas" for mixed commercial and 26.886 "cuerdas" for residential.

1.1 Objective

The objective of this report is to present the results of a hydrologic-hydraulic study performed to determine flooding levels for the 100, 50, 25, 10, 5 and 2-year storms, and to determine the improvements required to mitigate the effects of the proposed structures on these levels. This study was prepared in accordance with the Puerto Rico Planning Board (PRPB) Regulation No. 13[(1)] and Resolution JP-94-254 [(2)] and Regulation No. 3[(3)]

1.2 Authority

This hydrologic-hydraulic study was performed by CMA Architects & Engineers LLP as requested by Land Development Associates, S.E. (LDA). It is part of the required engineering studies to develop the proposed project.

SECTION 2.0

PROJECT DESCRIPTION

2.1 Location

The proposed project is located in State Roads PR-3, Barrio Pueblo of the Municipality of Canovanas. The location of the proposed project is shown in Figure 1, which partially reproduces the United States Geological Survey (USGS) Topographic Quadrangle of the area of Canovanas[9]. An aerial photograph depicting the proposed project location and adjacent developments is included as Figure 2.

2.2 Existing Topography

The elevations at the project area vary from 60 to 5 meters, referred to mean sea level. These elevations were obtained from the USGS Topographic Quadrangle and from topographic plans of the area. A copy of the topographic plan is included as Appendix A.

2.3 Water Resources

The topographic quadrangle and the PRPB flood Zones Map show the Bocaforma Creek on the east side of the Development

2.4 Scope

This study has been divided in the following phases:

a) Hydrologic analysis of existing and proposed conditions of the site drainage basin. This includes field inspections and the review of available information to compute the required hydrologic parameters. Discharges will be determined for a storm event with a return period of 100, 50, 25, 10, 5 and 2 years with duration of 24 hours.

b) Hydraulic modeling of the existing conditions to determine the flood levels for the discharges obtained in Phase a).

c) Hydraulic modeling of the proposed conditions to determine the flood levels for the discharges obtained in Phase a). This phase include the design of a detention pond with a culvert and weir. The flood levels obtained in this phase will be compared with the flood levels and discharges generated under the existing conditions to evaluate the structures required by the proposed project. The proposed structure shall be designed to not cause an increase in the flood levels or final discharge determined for the existing conditions.

SECTION 3.0

PRELIMINARY EVALUATION

3.1 Field Inspection

Several field visits were made to inspect the area under study and determine some hydrologic and hydraulic parameters of the drainage basin, such as curve numbers and roughness coefficients.

In addition, a licensed surveyor prepared a topographic plan of the project area. All of these provided useful information for the development of the hydrologic-hydraulic model.

3.2 Previous Studies / Historical Data Collection

The project area is located outside of the flood limits, according to the Flood Insurance Rate Map of the Federal Emergency Management Agency (FEMA) [(4)], This map is shown on Figures 3.

SECTION 4.0
HYDROLOGIC STUDY

The hydrologic analysis is the first phase of an H/H study. In this phase the runoff generated at a drainage basin is calculated for a given rainfall event. This runoff will be used in the hydraulic study to obtain the water surface levels for that rain event. This study will determine the runoff generated under existing and proposed conditions.

The hydrologic analysis was performed with the computer model PondPack (Version 9.003, 2003) developed by Haestad Methods; and following several procedures that are applicable in small watersheds issued by Natural Resources Conservation Service (NRCS) formerly the Soil Conservation Service (SCS) presented in their National Engineering Handbook [(5)].

4.1 Hydrologic Parameters

Several hydrologic parameters need to be determined as part of the hydrologic study. A brief description of these parameters follows:

4.1.1 Basin Area

The drainage basin under study has an area of 424.13 acres (0.663 square miles). This basin has been divided for the existing conditions in three (3) sub-basins: A-1, A-2, and A-2A and for the proposed conditions in four (4) sub-basin A-1A, A-2, A-2B and A-2C. The areas and limits of each sub-basin were determined from the USGS Topographic Quadrangle and topographic survey prepared for this project. The limitation of the drainage basins for existing and

proposed conditions are presented in figures 4 and 5 respectively

4.1.2 Curve Number

The curve number (CN) for the area under study was determined taking into consideration the various soil types found in the basin, land use, vegetation type and the Antecedent Moisture Condition.

The NRCS(formerly SCS) [6], in cooperation with the University of Puerto Rico, has published soil surveys of Puerto Rico and classified the soils in four groups according to their minimum infiltration rates· These groups are defined as follows:

Group A – They have the lowest runoff potential. They are soils with high infiltration rates even when wetted and consist chiefly of deep, well to excessively drained sands and gravels. These soils have a high rate of water transmission.

Group B – They are soils with moderate infiltration rates when thoroughly wetted. They consist chiefly of moderately deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Group C – They have moderately high runoff potential. They are soils with low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water, soils with moderately fine to fine texture, or soils with moderate water tables. These soils may be somewhat poorly drained.

Group D – They have the highest runoff potential. Soils with very low infiltration rates. They consist chiefly of clay soils with a high water table, soils with a clay pan

or clay layer at or near the surface and shallow soils over nearly impervious material. These soils have a very low rate of water transmission.

The soils of the area under study belong to Type D. Figure 6 is a soil map of the drainage basin and Table 1 shows the various soil types encountered and classified by their hydrologic group.

Table 1
Soil Hydrologic Classification

Soil Symbols	Soil Description	Hydrologic Classification
MaC2	Mabi clay 5-12% slopes	D
CbF2	Caguabo clay loam 20-60% slopes	D
MaD2	Mabi clay 12-20% slopes	D
MaB	Mabi clay 0-5% slopes	D

The NRCS(formerly SCS) has established CN values for these soil groups, according to the land use. These values were weighted according to the soil type and land use area percentage on each sub-basin to obtain an average CN value. Most of the land at the drainage basins under study is undeveloped and cover with pasture.

The Antecedent Moisture Condition, AMC, is an index of watershed wetness at the beginning of a storm used with the runoff estimation method. This index will be used to correct the weighted CN value obtained previously for each sub-basin. Three levels of AMC can be used: AMC I, AMC II and AMC III. AMC I is

the condition where soils are dry, but not to the wilting point, AMC II is the average condition, and AMC III is the condition where heavy rainfall have occurred within the last five days and the soil is saturated. A condition of AMC II was used for this analysis.

4.1.3 Lag Time

Time of concentration is defined as the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest downstream within the watershed, in this case, the sub-basin outlet. The time of concentration is the sum of overland (upland) time and stream time. The overland time is calculated using the SCS average velocity equation:

$$T_o = \frac{L_o}{V_o}$$

where:

T_o = overland time (seconds)

L_o = overland length (feet)

v_o = overland velocity (feet/seconds) from TR-55 charts as function of average slope and surface cover [7]

The flow through the existing drainage channels was determined using the flood routing procedures described in Section 4.2, and the Manning's equation of

open channel flow for the average velocity and the travel time as follows:

$$V_s = \frac{1.0}{n} * R^{2/3} * S^{1/2} \qquad (2)$$

$$T_s = \frac{L_s}{V_s} \qquad (3)$$

$$T_c = T_o + T_s \qquad (4)$$

Where:

V_s = average channel velocity (meter/seconds) from Manning's equation

n = roughness coefficient

R = hydraulic radius (meter)

S = average slope

T_s = channel time (seconds)

Ls = channel length (meter)

T_c = Time of Concentration (seconds)

With the time of concentration the lag time or delay time is calculated using the empirical relation:

$$Lag = 0.6T_c$$

4.1.4 Precipitation

Precipitation values for storms with frequencies of 100, 50, 25, 10, 5 and 2 years and duration of 24 hours were obtained from the U.S. Weather Bureau [8]. The precipitation maps are shown in Figures 9 through 14, respectively.

Table 2 list the precipitation data for the drainage basin under study:

Table 2 Precipitation Data for the Drainage Basin under study (inches)						
Duration (hrs)	Frequencies (years)					
	100	50	25	10	5	2
24	13	11	10	8.5	7.5	5.5

Table 3 lists the main hydrologic parameters for each drainage sub-basin. These parameters will be used to obtain the flow hydrograph generated at each sub-basin.

Table 3 Main Hydrologic Parameters							
Existing Conditions				Proposed Conditions			
Sub-Basin No.	Area (acres)	CN	Lag Time (hours)	Sub-Basin No.	Area (acres)	CN	Lag Time (hours)
A-1	37.71	80	0.159	A-1A	26.34	95	0.147
A-2	345.70	80	0.562	A-2	345.70	80	0.562
A-2a	40.72	89	0.179	A-2B	7.04	95	0.06
				A-2C	35.38	92	0.171

4.2 Hydrologic Study Results

The detailed calculations of all hydrologic parameters, including those needed for the routing analyses are included as Appendix B. The PondPack summaries of the hydrologic analyses for the existing and proposed conditions are included as Appendices C and D, respectively. The existing Hydrologic-Hydraulic modeling is included in the CD

attached to the back of this document. Tables 4 through 10 contain the main results of these analyses for frequencies of 100, 50, 25, 10, 5 and 2 years, respectively. These tables include the individual flows calculated for each sub-basin.

Table 4
Hydrologic Study Results - 100-yr, 24-hr Storm

Sub-Basin No.	Existing Conditions Peak Flow (ft^3/s)	Peak Time (hours)
A-1	444.90	12.04
A-2	1948.99	12.37
A-2A	487.05	12.04
Sub-Basin No.	**Proposed Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1A	346.48	12.03
A-2	1948.99	12.37
A-2B	115.52	11.92
A-2C	437.15	12.05

Table 5
Hydrologic Study Results - 50-yr, 24-hr Storm

Sub-Basin No.	Existing Conditions Peak Flow (ft^3/s)	Peak Time (hours)
A-1	366.13	12.04
A-2	1596.94	12.37
A-2A	407.94	12.04
Sub-Basin No.	**Proposed Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1A	292.52	12.03
A-2	1596.94	12.37
A-2B	97.53	11.92
A-2C	367.88	12.05

Table 6 Hydrologic Study Results – 25-yr, 24-hr Storm		
Sub-Basin No.	**Existing Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1	326.60	12.04
A-2	1420.53	12.37
A-2A	368.22	12.04
Sub-Basin No.	**Proposed Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1A	265.50	12.03
A-2	1420.53	12.37
A-2B	88.52	11.92
A-2C	333.13	12.05

Table 7 Hydrologic Study Results – 10-yr, 24-hr Storm		
Sub-Basin No.	**Existing Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1	267.17	12.04
A-2	1157.07	12.49
A-2A	308.38	12.06
Sub-Basin No.	**Proposed Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1A	224.90	12.03
A-2	1157.07	12.49
A-2B	74.99	11.92
A-2C	280.84	12.05

Table 8 Hydrologic Study Results – 5-yr, 24-hr Storm		
Sub-Basin No.	**Existing Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1	227.52	12.04
A-2	983.13	12.49
A-2A	268.47	12.07
Sub-Basin No.	**Proposed Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1A	197.77	12.03
A-2	983.13	12.49
A-2B	65.94	11.92
A-2C	245.83	12.05

Table 9 Hydrologic Study Results – 2-yr, 24-hr Storm		
Sub-Basin No.	**Existing Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1	148.69	12.04
A-2	638.42	12.49
A-2A	188.06	12.07
Sub-Basin No.	**Proposed Conditions Peak Flow (ft^3/s)**	**Peak Time (hours)**
A-1A	143.27	12.03
A-2	638.42	12.49
A-2B	47.77	11.92
A-2C	175.31	12.05

Table 10 Hydrologic Study Results at existing drainage structures			
Outlet ID	YEAR	Existing Conditions Peak Flow (ft^3/s)	Proposed Conditions Peak Flow (ft^3/s)
Ex. 48 pipe	2	148.69	143.27
	5	227.52	197.77
	10	267.17	224.90
	25	326.60	265.50
	50	366.13	292.52
	100	444.90	346.48
Box 14x 10	2	688.93	668.93
	5	1060.49	1052.02
	10	1248.19	1240.51
	25	1530.28	1519.34
	50	1718.25	1703.30
	100	2093.35	2067.65

SECTION 5.0

HYDRAULIC STUDY

The hydraulic study for this project will consist in determining the number, size and capacity of the hydraulic structures (pond, weir and culvert) needed to manage the discharges obtained in the hydrologic study in order to comply with the requirements of PRPB Regulation No. 3[9].

5.1 Historical Floods

According to the Flood Insurance Studies, no historical flood events have been reported in the project area up to day.

5.2 Existing Conditions Hydraulic Data

Figure 7 show two principal hydraulic structure at the area under study. Those structures consist of a one cell 14ft x 10ft box culvert and 48 inches diameter culvert that pass under the State Road PR-3. The Box Culvert conveying the Bocaforma Creek flow and the 48 inches diameter conveying a local system discharges.

5.3 Proposed Conditions Hydraulic Data

Figure 8 shows the proposed hydraulic conditions at the area under study. Sub-basin A-2B will discharge directly to the existing box culvert and the sub-basin A-2C will discharge into the proposed detention pond, with a composite outlet structure that consist of two 30 inches diameter pipes, a contracted weir, 8 ft in length and suppressed weir,15.28 ft in length. Those weir will discharge directly into the two 30 inches diameter

pipes. Basin A-2 remains as in the existing condition and Sub basin A-1A due to that the watershed area reduce, don't occurred an increment in the discharge that go into the 48 inches diameter culvert.

The detention pond will have a depth of 9.5ft, a volume of 18.29 acre-ft, a water surface elevation of 35.89 ft(10.94 meters) and 2:1 side slope.

5.4 Methodology

The Hydraulic evaluation for the existing and proposed condition were performed with the computer software Pond Pack (Version 9.003, 2003), developed by Haestad Methods. For the proposed conditions a detention pond and outlet structures were modeled. This pond will ensure that the proposed condition do not exceed the peak flow under existing condition as required by P.R. Planning Board Regulation No. 3[(9)].

Additional analysis for the Bocaforma Creek was executed with the computer software HEC-RAS (Version 3.1.3). A water surface elevation (WSEL) of 9.10 meters, recorded at the point of interest from the FEMA flood maps at Bocaforma Creek, was used as the downstream boundary condition in the hydraulic model for the 100-year storm. The critical depth was used as the upstream boundary condition. The HEC-RAS computer models were run in a mixed flow regime.

5.5 Hydraulic Study Results

The Pond Pack summaries of the hydraulic analysis for the existing and the proposed conditions are included in Appendices C and D respectively. The Existing and Proposed Conditions Hydrologic -Hydraulic Modeling are included in the CD attached to

the back of this document. Tables 11, show a summary of the main characteristics of the proposed pond. Tables 12 and 13 show a summary of the main characteristics of the composite outlet structure. The HEC-RAS reports of the hydraulic analysis for the existing and proposed conditions at the Bocaforma Creek are included in Appendix E. Tables 14 show a comparison of the water surface elevations and flow velocities under both conditions for the 100 and 25 year–24hours storm events. Figure 15 shows the topographic survey and the cross sections used in the existing and proposed conditions hydraulic model.

Table 11
Proposed Pond Characteristics
(100 yr-24 hr Storm Event)

Pond ID	Invert Elevation	Bottom Area	Top Elevation	Top Area	Maximum Stage Elevation	Storage at Maximum Elevation
	(m)	(acre)	(m)	(acre)	(m)	(acre-ft)
Pond 1	9.00	2.52	11.9	3.60	10.94	18.29

Table 12
Proposed Outlet Structures Main Characteristics
(Pond 1)

Structure	Type	Length (m)	Crest Elevation(m)
Weir	Contracted	2.44	9.59
Weir	Suppressed	4.66	10.09

Table 13
Proposed Outlet Structure Main Characteristics
(Pond 1)

Structure	Shape	Diameter (m)	No.of Barrels	Length (m)	Slope	Invert Elevation	
						Up (m)	Dn (m)
Culvert	circular	0.76	2	25.00	0.04	9.00	8.00

Table 14
Hydraulic Study Results – Qda. Bocaforma
100-year, 24-hour Storm

River Station	Existing Conditions			Proposed Conditions		
	Flow (m^3/s)	Water Surface Elevation (m)	Velocity (m/s)	Flow (m^3/s)	Water Surface Elevation (m)	Velocity (m/s)
4	59.28	9.30	2.45	59.04	9.30	2.45
3.5				59.04	9.13	0.46
3	59.28	9.11	0.41	59.04	9.10	0.36
2	59.28	9.11	0.29	59.04	9.10	0.29
1.5				59.04	9.10	0.19
1	59.28	9.10	0.36	59.04	9.10	0.34
0	59.28	9.10	0.07	59.04	9.10	0.07

SECTION 6.0

CONCLUSIONS

The following conclusions are based on the hydrological-hydraulic analysis performed for reference project.

1) The modification of the drainage basin discharging into the existing 48 inches diameter culvert under State Road PR-3 causes a reduction in the discharge under proposed conditions in comparison to the existing conditions for the 100, 50, 25, 10, 5, and 2 year, 24-hour storms.

2) The proposed detention pond 1 will have storage capacity of 18.29 acre-ft and a water surface elevation of 10.94m for 100yr-24hour storm event. The pond will reduced the outflow conveyed to the existing box culvert (2cells 14ft x 10ft) under the State Road PR-3 by 106.40, 95.95, 89.35, 76.62, 64.36 and 26.68 cfs for the 100, 50, 25, 10, 5 and 2 -year, respectively.

3) The proposed outlet structures consist of a contracted weir, 2.44m in length and a crest elevation of 9.59m, suppressed weir, 4.66m in length and a crest elevation of 10.09m and two 30 inches diameter culverts, 25m in length.

4) A hydraulic analysis, was performed on HEC-RAS V.3.0, for the existing and proposed conditions at the Bocaforma Creek. These analysis demonstrates that the proposed project will not cause an increase in the calculated water surface elevations at the Bocaforma Creek.

5) A hydraulic analysis was performed on Pond Pack for existing and proposed conditions. These analysis demonstrates that the proposed project will not cause an increase in the peak flow discharges for the 2, 5, 10, 25, 50, and 100 year-24

hour storm under proposed conditions when compared to the existing conditions as required by the PRPB Regulation No.3 [9].

SECTION 7.0

CERTIFICATION

Certifico que el ***Estudio Hidrológico e Hidráulico –El Nuevo Comandante*** el cual ubica en el Bo. Pueblo del municipio de Canóvanas, Puerto Rico, fue preparado utilizando las mejores prácticas de hidrología e hidráulica aplicables al proyecto según descritas en el documento propio, y que, basándose en los estudios y medidas de campo provistas por otras personas, los resultados en el estudio son ciertos y correctos.

Certifico hoy, 22 de febrero de 2007.

Jorge A. Tirado, P.E.
Lic. No. 15655

CMA Architects and Engineers LLP
Nombre de firma consultora

SECTION 8.0

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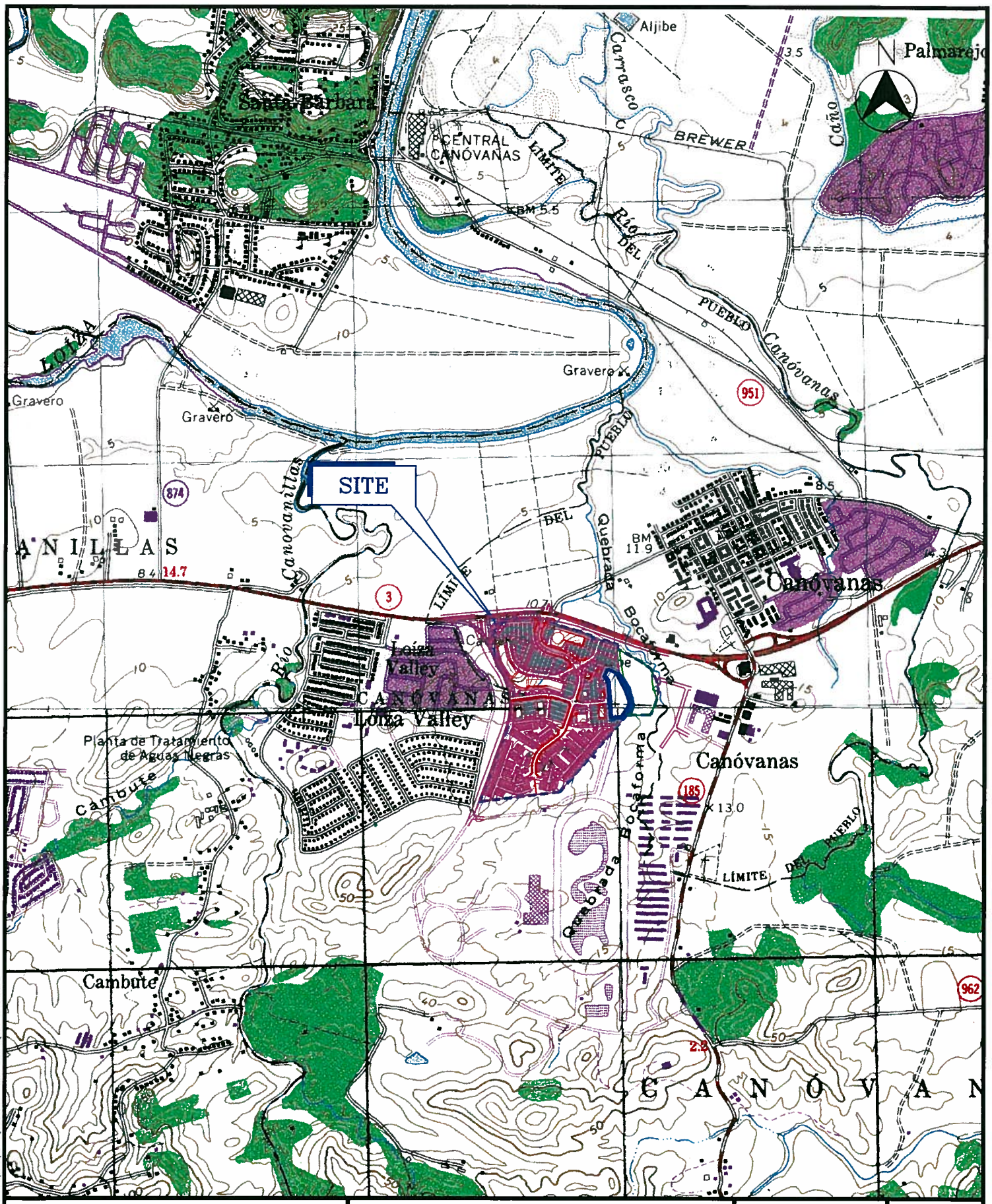
FIGURES



FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-01.DWG

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LOCATION PLAN

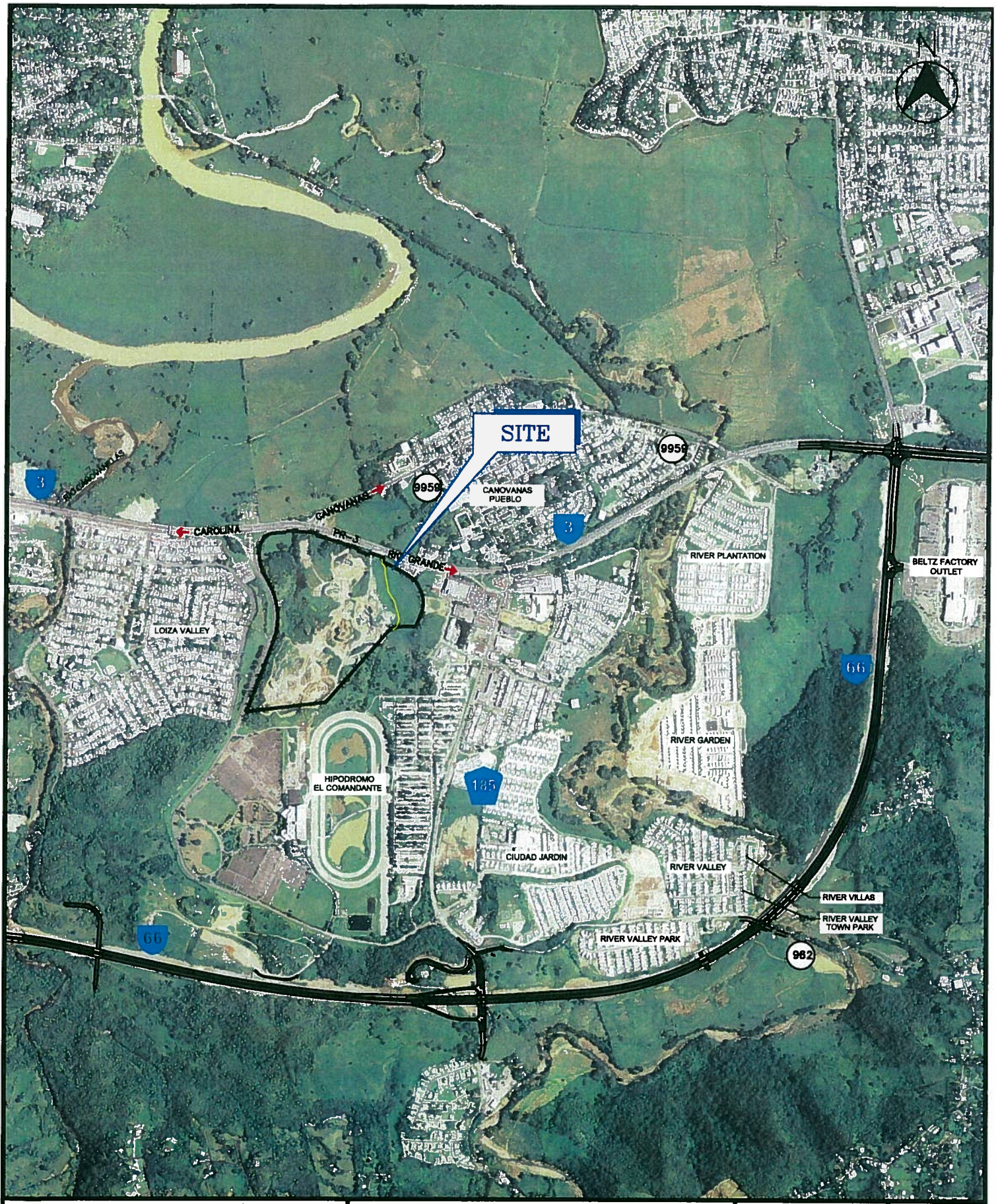
EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY
CANOVANAS, PUERTO RICO

CMA# 05201

SCALE: 1:20,000

DATE: 10/06/06

FIGURE 1



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AERIAL PHOTO

EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

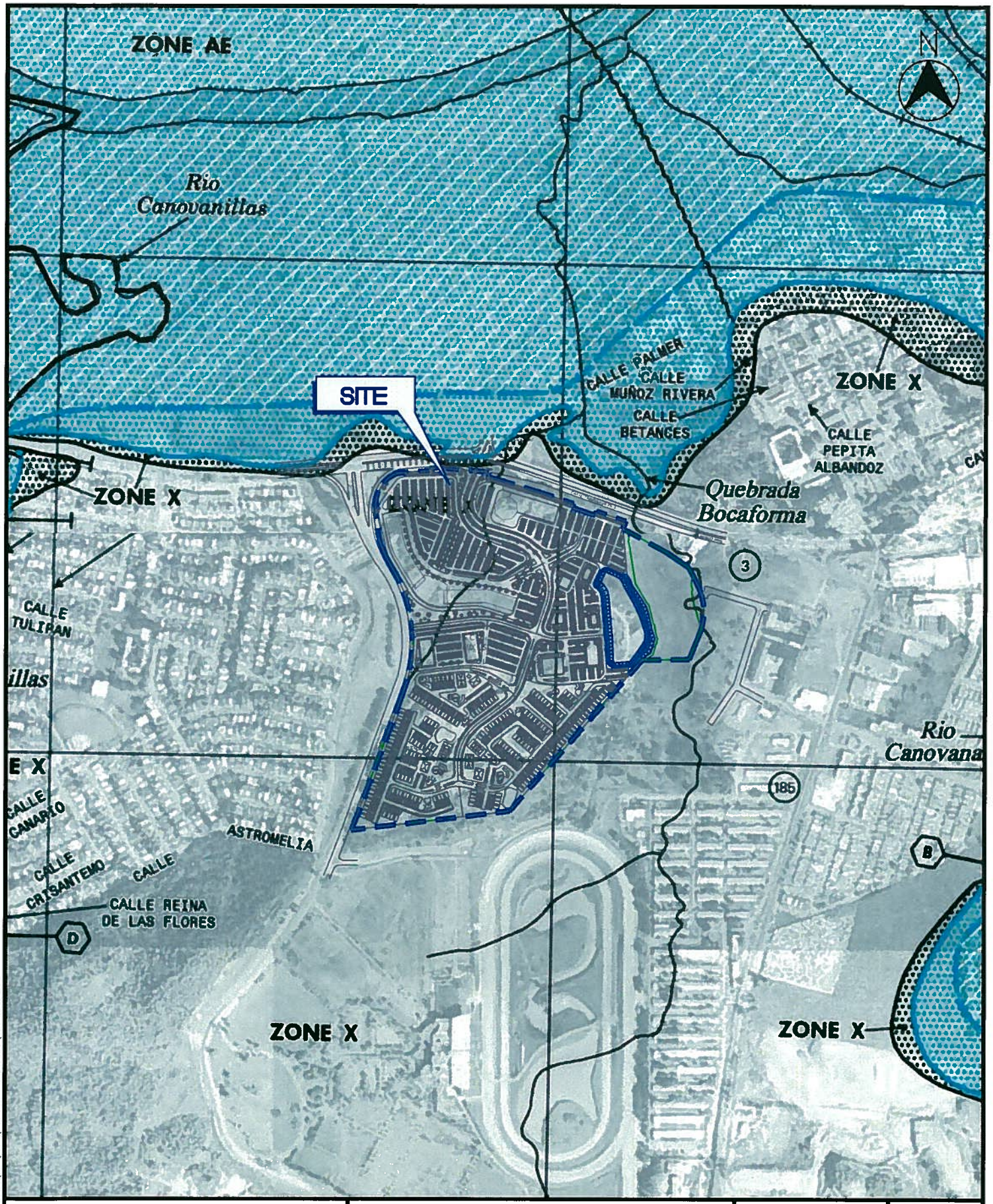
CANOVANAS, PUERTO RICO

CMA# 05201

SCALE: 1:20,000

DATE: 10/06/06

FIGURE 2



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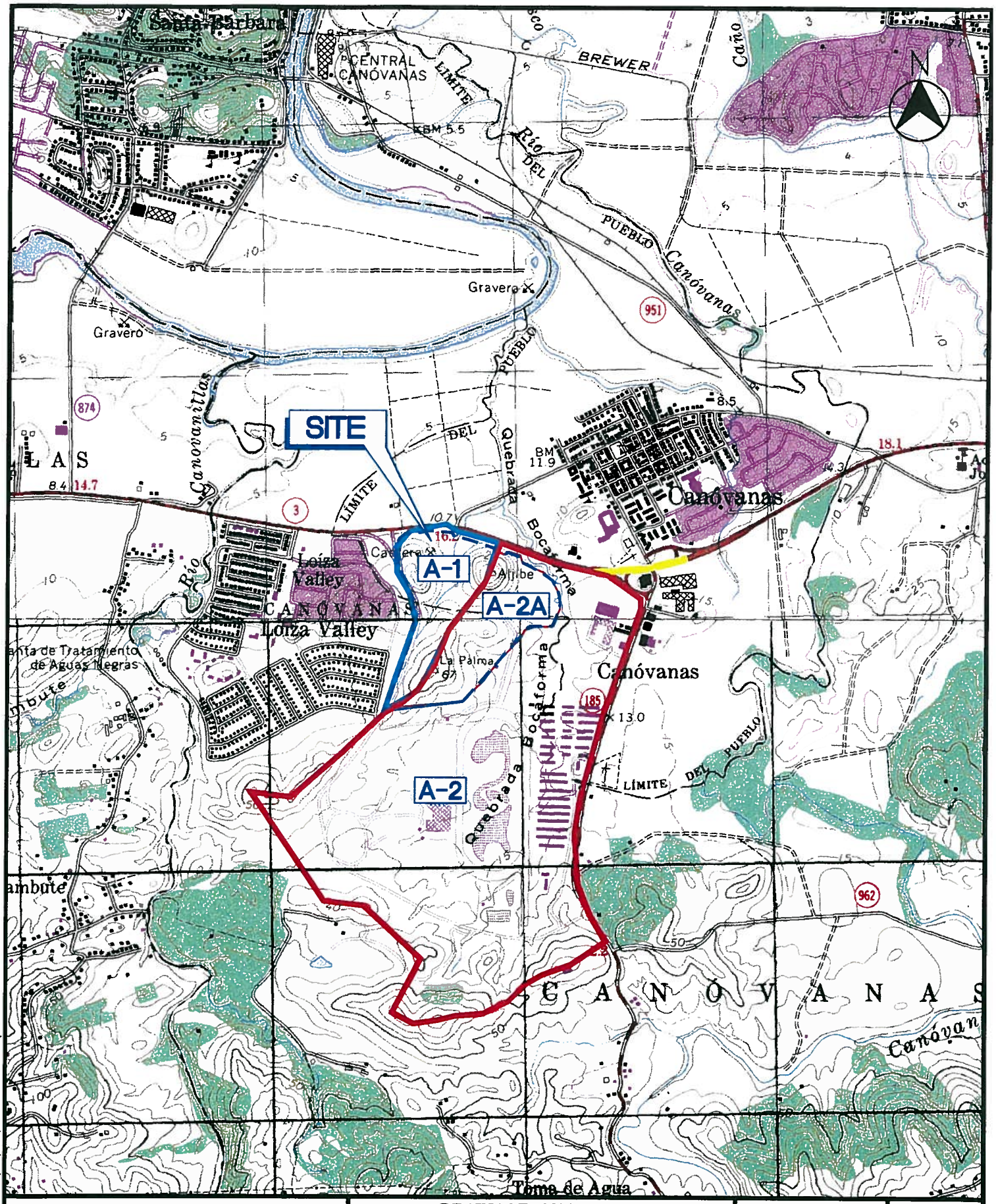
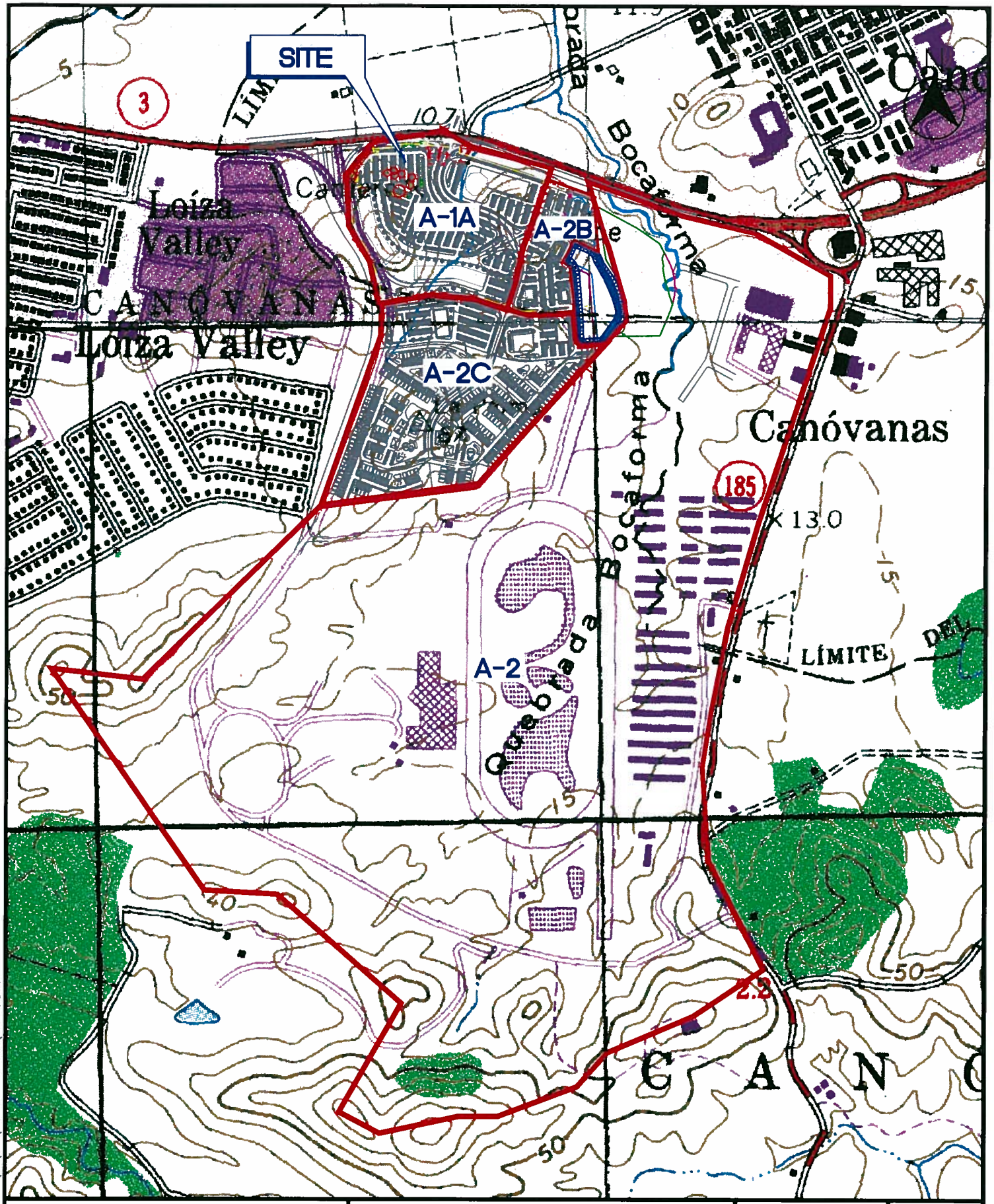
FEMA–FLOOD INSURANCE RATE MAP	CMA# 05201	FIGURA 3
EL NUEVO COMANDANTE HYDROLOGIC – HYDRAULIC STUDY	SCALE: 1:10,000	
CANOVANAS, PUERTO RICO	DATE: 10/06/06	

FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-03.DWG



CMA ARCHITECTS & ENGINEERS LLP 1509 F.D. Roosevelt Ave. San Juan, Puerto Rico 00968 Tel: 787-792-1509 Fax: 787-782-0687 E-mail: cma@cma-sjpr.com www.cma-sjpr.com	DRAINAGE SUB-BASIN EXISTING CONDITIONS EL NUEVO COMANDANTE HYDROLOGIC – HYDRAULIC STUDY CANOVANAS, PUERTO RICO	CMA# 05201 SCALE: 1:20,000 DATE: 10/06/06	FIGURE 4

FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-04.DWG



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DRAINAGE SUB-BASIN
PROPOSED CONDITIONS

EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

CANOVANAS, PUERTO RICO

CMA# 05201

SCALE: 1:10,000

DATE: 10/06/06

FIGURE 5

FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-05.DWG

FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-06.DWG

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U.S. DEPARTMENT OF AGRICULTURE SOILS MAP

EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

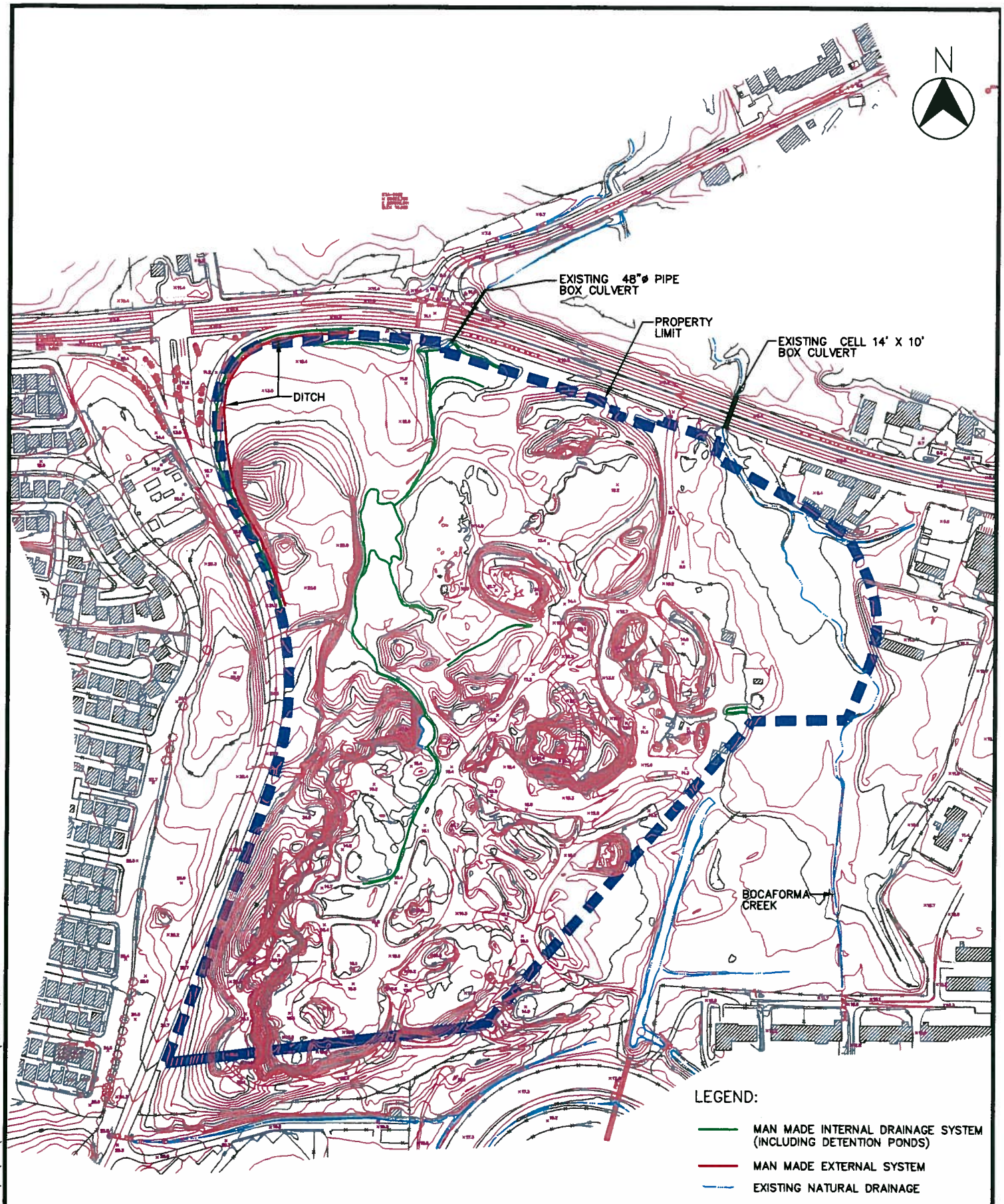
CANOVANAS, PUERTO RICO

CMA# 05201

SCALE: 1: 20,000

DATE: 10/06/06

FIGURE 6



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EXISTING CONDITIONS SURVEY PLAN

EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

CANOVANAS, PUERTO RICO

CMA# 05201

ESCALA: 1: 5,000

FECHA: 10/06/06

FIGURA 7

FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-07.DWG

FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-08.DWG

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PROPOSED CONDITIONS

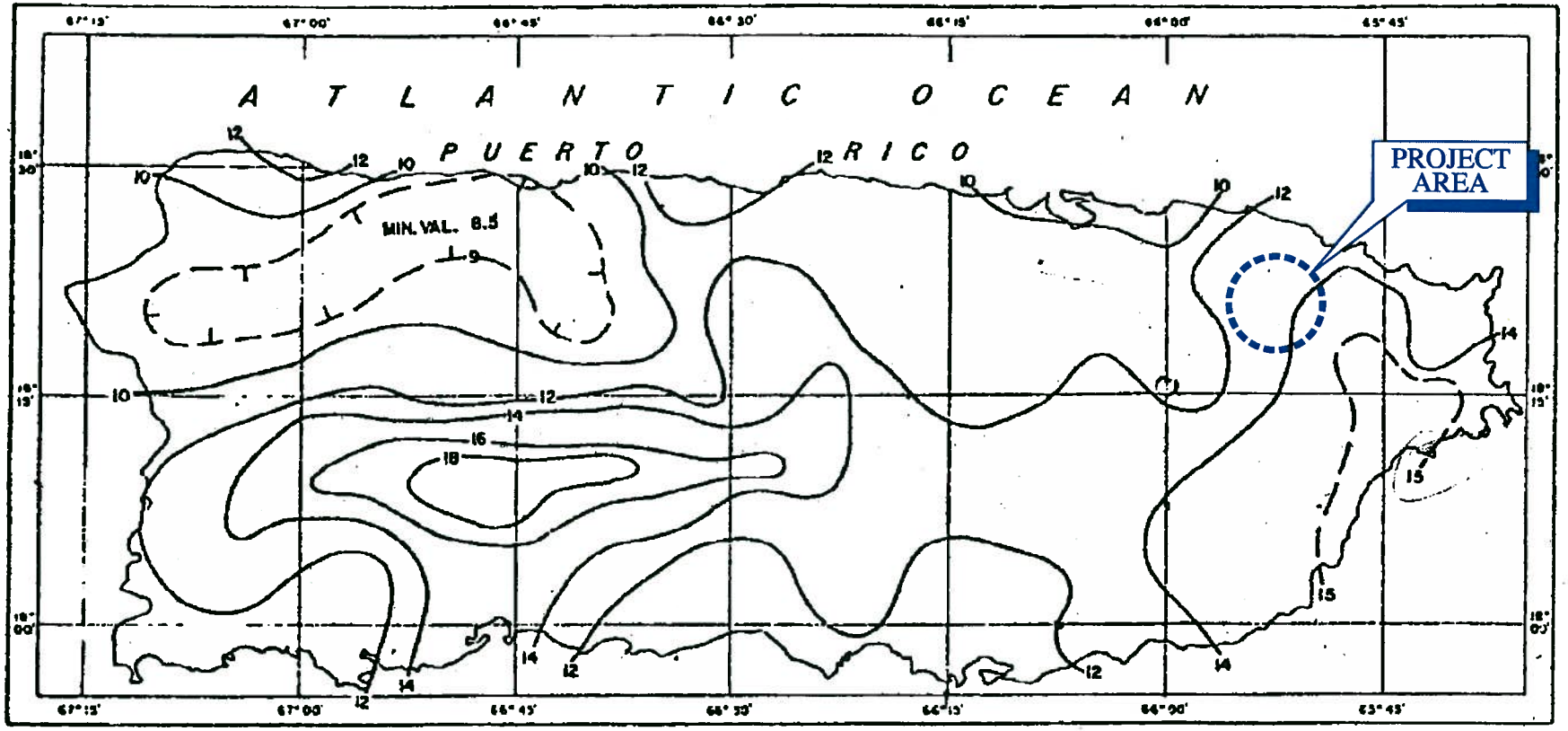
EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY
CANOVANAS, PUERTO RICO

CMA# 05201

SCALE: 1:5,000

DATE: 10/06/06

FIGURA 8



100-YEAR 24-HOUR RAINFALL (INCHES)

SOURCE: NATIONAL WEATHER BUREAU
TECHNICAL PAPER NO. 42, 1961

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100-YEAR, 24-HOUR PRECIPITATION MAP

EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

CANOVANAS, PUERTO RICO

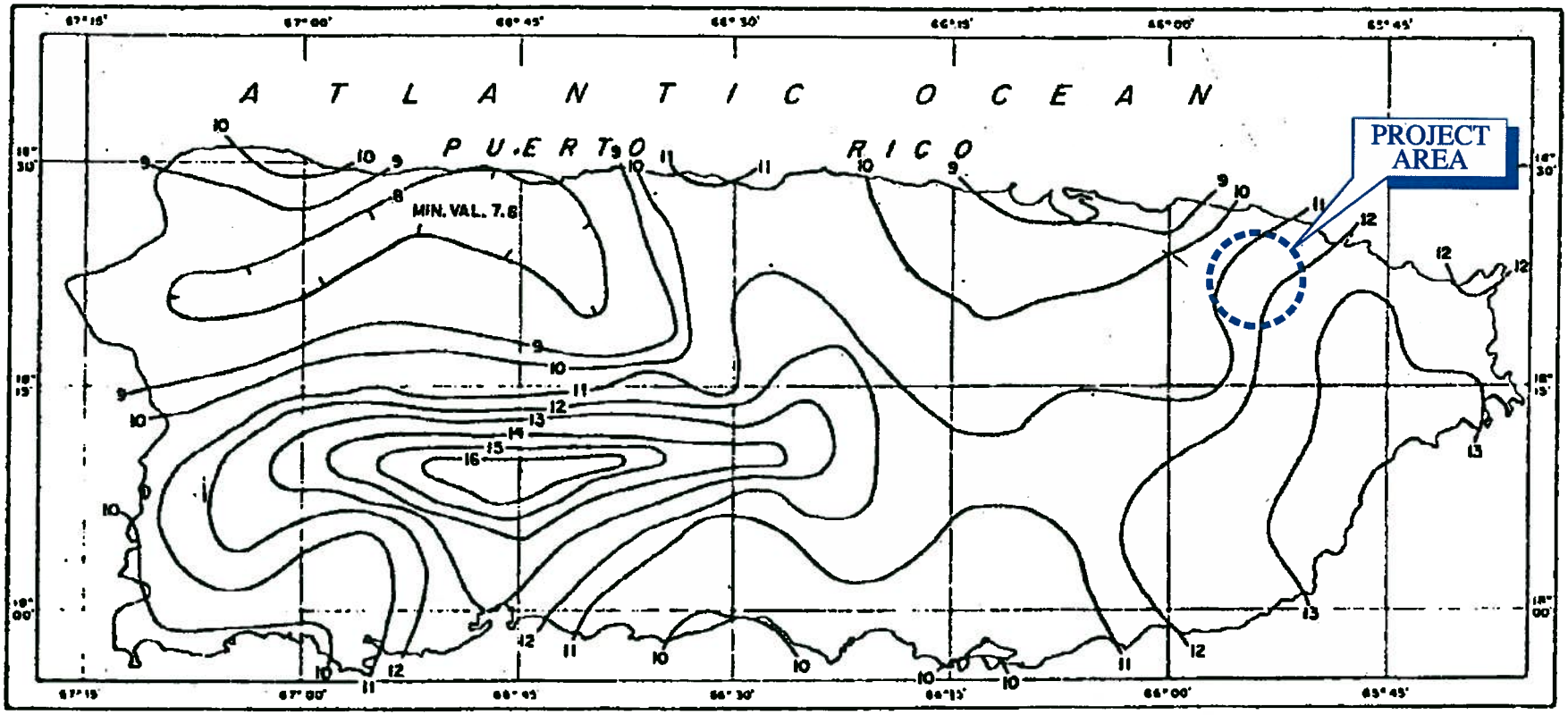
CMA# 05201

SCALE: N.T.S.

DATE: 10/06/06

FIGURE 9

FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-09.DWG



50-YEAR 24-HOUR RAINFALL (INCHES)

SOURCE: NATIONAL WEATHER BUREAU
TECHNICAL PAPER NO. 42, 1961

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50-YEAR, 24-HOUR PRECIPITATION MAP

EL NUEVO COMANDANTE
HYDROLOGIC - HYDRAULIC STUDY

CANOVANAS, PUERTO RICO

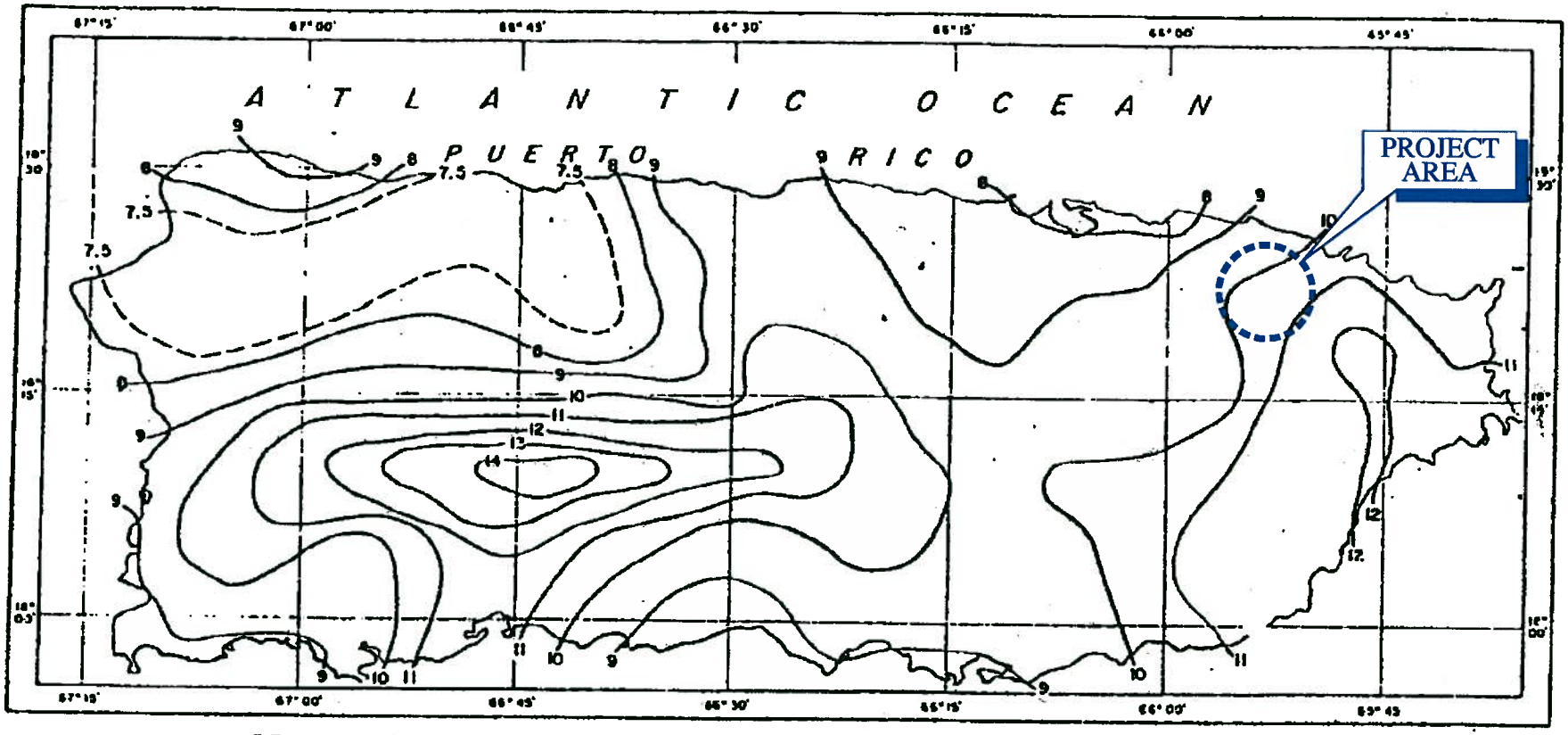
CMA# 05201

SCALE: N. T. S.

DATE: 10/06/06

FIGURE 10

FILE: M:\CIVIL\PROYECTOS\05\201\EST-HID-HID\FIG-10.DWG



25-YEAR 24-HOUR RAINFALL (INCHES)

SOURCE: NATIONAL WEATHER BUREAU
TECHNICAL PAPER NO. 42, 1961

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25-YEAR, 24-HOUR PRECIPITATION MAP

EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

CANOVANAS, PUERTO RICO

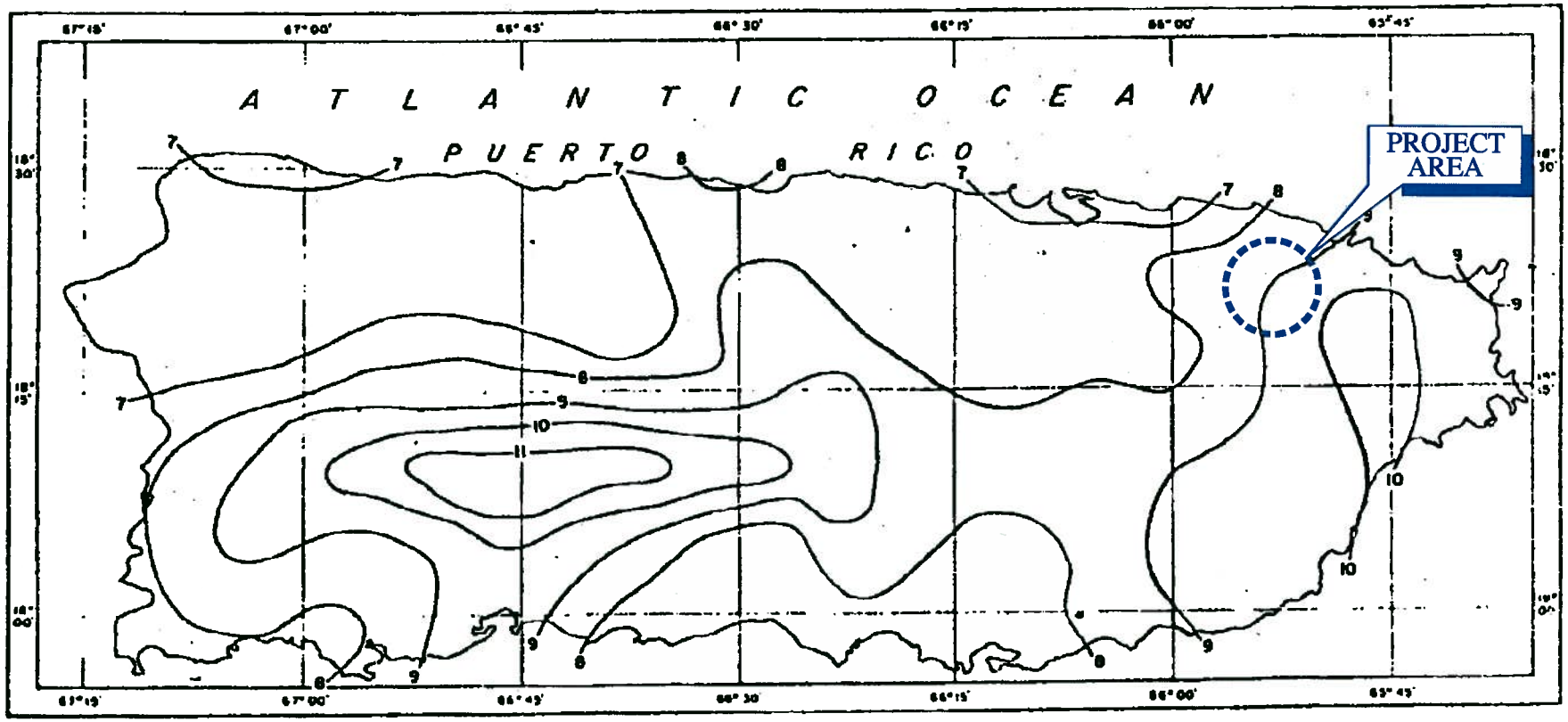
CMA# 05201

SCALE: N.T.S.

DATE: 10/06/06

FIGURE 11

M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-11.DWG



10-YEAR 24-HOUR RAINFALL (INCHES)

SOURCE: NATIONAL WEATHER BUREAU
TECHNICAL PAPER NO. 42, 1961

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10-YEAR, 24-HOUR PRECIPITATION MAP

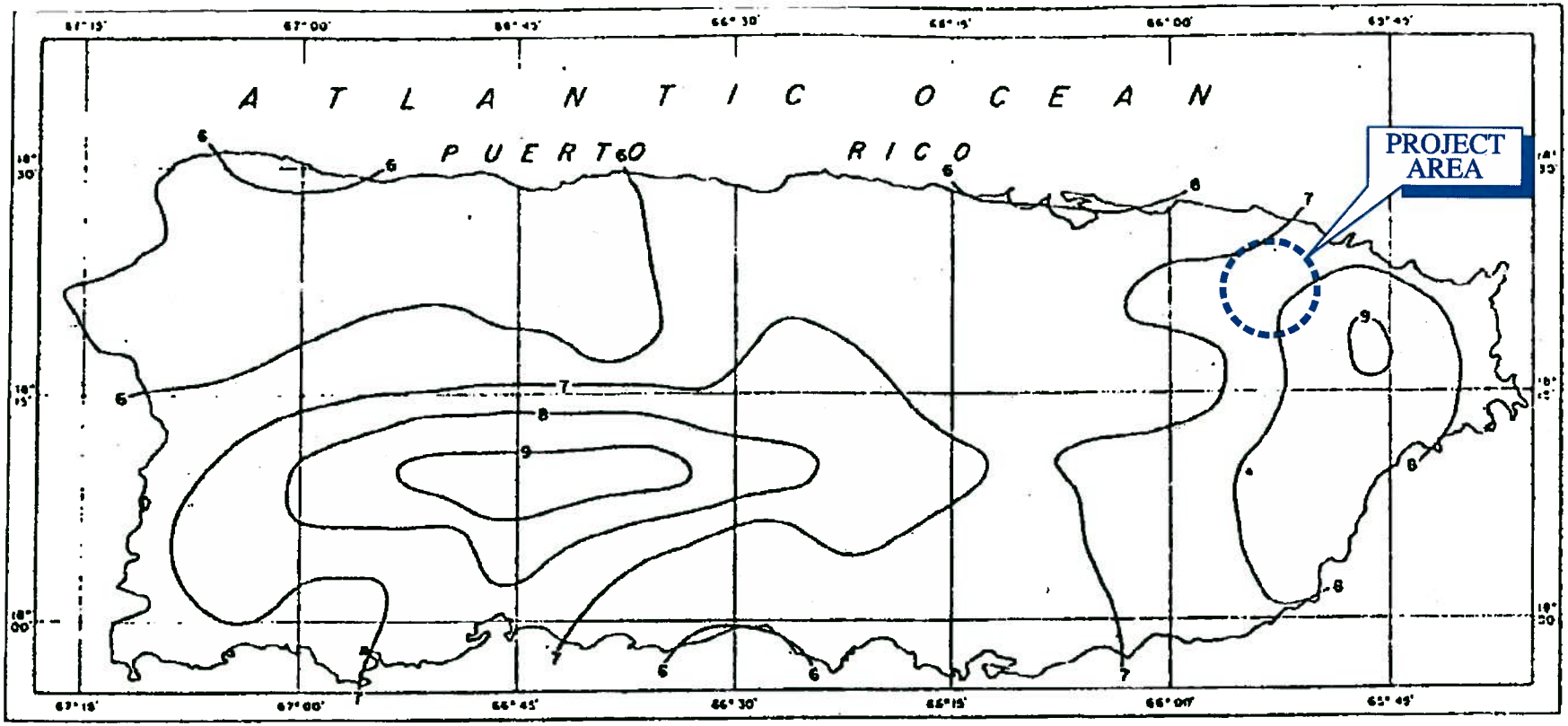
EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

CANOVANAS, PUERTO RICO

CMA# 05201
SCALE: N.T.S.
DATE: 10/06/06

FIGURE 12

M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-12.DWG



5-YEAR 24-HOUR RAINFALL (INCHES)

SOURCE: NATIONAL WEATHER BUREAU
TECHNICAL PAPER NO. 42, 1961

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5-YEAR, 24-HOUR PRECIPITATION MAP

EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

CANOVANAS, PUERTO RICO

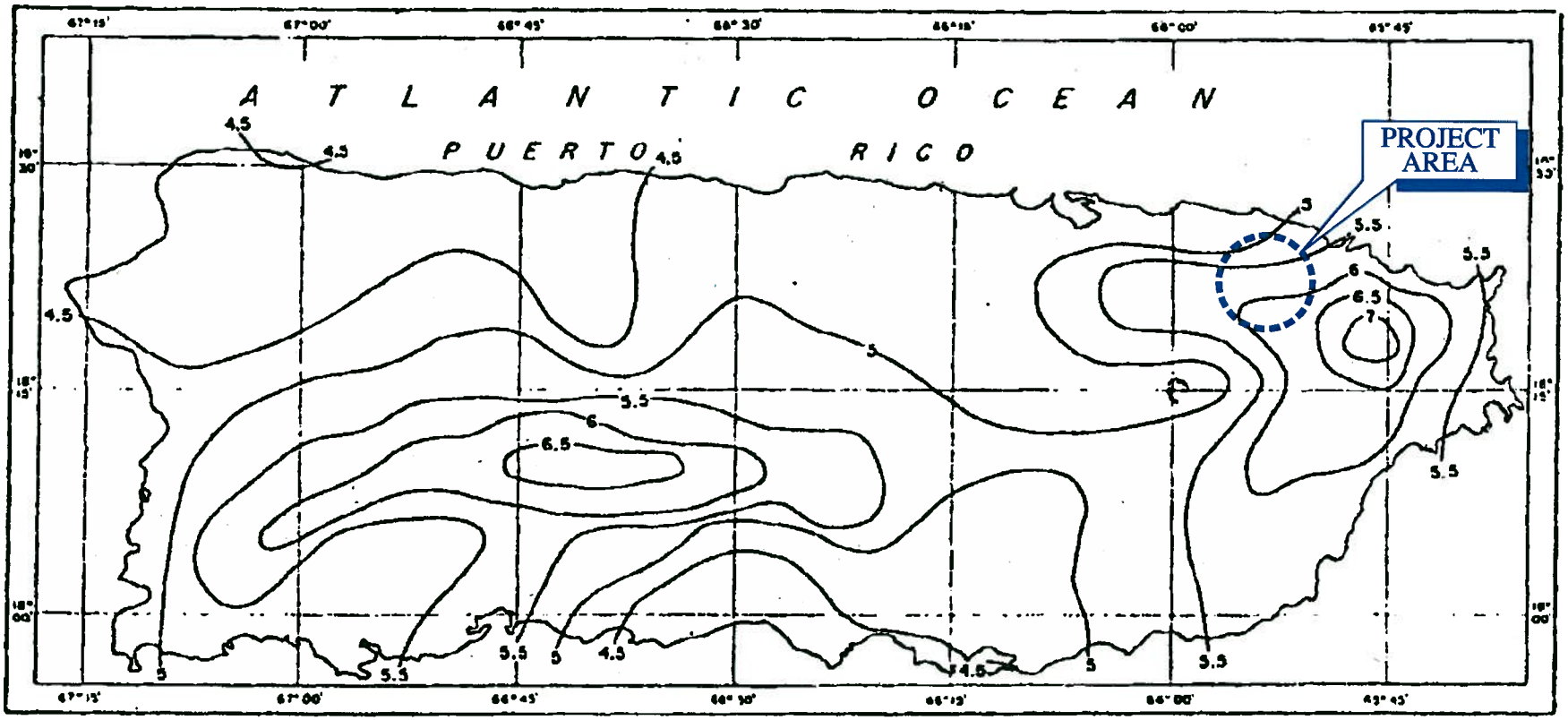
CMA# 05201

SCALE: N.T.S.

DATE: 10/06/06

FIGURE 13

M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-13.DWG



2-YEAR 24-HOUR RAINFALL (INCHES)

SOURCE: NATIONAL WEATHER BUREAU TECHNICAL PAPER NO. 42, 1961

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2-YEAR, 24-HOUR PRECIPITATION MAP

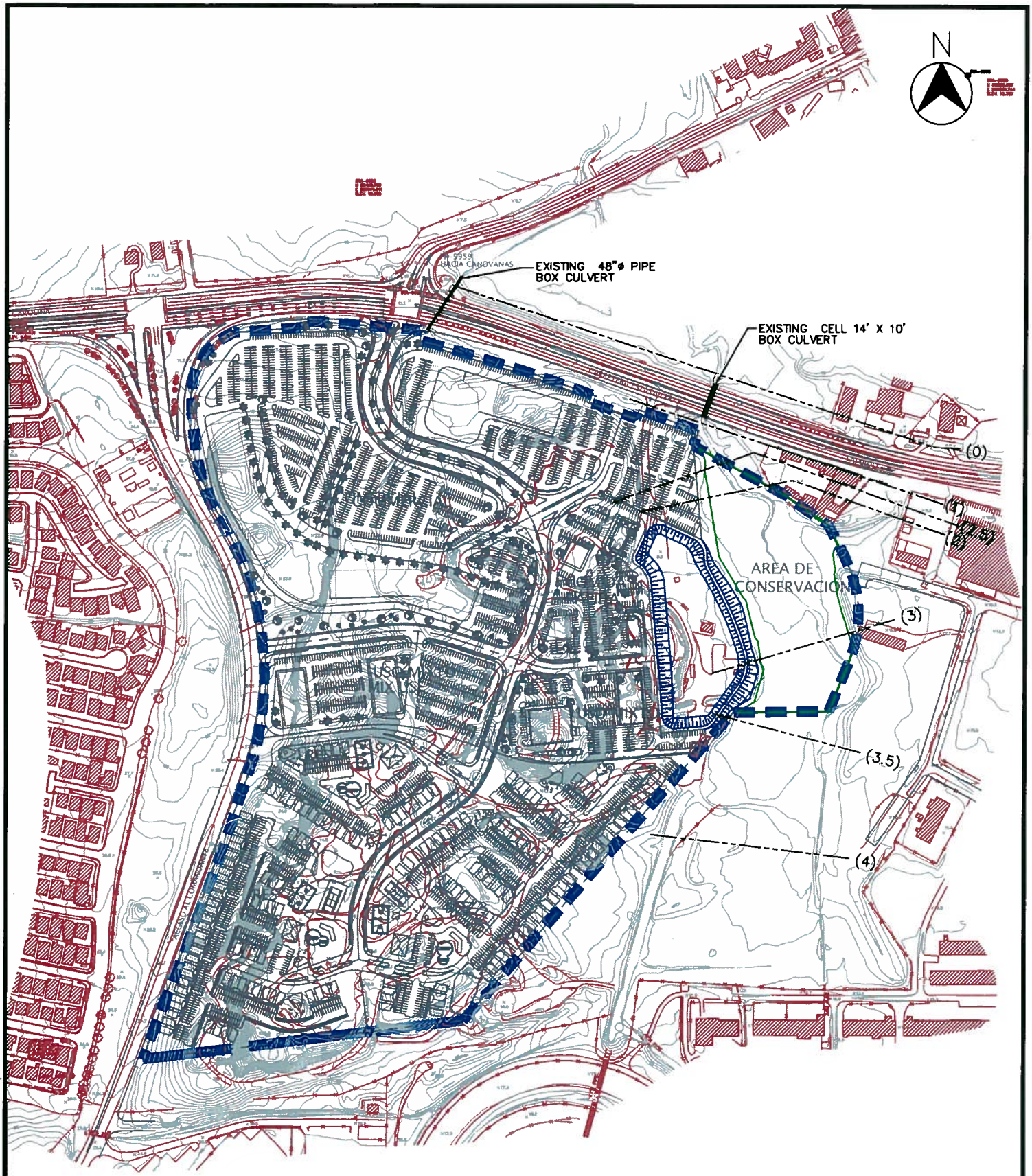
EL NUEVO COMANDANTE
HYDROLOGIC – HYDRAULIC STUDY

CANOVANAS, PUERTO RICO

CMA# 05201
SCALE: N.T.S.
DATE: 10/06/06

FIGURE 14

M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-14.DWG



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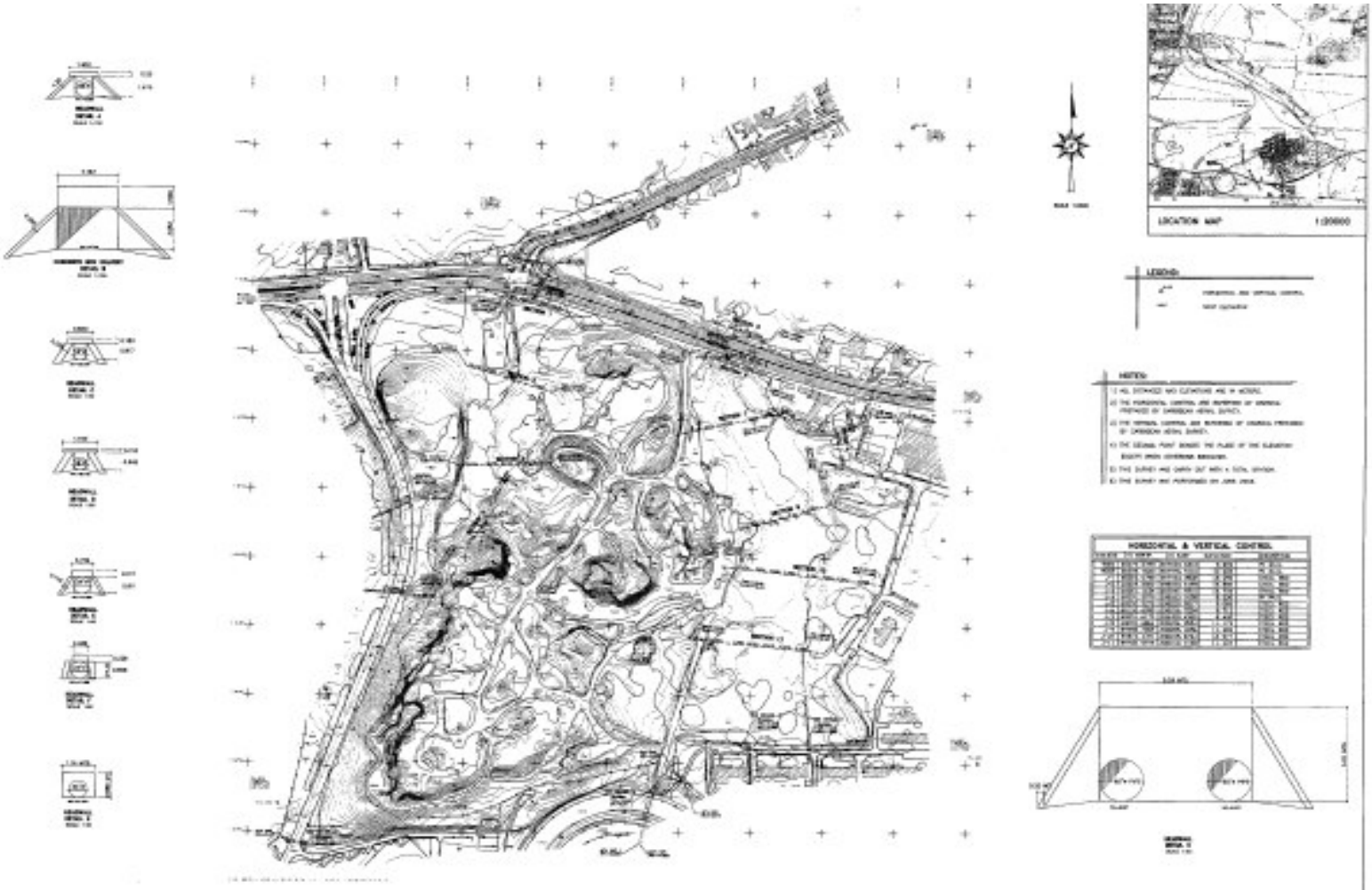
HYDRAULIC STUDY REFERENCE PLAN	CMA# 05201	FIGURA 15
EL NUEVO COMANDANTE HYDROLOGIC – HYDRAULIC STUDY CANOVANAS, PUERTO RICO	ESCALA: 1: 5,000 FECHA: 10/06/06	

FILE: M:\CIVIL\PROYECTOS\05\201\FIG-EST-HID-HID\FIG-15.DWG

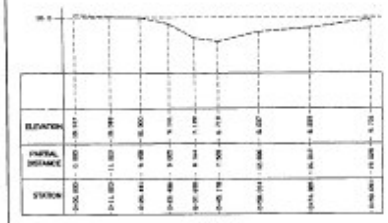
APPENDICES

APPENDIX A
TOPOGRAPHIC PLAN

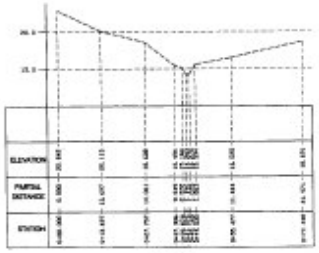


PLAN

EL NUEVO COMANDANTE QUARRY SITE, LOCATED AT CANOVANAS, P.R.

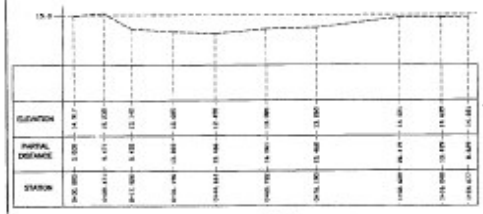


SECTION 1

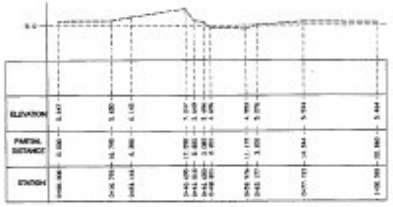


SECTION 4

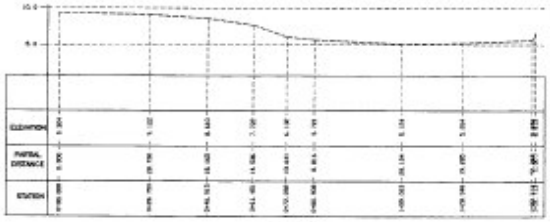
LOCATION MAP 1:20000



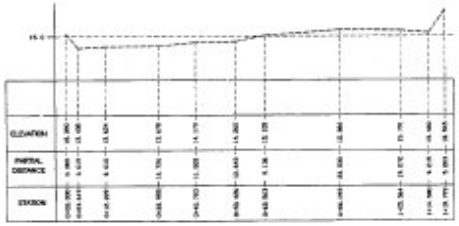
SECTION 2



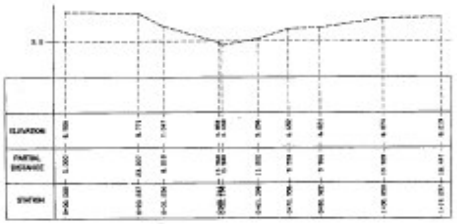
SECTION 5



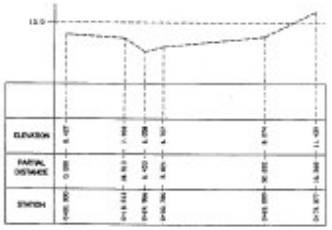
SECTION 7



SECTION 3



SECTION 6



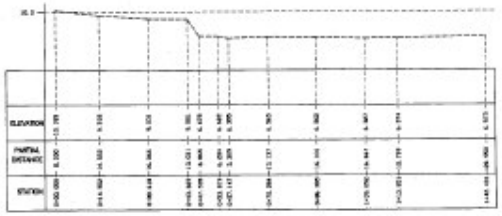
SECTION 8

Terrazas & Associados
Agrimensores

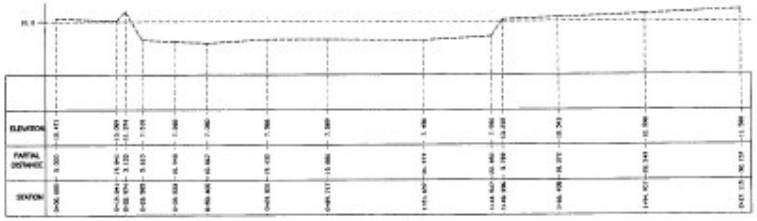
REVISIONS

PROFILES PLAN

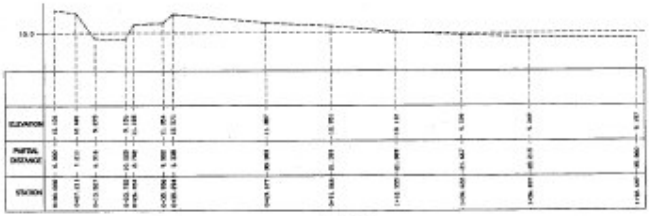
EL NUEVO COMANDANTE QUARRY SITE, LOCATED AT CANOVANAS, P.R.



SECTION 9



SECTION 10



SECTION 11

LOCATION MAP 1:20000

Torres & Asociados
Agrimensores

PROFILES PLAN
EL NUEVO COMANDANTE QUARRY SITE, LOCATED AT CANOVANAS, P.R.

APPENDIX B
HYDROLOGIC PARAMETERS – DETAILED CALCULATIONS

Worksheet 2 : Runoff curve number and runoff

Project	El Nuevo Comandante	By	M. Aristy	Date	09-Oct-06
Location	Canóvanas, Puerto Rico	Checked	J.A. Tirado	Date	09-Oct-06

Check: [X] Present [ ] Developed Basin A-1

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area [X] acres [ ] mi² [ ] %	Product of CN x area
Mabi clay,5 to 12 percentage slopesMaC2	Pasture or Range, good condition	80			6.76	540.57
Caguabo clay loam, 20 to 60 percent slopes CbF2 {D}	Pasture or Range, good condition	80			19.26	1541.01
Mabi clay, 12 to 20 percent slopes, MaD2 {D}	Pasture or Range, good condition	80			2.97	237.97
Mabi clay, 0 to 5 percent slopes, MaB {D}	Pasture or Range, good condition	80			1.10	88.27
Gravel Pit	Pasture or Range, good condition	80			7.61	609.18
				Totals ->	37.71	3016.99

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{3016.99}{37.71} = 80.00$ **Use CN ->** **80**

S= 2.5

2. Runoff

	Storm #1	*Storm #2*	*Storm #3*	*Storm #4*	*Storm #5*	*Storm #6*
Frequency.....yr	100	50	25	10	5	2
Rainfall, P (24-hr).....in	13.00	11.00	10.00	8.50	7.50	5.50
Runoff,Q.....in	10.42	8.48	7.52	6.10	5.16	3.33

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

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Fax (787) 782-0687

Project	El Nuevo Comandante Canóvanas, PR				
By	M. Aristy	Date	09-Oct-06	Project	# 05201H
Chkd	J.A. Tirado	Date	09-Oct-06	Page	

Worksheet 2 : Runoff curve number and runoff

Project	El Nuevo Comandante	By	M. Aristy	Date	09-Oct-06
Location	Canóvanas, Puerto Rico	Checked	J.A. Tirado	Date	09-Oct-06

Check: [X] Present [ ] Developed Basin A-2

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area X acres / mi² / %	Product of CN x area
Caguabo clay loam, 20 to 60 percent slopes CbF2 {D}	Pasture or Range,good condition	80			60.99	4879.41
Coloso silty clay loam Co {D}	Pasture or Range,good condition	80			1.27	101.23
Mabi clay, 0 to 5 percent slopes MaB {D}	Pasture or Range,good condition	80			24.90	1991.71
Mabi Clay, 12 to 20 percent slopes, MaD2 {D}	Pasture or Range,good condition	80			17.02	1361.49
Soil not surveyed	Pasture or Range,good condition	80			21.23	1698.74
Mabi clay, 5 to 12 percent slope MaC2 {D}	Lawns, parks, golf course, cementeries etc.- vegetation established	80			143.55	11484.37
Mucara silty clay loam, 20 to 40 percent slopes MuE2 {D}	Pasture or Range,good condition	80			19.15	1532.13
Rio arriba clay, 5 to 12 percent slopes RrC2 {D}	Lawns, parks, golf course, cementeries etc.- vegetation established	80			39.59	3167.33
Rio arriba clay, 2 to 5 percent slope Rrb {D}	Lawns, parks, golf course, cementeries etc.- vegetation established	80			17.99	1439.58
				Totals ->	345.70	27655.98

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{27655.98}{345.70} = 80.00$ **Use CN ->** **80**

S= 2.5

2. Runoff

	Storm #1	*Storm #2*	*Storm #3*	*Storm #4*	*Storm #5*	*Storm #6*
Frequency.....yr	100	50	25	10	5	2
Rainfall, P (24-hr).....in	13.00	11.00	10.00	8.50	7.50	5.50
Runoff,Q.....in	10.42	8.48	7.52	6.10	5.16	3.33

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

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Project	El Nuevo Comandante Canóvanas, PR				
By	M. Aristy	Date	09-Oct-06	Project	# 05201H
Chkd	J.A. Tirado	Date	09-Oct-06	Page	

Worksheet 2 : Runoff curve number and runoff

Project	El Nuevo Comandante	By	M. Aristy	Date	09-Oct-06
Location	Canóvanas, Puerto Rico	Checked	J.A. Tirado	Date	09-Oct-06

Check: [X] Present [ ] Developed Basin A-2A

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area [X] acres [ ] mi^2 [ ] %	Product of CN x area
Caguabo clay loam, 20 to 60 percent slopes CbF2 {D}	Roads dirts	89			15.13	1346.39
Mabi clay, 0 to 5 percent slopes MaB {D}	Roads dirts	89			17.09	1520.90
Mabi Clay, 12 to 20 percent slopes, MaD2 {D}	Roads dirts	89			8.50	756.53
				Totals ->	40.72	3623.83

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{3623.83}{40.72} = 89.00$ **Use CN ->** **89**

S= 1.236

2. Runoff

	Storm #1	*Storm #2*	*Storm #3*	*Storm #4*	*Storm #5*	*Storm #6*
Frequency.....yr	100	50	25	10	5	2
Rainfall, P (24-hr).....in	13.00	11.00	10.00	8.50	7.50	5.50
Runoff,Q.....in	11.63	9.64	8.66	7.18	6.20	4.25

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

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Project	El Nuevo Comandante Canóvanas, PR				
By	M. Aristy	Date	09-Oct-06	Project	# 05201H
Chkd	J.A. Tirado	Date	09-Oct-06	Page	

Worksheet 2 : Runoff curve number and runoff

Project	El Nuevo Comandante	By	M. Aristy	Date	09-Oct-06
Location	Canóvanas, Puerto Rico	Checked	J.A. Tirado	Date	09-Oct-06

Check: [ ] Present [X] Developed Basin A-1A

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area [X] acres [ ] mi² [ ] %	Product of CN x area
{D}	Commercial and Business	95			26.34	2502.46
				Totals ->	26.34	2502.46

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{2502.46}{26.34} = 95.00$ **Use CN ->** **95**

S= 0.5263

2. Runoff

	Storm #1	*Storm #2*	*Storm #3*	*Storm #4*	*Storm #5*	*Storm #6*
Frequency.....yr	100	50	25	10	5	2
Rainfall, P (24-hr).....in	13.00	11.00	10.00	8.50	7.50	5.50
Runoff,Q.....in	12.39	10.39	9.40	7.90	6.90	4.92

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2 : Runoff curve number and runoff

Project	El Nuevo Comandante	By	M. Aristy	Date	09-Oct-06
Location	Canóvanas, Puerto Rico	Checked	J.A. Tirado	Date	09-Oct-06

Check: [ ] Present [X] Developed Basin A-2

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area X acres / mi² / %	Product of CN x area
Caguabo clay loam, 20 to 60 percent slopes CbF2 {D}	Pasture or Range,good condition	80			60.99	4879.41
Coloso silty clay loam Co {D}	Pasture or Range,good condition	80			1.27	101.23
Mabi clay, 0 to 5 percent slopes MaB {D}	Pasture or Range,good condition	80			24.90	1991.71
Mabi Clay, 12 to 20 percent slopes, MaD2 {D}	Pasture or Range,good condition	80			17.02	1361.49
Soil not surveyed	Pasture or Range,good condition	80			21.23	1698.74
Mabi clay, 5 to 12 percent slope MaC2 {D}	Lawns, parks, golf course, cementeries etc.- vegetation established	80			143.55	11484.37
Mucara silty clay loam, 20 to 40 percent slopes MuE2 {D}	Pasture or Range,good condition	80			19.15	1532.13
Rio arriba clay, 5 to 12 percent slopes RrC2 {D}	Lawns, parks, golf course, cementeries etc.- vegetation established	80			39.59	3167.33
Rio arriba clay, 2 to 5 percent slope Rrb {D}	Lawns, parks, golf course, cementeries etc.- vegetation established	80			17.99	1439.58
				Totals ->	345.70	27655.98

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{27655.98}{345.70} =$ 80.00 **Use CN ->** **80**

S= 2.5

2. Runoff

	Storm #1	*Storm #2*	*Storm #3*	*Storm #4*	*Storm #5*	*Storm #6*
Frequency.....yr	100	50	25	10	5	2
Rainfall, P (24-hr).....in	13.00	11.00	10.00	8.50	7.50	5.50
Runoff,Q.....in	10.42	8.48	7.52	6.10	5.16	3.33

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

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Project	El Nuevo Comandante Canóvanas, PR				
By	M. Aristy	Date	09-Oct-06	Project	# 05201H
Chkd	J.A. Tirado	Date	09-Oct-06	Page	

Worksheet 2 : Runoff curve number and runoff

Project	El Nuevo Comandante	By	M. Aristy	Date	09-Oct-06
Location	Canóvanas, Puerto Rico	Checked	J.A. Tirado	Date	09-Oct-06

Check: [ ] Present [X] Developed Sub-basin A-2B

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area [X] acres [ ] mi^2 [ ] %	Product of CN x area
{D}	Commercial and Business	95			6.56	623.52
				Totals ->	6.56	623.52

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{623.52}{6.56} =$ 95.00 **Use CN ->** **95**

S= 0.5263

2. Runoff

	Storm #1	*Storm #2*	*Storm #3*	*Storm #4*	*Storm #5*	*Storm #6*
Frequency.....yr	100	50	25	10	5	2
Rainfall, P (24-hr).....in	13.00	11.00	10.00	8.50	7.50	5.50
Runoff,Q.....in	12.39	10.39	9.40	7.90	6.90	4.92

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

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By	M. Aristy	Date	09-Oct-06	Project	# 05201H
Chkd	J.A. Tirado	Date	09-Oct-06	Page	

Worksheet 2 : Runoff curve number and runoff

Project	El Nuevo Comandante	By	M. Aristy	Date	09-Oct-06
Location	Canóvanas, Puerto Rico	Checked	J.A. Tirado	Date	09-Oct-06

Check: [ ] Present [X] Developed Sub-basin A-2C

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area X acres / mi² / %	Product of CN x area
{D}	Residential Districts by average lots size : 1/8 acres or less	92			36.05	3316.90
				Totals ->	36.05	3316.90

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{3316.90}{36.05} = 92.00$ **Use CN ->** **92**

S= 0.8696

2. Runoff

	Storm #1	*Storm #2*	*Storm #3*	*Storm #4*	*Storm #5*	*Storm #6*
Frequency.....yr	100	50	25	10	5	2
Rainfall, P (24-hr).....in	13.00	11.00	10.00	8.50	7.50	5.50
Runoff,Q.....in	12.01	10.02	9.03	7.54	6.55	4.58

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Tc Calculations

Basin ID **A-1** (existing condition)

Overland Flow (t_o)

L (m) = 812.51 m

S = y2-y1/L Y1 (m)= 5.86 m

Y2 (m) = 30.00 m

S= 0.0297

(From Figure 3-1)

V (ft/s) = 2.80 ft/s (unpaved)

V (m/s) = 0.85 m/s

to (sec) = 951.80 secs. = 0.264 hrs.

Tc = Σt_o 951.80 secs. = 0.264 hrs.

Tlag = 0.6Tc **571.08 secs.** **=** **0.159 hrs.**

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By	M.Aristy	Date	10/9/2006	Project #	05201
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Tc Calculations

Basin ID **A-2** (existing condition)

Overland Flow (t_o)

L (m) = 535.00 m

S = y2-y1/L Y1 (m)= 15.00 m

Y2 (m) = 60.00 m

S= 0.0841

(From Figure 3-1)

V (ft/s) = 4.70 ft/s (unpaved)

V (m/s) = 1.43 m/s

to (sec) = 373.36 secs. = 0.104 hrs.

Overland Flow (t_o)

L (m) = 648.00 m

S = y2-y1/L Y1 (m)= 10.00 m

Y2 (m) = 15.00 m

S= 0.0077

(From Figure 3-1)

V (ft/s) = 1.80 ft/s (paved)

V (m/s) = 0.55 m/s

to (sec) = 1180.80 secs. = 0.328 hrs.

Overland Flow (t_o)

L (m) = 915.00 m

S = y2-y1/L Y1 (m)= 3.74 m

Y2 (m) = 10.00 m

S= 0.0068

(From Figure 3-1)

V (ft/s) = 1.65 ft/s (unpaved)

V (m/s) = 0.50 m/s

to (sec) = 1818.91 secs. = 0.505 hrs.

$Tc = \Sigma t_o$ 3373.07 secs. = 0.937 hrs.

Tlag = 0.6Tc **2023.84 secs.** = **0.562 hrs.**

Tc Calculations

Basin ID **A-2a** (existing condition)

Overland Flow (t_o)

L (m) =	950.00	m	
S = y2-y1/L	Y1 (m)=	9.00	m
	Y2 (m) =	40.80	m
S=	0.0335		

(From Figure 3-1)

V (ft/s) =	2.90	ft/s	(unpaved)
V (m/s) =	0.88	m/s	

to (sec) =	1074.48	secs.	=	0.298	hrs.

Tc = Σt_o	1074.48	secs.	=	0.298	hrs.
Tlag = 0.6Tc	**644.69**	**secs.**	=	**0.179**	**hrs.**

Tc Calculations

Basin ID **A-1** (proposed condition)

Overland Flow (t_o)

L (m) =	248.58	m	
S = y2-y1/L	Y1 (m)=	15.23	m
	Y2 (m) =	21.94	m
S=	0.0270		

(From Figure 3-1)

V (ft/s) =	3.40	ft/s	(paved area)
V (m/s) =	1.04	m/s	

to (sec) =	239.81	secs.	=	0.067 hrs.

Overland Flow (t_o)

L (m) =	432.09	m	
S = y2-y1/L	Y1 (m)=	10.11	m
	Y2 (m) =	15.23	m
S=	0.0118		

(From Figure 3-1)

V (ft/s) =	2.20	ft/s	(paved area)
V (m/s) =	0.67	m/s	

to (sec) =	644.21	secs.	=	0.179 hrs.
$Tc = \Sigma t_o$	884.01	secs.	=	0.246 hrs.
Tlag = 0.6Tc	**530.41**	**secs.**	**=**	**0.147 hrs.**

Tc Calculations

Basin ID **A-2** (proposed condition)

Overland Flow (t_o)

L (m) = 535.00 m
S = y2-y1/L Y1 (m)= 15.00 m
Y2 (m) = 60.00 m
S= 0.0841

(From Figure 3-1)

V (ft/s) = 4.70 ft/s (unpaved)
V (m/s) = 1.43 m/s

to (sec) = 373.36 secs. = 0.104 hrs.

Overland Flow (t_o)

L (m) = 648.00 m
S = y2-y1/L Y1 (m)= 10.00 m
Y2 (m) = 15.00 m
S= 0.0077

(From Figure 3-1)

V (ft/s) = 1.80 ft/s (paved)
V (m/s) = 0.55 m/s

to (sec) = 1180.80 secs. = 0.328 hrs.

Overland Flow (t_o)

L (m) = 915.00 m
S = y2-y1/L Y1 (m)= 3.74 m
Y2 (m) = 10.00 m
S= 0.0068

(From Figure 3-1)

V (ft/s) = 1.65 ft/s (unpaved)
V (m/s) = 0.50 m/s

to (sec) = 1818.91 secs. = 0.505 hrs.

$Tc = \Sigma t_o$ 3373.07 secs. = 0.937 hrs.

Tlag = 0.6Tc **2023.84 secs.** = **0.562 hrs.**

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Tc Calculations

Basin ID **A-2b** (proposed condition)

Overland Flow (t_o)

L (m) =		318.32	m	
S = y2-y1/L	Y1 (m)=		9.00	m
	Y2 (m) =		15.18	m
S=		0.0194		

(From Figure 3-1)

V (ft/s) =	2.90	ft/s	(paved)
V (m/s) =	0.88	m/s	

to (sec) =	360.03	secs.	=	0.100	hrs.

Tc = Σt_o	360.03	secs.	=	0.100	hrs.
Tlag = 0.6Tc	**216.02**	**secs.**	**=**	**0.060**	**hrs.**

Tc Calculations

Basin ID **A-2c** (proposed condition)

Overland Flow (t_o)

L (m) =	689.62	m	
S = y2-y1/L	Y1 (m)=	15.18	m
	Y2 (m) =	23.34	m
S=	0.0118		

(From Figure 3-1)

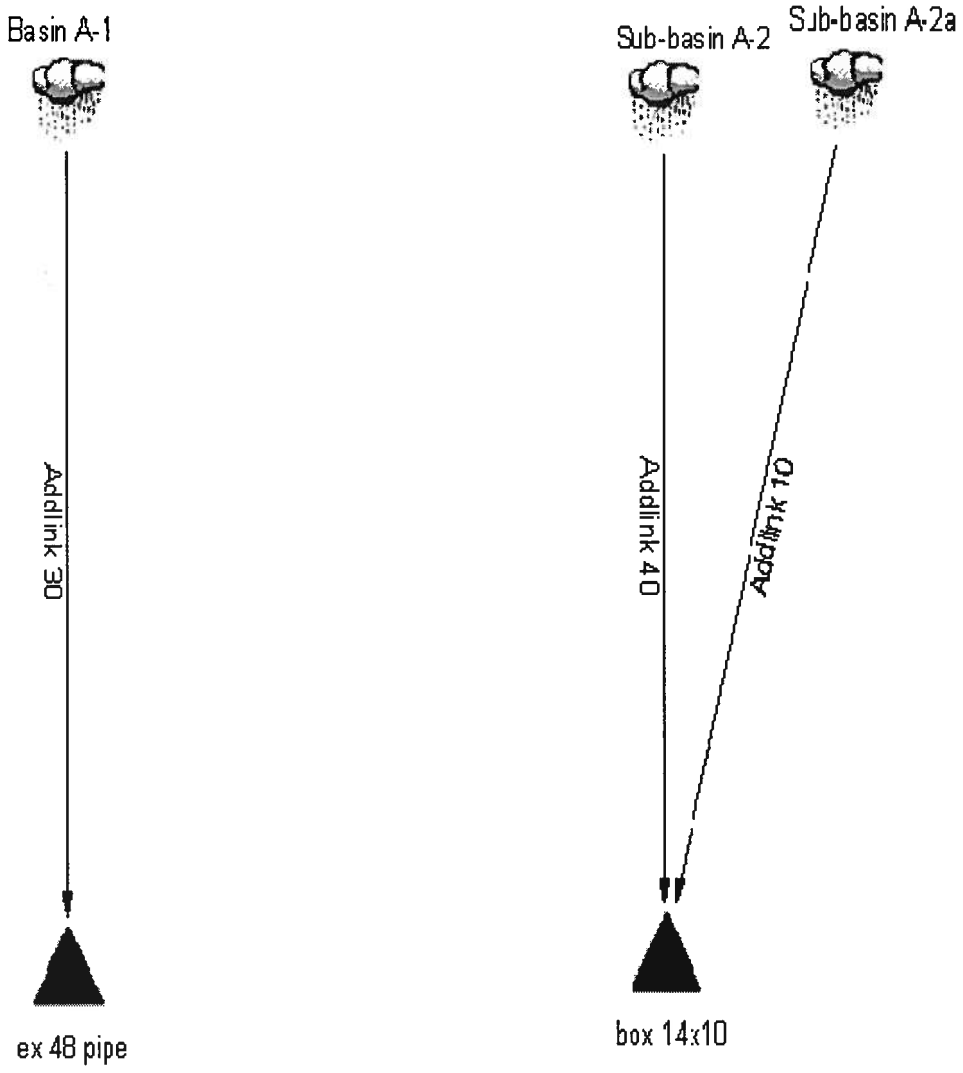
V (ft/s) =	2.20	ft/s	(paved)
V (m/s) =	0.67	m/s	

to (sec) =	1028.16	secs.	=	0.286	hrs.

Tc = Σt_o	1028.16	secs.	=	0.286	hrs.
Tlag = 0.6Tc	**616.90**	**secs.**	**=**	**0.171**	**hrs.**

APPENDIX C
PONDPACK RESULTS– EXISTING CONDITIONS

El Nuevo Comandante
Canóvanas, Puerto Rico
Existing Conditions



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MASTER DESIGN STORM SUMMARY

Network Storm Collection: Canvanas

Return Event	Total Depth in	Rainfall Type	RNF ID
2	5.5000	Synthetic Curve	TypeII 24hr
5	7.5000	Synthetic Curve	TypeII 24hr
10	8.5000	Synthetic Curve	TypeII 24hr
25	10.0000	Synthetic Curve	TypeII 24hr
50	11.0000	Synthetic Curve	TypeII 24hr
100	13.0000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
BASIN A-1	AREA	2	10.475		12.0400	148.69		
BASIN A-1	AREA	5	16.208		12.0400	227.52		
BASIN A-1	AREA	10	19.154		12.0400	267.17		
BASIN A-1	AREA	25	23.634		12.0400	326.60		
BASIN A-1	AREA	50	26.650		12.0400	366.13		
BASIN A-1	AREA	100	32.733		12.0400	444.90		
*BOX 14X10	JCT	2	110.455		12.3700	688.93		
*BOX 14X10	JCT	5	169.615		12.3700	1060.49		
*BOX 14X10	JCT	10	199.946		12.3700	1248.19		
*BOX 14X10	JCT	25	246.030		12.3700	1530.28		
*BOX 14X10	JCT	50	277.037		12.3700	1718.25		
*BOX 14X10	JCT	100	339.531		12.3700	2093.35		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*EX 48 PIPE	JCT	2	10.475		12.0400	148.69		
*EX 48 PIPE	JCT	5	16.208		12.0400	227.52		
*EX 48 PIPE	JCT	10	19.154		12.0400	267.17		
*EX 48 PIPE	JCT	25	23.634		12.0400	326.60		
*EX 48 PIPE	JCT	50	26.650		12.0400	366.13		
*EX 48 PIPE	JCT	100	32.733		12.0400	444.90		
SUB-BASIN A-2	AREA	2	96.026		12.4900	638.42		
SUB-BASIN A-2	AREA	5	148.587		12.4900	983.13		
SUB-BASIN A-2	AREA	10	175.590		12.4900	1157.07		
SUB-BASIN A-2	AREA	25	216.657		12.3700	1420.53		
SUB-BASIN A-2	AREA	50	244.311		12.3700	1596.94		
SUB-BASIN A-2	AREA	100	300.080		12.3700	1948.99		
SUB-BASIN A-2A	AREA	2	14.429		12.0700	188.06		
SUB-BASIN A-2A	AREA	5	21.028		12.0700	268.47		
SUB-BASIN A-2A	AREA	10	24.357		12.0600	308.38		
SUB-BASIN A-2A	AREA	25	29.372		12.0400	368.22		
SUB-BASIN A-2A	AREA	50	32.726		12.0400	407.94		
SUB-BASIN A-2A	AREA	100	39.451		12.0400	487.05		

Title... Project Date: 8/3/2006
Project Engineer: Jorge Tirado
Project Title: El Nuevo Comandante
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Canvanas

Storm Tag Name = 2

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 5.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 5

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 5 yr
Total Rainfall Depth= 7.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 8.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 25 yr
Total Rainfall Depth= 10.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 50

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 50 yr
Total Rainfall Depth= 11.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Title... Project Date: 8/3/2006
Project Engineer: Jorge Tirado
Project Title: El Nuevo Comandante
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Canvanas

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 13.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - BASIN A-1 2
Tc            = .2640 hrs
Drainage Area = 37.710 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .03520 hrs
Computed Peak Time             =  12.0384 hrs
Computed Peak Flow             =   148.79 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   148.69 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:BASIN A-1
               CN   =   80
               Area =      37.710 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       3.3333 in
                       10.475 ac-ft

HYG Volume...          10.475 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .26400 hrs (ID: BASIN A-1)
Computational Incr, Tm =   .03520 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   161.84 cfs
Unit peak time      Tp =   .17600 hrs
Unit receding limb, Tr =   .70400 hrs
Total unit time,    Tb =   .88000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - BASIN A-1 5
Tc            = .2640 hrs
Drainage Area = 37.710 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .03520 hrs
Computed Peak Time             =  12.0384 hrs
Computed Peak Flow             =   227.75 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   227.52 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:BASIN A-1
               CN   =   80
               Area =      37.710 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       5.1579 in
                       16.209 ac-ft

HYG Volume...          16.208 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .26400 hrs (ID: BASIN A-1)
Computational Incr, Tm =   .03520 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   161.84 cfs
Unit peak time      Tp =   .17600 hrs
Unit receding limb, Tr =   .70400 hrs
Total unit time,    Tb =   .88000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - BASIN A-1 10
Tc            = .2640 hrs
Drainage Area = 37.710 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .03520 hrs
Computed Peak Time             =  12.0384 hrs
Computed Peak Flow             =   267.46 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   267.17 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:BASIN A-1
               CN   =   80
               Area =      37.710 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       6.0952 in
                       19.154 ac-ft

HYG Volume...          19.154 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .26400 hrs (ID: BASIN A-1)
Computational Incr, Tm =   .03520 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   161.84 cfs
Unit peak time      Tp =   .17600 hrs
Unit receding limb, Tr =   .70400 hrs
Total unit time,    Tb =   .88000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - BASIN A-1 25
Tc            = .2640 hrs
Drainage Area = 37.710 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .03520 hrs
Computed Peak Time             =  12.0384 hrs
Computed Peak Flow             =   326.99 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   326.60 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:BASIN A-1
              CN   =   80
              Area =      37.710 acres
              S    =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                      7.5208 in
                      23.634 ac-ft

HYG Volume...         23.634 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .26400 hrs (ID: BASIN A-1)
Computational Incr, Tm =   .03520 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   161.84 cfs
Unit peak time      Tp =   .17600 hrs
Unit receding limb, Tr =   .70400 hrs
Total unit time,    Tb =   .88000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - BASIN A-1 50
Tc            = .2640 hrs
Drainage Area = 37.710 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .03520 hrs
Computed Peak Time             =  12.0384 hrs
Computed Peak Flow             =   366.59 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   366.13 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:BASIN A-1
               CN   =   80
               Area =      37.710 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       8.4808 in
                       26.651 ac-ft

HYG Volume...          26.650 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .26400 hrs (ID: BASIN A-1)
Computational Incr, Tm =   .03520 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   161.84 cfs
Unit peak time      Tp =   .17600 hrs
Unit receding limb, Tr =   .70400 hrs
Total unit time,    Tb =   .88000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - BASIN A-1 100
Tc            = .2640 hrs
Drainage Area = 37.710 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .03520 hrs
Computed Peak Time             =  12.0384 hrs
Computed Peak Flow             =   445.48 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   444.90 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:BASIN A-1
              CN   =   80
              Area =      37.710 acres
              S    =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                     10.4167 in
                      32.734 ac-ft

HYG Volume...         32.733 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .26400 hrs (ID: BASIN A-1)
Computational Incr, Tm =   .03520 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   161.84 cfs
Unit peak time      Tp =   .17600 hrs
Unit receding limb, Tr =   .70400 hrs
Total unit time,    Tb =   .88000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2 2
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

=============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =   638.59 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =   638.42 cfs
=============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2
               CN    =   80
               Area =     345.700 acres
               S     =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       3.3333 in
                       96.028 ac-ft

HYG Volume...          96.026 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =    .93700 hrs (ID: SUB-BASIN A-2)
Computational Incr, Tm =    .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2 5
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =   983.22 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =   983.13 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2
               CN   =   80
               Area =     345.700 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       5.1579 in
                      148.590 ac-ft

HYG Volume...        148.587 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB-BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2 10
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =  1157.10 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =  1157.07 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2
               CN    =   80
               Area =     345.700 acres
               S     =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       6.0952 in
                      175.594 ac-ft

HYG Volume...        175.590 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB-BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2 25
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

=============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1420.56 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1420.53 cfs
=============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2
               CN   =   80
               Area =     345.700 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       7.5208 in
                      216.663 ac-ft

HYG Volume...        216.657 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB-BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2 50
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

=============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1597.00 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1596.94 cfs
=============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2
               CN   =   80
               Area =     345.700 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       8.4808 in
                      244.317 ac-ft

HYG Volume...        244.311 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB-BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2 100
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1949.14 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1948.99 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2
               CN    =   80
               Area =     345.700 acres
               S     =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                      10.4167 in
                      300.087 ac-ft

HYG Volume...        300.080 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB-BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2A 2
Tc            = .2980 hrs
Drainage Area = 40.720 acres  Runoff CN= 89

============================================
Computational Time Increment   =   .03973 hrs
Computed Peak Time             =  12.0789 hrs
Computed Peak Flow             =   188.23 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0702 hrs
Peak Flow, Interpolated Output =   188.06 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2A
               CN    =   89
               Area =      40.720 acres
               S     =   1.2360 in
               0.2S =    .2472 in

                Cumulative Runoff
               -------------------
                       4.2523 in
                       14.429 ac-ft

HYG Volume...          14.429 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .29800 hrs (ID: SUB-BASIN A-2A)
Computational Incr, Tm =   .03973 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   154.82 cfs
Unit peak time      Tp =   .19867 hrs
Unit receding limb, Tr =   .79467 hrs
Total unit time,    Tb =   .99333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2A 5
Tc            = .2980 hrs
Drainage Area = 40.720 acres  Runoff CN= 89

=============================================
Computational Time Increment   =   .03973 hrs
Computed Peak Time             =  12.0789 hrs
Computed Peak Flow             =   268.53 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0702 hrs
Peak Flow, Interpolated Output =   268.47 cfs
=============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2A
               CN   =   89
               Area =      40.720 acres
               S    =   1.2360 in
               0.2S =    .2472 in

                Cumulative Runoff
               -------------------
                       6.1968 in
                       21.028 ac-ft

HYG Volume...          21.028 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .29800 hrs (ID: SUB-BASIN A-2A)
Computational Incr, Tm =   .03973 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   154.82 cfs
Unit peak time      Tp =   .19867 hrs
Unit receding limb, Tr =   .79467 hrs
Total unit time,    Tb =   .99333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2A 10
Tc            = .2980 hrs
Drainage Area = 40.720 acres  Runoff CN= 89

============================================
Computational Time Increment   =   .03973 hrs
Computed Peak Time             =  12.0789 hrs
Computed Peak Flow             =   308.38 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0702 hrs
Peak Flow, Interpolated Output =   308.38 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2A
               CN   =   89
               Area =      40.720 acres
               S    =   1.2360 in
               0.2S =    .2472 in

                Cumulative Runoff
               -------------------
                       7.1778 in
                       24.357 ac-ft

HYG Volume...          24.357 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .29800 hrs (ID: SUB-BASIN A-2A)
Computational Incr, Tm =   .03973 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   154.82 cfs
Unit peak time      Tp =   .19867 hrs
Unit receding limb, Tr =   .79467 hrs
Total unit time,    Tb =   .99333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2A 25
Tc            = .2980 hrs
Drainage Area = 40.720 acres  Runoff CN= 89

============================================
Computational Time Increment   =   .03973 hrs
Computed Peak Time             =  12.0392 hrs
Computed Peak Flow             =   368.23 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   368.22 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2A
               CN   =   89
               Area =      40.720 acres
               S    =   1.2360 in
               0.2S =    .2472 in

                Cumulative Runoff
               -------------------
                       8.6559 in
                       29.372 ac-ft

HYG Volume...          29.372 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .29800 hrs (ID: SUB-BASIN A-2A)
Computational Incr, Tm =   .03973 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   154.82 cfs
Unit peak time      Tp =   .19867 hrs
Unit receding limb, Tr =   .79467 hrs
Total unit time,    Tb =   .99333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2A 50
Tc            = .2980 hrs
Drainage Area = 40.720 acres  Runoff CN= 89

============================================
Computational Time Increment   =   .03973 hrs
Computed Peak Time             =  12.0392 hrs
Computed Peak Flow             =   407.96 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   407.94 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2A
               CN   =   89
               Area =      40.720 acres
               S    =   1.2360 in
               0.2S =    .2472 in

                Cumulative Runoff
               -------------------
                       9.6443 in
                       32.726 ac-ft

HYG Volume...          32.726 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .29800 hrs (ID: SUB-BASIN A-2A)
Computational Incr, Tm =   .03973 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   154.82 cfs
Unit peak time      Tp =   .19867 hrs
Unit receding limb, Tr =   .79467 hrs
Total unit time,    Tb =   .99333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB-BASIN A-2A 100
Tc            = .2980 hrs
Drainage Area = 40.720 acres  Runoff CN= 89

=============================================
Computational Time Increment   =   .03973 hrs
Computed Peak Time             =  12.0392 hrs
Computed Peak Flow             =   487.07 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0402 hrs
Peak Flow, Interpolated Output =   487.05 cfs
=============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB-BASIN A-2A
               CN   =   89
               Area =      40.720 acres
               S    =   1.2360 in
               0.2S =    .2472 in

                Cumulative Runoff
               -------------------
                      11.6261 in
                       39.451 ac-ft

HYG Volume...          39.451 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .29800 hrs (ID: SUB-BASIN A-2A)
Computational Incr, Tm =   .03973 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   154.82 cfs
Unit peak time      Tp =   .19867 hrs
Unit receding limb, Tr =   .79467 hrs
Total unit time,    Tb =   .99333 hrs
```

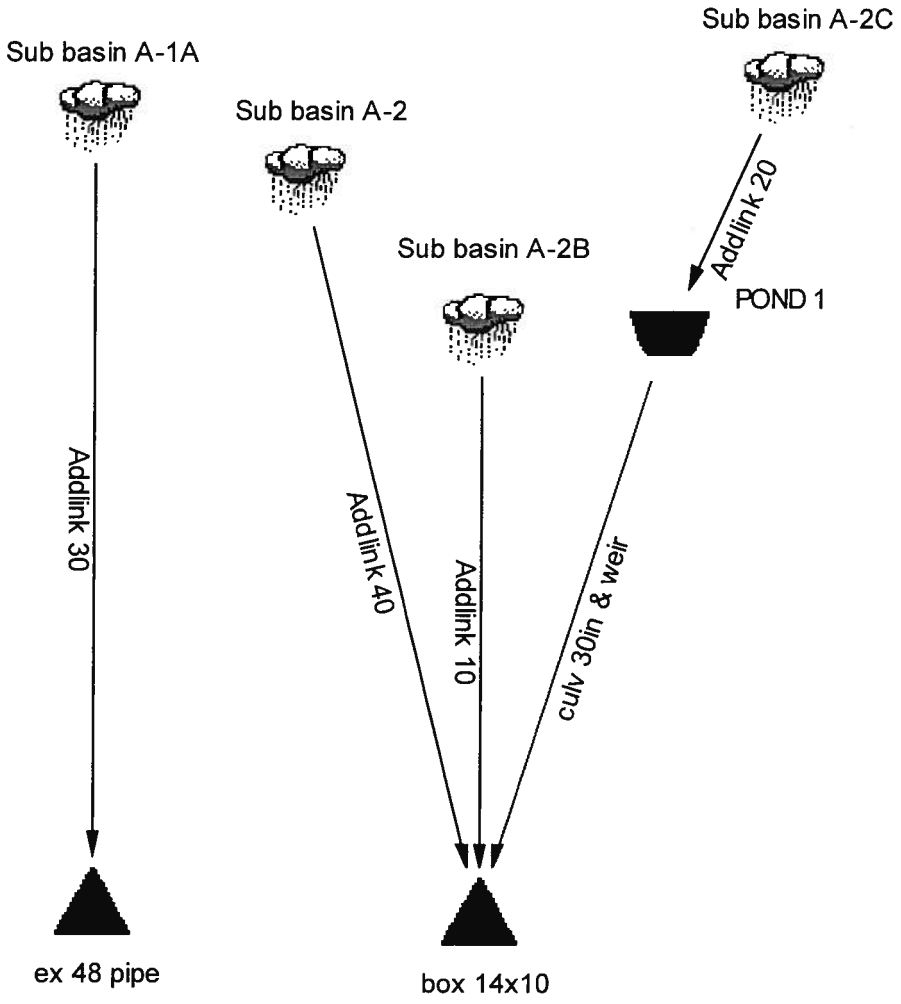
APPENDIX D

PONDPACK RESULTS - PROPOSED CONDITIONS
100 YR-24 HOUR STORM

El Nuevo Comandante

Canóvanas, Puerto Rico

Proposed Condition



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MASTER DESIGN STORM SUMMARY

Network Storm Collection: Canvanas

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev 2	5.5000	Synthetic Curve	TypeII 24hr
Dev 5	7.5000	Synthetic Curve	TypeII 24hr
Dev 10	8.5000	Synthetic Curve	TypeII 24hr
Dev 25	10.0000	Synthetic Curve	TypeII 24hr
Dev 50	11.0000	Synthetic Curve	TypeII 24hr
Dev100	13.0000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*BOX 14X10	JCT	2	106.970		12.4900	668.93		
*BOX 14X10	JCT	5	166.431		12.4400	1052.02		
*BOX 14X10	JCT	10	196.900		12.3700	1240.51		
*BOX 14X10	JCT	25	243.176		12.3700	1519.34		
*BOX 14X10	JCT	50	274.308		12.3700	1703.30		
*BOX 14X10	JCT	100	337.045		12.3700	2067.65		
*EX 48 PIPE	JCT	2	10.789		12.0300	143.27		
*EX 48 PIPE	JCT	5	15.153		12.0300	197.77		
*EX 48 PIPE	JCT	10	17.339		12.0300	224.90		
*EX 48 PIPE	JCT	25	20.622		12.0300	265.50		
*EX 48 PIPE	JCT	50	22.812		12.0300	292.52		
*EX 48 PIPE	JCT	100	27.194		12.0300	346.48		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
POND 1	IN	POND	2	13.499		12.0500	175.31		
POND 1	IN	POND	5	19.308		12.0500	245.83		
POND 1	IN	POND	10	22.226		12.0500	280.84		
POND 1	IN	POND	25	26.615		12.0500	333.13		
POND 1	IN	POND	50	29.545		12.0500	367.88		
POND 1	IN	POND	100	35.414		12.0500	437.15		
POND 1	OUT	POND	2	8.060		12.5600	26.68	32.56	8.142
POND 1	OUT	POND	5	13.793		12.3800	64.36	33.45	10.739
POND 1	OUT	POND	10	16.675		12.3700	76.62	33.90	12.082
POND 1	OUT	POND	25	21.006		12.3800	89.35	34.59	14.193
POND 1	OUT	POND	50	23.899		12.3800	95.95	35.04	15.585
POND 1	OUT	POND	100	29.695		12.4000	106.40	35.89	18.285
SUB BASIN A-1A		AREA	2	10.789		12.0300	143.27		
SUB BASIN A-1A		AREA	5	15.153		12.0300	197.77		
SUB BASIN A-1A		AREA	10	17.339		12.0300	224.90		
SUB BASIN A-1A		AREA	25	20.622		12.0300	265.50		
SUB BASIN A-1A		AREA	50	22.812		12.0300	292.52		
SUB BASIN A-1A		AREA	100	27.194		12.0300	346.48		
SUB BASIN A-2		AREA	2	96.026		12.4900	638.42		
SUB BASIN A-2		AREA	5	148.587		12.4900	983.13		
SUB BASIN A-2		AREA	10	175.590		12.4900	1157.07		
SUB BASIN A-2		AREA	25	216.657		12.3700	1420.53		
SUB BASIN A-2		AREA	50	244.311		12.3700	1596.94		
SUB BASIN A-2		AREA	100	300.080		12.3700	1948.99		
SUB BASIN A-2B		AREA	2	2.884		11.9200	47.77		
SUB BASIN A-2B		AREA	5	4.050		11.9200	65.94		
SUB BASIN A-2B		AREA	10	4.634		11.9200	74.99		
SUB BASIN A-2B		AREA	25	5.512		11.9200	88.52		
SUB BASIN A-2B		AREA	50	6.097		11.9200	97.53		
SUB BASIN A-2B		AREA	100	7.268		11.9200	115.52		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
SUB BASIN A-2C	AREA	2	13.499		12.0500	175.31		
SUB BASIN A-2C	AREA	5	19.308		12.0500	245.83		
SUB BASIN A-2C	AREA	10	22.226		12.0500	280.84		
SUB BASIN A-2C	AREA	25	26.615		12.0500	333.13		
SUB BASIN A-2C	AREA	50	29.545		12.0500	367.88		
SUB BASIN A-2C	AREA	100	35.414		12.0500	437.15		

Title... Project Date: 8/3/2006
Project Engineer: Jorge Tirado
Project Title: El Nuevo Comandante
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Canvanas

Storm Tag Name = Dev 2

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 5.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev 5

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 5 yr
Total Rainfall Depth= 7.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev 10

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 8.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev 25

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 25 yr
Total Rainfall Depth= 10.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev 50

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 50 yr
Total Rainfall Depth= 11.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Title... Project Date: 8/3/2006
Project Engineer: Jorge Tirado
Project Title: El Nuevo Comandante
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Canvanas

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 13.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev  2
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   143.57 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   143.27 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-1A
               CN   =   95
               Area =      26.340 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                       4.9152 in
                       10.789 ac-ft

HYG Volume...          10.789 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev  5
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   198.15 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   197.77 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-1A
               CN   =   95
               Area =      26.340 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                       6.9034 in
                       15.153 ac-ft

HYG Volume...          15.153 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev 10
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

=============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   225.32 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   224.90 cfs
=============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-1A
               CN   =   95
               Area =      26.340 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                       7.8995 in
                       17.339 ac-ft

HYG Volume...          17.339 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev 25
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   265.98 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   265.50 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-1A
               CN   =   95
               Area =      26.340 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                       9.3950 in
                       20.622 ac-ft

HYG Volume...          20.622 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev 50
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

=============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   293.04 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   292.52 cfs
=============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-1A
              CN   =   95
              Area =      26.340 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                     10.3927 in
                      22.812 ac-ft

HYG Volume...         22.812 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev100
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   347.07 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   346.48 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-1A
               CN   =   95
               Area =      26.340 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                      12.3891 in
                       27.194 ac-ft

HYG Volume...         27.194 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev  2
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =   638.59 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =   638.42 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2
               CN   =   80
               Area =     345.700 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       3.3333 in
                       96.028 ac-ft

HYG Volume...          96.026 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev  5
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

=============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =   983.22 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =   983.13 cfs
=============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2
              CN    =   80
              Area =     345.700 acres
              S     =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                      5.1579 in
                     148.590 ac-ft

HYG Volume...        148.587 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev 10
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =  1157.10 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =  1157.07 cfs
============================================

                DRAINAGE AREA
             -------------------
             ID:SUB BASIN A-2
             CN   =   80
             Area =     345.700 acres
             S    =   2.5000 in
             0.2S =    .5000 in

              Cumulative Runoff
             -------------------
                     6.0952 in
                    175.594 ac-ft

HYG Volume...        175.590 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev 25
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1420.56 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1420.53 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2
               CN   =   80
               Area =     345.700 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       7.5208 in
                      216.663 ac-ft

HYG Volume...        216.657 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev 50
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1597.00 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1596.94 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2
               CN   =   80
               Area =     345.700 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                       8.4808 in
                      244.317 ac-ft

HYG Volume...        244.311 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev100
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

=============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1949.14 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1948.99 cfs
=============================================

                 DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2
              CN   =   80
              Area =     345.700 acres
              S    =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                     10.4167 in
                     300.087 ac-ft

HYG Volume...        300.080 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev  2
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    47.77 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    47.77 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2B
               CN   =   95
               Area =       7.040 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                       4.9152 in
                        2.884 ac-ft

HYG Volume...          2.884 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev  5
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    65.94 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    65.94 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2B
               CN   =   95
               Area =       7.040 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                       6.9034 in
                        4.050 ac-ft

HYG Volume...          4.050 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev 10
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    74.99 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    74.99 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2B
               CN   =   95
               Area =       7.040 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                       7.8995 in
                        4.634 ac-ft

HYG Volume...          4.634 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev 25
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

=============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    88.52 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    88.52 cfs
=============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2B
              CN   =   95
              Area =       7.040 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                      9.3950 in
                       5.512 ac-ft

HYG Volume...          5.512 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev 50
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    97.53 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    97.53 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2B
               CN   =   95
               Area =       7.040 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                      10.3927 in
                        6.097 ac-ft

HYG Volume...           6.097 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev100
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

=============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =   115.52 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =   115.52 cfs
=============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2B
               CN   =   95
               Area =       7.040 acres
               S    =    .5263 in
               0.2S =    .1053 in

                Cumulative Runoff
               -------------------
                      12.3891 in
                        7.268 ac-ft

HYG Volume...          7.268 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev  2
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   175.32 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   175.31 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2C
               CN   =   92
               Area =      35.380 acres
               S    =    .8696 in
               0.2S =    .1739 in

                Cumulative Runoff
               -------------------
                       4.5786 in
                       13.499 ac-ft

HYG Volume...          13.499 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev  5
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

=============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   245.84 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   245.83 cfs
=============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2C
              CN   =   92
              Area =      35.380 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                      6.5488 in
                      19.308 ac-ft

HYG Volume...         19.308 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev 10
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   280.85 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   280.84 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2C
               CN   =   92
               Area =      35.380 acres
               S    =    .8696 in
               0.2S =    .1739 in

                Cumulative Runoff
               -------------------
                       7.5388 in
                       22.227 ac-ft

HYG Volume...          22.226 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev 25
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   333.15 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   333.13 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2C
               CN   =   92
               Area =      35.380 acres
               S    =    .8696 in
               0.2S =    .1739 in

                Cumulative Runoff
               -------------------
                       9.0272 in
                       26.615 ac-ft

HYG Volume...          26.615 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev 50
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   367.89 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   367.88 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2C
               CN   =   92
               Area =      35.380 acres
               S    =    .8696 in
               0.2S =    .1739 in

                Cumulative Runoff
               -------------------
                      10.0212 in
                       29.546 ac-ft

HYG Volume...         29.545 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev100
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   437.17 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   437.15 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2C
              CN   =   92
              Area =      35.380 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                     12.0117 in
                      35.415 ac-ft

HYG Volume...         35.414 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
29.53	-----	2.5200	.0000	.000	.000
34.28	-----	3.0600	8.3569	13.232	13.232
39.04	-----	3.6000	9.9790	15.833	29.065

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 29.53 ft
Increment = .50 ft
Max. Elev.= 39.04 ft

```
*********************************************
                OUTLET CONNECTIVITY
*********************************************

 ---> Forward Flow Only (UpStream to DnStream)
<---  Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed
```

Structure	No.		Outfall	E1, ft	E2, ft
Weir-Rectangular	W0	--->	CV	31.490	39.040
Weir-Rectangular	W1	--->	CV	33.110	39.040
Culvert-Circular	CV	--->	TW	29.530	39.040
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = W0
Structure Type     = Weir-Rectangular
------------------------------------
# of Openings      =         1
Crest Elev.        =     31.49 ft
Weir Length        =      8.00 ft
Weir Coeff.        =  3.367000

Weir TW effects      (Use adjustment equation)
```

```
Structure ID       = W1
Structure Type     = Weir-Rectangular
------------------------------------
# of Openings      =         1
Crest Elev.        =     33.11 ft
Weir Length        =     15.28 ft
Weir Coeff.        =  3.330000

Weir TW effects      (Use adjustment equation)
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = CV
Structure Type     = Culvert-Circular
-----------------------------------
No. Barrels        =         2
Barrel Diameter    =    2.5000 ft
Upstream Invert    =     29.53 ft
Dnstream Invert    =     26.25 ft
Horiz. Length      =     82.00 ft
Barrel Length      =     82.07 ft
Barrel Slope       =    .04000 ft/ft

OUTLET CONTROL DATA...
Mannings n         =     .0130
Ke                 =     .5000  (forward entrance loss)
Kb                 =   .009217  (per ft of full flow)
Kr                 =     .5000  (reverse entrance loss)
HW Convergence     =      .001  +/- ft

INLET CONTROL DATA...
Equation form      =         1
Inlet Control K    =     .0098
Inlet Control M    =    2.0000
Inlet Control c    =    .03980
Inlet Control Y    =     .6700
T1 ratio (HW/D)    =     1.140
T2 ratio (HW/D)    =     1.287
Slope Factor       =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =     32.38 ft  --->  Flow =     27.16 cfs
At T2 Elev =     32.75 ft  --->  Flow =     31.05 cfs
```

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
29.53	.00	REVERSE: Flow is closed off						
30.03	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
30.53	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.03	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.49	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.53	.22	31.53	Free	29.86	.000	.000	29.86	.000
		H=.04; Htw=.00; Qfree=.22;						
32.03	10.54	32.03	Free	30.70	.000	.000	29.86	.000
		H=.54; Htw=.00; Qfree=10.54;						
32.53	27.83	32.53	Free	31.43	.000	.000	29.86	.000
		H=1.04; Htw=.00; Qfree=27.83;						
33.03	42.22	33.03	32.24	32.24	.000	.000	29.86	.000
		H=1.54; Htw=.75; Qfree=49.50;						
33.11	45.10	33.11	32.30	32.30	.000	.000	29.86	.000
		H=1.62; Htw=.81; Qfree=53.29;						
33.53	47.89	33.53	33.07	33.07	.000	.000	29.86	.000
		H=2.04; Htw=1.58; Qfree=74.48;						
34.03	49.18	34.03	33.77	33.77	.000	.000	29.86	.000
		H=2.54; Htw=2.28; Qfree=102.12;						
34.53	47.68	34.53	34.38	34.38	.000	.000	29.86	.000
		H=3.04; Htw=2.89; Qfree=131.92;						
35.03	44.50	35.03	34.95	34.95	.000	.000	29.86	.000
		H=3.54; Htw=3.46; Qfree=163.53;						
35.53	46.72	35.53	35.47	35.47	.000	.000	29.86	.000
		H=4.04; Htw=3.98; Qfree=196.64;						
36.03	47.00	36.03	35.98	35.98	.000	.000	29.86	.000
		H=4.54; Htw=4.49; Qfree=230.99;						
36.53	47.31	36.53	36.49	36.49	.000	.000	29.86	.000
		H=5.04; Htw=5.00; Qfree=266.37;						
37.03	47.80	37.03	37.00	37.00	.000	.000	29.86	.000
		H=5.54; Htw=5.51; Qfree=302.59;						
37.53	48.21	37.53	37.50	37.50	.000	.000	29.86	.000
		H=6.04; Htw=6.01; Qfree=339.47;						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
38.03	48.83	38.03	38.01	38.01	.000	.000	29.86	.000
		H=6.54; Htw=6.52; Qfree=376.85;						
38.53	49.23	38.53	38.51	38.51	.000	.000	29.86	.000
		H=7.04; Htw=7.02; Qfree=414.59;						
39.03	49.65	39.03	39.01	39.01	.000	.000	29.86	.000
		H=7.54; Htw=7.52; Qfree=452.56;						
39.04	49.65	39.04	39.02	39.02	.000	.000	29.86	.000
		H=7.55; Htw=7.53; Qfree=453.32;						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W1 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
29.53	.00	REVERSE: Flow is closed off						
30.03	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
30.53	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.03	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.49	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.53	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
32.03	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
32.53	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
33.03	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
33.11	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
33.53	13.85	33.53	Free	33.07	.000	.000	29.86	.000
		H=.42; Htw=.00; Qfree=13.85;						
34.03	31.35	34.03	33.77	33.77	.000	.000	29.86	.000
		H=.92; Htw=.66; Qfree=44.90;						
34.53	41.49	34.53	34.38	34.38	.000	.000	29.86	.000
		H=1.42; Htw=1.27; Qfree=86.10;						
35.03	46.53	35.03	34.95	34.95	.000	.000	29.86	.000
		H=1.92; Htw=1.84; Qfree=135.37;						
35.53	55.38	35.53	35.47	35.47	.000	.000	29.86	.000
		H=2.42; Htw=2.36; Qfree=191.55;						
36.03	61.19	36.03	35.98	35.98	.000	.000	29.86	.000
		H=2.92; Htw=2.87; Qfree=253.89;						
36.53	66.34	36.53	36.49	36.49	.000	.000	29.86	.000
		H=3.42; Htw=3.38; Qfree=321.82;						
37.03	71.25	37.03	37.00	37.00	.000	.000	29.86	.000
		H=3.92; Htw=3.89; Qfree=394.91;						
37.53	75.72	37.53	37.50	37.50	.000	.000	29.86	.000
		H=4.42; Htw=4.39; Qfree=472.83;						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W1 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
38.03	80.27	38.03	38.01	38.01	.000	.000	29.86	.000
		H=4.92; Htw=4.90; Qfree=555.28;						
38.53	84.30	38.53	38.51	38.51	.000	.000	29.86	.000
		H=5.42; Htw=5.40; Qfree=642.05;						
39.03	88.25	39.03	39.01	39.01	.000	.000	29.86	.000
		H=5.92; Htw=5.90; Qfree=732.91;						
39.04	88.32	39.04	39.02	39.02	.000	.000	29.86	.000
		H=5.93; Htw=5.91; Qfree=734.77;						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CV (Culvert-Circular)

Mannings open channel maximum capacity: 88.24 cfs
UPstream ID's= W0, W1
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 2
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
29.53	.00	REVERSE: Flow is closed off						
30.03	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
30.53	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.03	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.49	.00	...	...	...	...	...	29.86	.000
		WS below an invert; no flow.						
31.53	*	29.86	29.86	29.86	.000	.000	29.86	.000
		FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE						
32.03	10.67	30.70	29.86	29.86	.000	.124	29.86	.000
		CRIT.DEPTH CONTROL Vh= .275ft Dcr= .761ft H.JUMP IN PIPE Hev= .00ft						
32.53	25.46	31.43	29.86	29.86	.000	2.365	29.86	.000
		CRIT.DEPTH CONTROL Vh= .467ft Dcr= 1.201ft H.JUMP IN PIPE Hev= .00ft						
33.03	46.15	32.24	29.86	29.86	.000	3.929	29.86	.000
		CRIT.DEPTH CONTROL Vh= .715ft Dcr= 1.635ft H.JUMP IN PIPE Hev= .00ft						
33.11	47.83	32.30	29.86	29.86	.000	2.736	29.86	.000
		CRIT.DEPTH CONTROL Vh= .736ft Dcr= 1.664ft H.JUMP IN PIPE Hev= .00ft						
33.53	68.12	33.07	29.86	29.86	.000	6.376	29.86	.000
		INLET CONTROL... Submerged: HW =3.54						
34.03	79.56	33.77	29.86	29.86	.000	.964	29.86	.000
		INLET CONTROL... Submerged: HW =4.24						
34.53	88.43	34.38	29.86	29.86	.000	.743	29.86	.000
		INLET CONTROL... Submerged: HW =4.85						
35.03	95.84	34.95	29.86	29.86	.000	4.808	29.86	.000
		INLET CONTROL... Submerged: HW =5.42						
35.53	102.16	35.47	29.86	29.86	.000	.061	29.86	.000
		INLET CONTROL... Submerged: HW =5.94						
36.03	108.12	35.98	29.86	29.86	.000	.060	29.86	.000
		INLET CONTROL... Submerged: HW =6.45						
36.53	113.68	36.49	29.86	29.86	.000	.031	29.86	.000
		INLET CONTROL... Submerged: HW =6.96						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CV (Culvert-Circular)

Mannings open channel maximum capacity: 88.24 cfs
UPstream ID's= W0, W1
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 2
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
37.03	118.97	37.00	29.86	29.86	.000	.077	29.86	.000
		INLET CONTROL... Submerged: HW =7.47						
37.53	124.00	37.50	29.86	29.86	.000	.075	29.86	.000
		INLET CONTROL... Submerged: HW =7.97						
38.03	128.83	38.01	29.86	29.86	.000	.270	29.86	.000
		INLET CONTROL... Submerged: HW =8.48						
38.53	133.47	38.51	29.86	29.86	.000	.064	29.86	.000
		INLET CONTROL... Submerged: HW =8.98						
39.03	137.95	39.01	29.86	29.86	.000	.051	29.86	.000
		INLET CONTROL... Submerged: HW =9.48						
39.04	138.04	39.02	29.86	29.86	.000	.073	29.86	.000
		INLET CONTROL... Submerged: HW =9.49						

***** COMPOSITE OUTFLOW SUMMARY ****

CUMULATIVE HGL CONVERGENCE ERROR .000 (+/- ft)
FLOW PATH: Elev= 38.03; Branch: W1-CV-TW

* Max. convergence errors shown may also occur for flow paths other than the ones listed above.

WS Elev, Total Q		Notes		
Elev. ft	Q cfs	TW Elev ft	Converge Error +/-ft	Contributing Structures
29.53	.00	29.86	.000	(no Q: W0,W1,CV)
30.03	.00	29.86	.000	(no Q: W0,W1,CV)
30.53	.00	29.86	.000	(no Q: W0,W1,CV)
31.03	.00	29.86	.000	(no Q: W0,W1,CV)
31.49	.00	29.86	.000	(no Q: W0,W1,CV)
31.53	.22	29.86	.000	W0,CV (no Q: W1)
32.03	10.67	29.86	.000	W0,CV (no Q: W1)
32.53	25.46	29.86	.000	W0,CV (no Q: W1)
33.03	46.15	29.86	.000	W0,CV (no Q: W1)
33.11	47.83	29.86	.000	W0,CV (no Q: W1)
33.53	68.12	29.86	.000	W0,W1,CV
34.03	79.56	29.86	.000	W0,W1,CV
34.53	88.43	29.86	.000	W0,W1,CV
35.03	95.84	29.86	.000	W0,W1,CV
35.53	102.16	29.86	.000	W0,W1,CV
36.03	108.12	29.86	.000	W0,W1,CV
36.53	113.68	29.86	.000	W0,W1,CV
37.03	118.97	29.86	.000	W0,W1,CV
37.53	124.00	29.86	.000	W0,W1,CV
38.03	128.83	29.86	.000	W0,W1,CV
38.53	133.47	29.86	.000	W0,W1,CV
39.03	137.95	29.86	.000	W0,W1,CV
39.04	138.04	29.86	.000	W0,W1,CV

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev  2
Outflow HYG file = NONE STORED - POND 1       OUT Dev  2

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    175.31 cfs    at   12.0500 hrs
Peak Outflow      =     26.69 cfs    at   12.5600 hrs
-----------------------------------------------------
Peak Elevation    =     32.56 ft
Peak Storage =          8.142 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      13.499
- Infiltration =        .000
- HYG Vol OUT  =       8.060
- Retained Vol =       5.437
                  ----------
Unrouted Vol =       -.002 ac-ft  (.012% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev  5
Outflow HYG file = NONE STORED - POND 1       OUT Dev  5

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    245.83 cfs    at   12.0500 hrs
Peak Outflow      =     64.36 cfs    at   12.3800 hrs
-----------------------------------------------------
Peak Elevation    =     33.45 ft
Peak Storage =         10.739 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      19.308
- Infiltration =        .000
- HYG Vol OUT  =      13.793
- Retained Vol =       5.513
                  ----------
Unrouted Vol =       -.002 ac-ft  (.011% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev 10
Outflow HYG file = NONE STORED - POND 1       OUT Dev 10

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    280.84 cfs    at   12.0500 hrs
Peak Outflow      =     76.62 cfs    at   12.3700 hrs
-----------------------------------------------------
Peak Elevation    =     33.90 ft
Peak Storage =         12.082 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      22.226
- Infiltration =        .000
- HYG Vol OUT  =      16.675
- Retained Vol =       5.549
                 ----------
Unrouted Vol =       -.002 ac-ft  (.011% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev 25
Outflow HYG file = NONE STORED - POND 1       OUT Dev 25

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    333.13 cfs    at   12.0500 hrs
Peak Outflow      =     89.35 cfs    at   12.3800 hrs
-----------------------------------------------------
Peak Elevation    =     34.59 ft
Peak Storage =         14.193 ac-ft
=====================================================


MASS BALANCE (ac-ft)
--------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      26.615
- Infiltration =        .000
- HYG Vol OUT  =      21.006
- Retained Vol =       5.606
                 ----------
Unrouted Vol =       -.003 ac-ft  (.010% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev 50
Outflow HYG file = NONE STORED - POND 1       OUT Dev 50

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    367.88 cfs    at   12.0500 hrs
Peak Outflow      =     95.95 cfs    at   12.3800 hrs
-----------------------------------------------------
Peak Elevation    =     35.04 ft
Peak Storage =         15.585 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      29.545
- Infiltration =        .000
- HYG Vol OUT  =      23.899
- Retained Vol =       5.643
                  ----------
Unrouted Vol =       -.003 ac-ft  (.010% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev100
Outflow HYG file = NONE STORED - POND 1       OUT Dev100

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
---------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    437.15 cfs    at   12.0500 hrs
Peak Outflow      =    106.40 cfs    at   12.4000 hrs
-----------------------------------------------------
Peak Elevation    =     35.89 ft
Peak Storage =         18.285 ac-ft
=====================================================


MASS BALANCE (ac-ft)
--------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      35.414
- Infiltration =        .000
- HYG Vol OUT  =      29.695
- Retained Vol =       5.716
               ----------
Unrouted Vol =       -.003 ac-ft  (.009% of Inflow Volume)
```

APPENDIX D

PONDPACK RESULTS - PROPOSED CONDITIONS
25 YR-24 HOUR STORM

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MASTER DESIGN STORM SUMMARY

Network Storm Collection: Canvanas

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev 2	5.5000	Synthetic Curve	TypeII 24hr
Dev 5	7.5000	Synthetic Curve	TypeII 24hr
Dev 10	8.5000	Synthetic Curve	TypeII 24hr
Dev 25	10.0000	Synthetic Curve	TypeII 24hr
Dev 50	11.0000	Synthetic Curve	TypeII 24hr
Dev100	13.0000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*BOX 14X10	JCT	2	106.962		12.4900	669.44		
*BOX 14X10	JCT	5	166.424		12.4400	1051.51		
*BOX 14X10	JCT	10	196.893		12.3700	1240.15		
*BOX 14X10	JCT	25	243.171		12.3700	1519.23		
*BOX 14X10	JCT	50	274.303		12.3700	1703.26		
*BOX 14X10	JCT	100	337.039		12.3700	2067.62		
*EX 48 PIPE	JCT	2	10.789		12.0300	143.27		
*EX 48 PIPE	JCT	5	15.153		12.0300	197.77		
*EX 48 PIPE	JCT	10	17.339		12.0300	224.90		
*EX 48 PIPE	JCT	25	20.622		12.0300	265.50		
*EX 48 PIPE	JCT	50	22.812		12.0300	292.52		
*EX 48 PIPE	JCT	100	27.194		12.0300	346.48		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
POND 1 IN	POND	2	13.499		12.0500	175.31		
POND 1 IN	POND	5	19.308		12.0500	245.83		
POND 1 IN	POND	10	22.226		12.0500	280.84		
POND 1 IN	POND	25	26.615		12.0500	333.13		
POND 1 IN	POND	50	29.545		12.0500	367.88		
POND 1 IN	POND	100	35.414		12.0500	437.15		
POND 1 OUT	POND	2	8.052		12.5600	27.15	32.55	8.126
POND 1 OUT	POND	5	13.786		12.3900	63.81	33.45	10.744
POND 1 OUT	POND	10	16.668		12.3700	76.26	33.90	12.090
POND 1 OUT	POND	25	21.000		12.3800	89.24	34.59	14.197
POND 1 OUT	POND	50	23.893		12.3800	95.92	35.04	15.587
POND 1 OUT	POND	100	29.691		12.4000	106.37	35.88	18.283
SUB BASIN A-1A	AREA	2	10.789		12.0300	143.27		
SUB BASIN A-1A	AREA	5	15.153		12.0300	197.77		
SUB BASIN A-1A	AREA	10	17.339		12.0300	224.90		
SUB BASIN A-1A	AREA	25	20.622		12.0300	265.50		
SUB BASIN A-1A	AREA	50	22.812		12.0300	292.52		
SUB BASIN A-1A	AREA	100	27.194		12.0300	346.48		
SUB BASIN A-2	AREA	2	96.026		12.4900	638.42		
SUB BASIN A-2	AREA	5	148.587		12.4900	983.13		
SUB BASIN A-2	AREA	10	175.590		12.4900	1157.07		
SUB BASIN A-2	AREA	25	216.657		12.3700	1420.53		
SUB BASIN A-2	AREA	50	244.311		12.3700	1596.94		
SUB BASIN A-2	AREA	100	300.080		12.3700	1948.99		
SUB BASIN A-2B	AREA	2	2.884		11.9200	47.77		
SUB BASIN A-2B	AREA	5	4.050		11.9200	65.94		
SUB BASIN A-2B	AREA	10	4.634		11.9200	74.99		
SUB BASIN A-2B	AREA	25	5.512		11.9200	88.52		
SUB BASIN A-2B	AREA	50	6.097		11.9200	97.53		
SUB BASIN A-2B	AREA	100	7.268		11.9200	115.52		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
SUB BASIN A-2C	AREA	2	13.499		12.0500	175.31		
SUB BASIN A-2C	AREA	5	19.308		12.0500	245.83		
SUB BASIN A-2C	AREA	10	22.226		12.0500	280.84		
SUB BASIN A-2C	AREA	25	26.615		12.0500	333.13		
SUB BASIN A-2C	AREA	50	29.545		12.0500	367.88		
SUB BASIN A-2C	AREA	100	35.414		12.0500	437.15		

Title... Project Date: 8/3/2006
Project Engineer: Jorge Tirado
Project Title: El Nuevo Comandante
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Canvanas

Storm Tag Name = Dev 2

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 5.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev 5

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 5 yr
Total Rainfall Depth= 7.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev 10

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 8.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev 25

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 25 yr
Total Rainfall Depth= 10.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev 50

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 50 yr
Total Rainfall Depth= 11.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Title... Project Date: 8/3/2006
Project Engineer: Jorge Tirado
Project Title: El Nuevo Comandante
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Canvanas

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 13.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev  2
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

=============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   143.57 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   143.27 cfs
=============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-1A
              CN   =   95
              Area =      26.340 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                      4.9152 in
                      10.789 ac-ft

HYG Volume...         10.789 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev  5
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   198.15 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   197.77 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-1A
              CN   =   95
              Area =      26.340 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                      6.9034 in
                      15.153 ac-ft

HYG Volume...         15.153 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev 10
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   225.32 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   224.90 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-1A
              CN   =   95
              Area =      26.340 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                      7.8995 in
                      17.339 ac-ft

HYG Volume...         17.339 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev 25
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   265.98 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   265.50 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-1A
              CN   =   95
              Area =      26.340 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                      9.3950 in
                      20.622 ac-ft

HYG Volume...         20.622 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev 50
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   293.04 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   292.52 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-1A
              CN   =   95
              Area =      26.340 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                     10.3927 in
                      22.812 ac-ft

HYG Volume...         22.812 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-1A Dev100
Tc            = .2460 hrs
Drainage Area = 26.340 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .03280 hrs
Computed Peak Time             =  12.0376 hrs
Computed Peak Flow             =   347.07 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0302 hrs
Peak Flow, Interpolated Output =   346.48 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-1A
              CN   =   95
              Area =      26.340 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                     12.3891 in
                      27.194 ac-ft

HYG Volume...         27.194 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .24600 hrs (ID: SUB BASIN A-1A)
Computational Incr, Tm =   .03280 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   121.32 cfs
Unit peak time      Tp =   .16400 hrs
Unit receding limb, Tr =   .65600 hrs
Total unit time,    Tb =   .82000 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev  2
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =   638.59 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =   638.42 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2
              CN   =   80
              Area =     345.700 acres
              S    =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                      3.3333 in
                      96.028 ac-ft

HYG Volume...         96.026 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev  5
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =   983.22 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =   983.13 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2
              CN   =   80
              Area =     345.700 acres
              S    =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                      5.1579 in
                     148.590 ac-ft

HYG Volume...        148.587 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev 10
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.4933 hrs
Computed Peak Flow             =  1157.10 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.4902 hrs
Peak Flow, Interpolated Output =  1157.07 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2
              CN   =   80
              Area =     345.700 acres
              S    =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                      6.0952 in
                     175.594 ac-ft

HYG Volume...        175.590 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev 25
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1420.56 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1420.53 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2
              CN   =   80
              Area =     345.700 acres
              S    =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                      7.5208 in
                     216.663 ac-ft

HYG Volume...        216.657 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev 50
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1597.00 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1596.94 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2
              CN   =   80
              Area =     345.700 acres
              S    =   2.5000 in
              0.2S =    .5000 in

               Cumulative Runoff
              -------------------
                      8.4808 in
                     244.317 ac-ft

HYG Volume...        244.311 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2 Dev100
Tc            = .9370 hrs
Drainage Area = 345.700 acres  Runoff CN= 80

============================================
Computational Time Increment   =   .12493 hrs
Computed Peak Time             =  12.3684 hrs
Computed Peak Flow             =  1949.14 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.3702 hrs
Peak Flow, Interpolated Output =  1948.99 cfs
============================================

                 DRAINAGE AREA
               -------------------
               ID:SUB BASIN A-2
               CN   =   80
               Area =     345.700 acres
               S    =   2.5000 in
               0.2S =    .5000 in

                Cumulative Runoff
               -------------------
                      10.4167 in
                      300.087 ac-ft

HYG Volume...        300.080 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .93700 hrs (ID: SUB BASIN A-2)
Computational Incr, Tm =   .12493 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   418.03 cfs
Unit peak time      Tp =   .62467 hrs
Unit receding limb, Tr =  2.49867 hrs
Total unit time,    Tb =  3.12333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev  2
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    47.77 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    47.77 cfs
============================================

                DRAINAGE AREA
             -------------------
             ID:SUB BASIN A-2B
             CN   =   95
             Area =       7.040 acres
             S    =    .5263 in
             0.2S =    .1053 in

              Cumulative Runoff
             -------------------
                     4.9152 in
                      2.884 ac-ft

HYG Volume...          2.884 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev  5
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    65.94 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    65.94 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2B
              CN   =   95
              Area =       7.040 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                      6.9034 in
                       4.050 ac-ft

HYG Volume...          4.050 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev 10
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    74.99 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    74.99 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2B
              CN   =   95
              Area =       7.040 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                      7.8995 in
                       4.634 ac-ft

HYG Volume...          4.634 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev 25
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    88.52 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    88.52 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2B
              CN   =   95
              Area =       7.040 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                      9.3950 in
                       5.512 ac-ft

HYG Volume...          5.512 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev 50
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =    97.53 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    97.53 cfs
============================================

                DRAINAGE AREA
             -------------------
             ID:SUB BASIN A-2B
             CN   =   95
             Area =       7.040 acres
             S    =    .5263 in
             0.2S =    .1053 in

              Cumulative Runoff
             -------------------
                    10.3927 in
                      6.097 ac-ft

HYG Volume...          6.097 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2B Dev100
Tc            = .1000 hrs
Drainage Area = 7.040 acres  Runoff CN= 95

============================================
Computational Time Increment   =   .01333 hrs
Computed Peak Time             =  11.9200 hrs
Computed Peak Flow             =   115.52 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =   115.52 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2B
              CN   =   95
              Area =       7.040 acres
              S    =    .5263 in
              0.2S =    .1053 in

               Cumulative Runoff
              -------------------
                     12.3891 in
                       7.268 ac-ft

HYG Volume...          7.268 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .10000 hrs (ID: SUB BASIN A-2B)
Computational Incr, Tm =   .01333 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    79.77 cfs
Unit peak time      Tp =   .06667 hrs
Unit receding limb, Tr =   .26667 hrs
Total unit time,    Tb =   .33333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev  2
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   175.32 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   175.31 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2C
              CN   =   92
              Area =      35.380 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                      4.5786 in
                      13.499 ac-ft

HYG Volume...         13.499 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration      = 24.0000 hrs     Rain Depth = 7.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev  5
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   245.84 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   245.83 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2C
              CN   =   92
              Area =      35.380 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                      6.5488 in
                      19.308 ac-ft

HYG Volume...         19.308 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.5000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev 10
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   280.85 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   280.84 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2C
              CN   =   92
              Area =      35.380 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                      7.5388 in
                      22.227 ac-ft

HYG Volume...         22.226 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration      = 24.0000 hrs     Rain Depth = 10.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev 25
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   333.15 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   333.13 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2C
              CN   =   92
              Area =      35.380 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                      9.0272 in
                      26.615 ac-ft

HYG Volume...         26.615 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration      = 24.0000 hrs     Rain Depth = 11.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev 50
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

=============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   367.89 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   367.88 cfs
=============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2C
              CN   =   92
              Area =      35.380 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                     10.0212 in
                      29.546 ac-ft

HYG Volume...         29.545 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 13.0000 in
Rain Dir      = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comanda
HYG File - ID =  - SUB BASIN A-2C Dev100
Tc            = .2860 hrs
Drainage Area = 35.380 acres  Runoff CN= 92

============================================
Computational Time Increment   =   .03813 hrs
Computed Peak Time             =  12.0501 hrs
Computed Peak Flow             =   437.17 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  12.0502 hrs
Peak Flow, Interpolated Output =   437.15 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:SUB BASIN A-2C
              CN   =   92
              Area =      35.380 acres
              S    =    .8696 in
              0.2S =    .1739 in

               Cumulative Runoff
              -------------------
                     12.0117 in
                      35.415 ac-ft

HYG Volume...         35.414 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .28600 hrs (ID: SUB BASIN A-2C)
Computational Incr, Tm =   .03813 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =   140.16 cfs
Unit peak time      Tp =   .19067 hrs
Unit receding limb, Tr =   .76267 hrs
Total unit time,    Tb =   .95333 hrs
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
29.53	-----	2.5200	.0000	.000	.000
34.28	-----	3.0600	8.3569	13.232	13.232
39.04	-----	3.6000	9.9790	15.833	29.065

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 29.53 ft
Increment = .50 ft
Max. Elev.= 39.04 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Weir-Rectangular	W0	--->	CV	31.490	39.040
Weir-Rectangular	W1	--->	CV	33.110	39.040
Culvert-Circular	CV	--->	TW	29.530	39.040
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = W0
Structure Type     = Weir-Rectangular
------------------------------------
# of Openings      =         1
Crest Elev.        =     31.49 ft
Weir Length        =      8.00 ft
Weir Coeff.        =  3.367000

Weir TW effects      (Use adjustment equation)
```

```
Structure ID       = W1
Structure Type     = Weir-Rectangular
------------------------------------
# of Openings      =         1
Crest Elev.        =     33.11 ft
Weir Length        =     15.28 ft
Weir Coeff.        =  3.330000

Weir TW effects      (Use adjustment equation)
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CV
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         2
Barrel Diameter   =    2.5000 ft
Upstream Invert   =     29.53 ft
Dnstream Invert   =     26.25 ft
Horiz. Length     =     82.00 ft
Barrel Length     =     82.07 ft
Barrel Slope      =    .04000 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .009217  (per ft of full flow)
Kr                =     .5000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0098
Inlet Control M   =    2.0000
Inlet Control c   =    .03980
Inlet Control Y   =     .6700
T1 ratio (HW/D)   =     1.140
T2 ratio (HW/D)   =     1.287
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =     32.38 ft  --->  Flow =     27.16 cfs
At T2 Elev =     32.75 ft  --->  Flow =     31.05 cfs
```

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
29.53	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
30.03	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
30.53	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.03	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.49	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.53	.22	31.53	Free	29.65	.000	.000	28.87	.000
		H=.04; Htw=.00; Qfree=.22;						
32.03	10.54	32.03	Free	30.70	.000	.000	28.87	.000
		H=.54; Htw=.00; Qfree=10.54;						
32.53	27.83	32.53	Free	31.46	.000	.000	28.87	.000
		H=1.04; Htw=.00; Qfree=27.83;						
33.03	42.06	33.03	32.25	32.25	.000	.000	28.87	.000
		H=1.54; Htw=.76; Qfree=49.50;						
33.11	45.28	33.11	32.29	32.29	.000	.000	28.87	.000
		H=1.62; Htw=.80; Qfree=53.29;						
33.53	49.39	33.53	33.03	33.03	.000	.000	28.87	.000
		H=2.04; Htw=1.54; Qfree=74.48;						
34.03	50.60	34.03	33.75	33.75	.000	.000	28.87	.000
		H=2.54; Htw=2.26; Qfree=102.12;						
34.53	48.94	34.53	34.37	34.37	.000	.000	28.87	.000
		H=3.04; Htw=2.88; Qfree=131.92;						
35.03	45.57	35.03	34.94	34.94	.000	.000	28.87	.000
		H=3.54; Htw=3.45; Qfree=163.53;						
35.53	46.72	35.53	35.47	35.47	.000	.000	28.87	.000
		H=4.04; Htw=3.98; Qfree=196.64;						
36.03	47.19	36.03	35.98	35.98	.001	.000	28.87	.001
		H=4.54; Htw=4.49; Qfree=230.99;						
36.53	47.31	36.53	36.49	36.49	.000	.000	28.87	.000
		H=5.04; Htw=5.00; Qfree=266.37;						
37.03	47.80	37.03	37.00	37.00	.000	.000	28.87	.000
		H=5.54; Htw=5.51; Qfree=302.59;						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W0 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
37.53	48.22	37.53	37.50	37.50	.000	.000	28.87	.000
		H=6.04; Htw=6.01; Qfree=339.47;						
38.03	48.72	38.03	38.01	38.01	.000	.000	28.87	.000
		H=6.54; Htw=6.52; Qfree=376.85;						
38.53	49.22	38.53	38.51	38.51	.000	.000	28.87	.000
		H=7.04; Htw=7.02; Qfree=414.59;						
39.03	49.66	39.03	39.01	39.01	.000	.000	28.87	.000
		H=7.54; Htw=7.52; Qfree=452.56;						
39.04	49.64	39.04	39.02	39.02	.000	.000	28.87	.000
		H=7.55; Htw=7.53; Qfree=453.32;						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W1 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
29.53	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
30.03	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
30.53	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.03	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.49	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.53	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
32.03	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
32.53	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
33.03	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
33.11	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
33.53	13.85	33.53	Free	33.03	.000	.000	28.87	.000
		H=.42; Htw=.00; Qfree=13.85;						
34.03	32.20	34.03	33.75	33.75	.000	.000	28.87	.000
		H=.92; Htw=.64; Qfree=44.90;						
34.53	42.56	34.53	34.37	34.37	.000	.000	28.87	.000
		H=1.42; Htw=1.26; Qfree=86.10;						
35.03	47.64	35.03	34.94	34.94	.000	.000	28.87	.000
		H=1.92; Htw=1.83; Qfree=135.37;						
35.53	55.38	35.53	35.47	35.47	.000	.000	28.87	.000
		H=2.42; Htw=2.36; Qfree=191.55;						
36.03	61.44	36.03	35.98	35.98	.001	.000	28.87	.001
		H=2.92; Htw=2.87; Qfree=253.89;						
36.53	66.34	36.53	36.49	36.49	.000	.000	28.87	.000
		H=3.42; Htw=3.38; Qfree=321.82;						
37.03	71.26	37.03	37.00	37.00	.000	.000	28.87	.000
		H=3.92; Htw=3.89; Qfree=394.91;						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = W1 (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
37.53	75.73	37.53	37.50	37.50	.000	.000	28.87	.000
		H=4.42; Htw=4.39; Qfree=472.83;						
38.03	80.10	38.03	38.01	38.01	.000	.000	28.87	.000
		H=4.92; Htw=4.90; Qfree=555.28;						
38.53	84.29	38.53	38.51	38.51	.000	.000	28.87	.000
		H=5.42; Htw=5.40; Qfree=642.05;						
39.03	88.26	39.03	39.01	39.01	.000	.000	28.87	.000
		H=5.92; Htw=5.90; Qfree=732.91;						
39.04	88.30	39.04	39.02	39.02	.000	.000	28.87	.000
		H=5.93; Htw=5.91; Qfree=734.77;						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CV (Culvert-Circular)

Mannings open channel maximum capacity: 88.24 cfs
UPstream ID's= W0, W1
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 2
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
29.53	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
30.03	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
30.53	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.03	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.49	.00	...	...	...	...	...	28.87	.000
		WS below an invert; no flow.						
31.53	.14	29.65	28.87	28.87	.000	.078	28.87	.000
		CRIT.DEPTH CONTROL Vh= .026ft Dcr= .078ft H.JUMP IN PIPE Hev= .00ft						
32.03	10.67	30.70	28.87	28.87	.000	.124	28.87	.000
		CRIT.DEPTH CONTROL Vh= .275ft Dcr= .761ft H.JUMP IN PIPE Hev= .00ft						
32.53	26.18	31.46	28.87	28.87	.000	1.641	28.87	.000
		CRIT.DEPTH CONTROL Vh= .476ft Dcr= 1.220ft H.JUMP IN PIPE Hev= .00ft						
33.03	46.32	32.25	28.87	28.87	.000	4.262	28.87	.000
		CRIT.DEPTH CONTROL Vh= .718ft Dcr= 1.640ft H.JUMP IN PIPE Hev= .00ft						
33.11	47.67	32.29	28.87	28.87	.000	2.394	28.87	.000
		CRIT.DEPTH CONTROL Vh= .732ft Dcr= 1.659ft H.JUMP IN PIPE Hev= .00ft						
33.53	67.38	33.03	28.87	28.87	.000	4.134	28.87	.000
		INLET CONTROL... Submerged: HW =3.50						
34.03	79.25	33.75	28.87	28.87	.000	3.544	28.87	.000
		INLET CONTROL... Submerged: HW =4.22						
34.53	88.29	34.37	28.87	28.87	.000	3.214	28.87	.000
		INLET CONTROL... Submerged: HW =4.84						
35.03	95.80	34.94	28.87	28.87	.000	2.584	28.87	.000
		INLET CONTROL... Submerged: HW =5.41						
35.53	102.16	35.47	28.87	28.87	.000	.057	28.87	.000
		INLET CONTROL... Submerged: HW =5.94						
36.03	108.10	35.98	28.87	28.87	.000	.533	28.87	.001
		INLET CONTROL... Submerged: HW =6.45						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CV (Culvert-Circular)

Mannings open channel maximum capacity: 88.24 cfs
UPstream ID's= W0, W1
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 2
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
36.53	113.68	36.49	28.87	28.87	.000	.027	28.87	.000
		INLET CONTROL... Submerged: HW =6.96						
37.03	118.97	37.00	28.87	28.87	.000	.094	28.87	.000
		INLET CONTROL... Submerged: HW =7.47						
37.53	124.00	37.50	28.87	28.87	.000	.053	28.87	.000
		INLET CONTROL... Submerged: HW =7.97						
38.03	128.83	38.01	28.87	28.87	.000	.010	28.87	.000
		INLET CONTROL... Submerged: HW =8.48						
38.53	133.47	38.51	28.87	28.87	.000	.043	28.87	.000
		INLET CONTROL... Submerged: HW =8.98						
39.03	137.95	39.01	28.87	28.87	.000	.026	28.87	.000
		INLET CONTROL... Submerged: HW =9.48						
39.04	138.04	39.02	28.87	28.87	.000	.098	28.87	.000
		INLET CONTROL... Submerged: HW =9.49						

***** COMPOSITE OUTFLOW SUMMARY ****

CUMULATIVE HGL CONVERGENCE ERROR .001 (+/- ft)
FLOW PATH: Elev= 36.03; Branch: W1-CV-TW

* Max. convergence errors shown may also occur for flow paths other than the ones listed above.

WS Elev, Total Q			Converge	Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
29.53	.00	28.87	.000	(no Q: W0,W1,CV)
30.03	.00	28.87	.000	(no Q: W0,W1,CV)
30.53	.00	28.87	.000	(no Q: W0,W1,CV)
31.03	.00	28.87	.000	(no Q: W0,W1,CV)
31.49	.00	28.87	.000	(no Q: W0,W1,CV)
31.53	.14	28.87	.000	W0,CV (no Q: W1)
32.03	10.67	28.87	.000	W0,CV (no Q: W1)
32.53	26.18	28.87	.000	W0,CV (no Q: W1)
33.03	46.32	28.87	.000	W0,CV (no Q: W1)
33.11	47.67	28.87	.000	W0,CV (no Q: W1)
33.53	67.38	28.87	.000	W0,W1,CV
34.03	79.25	28.87	.000	W0,W1,CV
34.53	88.29	28.87	.000	W0,W1,CV
35.03	95.80	28.87	.000	W0,W1,CV
35.53	102.16	28.87	.000	W0,W1,CV
36.03	108.10	28.87	.001	W0,W1,CV
36.53	113.68	28.87	.000	W0,W1,CV
37.03	118.97	28.87	.000	W0,W1,CV
37.53	124.00	28.87	.000	W0,W1,CV
38.03	128.83	28.87	.000	W0,W1,CV
38.53	133.47	28.87	.000	W0,W1,CV
39.03	137.95	28.87	.000	W0,W1,CV
39.04	138.04	28.87	.000	W0,W1,CV

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev  2
Outflow HYG file = NONE STORED - POND 1       OUT Dev  2

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    175.31 cfs    at   12.0500 hrs
Peak Outflow      =     27.15 cfs    at   12.5600 hrs
-----------------------------------------------------
Peak Elevation    =     32.55 ft
Peak Storage =          8.126 ac-ft
=====================================================


MASS BALANCE (ac-ft)
--------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      13.499
- Infiltration =        .000
- HYG Vol OUT  =       8.052
- Retained Vol =       5.445
                  ----------
Unrouted Vol =       -.002 ac-ft  (.012% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev  5
Outflow HYG file = NONE STORED - POND 1       OUT Dev  5

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    245.83 cfs    at   12.0500 hrs
Peak Outflow      =     63.81 cfs    at   12.3900 hrs
-----------------------------------------------------
Peak Elevation    =     33.45 ft
Peak Storage =         10.744 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      19.308
- Infiltration =        .000
- HYG Vol OUT  =      13.786
- Retained Vol =       5.520
                 ----------
Unrouted Vol =       -.002 ac-ft  (.011% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev 10
Outflow HYG file = NONE STORED - POND 1       OUT Dev 10

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    280.84 cfs    at   12.0500 hrs
Peak Outflow      =     76.26 cfs    at   12.3700 hrs
-----------------------------------------------------
Peak Elevation    =     33.90 ft
Peak Storage =         12.090 ac-ft
=====================================================


MASS BALANCE (ac-ft)
--------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      22.226
- Infiltration =        .000
- HYG Vol OUT  =      16.668
- Retained Vol =       5.555
                  ----------
Unrouted Vol =       -.002 ac-ft  (.011% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev 25
Outflow HYG file = NONE STORED - POND 1       OUT Dev 25

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    333.13 cfs    at   12.0500 hrs
Peak Outflow      =     89.24 cfs    at   12.3800 hrs
-----------------------------------------------------
Peak Elevation    =     34.59 ft
Peak Storage =         14.197 ac-ft
=====================================================


MASS BALANCE (ac-ft)
--------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      26.615
- Infiltration =        .000
- HYG Vol OUT  =      21.000
- Retained Vol =       5.612
                  ----------
Unrouted Vol =       -.003 ac-ft  (.010% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

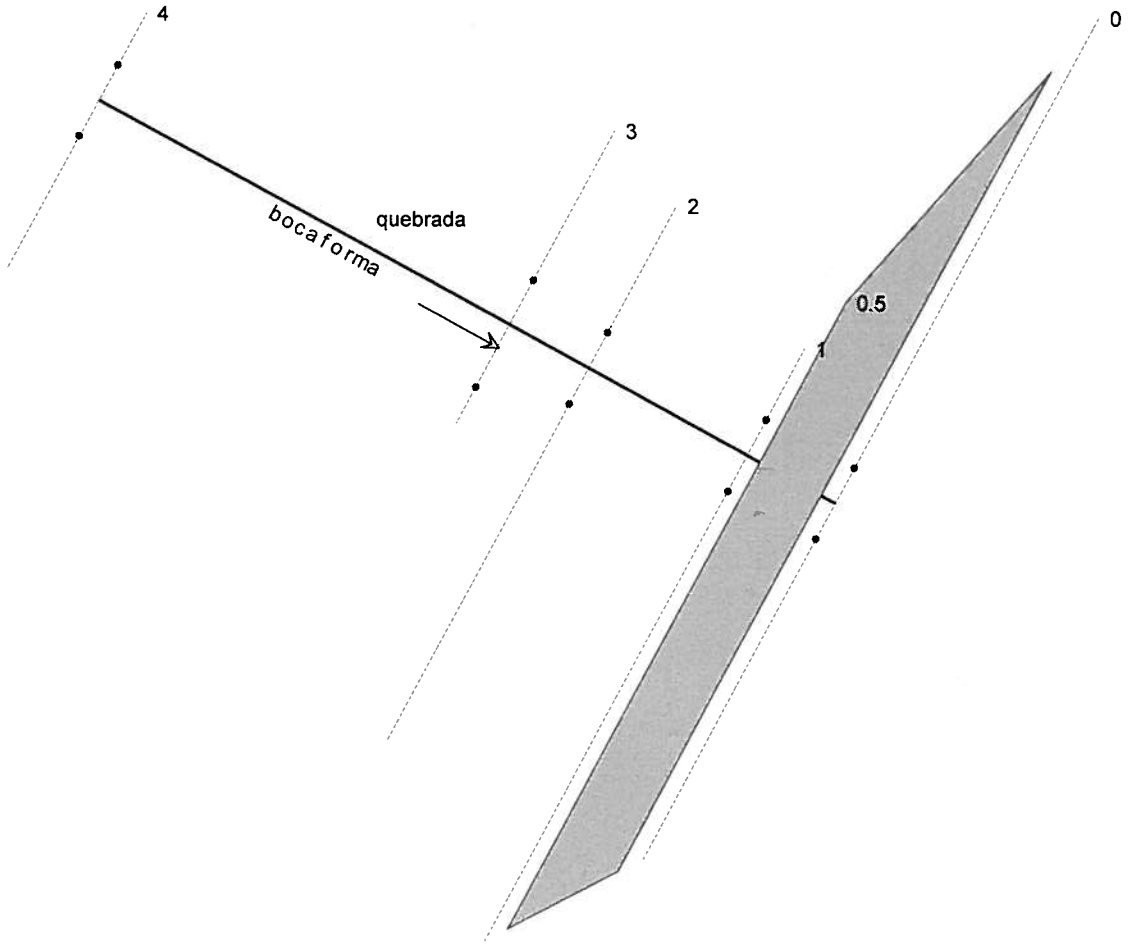
```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev 50
Outflow HYG file = NONE STORED - POND 1       OUT Dev 50

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    367.88 cfs    at   12.0500 hrs
Peak Outflow      =     95.92 cfs    at   12.3800 hrs
-----------------------------------------------------
Peak Elevation    =     35.04 ft
Peak Storage =         15.587 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      29.545
- Infiltration =        .000
- HYG Vol OUT  =      23.893
- Retained Vol =       5.649
                  ----------
Unrouted Vol =       -.003 ac-ft  (.010% of Inflow Volume)
```

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\acad386\work\05201Comandante\Estudio H-H\El Nuevo Comandante05201h\
Inflow  HYG file = NONE STORED - POND 1       IN  Dev100
Outflow HYG file = NONE STORED - POND 1       OUT Dev100

Pond Node   Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = cv & wr

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =    29.53 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0100 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =    437.15 cfs    at   12.0500 hrs
Peak Outflow      =    106.37 cfs    at   12.4000 hrs
-----------------------------------------------------
Peak Elevation    =     35.88 ft
Peak Storage =         18.283 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =      35.414
- Infiltration =        .000
- HYG Vol OUT  =      29.691
- Retained Vol =       5.720
                  ----------
Unrouted Vol =       -.003 ac-ft  (.009% of Inflow Volume)
```

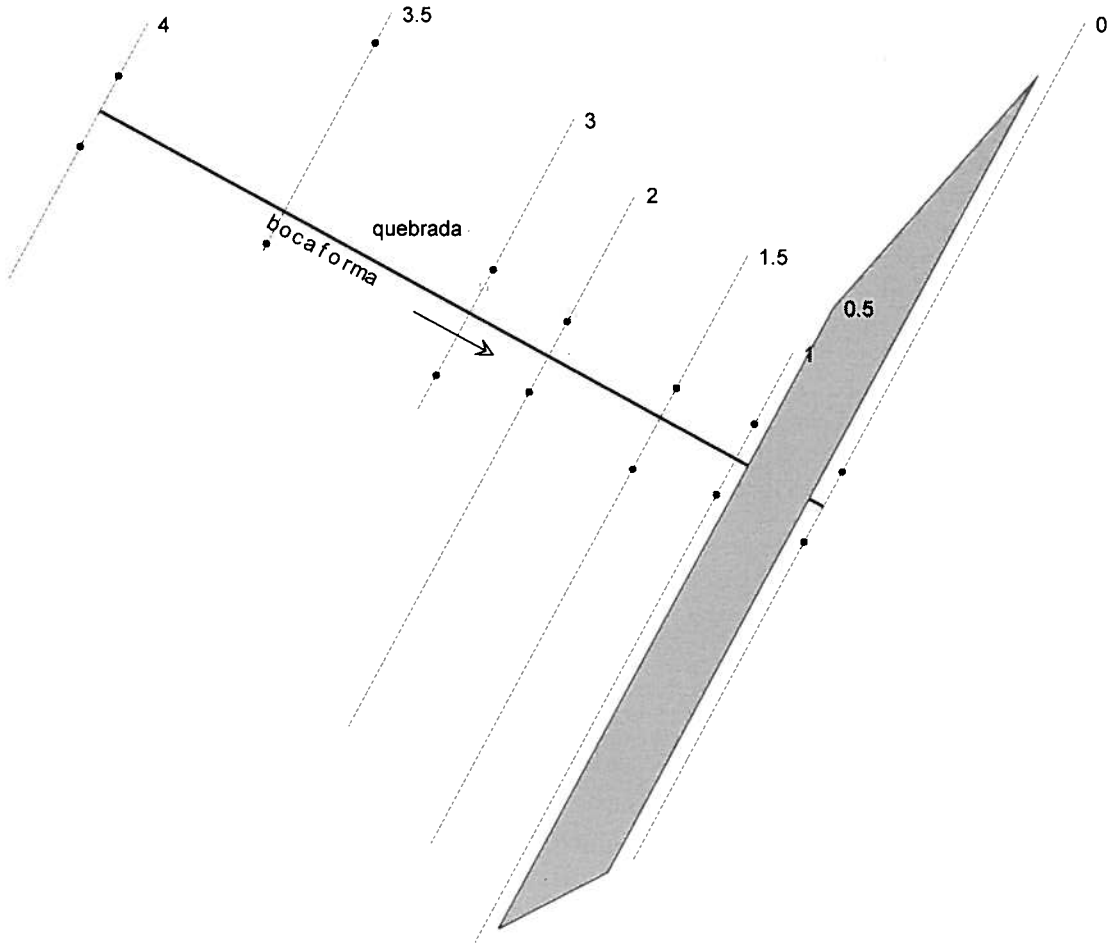
APPENDIX E

HEC-RAS RESULTS-EXISTING AND PROPOSED CONDITIONS


4
3
2
1
0.5
0
quebrada
bocaforma

HEC-RAS Plan: boca River: bocaforma Reach: quebrada Profile: BOCAEX

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
quebrada	4	BOCAEX	59.28	7.94	9.30	9.30	9.60	0.021318	2.45	25.94	46.68	0.89
quebrada	3	BOCAEX	59.28	7.00	9.11		9.11	0.000189	0.41	163.70	112.98	0.10
quebrada	2	BOCAEX	59.28	5.38	9.11		9.11	0.000048	0.29	314.35	269.51	0.05
quebrada	1	BOCAEX	59.28	5.33	9.10	6.88	9.10	0.000091	0.36	252.76	269.78	0.07
quebrada	0.5		Culvert									
quebrada	0	BOCAEX	59.28	4.52	9.10	6.06	9.10	0.000002	0.07	1068.88	443.40	0.01


4
3.5
3
2
1.5
1
0.5
0
bocaforma
quebrada

HEC-RAS Plan: pcboca1rev River: bocaforma Reach: quebrada Profile: BocaPC

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
quebrada	4	BocaPC	59.04	7.94	9.30	9.30	9.59	0.021347	2.45	25.84	46.57	0.89
quebrada	3.5	BocaPC	59.04	7.52	9.13	8.27	9.14	0.000459	0.46	127.96	116.80	0.14
quebrada	3	BocaPC	59.04	7.00	9.10	7.67	9.11	0.000154	0.36	158.64	96.90	0.09
quebrada	2	BocaPC	59.04	5.38	9.10	6.71	9.11	0.000047	0.29	279.43	226.50	0.05
quebrada	1.5	BocaPC	59.04	5.35	9.10		9.10	0.000021	0.19	425.37	268.63	0.04
quebrada	1	BocaPC	59.04	3.74	9.10	5.94	9.10	0.000067	0.34	268.68	269.78	0.06
quebrada	0.5		Culvert									
quebrada	0	BocaPC	59.04	3.62	9.10	5.54	9.10	0.000002	0.07	1077.83	443.40	0.01

HEC-RAS River: bocaforma Reach: quebrada Profile: BocaPC

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
quebrada	4	BocaPC	pcboca1rev	59.04	7.94	9.30	9.30	9.59	0.021347	2.45	25.84	46.57	0.89
quebrada	4	BOCAEX	boca	59.28	7.94	9.30	9.30	9.60	0.021318	2.45	25.94	46.68	0.89
quebrada	3.5	BocaPC	pcboca1rev	59.04	7.52	9.13	8.27	9.14	0.000459	0.46	127.96	116.80	0.14
quebrada	3	BocaPC	pcboca1rev	59.04	7.00	9.10	7.67	9.11	0.000154	0.36	158.64	96.90	0.09
quebrada	3	BOCAEX	boca	59.28	7.00	9.11		9.11	0.000189	0.41	163.70	112.98	0.10
quebrada	2	BocaPC	pcboca1rev	59.04	5.38	9.10	6.71	9.11	0.000047	0.29	279.43	226.50	0.05
quebrada	2	BOCAEX	boca	59.28	5.38	9.11		9.11	0.000048	0.29	314.35	269.51	0.05
quebrada	1.5	BocaPC	pcboca1rev	59.04	5.35	9.10		9.10	0.000021	0.19	425.37	268.63	0.04
quebrada	1	BocaPC	pcboca1rev	59.04	3.74	9.10	5.94	9.10	0.000067	0.34	268.68	269.78	0.06
quebrada	1	BOCAEX	boca	59.28	5.33	9.10	6.88	9.10	0.000091	0.36	252.76	269.78	0.07
quebrada	0.5			Culvert									
quebrada	0	BocaPC	pcboca1rev	59.04	3.62	9.10	5.54	9.10	0.000002	0.07	1077.83	443.40	0.01
quebrada	0	BOCAEX	boca	59.28	4.52	9.10	6.06	9.10	0.000002	0.07	1068.88	443.40	0.01

APPENDIX F
PONDPACK MODEL – ELECTRONIC COPY