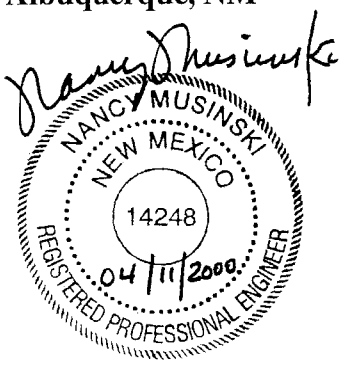
Design Analysis Report for

Borrega Detention Dam and North Borrega Channel

in
Bernalillo County, NM

Prepared for

Albuquerque Metropolitan Arroyo
Flood Control Authority
Albuquerque, NM



Submitted by:

Wilson & Company, Engineers & Architects
4900 Lang Avenue N.E.
Albuquerque, New Mexico 87109
(505) 348-4000

WCEA File No: 99-210-099

April 2000

TABLE OF CONTENTS

TABLES & FIGURES

APPENDIX

APPENDIX A – Hydrology

AHYMO97 Models:

- Existing 100-yr
- Post-Project 100-yr
- Interim 100-yr & PMP
- Future 100-yr & PMP

AHYMO Maps

APPENDIX B – Sediment Analysis

Calculations for sediment discharge to Borrega Dam
Calculations for sediment trapping
Excerpt from Borrega Diversion Sediment Issues

APPENDIX C – Hydraulics

North Borrega Channel HEC-RAS Analysis
Exhibit 1. HEC-RAS Cross Section Stations
Freeboard Calculations North Borrega Channel
Calculations for 96" RCP Intake for North Borrega Channel
Borrega Dam Storage-Discharge Calculations
Principal Spillway Outlet Calculations

APPENDIX D – Sheets from Construction Plans, including Dam Filing Sheet

APPENDIX E – Basin Maps

Exhibit 3. Existing
Exhibit 4. Revised (Post-Project)
Exhibit 4a. Interim – Phase "A" Dam
Exhibit 5. Future – Phase "B" Dam

APPENDIX F – AMAFCA Agreements

1.0 INTRODUCTION

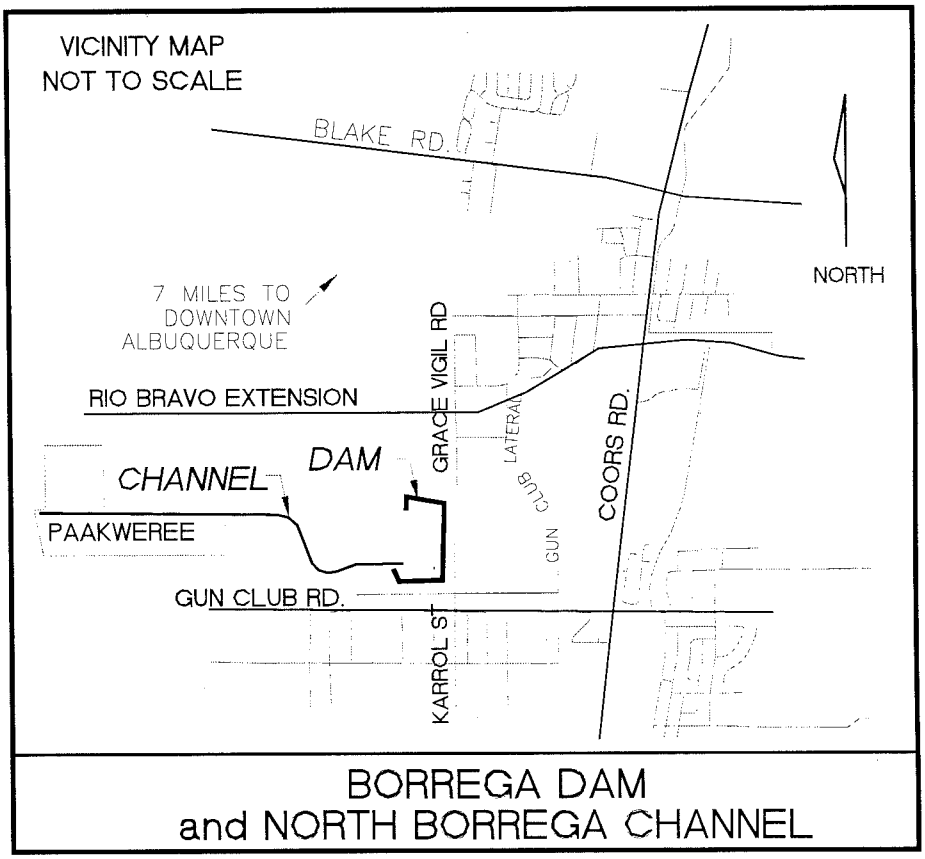
1.1 Purpose

Wilson & Company was contracted by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) to provide the analysis and design for the proposed Borrega Detention Dam and North Borrega Channel, southwest of Albuquerque, New Mexico.

The purpose of this report includes: the hydrologic and sediment analysis for the basins discharging to the proposed facilities, and hydraulic analysis of all the structures associated with the Borrega Detention Dam and North Borrega Channel.

1.2 Background Information

The Borrega Dam site is located in the Borrega Drainage Basin within the Amole Watershed southwest of the city of Albuquerque. The site is immediately west (upstream) of Karrol Street, which turns into Grace Vigil Road north of the site. The dam will be constructed to resemble a landform that blends with the local gently sloping landscape. The North Borrega Channel will be built to convey the Borrega watershed runoff to the dam.



Currently the Borrega watershed upstream of Karrol Street is undeveloped. The only signs of development are a 200-ft. wide power line easement 6000 feet upstream of the dam site, scattered barbwire fence lines and two-track dirt trails, and the earthen Borrega Arroyo Diversion Channel.

The Borrega Arroyo Diversion Channel was built in 1986. It begins 1500 feet upstream of Karrol Street where it diverts the existing Borrega Arroyo from its southeast path and conveys it east in a 20-ft. wide channel with gabion grade control structures. It outfalls via the Borrega Inlet (a 60" conduit with headwall) to the Hubbell Lake Detention Area approximately 2000 feet downstream of Karrol Street.

The existing channel capacity is 640 cfs. Without upstream detention or diversion, the channel does not have capacity to convey the developed discharge of 1600 cfs. The Borrega Inlet does not have the capacity to convey existing or developed flows. These conditions were addressed in the Amole-Hubbell Drainage Management Plan adopted by AMAFCA in July 1999 (hereinafter referred to as the A-H DMP).

The developers of Paakweree, a residential development upstream of the proposed dam in the Borrega basin, plan to hard-line the North Borrega Channel, intercept its tributaries, and confine the flood plain. These improvements also require detention to control the flow rates to the Borrega inlet.

1.3 Phasing

AMAFCA will build the following facilities within the next year: the Borrega Detention Dam, the North Borrega Channel downstream of the residential development, the confluence of the North and South Borrega Channels, and a portion of the Borrega Diversion Storm Drain. The construction of the Borrega Dam will be done in two phases: Phase "A" and Phase "B". The following compares the conditions of the phases:

PHASE "A"	PHASE "B"
• Construction scheduled to begin in spring 2000.	• Construction in the future.
• Dam is not fully excavated in the north portion.	• Dam north portion fully excavated to provide additional flood storage.
• Does not include recreational field.	• Has recreational field, by others.
• Total area draining to dam=1.25 sq mi.	• Total area draining to dam=1.75 sq mi.

AMAFCA will receive certification for Borrega Dam Phase "A" by the State Engineer upon completion of the construction of Phase "A".

Phase "B" will include full excavation of the north portion of the dam. Full excavation will be required to accommodate fully developed diverted runoff that will be delivered to the dam by two storm drains. One storm drain conveys flow from property owned

by American Southwest Homes northwest of the dam (Basin B-6). The other is the Borrega Diversion Storm Drain from Gun Club Road, which conveys flow from the south (Basin 6B).

1.4 AMAFCA Agreements

Cost sharing is to be implemented for the design and construction of the proposed North Borrega Channel and the Borrega Dam. AMAFCA has agreed to pay for the construction of the dam and public channels. The owner of Paakweree has agreed to pay for land acquisition, dam design, and construction of the private channels through the proposed development. See the "AMAFCA Agreement" dated 10 August 1999 in Appendix F.

In the A-H DMP the proposed Borrega Dam was planned to be a storage facility for runoff from only the Borrega watershed. The owner of the land within the Rio Bravo basin "B-6" (directly north of the Borrega watershed) wished to be able to divert runoff from that basin into the proposed dam. In December 1999, AMAFCA entered into an agreement with the landowner to ultimately accept the diverted runoff into the dam. This increased the drainage area to the dam from approximately 1.25 square miles to 1.75 square miles. See the "First Amendment to Agreement" dated 16 December 1999 in Appendix F.

2.0 HYDROLOGY

2.1 Hydrologic Model

The 100-year 24-hour runoff under existing, revised (post-project), interim, and future conditions was analyzed for this report. The hydrologic model is based on the Borrega Basin and Rio Bravo Basin AHYMO97 models taken from the Amole-Hubbell Drainage Management Plan by Leedshill-Herkenhoff, December 1998 (hereinafter referred to as the A-H DMP).

The rainfall data is summarized in Table 1 below. The hydrology was analyzed using the following assumptions:

1. The 100-year 24-hour event was modeled.
2. Sediment bulking was added only for undeveloped basins upstream of 118th Street.
3. The Principal Maximum Flood was modeled assuming a dam of High Hazard classification per the classification system given in New Mexico Dam Safety Design Criteria, 1997.
4. For the Principal Maximum Precipitation (PMP), the 6-hour local storm and the 24-hour general storm were analyzed per the requirements in Section 22.2 of the Albuquerque DPM. The local PMP storm resulted in higher discharge through the watershed; therefore the more intense local PMP storm was used to size the emergency spillway. The emergency spillway was sized for the full PMP local storm.

TABLE 1. DESIGN STORM RAINFALL AMOUNTS

Time	100-Year (inches)	PMP 6-hour Local Storm (inches)
1 hour	1.87	11.5
6 hours	2.20	16.0
24 hours	2.66	—

2.2 Development Conditions Summary

The drainage basin maps are in Appendix E of this report. The following summarizes the conditions presented in the maps:

- Existing Conditions - Exhibit 3, is based on the A-H DMP under existing conditions. Treatment types average 75% A, 25% B, 0% C and 0% D. Treatment type B is used for steep-sloped undeveloped areas per Table A-4 in the Albuquerque Development Process Manual (DPM).

- Revised (Post-Project) Conditions - Exhibit 4, is undeveloped except for the residential development Paakweree, the flood control channels, and the Borrega Dam has a 100-year storage volume of 64 acre-feet, sized for Phase "A".

  The Revised (Post-Project) is the condition required by FEMA for submittal of the Conditional Letter of Map Revision (CLOMR), which is required to begin the process of removing or relocating the flood plain through the project area.

  The treatment types approximate those used in the A-H DMP. Treatment types for the undeveloped basins average 75% A, 25% B, 0% C and 0% D. Treatment types for the developed basins average 0% A, 28% B, 23% C, and 49% D.

- Interim Phase "A" Dam - Exhibit 4A, has fully developed conditions in the Borrega watershed except for Basin 50201. The Phase "A" dam has a 100-year storage volume of 64 acre-feet. Treatment types match those used in the A-H DMP, with average of approximately 0% A, 28% B, 23% C, and 49% D.

- Future Conditions – Exhibit 5, has additional drainage area to the dam from the north and south. The Phase "B" dam was sized for Future Conditions with 100-year storage volume of 90 acre-feet. Treatment types match those used in the A-H DMP, with average of approximately 0% A, 28% B, 23% C, and 49% D. In the B-6 basin northwest of the dam, treatment types are 0% A, 60% B, 15% C, and 25% D. American Southwest Homes, the owner of most of B-6, plans to develop the land as half-golf course and half-residential. Higher levels of development may require additional detention storage.

The following sections describe the stages of development in the existing, revised, interim, and future models.

2.3 Existing Conditions

1. The Basin 50201 (6B) is not added to the analysis. This is because 50201 will not discharge to Hubbell Lake until the Borrega Diversion Storm Drain from Gun Club Road proposed in the A-H DMP is built.
2. The basins are undeveloped except for small pockets of development at the east side of the study area.
3. 15% sediment bulking was added to all basins, same as the A-H DMP.

2.4 Revised (Post-Project) Conditions

1. This condition is included because it is the condition required by FEMA for submittal of the Conditional Letter of Map Revision (CLOMR). The only fully developed basins are the Paakweree development, which is analyzed as developed with no bulking for sediment.
2. Sediment at culverts (see Section 3.2 below) is analyzed per this development condition.
3. The Borrega Dam Phase "A" and North Borrega Channel are built to accommodate Paakweree runoff.
4. The South Borrega Tributary Storm Drain is constructed to convey flows from basins 50101 and 50102 to the North Borrega Channel.
5. 118th Street from Rio Bravo Boulevard is constructed to provide access to Paakweree.
6. Basins 50103, 50104, and 50105 West are analyzed as existing with 15% bulking, and are routed south via the 118th Street Channel to be discharged to the North Borrega Channel.
7. Basins B-2 and B-4 West are analyzed as existing with 15% bulking, are routed to the southwest corner of 118th Street and Rio Bravo Boulevard intersection. This flow is discharged through a culvert to a channel currently under construction on the north side of Rio Bravo Boulevard.
8. AMAFCA builds only the first 300 linear feet of the Borrega Diversion Storm Drain that discharges into the Phase "A" Borrega Dam (see 1, above in Existing Conditions). Therefore, only a small portion of Basin 50201 runoff discharges to the Borrega Channel and dam system, and most of Basin 50201 remains undeveloped.

2.5 Interim Conditions

1. The Borrega Dam remains Phase "A".
2. The entire Borrega watershed is developed except Basin 50201, so only the 300 linear feet of the Borrega Diversion Storm Drain has been built (the remainder is built in Future Conditions, see Number 4 in Future Conditions below).
3. No sediment bulking is added to the model. In the A-H DMP, sediment bulking was added to only two of the basins: 2% bulking in Basin 50101, and 4% bulking in Basin 50104.

4. Discharge from developed Basins 50105 West, 50103, and 50104 is routed through "Pond 7", which is proposed by the A-H DMP to be located upstream of 118th St.
5. The routed flows from "Pond 7" are discharged south via the 118th Street Channel to the North Borrega Channel. The A-H DMP took these flows *north*, therefore the A-H DMP will require an amendment by AMAFCA.
6. Basins B-2 and B-4 West will discharge developed runoff to "Pond 8", which is proposed by the A-H DMP to be located upstream of 118th Street. The pond discharges through the culvert under Rio Bravo Boulevard to the north side of Rio Bravo Blvd. See Number 7 in Revised (Post-Project) Conditions, above.

2.6 Future Conditions

1. The Borrega Dam Phase "B" is constructed. This increases the volume of the dam and accommodates the developed flow that is diverted from basins B-4 East, B-6 and 50201.
2. No sediment bulking was added to the model.
3. The flows from developed Rio Bravo Basins B-4 East and B-6 are discharged to the Borrega Dam through a storm drain to the northwest corner of the dam per the AMAFCA Agreement dated 16 December 1999.
4. The flow from developed Basin 50201 is discharged to the Borrega Dam through an extension of the Borrega Diversion Storm Drain to Gun Club Road.

3.0 SEDIMENT

3.1 Sediment Discharge to the Borrega Dam

A comprehensive sediment analysis, Borrega Diversion Sediment Issues Floodplain Study for AMAFCA, was performed for the Borrega watershed in 1992. Resource Consultants, Inc. (RCI) prepared this report for Bohannan-Huston, Inc. The purpose of the report was to support the BHI hydrologic analysis of the watershed.

The report used the Modified Universal Soil Loss Equation (MUSLE) calibrated with sediment removal records from the nearby Don Felipe Dam to calculate sediment yield. The calculations indicated a sediment yield for the 100-year storm under existing conditions to be 8.56 tons/acre and the annual sediment yield to be 0.54 tons/acre.

The AMAFCA requirement for dams is 5 times the annual plus one 100-year event sediment yield. Using the information from the Borrega sediment report by RCI, the AMAFCA requirement is 3.8 acre-feet of sediment under post-project conditions, and 1.5 acre-feet under fully developed conditions. Table 2 below, Dam Storage Volume Summary shows that there is adequate volume to accommodate sediment storage. See Appendix B for the calculations of the sediment yield.

TABLE 2. BORREGA DAM STORAGE VOLUME SUMMARY

DESCRIPTION	PHASE "A"	PHASE "B"
Storage to Emergency Spillway Crest 4997 (ac-ft)	88.4	99.3
100-Yr Storage (ac-ft)	64.1	87.9
Sediment Storage (ac-ft)	3.8	1.5
Allowance for Bell (to meet 30 ac-ft allowance per AMAFCA Agreement)	N/A	8.2
Excess Storage (ac-ft)	20.5	1.7

The table indicates that in the Phase "A" dam, there is a great amount of excess (20 ac-ft) beyond what is required. This is because in the Phase "A" dam, the channel will be excavated to the northwest corner of the dam to intercept the Bell property runoff. This is being done in Phase "A" to avoid disturbing the dam embankment in the future.

3.2 Sediment Trapping at Upstream Culverts

At the two entrances to culverts (AP3, 96" under 118th Street and AP5, 66" South Borrega Trib Storm Drain, see Post-Project Basin Map), only the undeveloped condition sediment was analyzed. The developed condition is not analyzed because it is likely that in the future the drainage conveyances to the culvert structures will be altered so that sediment is trapped upstream.

To illustrate, in the future there will be a pond ("Pond 7") at the 118th Street Channel upstream of AP3. Pond 7 is proposed by the A-H DMP to act as a sediment-trapping and detention pond. Likewise, a storm drain connection is conceived as the ultimate conveyance for discharge to the South Borrega Trib Storm Drain at AP5. There would be no sediment deposited at this location because the structure would be underground.

The program TRAPMIX was used to compute the amount of sediment that is deposited at the entrance to the culvert under 118th Street and at the entrance to the South Borrega Tributary Storm Drain. The runoff to these culverts is undeveloped in the Revised (Post-Project) condition. The results of the analysis are summarized in the table below. Calculations for the sediment trapping are in Appendix B.

TABLE 3. SEDIMENT TRAP ANALYSIS RESULTS (100-Year)

	AP3 96" under 118th Street	AP5 66" South Borrega SD
Bulked V100 (ac-ft)	10.1	8.3
Bulking factor	1.15	1.15
Sediment load (ac-ft)	1.32	1.08
% Sediment passing	70	71
% Sediment trapped	30	29
Available sediment storage (ac-ft)	0.18	0.13

4.0 GEOTECHNICAL STUDY FINDINGS

The report entitled Geotechnical Engineering Study Proposed Borrega Detention Dam was produced for this project by AGRA Earth & Environmental of Albuquerque, New Mexico. The report includes the results of test drilling, laboratory analyses, and recommended criteria relative to embankment geometry, foundation treatment, and dam design.

The proposed embankment should have slopes no steeper than 3:1 upstream and 2.5:1 downstream. See Exhibit 1 below. The crest width should be 20 feet. The key trench (or "cutoff trench") with bottom width of 20 feet and depth of 5 feet should be excavated in the native soils beneath the embankment. The key trench should have side slopes no steeper than 2:1.

Foundation treatment should extend laterally a minimum distance of 25 feet from the upstream toe and 5 feet from the downstream toe of the embankment. The prepared surface should be pre-wetted per specifications to a depth of 5 feet, followed by vibratory roller compaction per specifications. A ground compaction of 0.5 foot (loss) should be used in earthwork quantity calculations for foundation treatment areas.

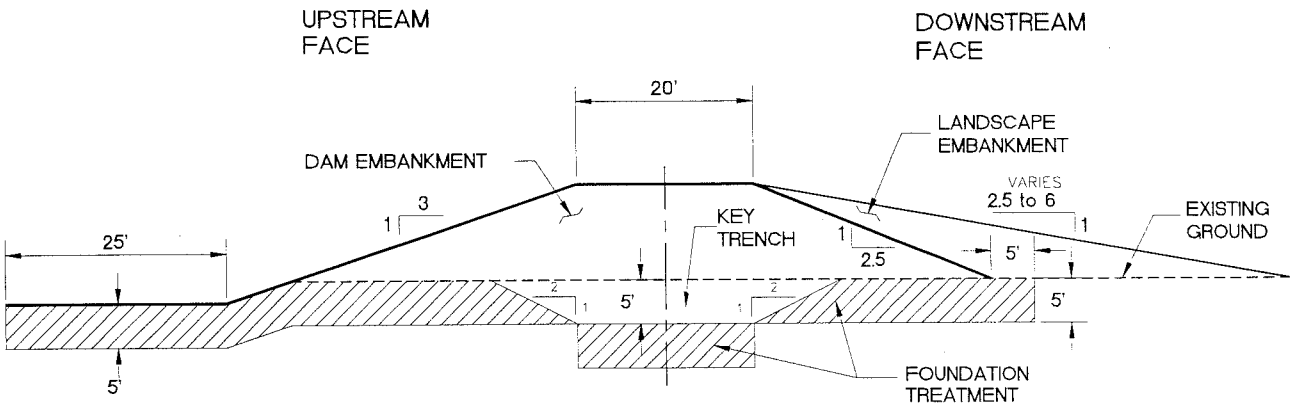


FIGURE 1. TYPICAL EMBANKMENT SECTION
NOT TO SCALE

Although the storage period for the 100-year storm is less than 40 hours, the study used a conservative storage time length of 6 days (144 hours) for the seepage analysis. The seepage analysis indicated that the wetted front would probably advance about 3.0 feet horizontally during a 6-day full retention period.

A shrinkage factor is 25% from cut to fill sections should be used for earthwork calculations. The specifications for earthwork are included in the geotechnical report appendix.

5.0 HYDRAULICS

5.1 North Borrega Channel

The concrete-lined North Borrega Channel will be constructed through Paakweree past the bridge at Perdiz Street by the developer of Paakweree. AMAFCA will construct the channel from downstream of Perdiz Street to the Borrega Dam.

The HEC-RAS analysis for the channel is in Appendix C. Exhibit 1 in Appendix C is provided to show the locations of the HEC-RAS cross sections. HEC-RAS format requires the highest station upstream; therefore the HEC-RAS stationing does not match the channel stationing in the plans.

At the upstream end of the North Borrega Channel, there is an intake structure with headwalls and a 96" culvert to convey the 118th St. Channel flow east under 118th Street (see analysis in Appendix C). The channel then conveys discharge east through Paakweree.

The channel is trapezoidal with approximately 2:1 side slopes. The cross section varies from 5-ft. depth with 10-ft. bottom width to 6-ft. depth with 12-ft. bottom width. At the confluence of the South Borrega Arroyo 1000 feet upstream of the dam, the width is 20 ft.

The channel is situated below existing ground level. Freeboard in the channel is minimum 2 feet above water surface elevation to comply with City of Albuquerque DPM. Additional freeboard is provided above the channel sill to account for superelevation at curves. Freeboard calculations are provided in Appendix C.

5.2 Intake Structure for Principal Spillway

The intake structure for the principal spillway is located 475 feet east of the channel chute of the incoming North Borrega Channel. The slope from the chute to the intake structure is 0.2%.

Th intake structure is a 10-ft. by 10-ft. concrete riser tower with thirty-nine 8" inclined circular orifices. The ground elevation is 4985 at the foot of the structure. The top of the riser is open and at elevation 4994. This is 0.68 ft. below the Phase "A" 100-year

water surface elevation of 4994.68, and 2.14 ft. below the Phase "B" 100-year elevation of 4996.14.

5.3 Principal Spillway Outlet Pipe

The principal spillway outlet is 176 linear feet of 54" pre-stressed concrete cylinder pipe (PCCP) which connects to a manhole and then discharges to 57 feet of 54" reinforced concrete pipe (RCP). The inlet invert is 4984.7 and the outlet invert is 4982.74 and the average slope is 0.8%. The maximum flow in the pipe is 170 cfs for the Phase "A" 100-year event, and 191 cfs for the Phase "B" 100-year event. A U.S. Bureau of Reclamation Type VI energy dissipator will be used at the outlet end to dissipate the energy of the outflow into the existing channel

The outlet was analyzed using the orifice equation. The area of the small orifices at the inlet structure controls the discharge until the water surface reaches the top of the riser. At that point the 47.5" orifice plate on the 54" PCCP controls the discharge. The 54" PCCP was designed to be non-pressurized flow in the 100-year event under fully developed conditions.

To alleviate scour at the outlet, a riprap blanket will extend 20 feet from the outlet of the energy dissipator. Downstream of the outlet, the existing channel is earthen with a trapezoidal cross section with 20-ft. bottom width; 3:1 side slopes, and a longitudinal slope of 0.4%.

5.4 Reservoir Storage and Routing

The storage-discharge curve was developed to allow a maximum outflow of approximately 191 cfs (non-pressurized flow) through the principal spillway pipe in the fully developed 100-year event. This limit is based on the 220-cfs capacity at the Borrega Inlet downstream. See Appendix C for the sheet showing the Borrega Dam outflow calculations for Borrega Dam Phase "A" and Phase "B". The storage-discharge curves are shown on the Dam Filing Sheet in the construction plans included in Appendix D.

Two levels of storage provide the storage within the dam. The lower level with invert at the principal spillway and top at 4991 is designed to hold the fully developed 5-year runoff of approximately 38 acre-feet. The upper level lies directly north of the lower level and is designed to accommodate the runoff greater than the 5-year up to the 100-year event. This maintains the water surface below the upper level invert for the more frequent storms. Therefore the upper level can be a multi-use facility, with recreational fields that will not be built with this project but are planned for the future.

The table below summarizes the Phase "A" Borrega Dam design data.

TABLE 4. PHASE "A" BORREGA DAM SUMMARY

DESCRIPTION	UNIT	VALUE
Detention Pond AHYMO Analysis Point No.	--	110.20
Return Period / Duration	(yr / hr)	100 / 24
Development Condition	--	Interim Developed
Total Drainage Area	(sq mi)	1.246
Inflow Time to Peak	(hrs)	1.60
Inflow Peak Discharge	(cfs)	1473
Inflow Total Runoff Volume	(ac-ft)	99.1
Outflow Time to Peak	(hrs)	2.80
Outflow Peak Discharge	(cfs)	170
Outflow Max Storage Volume at Peak	(ac-ft)	64.1
Outflow Total Runoff Volume	(ac-ft)	99.1
Max Storage at Emergency Spillway Elev	(ac-ft)	88.4
Dead Storage Volume	(ac-ft)	0
Total Reservoir Storage Time	(hrs)	26
Reservoir Invert Elev	(ft)	4985.0
Principal Spillway Elev	(ft)	4984.7
Emergency Spillway Elev	(ft)	4997.0
Top of Embankment Elev	(ft)	5003.0
Max 100-Yr Water Surface Elev	(ft)	4994.7
Max 100-Yr Water Depth	(ft)	9.7
Freeboard to Emergency Spillway Elev	(ft)	2.3
Freeboard to Top of Embankment	(ft)	8.3

Note that the table above is for the Phase "A" Borrega Dam. For further information on the Phase "A" and Phase "B" dams, see the Dam Filing Sheet in the construction plans.

5.5 Emergency Spillway

The soil cement-armored spillway has an overall length of 350 feet at the crest elevation of 4997. The top of the dam elevation is 5003. In the fully developed Phase "B" PMF, the maximum water surface elevation is 5002.81. The spillway discharges east to Karrol Street. Excess flows will likely spill over the top of the Borrega Channel downstream of Karrol Street and ultimately go east to Hubbell Lake or southeast to the existing Borrega Arroyo flood plain.

The spillway will be constructed of soil cement in 1-ft. lifts with a two-step 5-ft drop discharging to a plunge pool adjacent to Karrol Street. See sheet 8 in the construction plans in Appendix D. The design is based on the design for the Lower North Domingo Baca Dam, which was based on research done by Dr. Richard Heggen of UNM. The research showed that drop chutes with 2 or 3 silt blocks at the end of each apron provided the best performance.

5.6 Borrega Diversion Storm Drain from Gun Club Road

Runoff from basin 6B currently discharges east to the historic Borrega Arroyo. Per the A-H DMP the runoff from basin 6B will be diverted in the future from north of Gun Club Road to the Borrega Dam via a storm drain.

The storm drain will be 66" diameter and the Future Conditions peak 100-year flow rate is 230 cfs, with a 72" ring chamber energy dissipator at the downstream end to alleviate erosion at the outlet. The storm drain will discharge to the southwest corner of the dam. AMAFCA will build only the storm drain from the easement on the south side of the dam to the dam at this time. In the future, the storm drain will be extended to the south to Gun Club Road.

5.7 Future Basin B-6 Diversion Storm Drain

Per the Amendment to the AMAFCA Agreement (see Appendix F), the flow from Basins B-4 East and B-6 will be diverted to the dam in the future. The AHYMO Future Conditions 100-year peak runoff from this diverted area is 375 cfs. The AMAFCA Agreement allows 30 ac-ft to be discharged.

This flow will be conveyed into the dam through a storm drain with headwall and energy dissipator to be designed and built in the future by the developer. The storm drain will discharge into the northwest corner of the dam. From there, an open earthen channel will convey the flow south to the lower dam level.

6.0 CONCLUSIONS

The A-H DMP recommended a regional detention facility in the Borrega watershed. The construction of the Borrega Dam will fulfill this recommendation. When the dam construction is complete a Letter of Map revision (LOMR) will be required for submittal to FEMA.

A separate Conditional Letter of Map Revision (CLOMR) is being submitted to FEMA by the developer of Paakweree. The Paakweree CLOMR is for the Borrega Arroyo and tributary floodplain through Paakweree. It extends from upstream of Paakweree at 118th Street to the point where the North Borrega Channel crosses the existing Borrega Arroyo at approximately Station 43+00.

After the Borrega Dam LOMR is accepted by FEMA, the floodplain will be confined to the North Borrega Channel from Station 43+00 to the dam.

REFERENCES

AHYMO. Albuquerque Metropolitan Arroyo Flood Control Authority, 1997.

Amole-Hubbell Drainage Management Plan, for AMAFCA by Leedshill-Herkenhoff, Inc., 1999.

Borrega Diversion Sediment Issues Floodplain Study for AMAFCA, for Bohannan-Huston, Inc. by Resource Consultants, Inc., June 1992.

Development Process Manual - Volume 2, City of Albuquerque, 1993.

New Mexico Dam Safety Design Criteria, 1997 Edition, State Engineer, Santa Fe, New Mexico.

APPENDIX A - Hydrology

AHYMO97 Models

Existing Conditions
- Input
- 100-Yr 24-Hr Summary

Post-Project Conditions
- Input
- 100-Yr 24-Hr Summary

Interim Conditions
- Input
- 100-Yr 24-Hr Summary
- PMP 24-Hr Summary

Future Conditions
- Input
- 100-Yr 24-Hr Summary
- PMP 24-Hr Summary

AHYMO Maps
- Existing Conditions
- Interim Conditions
- Future Conditions

```
START               0.0 HOURS    PC=0   PL=-1
*S
*S      BORREGA WATERSHED
*S
*S
*S 100-YR, 24-HR STORM WITH SEDIMENT
*S FILE NAME: BR100E1B.DAT  (EXISTING CONDITIONS)
*S BY: RICHARD STOCKTON
*S LAST REVISION: 05-14-96
*S <<REV 12/99 BY WCEA.  REMOVED BASIN 6B BECAUSE IT DOES NOT FLOW TO HUBBELL
*S  UNDER EXISTING CONDITIONS.>>
*****************************************************************************
*S THE PURPOSE OF THIS MODEL IS TO CALCULATE THE RUNOFF FROM THE BORREGA
*S BASIN.  FLOWS FROM THIS BASIN IS CONVEYED TO HUBBLE LAKE DETENTION FACILITY
*S VIA THE BORREGA DIVERSION CHANNEL.
*S
*****************************************************************************
*S ANALYSIS ASSUMPTIONS:
*****************************************************************************
*S 1. ALL LAND IN THIS BASIN IS MODELED AS EXISTING CONDITION.
*S
*S 2. THE PUNCH HYD COMMAND WAS ADDED TO THE END OF THIS FILE SO THE OUTFALL
*S    HYDROGRAPH COULD BE USED IN THE AMOLE DEL NORTE EXISTING CONDITIONS MODEL
*S    AA100E1B.DAT, WHICH WILL BE USED IN THE ANALYSIS OF THE AMOLE ARROYO SYSTEM.
*S
*S 3. A BULKING FACTOR OF 15% HAS BEEN ADDED TO EACH UNDEVELOPED SUB-BASIN AND
*S    A BULKING FACTOR OF 6% HAS BEEN ADDED TO EACH DEVELOPED SUB-BASIN LIKELY
*S    TO PRODUCE SEDIMENT.  A BULKING FACTOR OF 3% HAS BEEN ADDED TO EACH
*S    DEVELOPED SUB-BASIN THAT WOULD PROBIBLY PRODUCE SEDIMENT, SUCH AS PARKS
*S    AND SCHOOL PLAY GROUNDS.   AND, NO BULKING FACTOR FOR WELL DEFINED RESIDENTIAL
*S    DEVELOPMENTS.
*S
*****************************************************************************
**S 2 YEAR 24HR STORM EXISTING CONDITION
*RAINFALL            TYPE=2  0.0  0.74  0.95  1.15    DT=0.05
**S 5 YEAR 24HR STORM EXISTING CONDITION
*RAINFALL            TYPE=2  0.0  1.00  1.30  1.60    DT=0.05
**S 10 YEAR 24HR STORM EXISTING CONDITION
*RAINFALL            TYPE=2  0.0  1.25  1.47  1.77    DT=0.05
**S 25 YEAR 24HR STORM EXISTING CONDITION
*RAINFALL            TYPE=2  0.0  1.50  1.90  2.20    DT=0.05
**S 50 YEAR 24HR STORM EXISTING CONDITION
*RAINFALL            TYPE=2  0.0  1.75  2.10  2.50    DT=0.05
*S 100 YEAR 24HR STORM EXISTING CONDITION
RAINFALL            TYPE=2  0.0  1.87  2.20  2.66    DT=0.05
**S PMP GENERAL STORM
*RAINFALL            TYPE=4  0.0  6.0   12.0  19.0    DT=0
*****************************************************************************
*
*            HYDROLOGIC MODEL FOR BORREGA DIVISION SYSTEM
*****************************************************************************
*                   INPUT FILE HYDRO:[H9027610]BORCHAN_24HRE.HYM
*                   100-YEAR STORM
*                   24-hour STORM
*                   EXISTING CONDITIONS
*                   ORIGINATED 5/13/91 BY D. GREGG
*                   REVISED 9/11/91 BY C. HOOVER
*                   BOHANNAN-HUSTON, INC.
*****************************************************************************
*
*
*  SUMMARY                  1
*
*****************************************************************************
*****************************************************************************
*****************************************************************************
*
* HYDROLOGY BASED SECTION 22.3 OF THE DEVELOPMENT PROCESS MANUAL, VOLUME 2,
* DESIGN CRITERIA, FOR THE CITY OF ALBUQUERQUE NEW MEXICO
* AUGUST 14, 1991
*
*****************************************************************************
*****************************************************************************
*
*    24-hour rainfall distribution based on NOAA Atlas 2
**RAINFALL              TYPE=2  RAIN QUARTER=0.0  RAIN ONE=1.91
**                      RAIN SIX=2.24  RAIN DAY=2.68 DT=.05
*
* COMPUTE HYD ABOVE AP 101  BASIN 7-A
*S BULK FLOWS 15%
SEDIMENT BULK           CODE=1  BK=1.15
COMPUTE NM HYD      ID=1    HYD=101.1   DA=0.154 SQ MI
                    PER A=74.4   PER B=25.6   PER C=0.0  PER D=0.0
                    TP=-0.1344    RAIN=-1
PRINT HYD           ID=1    CODE=10
*
*
* ROUTE OLF FROM AP 101 TO AP 102
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=3
                    ELMIN=52    ELMAX=58
                    CH SLP=.0338         FP SLP=.0338
```

```
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=3
                     ELMIN=43.8    ELMAX=50
                     CH SLP=.0289        FP SLP=.0289
                     N=.035  STA=117   N=.035  STA=240      N=.035  STA=259
                     DIST    ELEV      DIST    ELEV         DIST    ELEV
                     100     50        117     48           130     46
                     133     44        142     43.8         182     43.8
                     190     44        220     46           240     48
                     259     49
COMPUTE TRAVEL TIME ID=4      REACH=1     NO VS=1
                     L=1696    SLP=.0289
ROUTE                ID=4      HYD=104.5
                     INFLOW ID=3     DT=.05
*
* ROUTED OLF AT AP 105
*
PRINT HYD            ID=4       CODE=10
*
*
* COMPUTE HYD ABOVE AP 105  BASIN 7-E
COMPUTE NM HYD       ID=1    HYD=105.1   DA=0.1787 SQ MI
                     PER A=85.5    PER B=14.5    PER C=0.0   PER D=0.0
                     TP=-0.1936    RAIN=-1
PRINT HYD            ID=1    CODE=10
*
*
* ADD COMBINED ROUTED OLF FROM BASINS 7-K AND 7-B TO BASIN 7-E
ADD HYD              ID=4      HYD=105.3
                     ID=1      ID=4
PRINT HYD            ID=4      CODE=10
*
*
* COMPUTE HYD ABOVE AP 106  BASIN 7-D
COMPUTE NM HYD       ID=1    HYD=106.1   DA=0.09702 SQ MI
                     PER A=79.7    PER B=20.3    PER C=0.0   PER D=0.0
                     TP=-0.1684    RAIN=-1
PRINT HYD            ID=1    CODE=10
*
*
* ADD OLF FROM BASINS 7-K, 7-B, AND 7-E TO BASIN 7-D
ADD HYD              ID=4      HYD=106.3
                     ID=1      ID=4
PRINT HYD            ID=4      CODE=10
*
*
* ROUTE FLOW FROM BASINS 7-K, 7-B, 7-E, AND 7-D THROUGH BASIN 7-F TO AP 102
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=3
                     ELMIN=26    ELMAX=34
                     CH SLP=.0310        FP SLP=.0310
                     N=.035  STA=263   N=.035  STA=366      N=.035  STA=380
                     DIST    ELEV      DIST    ELEV         DIST    ELEV
                     100     34        170     32           263     30
                     285     28        305     26           328     26
                     346     28        366     30           380     30.8
COMPUTE TRAVEL TIME ID=3      REACH=1     NO VS=1
                     L=613    SLP=.0310
ROUTE                ID=3      HYD=106.4
                     INFLOW ID=4     DT=.05
*
* ROUTED OLF AT AP 102
*
PRINT HYD            ID=3       CODE=10
*
*
* COMPUTE HYD ABOVE AP 107  BASIN 7-F
COMPUTE NM HYD       ID=1    HYD=107.1   DA=0.01146 SQ MI
                     PER A=100.0    PER B=0.0    PER C=0.0   PER D=0.0
                     TP=-0.1333    RAIN=-1
PRINT HYD            ID=1    CODE=10
*
*
* ADD OLF FROM BASINS 7-K, 7-B, 7-E AND 7-D TO BASIN 7-F
ADD HYD              ID=3      HYD=107.3
                     ID=1      ID=3
PRINT HYD            ID=3      CODE=10
*
*
* ADD OLF FROM BASINS 7-K, 7-B, 7-E, 7-D AND 7-F TO OLF FROM BASINS 7-A AND 7-C
ADD HYD              ID=2      HYD=107.4
                     ID=2      ID=3
PRINT HYD            ID=2      CODE=10
*
*
* ROUTE FLOW ABOVE AP 107 THROUGH BASIN 7-H
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=3
                     ELMIN=46    ELMAX=51.3
                     CH SLP=.0236        FP SLP=.0236
                     N=.035  STA=119   N=.035  STA=181      N=.035  STA=200
                     DIST    ELEV      DIST    ELEV         DIST    ELEV
                     100     50.4      119     50           131     48
                     142     46        159     46           172     48
```

```
                                                                Br100e1b
                    DIST    ELEV      DIST    ELEV        DIST    ELEV
                    0       5         20      0           40      0
                    60      5
COMPUTE TRAVEL TIME ID=4      REACH=1     NO VS=1
                    L=2849.5    SLP=.011
ROUTE               ID=4      HYD=110.4
                    INFLOW ID=3     DT=.05
*
* ROUTED OLF FROM AP 110
*
PRINT HYD           ID=4       CODE=10
*
*
* COMPUTE HYD ABOVE AP 111  BASIN 7-I
COMPUTE NM HYD      ID=1    HYD=111.1   DA=0.10495 SQ MI
                    PER A=94.0   PER B=0.0   PER C=6.0  PER D=0.0
                    TP=-0.2739    RAIN=-1
PRINT HYD           ID=1    CODE=10
*
*S LH *** AP52 INFLOW INTO 60" PIPE
* ADD OLF FROM AP 110 TO BASIN 7-I AT AP 111
ADD HYD             ID=4       HYD=BR100E1B.HYD
                    ID=1       ID=4
PRINT HYD           ID=4       CODE=10
PUNCH HYD               ID=4
*
*
FINISH
```

```
(s16.66H
 AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                    - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =02/04/2000
 INPUT FILE = x:\public\projects\99099\ahym\exist\BR100e1b.dat                          USER NO.= AHYMO-I-9702a01000C05-AH
```


COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
										TIME= .00
START										
*S										
*S	BORREGA WATERSHED									
*S										
*S										
*S	100-YR, 24-HR STORM WITH SEDIMENT									
*S	FILE NAME: BR100E1B.DAT (EXISTING CONDITIONS)									
*S	BY: RICHARD STOCKTON									
*S	LAST REVISION: 05-14-96									
*S	<<REV 12/99 BY WCEA. REMOVED BASIN 6B BECAUSE IT DOES NOT FLOW TO HUBBELL									
*S	UNDER EXISTING CONDITIONS.>>									
*S	THE PURPOSE OF THIS MODEL IS TO CALCULATE THE RUNOFF FROM THE BORREGA									
*S	BASIN. FLOWS FROM THIS BASIN IS CONVEYED TO HUBBLE LAKE DETENTION FACILITY									
*S	VIA THE BORREGA DIVERSION CHANNEL.									
*S										
*S	ANALYSIS ASSUMPTIONS:									
*S	1. ALL LAND IN THIS BASIN IS MODELED AS EXISTING CONDITION.									
*S										
*S	2. THE PUNCH HYD COMMAND WAS ADDED TO THE END OF THIS FILE SO THE OUTFALL									
*S	HYDROGRAPH COULD BE USED IN THE AMOLE DEL NORTE EXISTING CONDITIONS MODEL									
*S	AA100E1B.DAT, WHICH WILL BE USED IN THE ANALYSIS OF THE AMOLE ARROYO SYSTE									
*S										
*S	3. A BULKING FACTOR OF 15% HAS BEEN ADDED TO EACH UNDEVELOPED SUB-BASIN AND									
*S	A BULKING FACTOR OF 6% HAS BEEN ADDED TO EACH DEVELOPED SUB-BASIN LIKELY									
*S	TO PRODUCE SEDIMENT. A BULKING FACTOR OF 3% HAS BEEN ADDED TO EACH									
*S	DEVELOPED SUB-BASIN THAT WOULD PROBIBLY PRODUCE SEDIMENT, SUCH AS PARKS									
*S	AND SCHOOL PLAY GROUNDS. AND, NO BULKING FACTOR FOR WELL DEFINED RESIDEN									
*S	DEVELOPMENTS.									
*S										
*S	100 YEAR 24HR STORM EXISTING CONDITION									RAIN24= 2.660
RAINFALL	TYPE= 2									
*S	BULK FLOWS 15%									
SEDIMENT	BULK									PK BF = 1.15
COMPUTE NM HYD		101.10	-	1	.15400	169.57	4.626	.56327	1.500	1.721 PER IMP= .00
ROUTE		101.30	1	2	.15400	95.88	4.626	.56328	1.650	.973
COMPUTE NM HYD		102.10	-	1	.19530	155.27	5.619	.53942	1.550	1.242 PER IMP= .00
ADD HYD		102.30	1& 2	2	.34930	248.09	10.245	.54994	1.600	1.110
COMPUTE NM HYD		103.10	-	1	.05400	71.53	1.984	.68892	1.500	2.070 PER IMP= .00
ROUTE		103.30	1	3	.05400	50.37	1.984	.68893	1.600	1.458
COMPUTE NM HYD		104.10	-	1	.03925	58.19	1.604	.76631	1.500	2.317 PER IMP= .00
ROUTE		104.30	1	4	.03925	40.11	1.604	.76633	1.600	1.597
ADD HYD		104.40	3& 4	3	.09325	90.48	3.588	.72149	1.600	1.516
ROUTE		104.50	3	4	.09325	67.57	3.588	.72150	1.750	1.132
COMPUTE NM HYD		105.10	-	1	.17870	138.81	5.116	.53681	1.600	1.214 PER IMP= .00
ADD HYD		105.30	1& 4	4	.27195	184.85	8.704	.60014	1.600	1.062
COMPUTE NM HYD		106.10	-	1	.09702	85.15	2.849	.55059	1.550	1.371 PER IMP= .00
ADD HYD		106.30	1& 4	4	.36897	264.76	11.553	.58711	1.600	1.121
ROUTE		106.40	4	3	.36897	264.63	11.553	.58711	1.600	1.121
COMPUTE NM HYD		107.10	-	1	.01146	10.85	.309	.50526	1.500	1.479 PER IMP= .00
ADD HYD		107.30	1& 3	3	.38043	273.32	11.862	.58465	1.600	1.123
ADD HYD		107.40	2& 3	2	.72973	521.41	22.107	.56803	1.600	1.116
ROUTE		107.50	2	3	.72973	395.29	22.107	.56803	1.700	.846
COMPUTE NM HYD		108.10	-	1	.21455	124.22	5.782	.50526	1.650	.905 PER IMP= .00

Br100e1b

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	108.30	1& 3	3	.94428	512.92	27.889	.55377	1.700	.849	
COMPUTE NM HYD	109.10	-	1	.19140	112.06	5.251	.51444	1.650	.915	PER IMP= .00
*S LH *** AP51 HEAD OF DIVERSION CHANNEL										

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	109.30	1& 3	3	1.13568	618.93	33.140	.54714	1.700	.852	
ROUTE	109.40	3	4	1.13568	619.85	33.140	.54714	1.700	.853	
ROUTE	109.50	4	3	1.13568	611.60	33.140	.54714	1.700	.841	
COMPUTE NM HYD	110.10	-	1	.14730	99.58	4.946	.62959	1.650	1.056	PER IMP= .90
ROUTE	110.40	3	4	1.13568	544.67	33.140	.54714	1.800	.749	
COMPUTE NM HYD	111.10	-	1	.10495	56.66	2.972	.53091	1.650	.844	PER IMP= .00
*S LH *** AP52 INFLOW INTO 60" PIPE										
ADD HYD	BR100E1B.HYD	1& 4	4	1.24063	590.70	36.112	.54577	1.800	.744	
FINISH										

(s10H

```
START                0.0 HOURS    PC=0   PL=-1
*
*S << WILSON&COMPANY (WCEA) AHYMO ANALYSIS FOR DESIGN OF THE BORREGA DAM.
*S   BASED ON LEEDSHILL AHYMO MODEL FOR THE AMOLE-HUBBELL DMP (A-H DMP).
*S   THE LEEDSHILL MODEL WAS BASED ON THE '92 BHI AHYMO MODEL.
*S
*S  FILENAME:  BOR_REVB.DAT  -  POST-PROJECT CONDITIONS,
*S                              ONLY PAAKWEREE IS DEVELOPED
*S                              FOR BASINS W OF 118TH ST - SEDIMENT BULK 15%
*S
*  WCEA CHANGES TO THE AMOLE-HUBBELL DMP (A-H DMP) MODEL NOTED WITH  "<< >>".
*  MODIFICATIONS INCLUDE MUSKINGUM CUNGE ROUTING. ALSO DIVERTED THE
*  A-H DMP SOUTH POWERLINE BASINS 50105 WEST, 50103, AND 50104
*  UNDER EXISTING CONDITIONS FLOW BULKED 15% & CONVEYED THEM TO THE
*  PROPOSED NORTH BORREGA CHANNEL THROUGH PAAKWEREE AND ON EAST TO THE
*  PROPOSED BORREGA DAM.  (8/99 BY NM OF WCEA)
*
*   WCEA ADJUSTED THE FOLLOWING IN THE A-H DMP AHYMO MODEL:
*     AREAS: 50109 WAS INCREASED FROM 0.1914 TO 0.2344
*            50110 WAS REDUCED FROM 0.105 TO 0.0826
*            BASINS 105 & 106 CUT OFF AT 118TH ST EMBANKMENT
*     TP'S: 50105 WAS RECALCED DUE TO SUBDIVISION OF BASIN
*           50106 WAS RECALCED DUE TO SUBDIVISION OF BASIN
*
*   NOTE 1:  50103 & 50104 LABELS WERE SWITCHED IN THE A-H MAP. IN THE
*    A-H AHYMO, 7B=BASIN 104 AND 7K=BASIN 103, WHICH MATCHES THE
*    ORIGINAL BHI MODEL.
*   NOTE 2: WCEA MODIFIED THE BASIN 50201 BOUNDARY.
*    THE BASIN 50201 AREA IS 0.1473 SQ MI IN THE A-H DMP & BHI AHYMO MODELS,
*    BUT THE A-H MAP MEASURED 0.238 SQ MI.  THE BHI MAP USED 2-FT CONTOURS,
*    WHILE THE A-H MAP USED 5-FT CONTOURS. WCEA DECREASED THE 50201 AREA
*    ON THE A-H MAP TO MATCH THE BHI BASIN MAP FOR BASIN 50201.
*S
*S*************************************************************************
*S
*S      BORREGA WATERSHED
*S
*S
* 100-YR, 24-HR STORM
* FILE NAME: BR_DMP1.DAT  (Final Draft Submittal #3)
* BY: RICHARD STOCKTON
* LAST REVISION: 06-03-98
*************************************************************************
* THE PURPOSE OF THIS MODEL IS TO CALCULATE THE RUNOFF FROM THE BORREGA
* BASIN.  FLOWS FROM THIS BASIN IS CONVEYED TO HUBBLE LAKE DETENTION FACILITY
* VIA THE BORREGA DIVERSION CHANNEL.
*
*S*************************************************************************

* 2 YEAR 24HR STORM
*RAINFALL            TYPE=2  0.0  0.74  0.95  1.15    DT=0.05
* 5 YEAR 24HR STORM
*RAINFALL            TYPE=2  0.0  1.00  1.30  1.60    DT=0.05
* 10 YEAR 24HR STORM
*RAINFALL            TYPE=2  0.0  1.25  1.47  1.77    DT=0.05
* 25 YEAR 24HR STORM
*RAINFALL            TYPE=2  0.0  1.50  1.90  2.20    DT=0.05
* 50 YEAR 24HR STORM
*RAINFALL            TYPE=2  0.0  1.75  2.10  2.50    DT=0.05
*S 100 YEAR 24HR STORM POST-PROJECT CONDITION
RAINFALL            TYPE=2  0.0  1.87  2.20  2.66    DT=0.05
* PMP GENERAL STORM
*RAINFALL            TYPE=4  0.0  6.0   12.0  19.0    DT=0.05
* PMP LOCAL STORM
*RAINFALL              TYPE=3  0.0  11.5  16.0   0    DT=0.05
*S*************************************************************************
* <<THE WCEA ANALYSIS OF BASINS B-2 AND B-4 WEST IS TAKEN FROM AHYMO FILE
*   FILE NAME: RB100E1B.DAT  (EXISTING CONDITIONS) FROM A-H DMP,
*   TO OBTAIN EXISTING FLOW AT THE SW CORNER OF 118TH & RIO BRAVO BLVD.
*
*  WCEA REDUCED THE AREAS OF BASINS B-2 AND B-4 TO MODEL THE BASINS SOUTH OF
*   RIO BRAVO: B-2 WAS REDUCED FROM 0.0754 TO 0.0445, AND B-4 WAS REDUCED
*   FROM 0.190 TO 0.0641. >>
*
* GENERATION OF SEDIMENT LIKELY, BULK FLOWS 15%
SEDIMENT BULK           CODE=1   BK=1.15
*S COMPUTE HYDROGRAPH FOR B-2
COMPUTE NM HYD          ID=2  HYD NO=204.0  DA=0.0445 SQ MI
                        %A=100.0  %B=0.0  %C=0.0  %D=0.0
                        TP=0.1333 HR
                        MASS RAINFALL=-1
PRINT HYD               ID=2 CODE=1
**LH* *S NOTE: DO NOT ROUTE, SINCE FLOW RUNS AWAY FROM ROADWAY
**LH* *S FLOW REACHES HUBBLE LAKE IN ARROYO THROUGH BASINS B-4 AND B-6
*S ROUTE ADD BY LH - ROUTE B-2 THROUGH B-4
COMPUTE RATING CURVE    CID=1  VS NO=1  NO SEGS=1
                        MIN ELEV=100.0 FT  MAX ELEV=106.0 FT
                        CH SLP=0.0386  FP SLOPE=0.0386
```

```
*S <<ADD 50105 WEST TO ROUTED OLF
ADD HYD              ID=12      HYD=105.1
                     ID=1       ID=12
PRINT HYD            ID=12      CODE=1
*

*S <<ROUTE SOUTH ALONG 118TH/POWERLINE THRU BASIN 50106
*   ASSUMED EARTHEN CHANNEL SECTION, 10 FT BOTTOM 3:1 SIDE SLOPES>>
COMPUTE RATING CURVE     CID=1  VS NO=1  NO SEGS=1
                         MIN ELEV=100.0 FT  MAX ELEV=105.0 FT
                         CH SLP=0.01  FP SLOPE=0.01
                         N=0.030  DIST=40
                         DIST     ELEV     DIST     ELEV     DIST     ELEV
                         0        105.0    15.0     100.0    25.0     100.0
                         40.0     105.0
COMPUTE TRAVEL TIME      ID=12  REACH NO=2  NO VS=1  L=1000 FT
                         SLP=0.01
ROUTE MCUNGE             OUTFLOW ID=2  OUTFLOW HYD=106.1
                         INFLOW ID=12  DT=0.0
                         L=1000 NS=0  S=0.01
PRINT HYD                ID=2 CODE=1
*
SEDIMENT BULK         CODE=1 BK=1.15
*S  BASIN NO. 50106
*S << BASIN CUT OFF AT 118TH/POWERLINE TO DIVERT SOUTH, CALCED NEW AREA & TP
*  << L-H AREA FOR 50106 WAS 0.09702, TP WAS .1505>>
COMPUTE LT TP         LCODE = 1     UPLAND/LAG TIME METHOD
                      NK = 3        ISLOPE = 0
                      LENGTH = 400 FT      SLOPE = 0.100    K = 0.7
                      LENGTH = 1600 FT     SLOPE = 0.063    K = 2.0
                      LENGTH = 1390 FT     SLOPE = 0.047    K = 3.0
                      KN = 0.025    CENTROID DISTANCE = 0 FT
COMPUTE NM HYD        ID=3     HYD=106    DA=0.0856 SQ MI
                      PER A=79.7     PER B=20.3    PER C=0    PER D=0
                      TP=0.0     RAIN=-1
PRINT HYD             ID=3     CODE=1

*S <<ADD 50106 TO ROUTED OLF FROM BASINS 50103,50104,50105WEST
*S << TOTAL FLOW AT UPSTREAM END OF PROPOSED N BORREGA CHANNEL >>
ADD HYD               ID=2       HYD=106.2
                      ID=3       ID=2
PRINT HYD             ID=2       CODE=1


*S ROUTE FLOW THRU NPROPOSED BORREGA CHAN TO 48" PIPE UPSTRM OF AVESTRUZ ST
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE  ID=1     VS NO=1     NO SEGS=1
                      ELMIN=100     ELMAX=106
                      CH SLP=.05          FP SLP=.05
                      N=.017  DIST=34
                      DIST     ELEV       DIST     ELEV          DIST     ELEV
                      0        106         12      100           22       100
                      34       106
*COMPUTE TRAVEL TIME   ID=14       REACH=1      NO VS=1
*                      L=700     SLP=.05
ROUTE MCUNGE          ID=14       HYD=106.3
                      INFLOW ID=2     DT=0
                      L=700 NS=0  S=0.02
PRINT HYD             ID=14       CODE=1


*S  << PAAKWEREE BASIN C >>
** NO BULKING FACTOR THIS BASIN
SEDIMENT BULK            CODE=1  BK=1.0
COMPUTE NM HYD        ID=1     HYD=BASIN_C    DA=0.0138 SQ MI
                      PER A=0     PER B=30    PER C=42   PER D=28
                      TP=-0.1333     RAIN=-1
PRINT HYD             ID=1     CODE=0
*
*S <<TOTAL FLOW IN CHAN UPSTRM OF 48" PIPE, AT AVESTRUZ ST
ADD HYD               ID=14       HYD=106.31
                      ID=1       ID=14
PRINT HYD             ID=14       CODE=1

*S  << PAAKWEREE BASIN A >>
** NO BULKING FACTOR THIS BASIN
**SEDIMENT BULK            CODE=1  BK=1.0
COMPUTE NM HYD        ID=1     HYD=BASIN_A    DA=0.0513 SQ MI
                      PER A=0     PER B=40    PER C=55 PER D=5
                      TP=-0.1333     RAIN=-1
PRINT HYD             ID=1     CODE=0
*
*S <<TOTAL FLOW IN CHAN DNSTRM OF 48" PIPE, AT AVESTRUZ ST
ADD HYD               ID=14       HYD=105E.1
                      ID=1        ID=14
PRINT HYD             ID=14       CODE=1
```

```
** <<ROUTE FLOW IN PROPOSED N BORREGA CHANNEL
*  ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=105
                     CH SLP=.03         FP SLP=.03
                     N=.017  STA=34
                     DIST    ELEV       DIST    ELEV        DIST    ELEV
                     0       106         12     100         22      100
                     34      106
ROUTE MCUNGE         ID=3      HYD=106.4
                     INFLOW ID=15     DT=0
                     L=500  NS=0   S=0.03
PRINT HYD            ID=3       CODE=1
*
*S  << PAAKWEREE BASIN E >>
** NO BULKING FACTOR THIS BASIN
**SEDIMENT BULK           CODE=1  BK=1.0
COMPUTE NM HYD       ID=1    HYD=BASIN_E    DA=0.0144 SQ MI
                     PER A=0    PER B=28    PER C=23 PER D=49
                     TP=-0.1333    RAIN=-1
PRINT HYD            ID=1    CODE=0


ADD HYD              ID=15      HYD=106.5
                     ID=3       ID=1
PRINT HYD            ID=15      CODE=1

** <<ROUTE FLOW IN PROPOSED N BORREGA CHANNEL TO PERDIZ ST
*  ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=105
                     CH SLP=.03         FP SLP=.03
                     N=.017  STA=34
                     DIST    ELEV       DIST    ELEV        DIST    ELEV
                     0       106         12     100         22      100
                     34      106
ROUTE MCUNGE         ID=3      HYD=106.6
                     INFLOW ID=15     DT=0
                     L=300  NS=0   S=0.03
PRINT HYD            ID=3       CODE=1
*
*S  << PAAKWEREE BASIN B >>
** NO BULKING FACTOR THIS BASIN
**SEDIMENT BULK           CODE=1  BK=1.0
COMPUTE NM HYD       ID=1    HYD=BASIN_B    DA=0.0641 SQ MI
                     PER A=0    PER B=28    PER C=23 PER D=49
                     TP=-0.1333    RAIN=-1
PRINT HYD            ID=1    CODE=0
*
*S  TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PERDIZ ST>>
ADD HYD              ID=2       HYD=107.1
                     ID=1       ID=3
PRINT HYD            ID=2       CODE=1

** <<ROUTE FLOW IN PROPOSED N BORREGA CHANNEL TO GRULLA ST
*   ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.03         FP SLP=.03
                     N=.017  STA=34
                     DIST    ELEV       DIST    ELEV        DIST    ELEV
                     0       106         12     100         22      100
                     34      106
ROUTE MCUNGE         ID=3      HYD=107.2
                     INFLOW ID=2     DT=0
                     L=900  NS=0   S=0.03
PRINT HYD            ID=3       CODE=1
*
*S  << PAAKWEREE BASIN F >>
** NO BULKING FACTOR THIS BASIN
**SEDIMENT BULK           CODE=1  BK=1.0
COMPUTE NM HYD       ID=1    HYD=BASIN_F    DA=0.0336 SQ MI
                     PER A=0    PER B=28    PER C=23 PER D=49
                     TP=-0.1333    RAIN=-1
PRINT HYD            ID=1    CODE=0

ADD HYD              ID=2       HYD=107.3
                     ID=1       ID=3
PRINT HYD            ID=2       CODE=1
*
** <<ROUTE FLOW THRU PROPOSED BORREGA CHANNEL TO PARDAL ST
*   ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.03         FP SLP=.03
                     N=.017  STA=34
                     DIST    ELEV       DIST    ELEV        DIST    ELEV
```

```
*                     ELMIN=0    ELMAX=5
*                     CH SLP=.0286       FP SLP=.0286
*                     N=.032  STA=60
*                     DIST    ELEV      DIST    ELEV        DIST    ELEV
*                      0       5         20      0           40      0
*                      60      5
*COMPUTE TRAVEL TIME  ID=4      REACH=1     NO VS=1
*                     L=230     SLP=.0286
*ROUTE                ID=4      HYD=109.4
*             INFLOW  ID=3     DT=0
*PRINT HYD            ID=4       CODE=1
** ROUTE FLOW FROM FIRST DROP STRUCTURE TO CONFLUENCE WITH BASIN 6-B
* ASSUME NATURAL ARROYO
*COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
*                     ELMIN=0    ELMAX=7
*                     CH SLP=.004        FP SLP=.004
*                     N=.033  STA=60
*                     DIST    ELEV      DIST    ELEV        DIST    ELEV
*                      0       7         28      0           48      0
*                      76      7
*S ROUTE FLOW ABOVE AP109 TO CONFLUENCE WITH BASIN 50201
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 20' BOTTOM
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.025        FP SLP=.025
                     N=.017  STA=44
                     DIST    ELEV      DIST    ELEV        DIST    ELEV
                     0       106       12      100         32      100
                     44      106
*COMPUTE TRAVEL TIME  ID=4      REACH=1     NO VS=1
*                     L=1230    SLP=.025
ROUTE MCUNGE         ID=4      HYD=109.5
                     INFLOW ID=3     DT=0
                     L=1230  NS=0  S=0.025
PRINT HYD            ID=4       CODE=1
*
*S  LH BASIN NO. 50201
*S  BASIN 50201 (6B) DOES NOT CONTRIBUTE TO BORREGA DAM UNTIL THE
*S   BORREGA DIVERSION STORM DRAIN IS BUILT PER THE AMOLE-HUBBELL DMP
** COMPUTE HYD ABOVE AP 110  BASIN 6-B
COMPUTE NM HYD       ID=1    HYD=201.0   DA=0.1473 SQ MI
                     PER A=76.9   PER B=0   PER C=22.2  PER D=0.9
                     TP=-0.2330    RAIN=-1
PRINT HYD            ID=1    CODE=1
*
*S  LH BASIN NO. 50110
** COMPUTE HYD ABOVE AP 111  BASIN 7-I
* << (NORTH PART IS BELL PROPERTY) >>
COMPUTE NM HYD       ID=2    HYD=110.0   DA=0.1018 SQ MI
                     PER A=88   PER B=0   PER C=10   PER D=2
                     TP=-0.1333    RAIN=-1
PRINT HYD            ID=2    CODE=1
*


** ADD OLF FROM AP 110 TO BASIN 7-I AT AP 111
*S << TOTAL INTO BORREGA DAM >>
ADD HYD              ID=4  HYD=110.2  ID=2      ID=4
*
*
************************
** TOTAL FLOW AT AP 110 *
************************
PRINT HYD            ID=4      CODE=1
*S
*S
**S ***************************************************
*S  BORREGA DAM PER WCEA DESIGN.
*S ***************************************************
*S  BORREGA DAM PHASE "A' PER WCEA DESIGN. NORTH PART NOT FULLY EXCAVATED BECAUSE
*S   BASIN 6B (50201) AND BASINS TO NORTH (B4EAST, B6) NOT ADDED.
* << 54" PIPE W/47.5" ORIF INV=5984.7.  350-FT WIDE EMERG SPILLWAY CREST=4997 >>
*S                     OUTFLOW     STORAGE     ELEV
*S                      0           0          4985
*S                      0.4         2.02       4986
*S                      4           7.94       4987
*S                      8          14.10       4988
*S                      14         20.51       4989
*S                      24         27.17       4990
*S                      36         34.08       4991
*S                      49         41.36       4992
*S                      69         49.21       4993
*S                      163        57.72       4994
*S                      174        67.03       4995
*S                      184        77.26       4996
*S                      191        88.36       4997
*S                      225        89.51       4997.1
*S                     1252       100.23       4998
```

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                    - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =04/09/2000
INPUT FILE = X:\PUBLIC\PROJECTS\99099\AHYM\POSTPAAK\BOR_REVB.DAT                      USER NO.= AHYMO-I-9702a01000C05-AH

                              FROM  TO                 PEAK      RUNOFF               TIME TO   CFS      PAGE =   1
               HYDROGRAPH      ID   ID       AREA    DISCHARGE   VOLUME    RUNOFF      PEAK     PER
COMMAND      IDENTIFICATION   NO.  NO.     (SQ MI)     (CFS)     (AC-FT)  (INCHES)   (HOURS)   ACRE     NOTATION

                                                                                                      TIME=        .00
START
*S << WILSON&COMPANY (WCEA) AHYMO ANALYSIS FOR DESIGN OF THE BORREGA DAM.
*S   BASED ON LEEDSHILL AHYMO MODEL FOR THE AMOLE-HUBBELL DMP (A-H DMP).
*S   THE LEEDSHILL MODEL WAS BASED ON THE '92 BHI AHYMO MODEL.
*S
*S  FILENAME:  BOR_REVB.DAT  -  POST-PROJECT CONDITIONS,
*S                              ONLY PAAKWEREE IS DEVELOPED
*S                              FOR BASINS W OF 118TH ST - SEDIMENT BULK 15%
*S
*S
*S**************************************************************************
*S
*S      BORREGA WATERSHED
*S
*S
*S**************************************************************************
*S 100 YEAR 24HR STORM POST-PROJECT CONDITION
RAINFALL  TYPE= 2                                                                                     RAIN24=    2.660
*S**************************************************************************
SEDIMENT BULK                                                                                         PK BF =     1.15
*S COMPUTE HYDROGRAPH FOR B-2
COMPUTE NM HYD      204.00    -     2      .04450       42.10      1.199     .50526    1.500    1.478 PER IMP=      .00
*S ROUTE ADD BY LH - ROUTE B-2 THROUGH B-4
ROUTE               202.40    2     3      .04450       24.99      1.199     .50530    1.650     .877
*S
*S
SEDIMENT BULK                                                                                         PK BF =     1.15
*S COMPUTE HYDROGRAPH FOR B-4 << B-4 WEST >>
COMPUTE NM HYD      205.00    -     2      .06410       40.86      1.727     .50526    1.600     .996 PER IMP=      .00
*S ADD BASIN B-4 TO ROUTED FLOW
*S <<FLOW TO SW CORNER OF 118TH & RIO BRAVO
ADD HYD            RB_CULV  3& 2    3      .10860       65.39      2.927     .50527    1.600     .941
*S**************************************************************************
*S COMPUTE FLOWS FROM SUB-BASIN 103 (7K) FROM BORREGA <<A-H MAP SAYS 50104>>
SEDIMENT BULK                                                                                         PK BF =     1.15
COMPUTE NM HYD      103.00    -     1      .05400       71.53      1.984     .68892    1.500    2.070 PER IMP=      .00
*S ROUTE TO 118TH CORRIDOR/POWERLINE
ROUTE MCUNGE        103.50    1    13      .05400       71.08      1.977     .68646    1.650    2.057 CCODE =       .1
*S COMPUTE FLOWS FROM SUB-BASIN 104 (7B) FROM BORREGA <<A-H MAP SAYS 50103>>
COMPUTE NM HYD      104.00    -     1      .03930       58.27      1.606     .76631    1.500    2.317 PER IMP=      .00
*S ROUTE TO 118TH CORRIDOR/POWERLINE
ROUTE MCUNGE        104.50    1    14      .03930       57.84      1.601     .76365    1.700    2.300 CCODE =       .1
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 103 TO THE ROUTED FLOWS
*S  FROM SUB-BASIN 104
ADD HYD             104.60 14&13   12      .09330      124.65      3.578     .71896    1.700    2.088
*S COMPUTE FLOWS FROM SUB-BASIN 50105 (WEST) FROM BORREGA
COMPUTE NM HYD        105W    -     1      .14130      131.30      4.045     .53681    1.550    1.452 PER IMP=      .00
*S <<ADD 50105 WEST TO ROUTED OLF
ADD HYD             105.10  1&12   12      .23460      213.31      7.623     .60925    1.650    1.421
*S <<ROUTE SOUTH ALONG 118TH/POWERLINE THRU BASIN 50106
ROUTE MCUNGE        106.10   12     2      .23460      210.59      7.630     .60982    1.700    1.403 CCODE =       .2
SEDIMENT BULK                                                                                         PK BF =     1.15
*S  BASIN NO. 50106
*S << BASIN CUT OFF AT 118TH/POWERLINE TO DIVERT SOUTH, CALCED NEW AREA & TP
COMPUTE NM HYD      106.00    -     3      .08560       82.37      2.514     .55059    1.550    1.504 PER IMP=      .00
```

*S <<ADD 50106 TO ROUTED OLF FROM BASINS 50103,50104,50105WEST
*S << TOTAL FLOW AT UPSTREAM END OF PROPOSED N BORREGA CHANNEL >>

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
ADD HYD	106.20	3& 2	2	.32020	264.01	10.144	.59398	1.650	1.288		
*S ROUTE FLOW THRU NPROPOSED BORREGA CHAN TO 48" PIPE UPSTRM OF AVESTRUZ ST											
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>											
ROUTE MCUNGE	106.30	2	14	.32020	261.98	10.116	.59236	1.700	1.278	CCODE =	.1
*S << PAAKWEREE BASIN C >>										PK BF =	1.00
SEDIMENT BULK										PER IMP=	28.00
COMPUTE NM HYD	BASIN_C	-	1	.01380	26.52	.946	1.28597	1.500	3.003		
*S <<TOTAL FLOW IN CHAN UPSTRM OF 48" PIPE, AT AVESTRUZ ST											
ADD HYD	106.31	1&14	14	.33400	273.71	11.062	.62101	1.700	1.280		
*S << PAAKWEREE BASIN A >>										PER IMP=	5.00
COMPUTE NM HYD	BASIN_A	-	1	.05130	84.88	2.517	.91999	1.500	2.585		
*S <<TOTAL FLOW IN CHAN DNSTRM OF 48" PIPE, AT AVESTRUZ ST											
ADD HYD	105E.1	1&14	14	.38530	315.67	13.579	.66082	1.650	1.280		
ROUTE MCUNGE	106.33	14	13	.38530	315.67	13.579	.66082	1.650	1.280	CCODE =	.0
*S LH BASIN NO. 50101										PK BF =	1.15
SEDIMENT BULK										PER IMP=	.00
COMPUTE NM HYD	101.10	-	1	.15400	141.99	4.626	.56327	1.550	1.441		
ROUTE MCUNGE	201.10	1	10	.15400	137.93	4.590	.55889	1.850	1.399	CCODE =	.1
*S LH BASIN NO. 50102											
*S << BASIN DIVIDED AT PAAKWEREE BNDRY, OLD AREA WAS 0.182 SQ MI >>											
COMPUTE NM HYD	102.10	-	1	.12770	134.02	3.674	.53942	1.500	1.640	PER IMP=	.00
*S <<FLOW INTO THE UPSTREAM END OF THE CULVERT UNDER PAVO ST.(S BORREGA TRIB) >>											
ADD HYD	S_CULV	1&10	5	.28170	161.21	8.264	.55006	1.800	.894		
*S << PAAKWEREE BASIN D >>										PK BF =	1.00
SEDIMENT BULK										PER IMP=	49.00
COMPUTE NM HYD	BASIN_D	-	1	.01440	30.68	1.227	1.59741	1.500	3.329		
ADD HYD	D1	5& 1	15	.29610	170.91	9.491	.60099	1.800	.902		
*S <<FLOW IN CHAN DNSTRM OF S BORREGA TRIB>>											
ADD HYD	106.35	15&13	15	.68140	443.75	23.070	.63482	1.550	1.018		
ROUTE MCUNGE	106.40	15	3	.68140	443.75	23.070	.63482	1.550	1.018	CCODE =	.0
*S << PAAKWEREE BASIN E >>										PER IMP=	49.00
COMPUTE NM HYD	BASIN_E	-	1	.01440	30.68	1.227	1.59741	1.500	3.329		
ADD HYD	106.50	3& 1	15	.69580	471.12	24.297	.65474	1.550	1.058		
ROUTE MCUNGE	106.60	15	3	.69580	471.12	24.297	.65474	1.550	1.058	CCODE =	.0
*S << PAAKWEREE BASIN B >>										PER IMP=	49.00
COMPUTE NM HYD	BASIN_B	-	1	.06410	136.51	5.461	1.59742	1.500	3.328		
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PERDIZ ST>>											
ADD HYD	107.10	1& 3	2	.75990	592.91	29.758	.73426	1.550	1.219		
ROUTE MCUNGE	107.20	2	3	.75990	590.11	29.763	.73439	1.550	1.213	CCODE =	.2
*S << PAAKWEREE BASIN F >>										PER IMP=	49.00
COMPUTE NM HYD	BASIN_F	-	1	.03360	71.56	2.863	1.59741	1.500	3.328		
ADD HYD	107.30	1& 3	2	.79350	653.95	32.626	.77093	1.550	1.288		
ROUTE MCUNGE	107.40	2	3	.79350	649.50	32.632	.77108	1.550	1.279	CCODE =	.2
*S << PAAKWEREE BASIN G >>										PER IMP=	49.00
COMPUTE NM HYD	BASIN_G	-	1	.03520	74.97	2.999	1.59742	1.500	3.328		
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PARDAL ST>>											
ADD HYD	107.50	1& 3	2	.82870	716.39	35.631	.80617	1.550	1.351		
ROUTE MCUNGE	107.60	2	3	.82870	716.39	35.631	.80617	1.550	1.351	CCODE =	.0
*S LH BASIN NO. 50108											
*S << BASIN CUT OFF AT PAAKWEREE BNDRY, OLD AREA 0.2146 SQ MI, CALC NEW TP											
*S HALF RESIDENTIAL/HALF GOLFCOURSE PROPOSED (BELL PROPERTY) >>										PK BF =	1.00
SEDIMENT BULK										PER IMP=	.00
COMPUTE NM HYD	108.00	-	1	.08130	41.64	1.905	.43936	1.600	.800		
*S << TOTAL FLOW DNSTREAM OF PAAKWEREE IN PROPOSED N BORREGA CHANNEL>>											
ADD HYD	108.30	1& 3	2	.91000	754.81	37.536	.77340	1.550	1.296		
ROUTE MCUNGE	108.40	2	3	.91000	745.82	37.549	.77367	1.600	1.281	CCODE =	.2

```
*S  LH BASIN NO. 50109
COMPUTE NM HYD        109.10   -     1        .23440       150.53       5.592       .44734    1.600    1.003 PER IMP=     .00
*S << TOTAL FLOW IN PROPOSED N BORREGA ARROYO CHANNEL AT AP 109
```


COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	109.30	1& 3	3	1.14440	896.35	43.141	.70683	1.600	1.224	
*S ROUTE FLOW ABOVE AP109 TO CONFLUENCE WITH BASIN 50201										
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 20' BOTTOM										
ROUTE MCUNGE	109.50	3	4	1.14440	890.74	43.085	.70591	1.600	1.216	CCODE = .1
*S LH BASIN NO. 50201										
*S BASIN 50201 (6B) DOES NOT CONTRIBUTE TO BORREGA DAM UNTIL THE										
*S BORREGA DIVERSION STORM DRAIN IS BUILT PER THE AMOLE-HUBBELL DMP										
COMPUTE NM HYD	201.00	-	1	.14730	98.24	4.301	.54747	1.600	1.042	PER IMP= .90
*S LH BASIN NO. 50110										
COMPUTE NM HYD	110.00	-	2	.10180	97.20	2.812	.51796	1.500	1.492	PER IMP= 2.00
*S << TOTAL INTO BORREGA DAM >>										
ADD HYD	110.20	2& 4	4	1.24620	967.14	45.897	.69056	1.600	1.213	
*S										
*S										
*S BORREGA DAM PER WCEA DESIGN.										
*S **********										
*S BORREGA DAM PHASE "A' PER WCEA DESIGN. NORTH PART NOT FULLY EXCAVATED BECAUS										
*S BASIN 6B (50201) AND BASINS TO NORTH (B4EAST, B6) NOT ADDED.										

	OUTFLOW	STORAGE	ELEV
*S	0	0	4985
*S	0.4	2.02	4986
*S	4	7.94	4987
*S	8	14.10	4988
*S	14	20.51	4989
*S	24	27.17	4990
*S	36	34.08	4991
*S	49	41.36	4992
*S	69	49.21	4993
*S	163	57.72	4994
*S	174	67.03	4995
*S	184	77.26	4996
*S	191	88.36	4997
*S	225	89.51	4997.1
*S	1252	100.23	4998
*S	3176	112.77	4999
*S	5667	125.94	5000
*S	8620	139.90	5001
*S	11966	154.34	5002
*S	15667	169.38	5003

```
ROUTE RESERVOIR    BPOND.OUT    4   99       1.24620        43.42       36.402       .54770    2.750     .054 AC-FT=   38.238
*S
*S HYD=BPOND.OUT IS *****AP 51*****
ROUTE MCUNGE          110.50   99    4        1.24620        43.42       36.251       .54542    2.900     .054 CCODE =      .2
*S  LH BASIN NO. 50111
COMPUTE NM HYD        111.00   -     2         .03790        32.92         .933       .46166    1.500    1.357 PER IMP=     .00
ADD HYD          BR_DMP1.HYD  4& 2   2        1.28410        43.91       37.184       .54295    2.850     .053
*S HYD=BR_DMP1.HYD IS *****AP 52*****
FINISH
(s10H
```

```
START                0.0 HOURS    PC=0   PL=-1
*
*S << WILSON&COMPANY (WCEA) AHYMO ANALYSIS FOR DESIGN OF THE BORREGA DAM.
*S   BASED ON LEEDSHILL AHYMO MODEL FOR THE '99 AMOLE-HUBBELL DMP (A-H DMP).
*S   THE LEEDSHILL MODEL WAS BASED ON THE '92 BHI AHYMO MODEL.
*S
*S  FILENAME: BOR_intU.DAT
*S   BORREGA DAM PHASE "A" CONSTRUCTION, INTERIM DEVELOPMENT, 100YR, UNBULKED.
*S
*S  1.BORREGA WATERSHED IS FULLY DEVELOPED.
*S  2.AM SW HOMES (BELL PROPERTY) IS NOT ADDED TO DAM (BASINS B-4EAST & B-6).
*S  3.BASIN 6B (50201) IS NOT ADDED TO DAM.
*S
*S  UNTIL THESE BASINS ARE ADDED, BORREGA DAM DOES NOT REQUIRE FULL EXCAVATION
*S   OF THE NORTH POOL.  THE STAGE-STORAGE TABLE FOR THE BORREGA DAM IS
*S   PER THIS NOT FULLY EXCAVATED CONDITION.
*S*************************************************************************
*S
*S  WCEA CHANGES TO THE AMOLE-HUBBELL DMP (A-H DMP) MODEL NOTED WITH  "<< >>".
*S
*S  MODIFICATIONS INCLUDE MUSKINGUM CUNGE ROUTING. ALSO DIVERTED THE A-H DMP
*S  BASINS 50105WEST, 50103, AND 50104 THRU "POND 7" THEN S IN THE 118TH ST CHAN
*s  & THEN TO THE PROPOSED N BORREGA CHANNEL THRU PAAKWEREE AND ON
*S  EAST TO THE PROPOSED BORREGA DAM.
*S
*   WCEA ADJUSTMTS INCLUDE THE FOLLOWING IN THE A-H DMP AHYMO MODEL:
*     AREAS: 50109 WAS INCREASED FROM 0.1914 TO 0.2344
*            50110 WAS REDUCED FROM 0.105 TO 0.0826
*            BASINS 105 & 106 CUT OFF AT 118TH ST EMBANKMENT
*     TP'S: 50105 WAS RECALCED DUE TO SUBDIVISION OF BASIN
*           50106 WAS RECALCED DUE TO SUBDIVISION OF BASIN
*
*   NOTE 1:  50103 & 50104 LABELS WERE SWITCHED IN THE A-H MAP. IN THE
*    A-H AHYMO, 7B=BASIN 104 AND 7K=BASIN 103, WHICH MATCHES THE
*    ORIGINAL BHI MODEL.
*   NOTE 2: WCEA MODIFIED THE BASIN 50201 BOUNDARY.
*    THE BASIN 50201 AREA IS 0.1473 SQ MI IN THE A-H DMP & BHI AHYMO MODELS,
*    BUT THE A-H MAP MEASURED 0.238 SQ MI.  THE BHI MAP USED 2-FT CONTOURS,
*    WHILE THE A-H MAP USED 5-FT CONTOURS. WCEA DECREASED THE 50201 AREA
*    ON THE A-H MAP TO MATCH THE BHI BASIN MAP FOR BASIN 50201.
*S
*S*************************************************************************
*S
*S       BORREGA WATERSHED
*S
*S
* 100-YR, 24-HR STORM
* FILE NAME: BR_DMP1.DAT  (Final Draft Submittal #3)
* BY: RICHARD STOCKTON
* LAST REVISION: 06-03-98
**************************************************************************
* THE PURPOSE OF THIS MODEL IS TO CALCULATE THE RUNOFF FROM THE BORREGA
* BASIN.  FLOWS FROM THIS BASIN IS CONVEYED TO HUBBLE LAKE DETENTION FACILITY
* VIA THE BORREGA DIVERSION CHANNEL.
*
**************************************************************************
* ANALYSIS ASSUMPTIONS:
**************************************************************************
* 1. ALL LAND IN THIS BASIN IS MODELED AS DEVELOPED CONDITION.  DEVELOPED
*    CONDITIONS ARE BASED ON LH'S RUNOFF CATAGPRY COLOR MAP.
*
* 2. THE PUNCH HYD COMMAND WAS ADDED TO THE END OF THIS FILE SO THE OUTFALL
*    HYDROGRAPH COULD BE USED IN THE AMOLE DEL NORTE DEVELOPED CONDITIONS MODEL
*    AA_DMP1.DAT, WHICH WILL BE USED IN THE ANALYSIS OF THE AMOLE ARROYO SYSTEM.
*
* 3. BULKING FACTORS FOR THE ESCARPMENT EASEMENT UNDER DEVELOPED CONDITIONS,
*    HAVE BEEN REMOVED DUE TO BORREGA DETENTION BASIN IN THIS ALTERNATIVE.
*
*S*************************************************************************

* 100 YEAR 24HR STORM
*RAINFALL              TYPE=2  0.0  1.87  2.20  2.66    DT=0.05
* 50 YEAR 24HR STORM
*RAINFALL            TYPE=2  0.0  1.75  2.10  2.50    DT=0.05
* 10 YEAR 24HR STORM
*RAINFALL            TYPE=2  0.0  1.25  1.47  1.77    DT=0.05
*  2 YEAR 24HR STORM
*RAINFALL            TYPE=2  0.0  0.74  0.95  1.15    DT=0.05
* PMP GENERAL STORM
*RAINFALL              TYPE=4  0.0  6.0  12.0  19.0   DT=0.05
*S PMP LOCAL STORM
RAINFALL              TYPE=3  0.0  11.5  16.0   0   DT=0.05

*S*************************************************************************
*S
* <<WCEA REDUCED THE AREAS OF BASINS B-2 AND B-4 TO MODEL THE BASINS SOUTH OF
*   RIO BRAVO: B-2 WAS REDUCED FROM 0.0754 TO 0.0445, AND B-4 WAS REDUCED
*   FROM 0.190 TO 0.0641. >>
```

```
                    MIN ELEV=100.0 FT  MAX ELEV=106.0 FT
                    CH SLP=0.045  FP SLOPE=0.045
                    N=0.030  DIST=34
                    DIST    ELEV    DIST    ELEV    DIST    ELEV
                    0       106.0   12.0    100.0   22.0    100.0
                    34.0    106.0
*COMPUTE TRAVEL TIME     ID=13  REACH NO=2  NO VS=1  L=2000 FT
*                        SLP=0.045
ROUTE MCUNGE            ID=13  HYD=104.5
                        INFLOW ID=1  DT=0.0  L=2000  NS=0  S=0.045
PRINT HYD               ID=13 CODE=1
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50103.5 TO THE ROUTED FLOWS
ADD HYD                 ID=12  HYD=104.6  I=12  II=13
PRINT HYD               ID=12  CODE=1
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50105 (WEST) FROM BORREGA
* << TRY RECALC TP TO COMPARE L-H TP=.1333   3700-FT LONG BASIN
COMPUTE LT TP       LCODE = 1    UPLAND/LAG TIME METHOD
                    NK = 3       ISLOPE = 0
                    LENGTH = 400 FT     SLOPE = 0.120   K = 0.7
                    LENGTH = 1600 FT    SLOPE = 0.078   K = 2.0
                    LENGTH = 1700 FT    SLOPE = 0.044   K = 3.0
                    KN = 0.025   CENTROID DISTANCE = 0 FT
COMPUTE NM HYD          ID=1  HYD=105W  DA=0.1413 SM
                        A=0 B=28 C=23 D=49
                        TP=0.0   RAIN=-1
PRINT HYD               ID=1 CODE=10
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50105 (WEST) TO THE ROUTED FLOWS
ADD HYD                 ID=12  HYD=POND7.IN  I=1  II=12
PRINT HYD               ID=12  CODE=1
*S
*S ROUTE FLOWS THROUGH POND 7
* <<MODIFIED THE A-H DMP POND 7 OUTFLOW CURVE- ASSUMED 2-48" OUTFLOW PIPE>>
* OLD ROUTE RESERVOIR
*                        Q OUT   STORE    ELEV
*                        0          0      10
*                        39.7      3      11
*                        48.6      6      11.5
*                        56.2      9      12
*                        62.8      12      12.5
*                        68.8      15      13
ROUTE RESERVOIR         ID=70 HYD=POND7.OUT I=12 CODE=10
                        Q OUT   STORE    ELEV
                        0         0      10
                        6         2      11
                        48        4      12
                        100       6      13
                        160       9      14
                        220       12     15
PRINT HYD                ID=70 CODE=1
*S
*S ROUTE FLOWS IN 118TH ST CHAN TO N BORREGA CHAN INTAKE UNDER 118TH ST
* <<ASSUMED EARTHEN CHANNEL SECTION, 2:1 SIDE SLOPES, 12' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                    ELMIN=100    ELMAX=106
                    CH SLP=.005        FP SLP=.02
                    N=.030  DIST=36
                    DIST    ELEV       DIST    ELEV        DIST    ELEV
                    0       106        12      100         24      100
                    36      106
*COMPUTE TRAVEL TIME     ID=12  REACH NO=1  NO VS=1  L=400 FT
*                        SLP=0.01
ROUTE MCUNGE            OUTFLOW ID=12  OUTFLOW HYD=106.05
                        INFLOW ID=70  DT=0.0  L=1200  NS=0  S=0.005
PRINT HYD               ID=12 CODE=1

*
SEDIMENT BULK       CODE=1 BK=1.00
*S  BASIN NO. 50106
*S << BASIN CUT OFF AT 118TH/POWERLINE TO DIVERT SOUTH, CALCED NEW AREA & TP
*  << L-H AREA FOR 50106 WAS 0.09702, TP WAS .1505>>
COMPUTE LT TP       LCODE = 1    UPLAND/LAG TIME METHOD
                    NK = 3       ISLOPE = 0
                    LENGTH = 400 FT     SLOPE = 0.100   K = 0.7
                    LENGTH = 1600 FT    SLOPE = 0.063   K = 2.0
                    LENGTH = 1390 FT    SLOPE = 0.047   K = 3.0
                    KN = 0.025   CENTROID DISTANCE = 0 FT
COMPUTE NM HYD      ID=3    HYD=106   DA=0.0856 SQ MI
                    PER A=0    PER B=28   PER C=23   PER D=49
                    TP=0.0    RAIN=-1
PRINT HYD           ID=3    CODE=1

*S <<ADD 50106 TO ROUTED OLF FROM BASINS 50103,50104,50105WEST
*S << TOTAL FLOW AT UPSTREAM END OF PROPOSED N BORREGA CHANNEL >>
ADD HYD             ID=2      HYD=106.2
                    ID=3      ID=12
```

```
                    DIST    ELEV      DIST    ELEV        DIST    ELEV
                    100     56        111     54          123     52
                    140     52        162     54          175     56
                    210     58
*COMPUTE TRAVEL TIME  ID=10      REACH=1      NO VS=1
*                     L=2362.5    SLP=.0338
ROUTE MCUNGE        ID=10     HYD=201.1
                    INFLOW ID=1     DT=0
                    L=3500 NS=0  S=0.03
PRINT HYD           ID=10      CODE=1
*
*
*
*S  LH BASIN NO. 50102
*  << BASIN DIVIDED AT PAAKWEREE BNDRY, OLD AREA WAS 0.182 SQ MI >>
**SEDIMENT BULK       CODE=1  BK=1.0
** COMPUTE HYD ABOVE AP 102  BASIN 7-C
COMPUTE NM HYD      ID=1    HYD=102.1   DA=0.1277 SQ MI
                    PER A=0  PER B=28   PER C=23   PER D=49
                    TP=-0.1333    RAIN=-1
PRINT HYD           ID=1    CODE=1
*
*
*S <<FLOW INTO THE UPSTREAM END OF THE CULVERT UNDER PAVO ST. >>
ADD HYD             ID=5      HYD=S_CULV
                    ID=1       ID=10
PRINT HYD           ID=5      CODE=1


*S  << PAAKWEREE BASIN D >>
** NO BULKING FACTOR THIS BASIN
SEDIMENT BULK           CODE=1  BK=1.0
COMPUTE NM HYD      ID=1    HYD=BASIN_D   DA=0.0144 SQ MI
                    PER A=0    PER B=28   PER C=23 PER D=49
                    TP=-0.1333    RAIN=-1
PRINT HYD           ID=1    CODE=0

ADD HYD             ID=15      HYD=D1
                    ID=5       ID=1
PRINT HYD           ID=15      CODE=1

*S <<FLOW IN CHAN DNSTRM OF 8X4 CBC>>
ADD HYD             ID=15      HYD=106.35
                    ID=15       ID=13
PRINT HYD           ID=15      CODE=1

** <<ROUTE FLOW IN PROPOSED N BORREGA CHANNEL
*  ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                    ELMIN=100    ELMAX=105
                    CH SLP=.03       FP SLP=.03
                    N=.017  STA=34
                    DIST    ELEV      DIST    ELEV        DIST    ELEV
                    0       106        12     100         22      100
                    34      106
ROUTE MCUNGE        ID=3      HYD=106.4
                    INFLOW ID=15     DT=0
                    L=500  NS=0  S=0.03
PRINT HYD           ID=3       CODE=1
*
*S  << PAAKWEREE BASIN E >>
** NO BULKING FACTOR THIS BASIN
**SEDIMENT BULK          CODE=1  BK=1.0
COMPUTE NM HYD      ID=1    HYD=BASIN_E   DA=0.0144 SQ MI
                    PER A=0    PER B=28   PER C=23 PER D=49
                    TP=-0.1333    RAIN=-1
PRINT HYD           ID=1    CODE=0


ADD HYD             ID=15      HYD=106.5
                    ID=3       ID=1
PRINT HYD           ID=15      CODE=1

** <<ROUTE FLOW IN PROPOSED N BORREGA CHANNEL TO PERDIZ ST
*  ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                    ELMIN=100    ELMAX=105
                    CH SLP=.03       FP SLP=.03
                    N=.017  STA=34
                    DIST    ELEV      DIST    ELEV        DIST    ELEV
                    0       106        12     100         22      100
                    34      106
ROUTE MCUNGE        ID=3      HYD=106.6
                    INFLOW ID=15     DT=0
                    L=300  NS=0  S=0.03
PRINT HYD           ID=3       CODE=1
*
*S  << PAAKWEREE BASIN B >>
```

```
                    LENGTH = 1600 FT    SLOPE = 0.0281   K = 2.0
                    LENGTH = 2000 FT    SLOPE = 0.022   K = 3.0
                    KN = 0.025   CENTROID DISTANCE = 0 FT
COMPUTE NM HYD       ID=1    HYD=108   DA=0.0813 SQ MI
                     PER A=0   PER B=60   PER C=15   PER D=25
                     TP=0    RAIN=-1
PRINT HYD            ID=1    CODE=1
*

*S << TOTAL FLOW DNSTREAM OF PAAKWEREE IN PROPOSED N BORREGA CHANNEL>>
ADD HYD              ID=2      HYD=108.3
                     ID=1      ID=3
PRINT HYD            ID=2      CODE=1
*
* <<ROUTE FLOW TO AP BASIN 109
*  ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.02        FP SLP=.02
                     N=.017  STA=34
                     DIST    ELEV      DIST    ELEV        DIST    ELEV
                     0       106        12     100         22      100
                     34      106
*COMPUTE TRAVEL TIME  ID=3      REACH=1     NO VS=1
*                     L=1500    SLP=.0286
ROUTE MCUNGE         ID=3      HYD=108.4
                     INFLOW ID=2     DT=0
                     L=1500  NS=0  S=0.0286
PRINT HYD            ID=3       CODE=1
*
*S  LH BASIN NO. 50109
** COMPUTE HYD ABOVE AP 109  BASIN 7-G
COMPUTE NM HYD       ID=1    HYD=109.1   DA=0.2344 SQ MI
                     PER A=0   PER B=28   PER C=23   PER D=49
                     TP=-0.2031    RAIN=-1
PRINT HYD            ID=1    CODE=1
*
*
*S << TOTAL FLOW IN PROPOSED N BORREGA ARROYO CHANNEL AT AP 109
ADD HYD              ID=3   HYD=109.3 ID=1      ID=3
PRINT HYD            ID=3      CODE=1
*
** ROUTE FLOW ABOVE AP 109 TO FIRST CHANNEL DROP STRUCTURE
** ASSUME NATURAL ARROYO
*COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
*                    ELMIN=0    ELMAX=5
*                    CH SLP=.0286       FP SLP=.0286
*                    N=.032  STA=60
*                    DIST    ELEV      DIST    ELEV        DIST    ELEV
*                     0       5         20      0           40      0
*                     60      5
*COMPUTE TRAVEL TIME  ID=4      REACH=1     NO VS=1
*                    L=230     SLP=.0286
*ROUTE                ID=4      HYD=109.4
*             INFLOW ID=3     DT=0
*PRINT HYD            ID=4       CODE=1
** ROUTE FLOW FROM FIRST DROP STRUCTURE TO CONFLUENCE WITH BASIN 6-B
* ASSUME NATURAL ARROYO
*COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
*                    ELMIN=0    ELMAX=7
*                    CH SLP=.004        FP SLP=.004
*                    N=.033  STA=60
*                    DIST    ELEV      DIST    ELEV        DIST    ELEV
*                     0       7         28      0           48      0
*                     76      7
*

*S ROUTE FLOW ABOVE AP109 TO CONFLUENCE WITH BASIN 50201
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 12' BOTTOM
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.025        FP SLP=.025
                     N=.017  STA=36
                     DIST    ELEV      DIST    ELEV        DIST    ELEV
                     0       106        12     100         24      100
                     36      106
*COMPUTE TRAVEL TIME  ID=4      REACH=1     NO VS=1
*                     L=1230    SLP=.025
ROUTE MCUNGE         ID=4      HYD=109.5
                     INFLOW ID=3     DT=0
                     L=1230  NS=0  S=0.025
PRINT HYD            ID=4       CODE=1
*

*S  LH BASIN NO. 50110
** COMPUTE HYD ABOVE AP 111  BASIN 7-I
* <<(APPROX HALF IS BELL PROPERTY) >>
COMPUTE NM HYD       ID=1    HYD=110.0   DA=0.1018 SQ MI
```

```
* << 54" PIPE W/47.5" ORIF INV=5984.7.  350-FT WIDE EMERG SPILLWAY CREST=4997 >>
*S                      OUTFLOW      STORAGE      ELEV
*S                       0             0          4985
*S                       0.4           2.02       4986
*S                       4             7.94       4987
*S                       8            14.10       4988
*S                      14            20.51       4989
*S                      24            27.17       4990
*S                      36            34.08       4991
*S                      49            41.36       4992
*S                      69            49.21       4993
*S                     163            57.72       4994
*S                     174            67.03       4995
*S                     184            77.26       4996
*S                     191            88.36       4997
*S                     225            89.51       4997.1
*S                    1252           100.23       4998
*S                    3176           112.77       4999
*S                    5667           125.94       5000
*S                    8620           139.90       5001
*S                   11966           154.34       5002
*S                   15667           169.38       5003
ROUTE RESERVOIR      ID=99  HYD=BPOND.OUT ID=4 CODE=5
                        0             0          4985
                        0.4           2.02       4986
                        4             7.94       4987
                        8            14.10       4988
                       14            20.51       4989
                       24            27.17       4990
                       36            34.08       4991
                       49            41.36       4992
                       69            49.21       4993
                      163            57.72       4994
                      174            67.03       4995
                      184            77.26       4996
                      191            88.36       4997
                      225            89.51       4997.1
                     1252           100.23       4998
                     3176           112.77       4999
                     5667           125.94       5000
                     8620           139.90       5001
                    11966           154.34       5002
                    15667           169.38       5003
PRINT HYD            ID=99 CODE=1

*S
*S HYD=BPOND.OUT IS *****AP 51*****

** ROUTE FLOW ABOVE AP 110 TO THE BORREGA OUTFALL IN HUBBELL
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=0    ELMAX=7
                     CH SLP=.004         FP SLP=.004
                     N=.033  STA=60
                     DIST    ELEV      DIST    ELEV         DIST    ELEV
                      0       7         28      0            48      0
                      76      7
*COMPUTE TRAVEL TIME  ID=4       REACH=1      NO VS=1
*                      L=1849.5    SLP=.004
ROUTE MCUNGE         ID=4       HYD=110.5
                     INFLOW ID=99      DT=0
                     L=1849.4  NS=0   S=0.004
PRINT HYD            ID=4        CODE=1
*
*S  LH BASIN NO. 50111
** COMPUTE HYD ABOVE AP 111  BASIN 7-I
* << REMOVED THE PART THAT IS IN THE DAM, OLD AREA WAS 0.05247>>
COMPUTE NM HYD       ID=2    HYD=111.0   DA=0.0379 SQ MI
                     PER A=0   PER B=45   PER C=10   PER D=45
                     TP=-0.1333    RAIN=-1
PRINT HYD            ID=2    CODE=1
*
** ADD OLF FROM AP 110 TO BASIN 7-I AT AP 111
ADD HYD              ID=2  HYD=BR_DMP1.HYD  ID=4       ID=2
PRINT HYD            ID=2    CODE=1
*
*S HYD=BR_DMP1.HYD IS *****AP 52*****
PUNCH HYD            ID=2
*
FINISH
```

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                           - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =04/09/2000
INPUT FILE = X:\PUBLIC\PROJECTS\99099\AHYM\INTERIM\BOR_INTU.DAT                             USER NO.= AHYMO-I-9702a01000C05-AH

                                   FROM  TO                     PEAK         RUNOFF                 TIME TO    CFS      PAGE =   1
                    HYDROGRAPH      ID   ID          AREA      DISCHARGE     VOLUME      RUNOFF      PEAK      PER
COMMAND            IDENTIFICATION   NO.  NO.        (SQ MI)      (CFS)       (AC-FT)    (INCHES)   (HOURS)    ACRE      NOTATION

START                                                                                                           TIME=        .00
*S << WILSON&COMPANY (WCEA) AHYMO ANALYSIS FOR DESIGN OF THE BORREGA DAM.
*S   BASED ON LEEDSHILL AHYMO MODEL FOR THE '99 AMOLE-HUBBELL DMP (A-H DMP).
*S   THE LEEDSHILL MODEL WAS BASED ON THE '92 BHI AHYMO MODEL.
*S
*S  FILENAME: BOR_intU.DAT
*S   BORREGA DAM PHASE "A" CONSTRUCTION, INTERIM DEVELOPMENT, 100YR, UNBULKED.
*S
*S  1.BORREGA WATERSHED IS FULLY DEVELOPED.
*S  2.AM SW HOMES (BELL PROPERTY) IS NOT ADDED TO DAM (BASINS B-4EAST & B-6).
*S  3.BASIN 6B (50201) IS NOT ADDED TO DAM.
*S
*S  UNTIL THESE BASINS ARE ADDED, BORREGA DAM DOES NOT REQUIRE FULL EXCAVATION
*S   OF THE NORTH POOL.  THE STAGE-STORAGE TABLE FOR THE BORREGA DAM IS
*S   PER THIS NOT FULLY EXCAVATED CONDITION.
*S***************************************************************************
*S
*S  WCEA CHANGES TO THE AMOLE-HUBBELL DMP (A-H DMP) MODEL NOTED WITH  "<< >>".
*S
*S  MODIFICATIONS INCLUDE MUSKINGUM CUNGE ROUTING. ALSO DIVERTED THE A-H DMP
*S  BASINS 50105WEST, 50103, AND 50104 THRU "POND 7" THEN S IN THE 118TH ST CHAN
*S  & THEN TO THE PROPOSED N BORREGA CHANNEL THRU PAAKWEREE AND ON
*S  EAST TO THE PROPOSED BORREGA DAM.
*S
*S
*S****************************************************************************
*S
*S      BORREGA WATERSHED
*S
*S
*S************************************************************************
*S 100 YEAR 24HR STORM
RAINFALL  TYPE= 2                                                                                               RAIN24=    2.660
*S*************************************************************************
*S
SEDIMENT BULK                                                                                                   PK BF =    1.00
*S COMPUTE HYDROGRAPH FOR B-2
COMPUTE NM HYD         204.00   -     2        .04450       87.36       3.236      1.36343    1.500    3.067 PER IMP=  34.00
*S ROUTE FLOWS TO POND 8
ROUTE MCUNGE           202.50   2    11        .04450       87.31       3.246      1.36779    1.600    3.066 CCODE =     .2
*S
*S COMPUTE HYDROGRAPH FOR B-4 (WEST) FROM RIO BRAVO REDUCE AREA TO 41 AC
COMPUTE NM HYD         204.00   -     1        .06410      125.84       4.661      1.36343    1.500    3.067 PER IMP=  34.00
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 202.5 TO THE FLOWS FROM SUB-BASIN 204
ADD HYD                204.10  1&11  11        .10860      196.42       7.907      1.36521    1.550    2.826
*S
*S ROUTE FLOWS THROUGH POND 8
ROUTE RESERVOIR     POND8.OUT  11    80        .10860       42.96       7.907      1.36520    2.000     .618 AC-FT=    4.100
*S
*S ROUTE FLOWS TO JUNCTION
*S << FLOW TO CULVERT CROSSING UNDER RIO BRAVO BLVD/118TH ST TO NE
*S   GETS ADDED TO RIO BRAVO CHAN N SIDE OF RIO BRAVO BLVD EXTENSION>>
ROUTE MCUNGE           RB_CULV  80   11        .10860       42.98       7.907      1.36521    2.000     .618 CCODE =     .2
*S****************************************************************************
```

```
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50104 FROM BORREGA (7B)
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
										PAGE =	2
COMPUTE NM HYD	104.00	-	1	.03930	72.17	2.667	1.27251	1.500	2.869	PER IMP=	32.00
*S											
*S ROUTE FLOWS TO POND 7											
ROUTE MCUNGE	103.50	1	12	.03930	71.63	2.674	1.27559	1.550	2.848	CCODE =	.2
*S											
*S COMPUTE FLOWS FROM SUB-BASIN 50103 FROM BORREGA (7K)											
COMPUTE NM HYD	103.00	-	1	.05400	102.13	3.834	1.33141	1.500	2.955	PER IMP=	35.00
*S											
*S ROUTE FLOWS TO POND 7											
ROUTE MCUNGE	104.50	1	13	.05400	101.60	3.831	1.33030	1.600	2.940	CCODE =	.1
*S											
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50103.5 TO THE ROUTED FLOWS											
ADD HYD	104.60	12&13	12	.09330	171.56	6.505	1.30724	1.600	2.873		
*S											
*S COMPUTE FLOWS FROM SUB-BASIN 50105 (WEST) FROM BORREGA											
COMPUTE NM HYD	105W	-	1	.14130	270.97	12.038	1.59742	1.500	2.996	PER IMP=	49.00
*S											
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50105 (WEST) TO THE ROUTED FLOWS											
ADD HYD	POND7.IN	1&12	12	.23460	428.46	18.543	1.48201	1.550	2.854		
*S											
*S ROUTE FLOWS THROUGH POND 7											
ROUTE RESERVOIR	POND7.OUT	12	70	.23460	146.29	18.433	1.47323	1.850	.974	AC-FT=	8.314
*S											
*S ROUTE FLOWS IN 118TH ST CHAN TO N BORREGA CHAN INTAKE UNDER 118TH ST											
ROUTE MCUNGE	106.05	70	12	.23460	145.75	18.401	1.47068	1.950	.971	CCODE =	.1
SEDIMENT BULK										PK BF =	1.00
*S BASIN NO. 50106											
*S << BASIN CUT OFF AT 118TH/POWERLINE TO DIVERT SOUTH, CALCED NEW AREA & TP											
COMPUTE NM HYD	106.00	-	3	.08560	170.83	7.293	1.59741	1.500	3.118	PER IMP=	49.00
*S <<ADD 50106 TO ROUTED OLF FROM BASINS 50103,50104,50105WEST											
*S << TOTAL FLOW AT UPSTREAM END OF PROPOSED N BORREGA CHANNEL >>											
ADD HYD	106.20	3&12	2	.32020	198.12	25.694	1.50456	1.800	.967		
*S ROUTE FLOW THRU PROPOSED BORREGA CHAN TO 48" PIPE UPSTRM OF AVESTRUZ ST											
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>											
ROUTE MCUNGE	106.30	2	14	.32020	198.10	25.681	1.50382	1.800	.967	CCODE =	.1
*S << PAAKWEREE BASIN C >>											
SEDIMENT BULK										PK BF =	1.00
COMPUTE NM HYD	BASIN_C	-	1	.01380	26.52	.946	1.28597	1.500	3.003	PER IMP=	28.00
*S <<TOTAL FLOW IN CHAN UPSTRM OF 48" PIPE, AT AVESTRUZ ST											
ADD HYD	106.31	1&14	14	.33400	205.93	26.628	1.49482	1.800	.963		
*S << PAAKWEREE BASIN A >>											
COMPUTE NM HYD	BASIN_A	-	1	.05130	84.88	2.517	.91999	1.500	2.585	PER IMP=	5.00
*S <<TOTAL FLOW IN CHAN DNSTRM OF 48" PIPE, AT AVESTRUZ ST											
ADD HYD	105E.1	1&14	14	.38530	275.04	29.145	1.41828	1.550	1.115		
ROUTE MCUNGE	106.33	14	13	.38530	275.04	29.145	1.41828	1.550	1.115	CCODE =	.0
*S LH BASIN NO. 50101											
SEDIMENT BULK										PK BF =	1.00
COMPUTE NM HYD	101.10	-	1	.15400	271.03	12.024	1.46394	1.550	2.750	PER IMP=	42.00
ROUTE MCUNGE	201.10	1	10	.15400	259.78	11.953	1.45535	1.800	2.636	CCODE =	.1
*S LH BASIN NO. 50102											
COMPUTE NM HYD	102.10	-	1	.12770	271.99	10.879	1.59742	1.500	3.328	PER IMP=	49.00
*S <<FLOW INTO THE UPSTREAM END OF THE CULVERT UNDER PAVO ST. >>											
ADD HYD	S_CULV	1&10	5	.28170	345.75	22.833	1.51974	1.800	1.918		
*S << PAAKWEREE BASIN D >>											
SEDIMENT BULK										PK BF =	1.00
COMPUTE NM HYD	BASIN_D	-	1	.01440	30.68	1.227	1.59741	1.500	3.329	PER IMP=	49.00

ADD HYD	D1	5& 1	15	.29610	355.46	24.059	1.52352	1.800	1.876	
*S <<FLOW IN CHAN DNSTRM OF 8X4 CBC>>										

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	106.35	15&13	15	.68140	583.55	53.204	1.46402	1.800	1.338	
ROUTE MCUNGE	106.40	15	3	.68140	583.55	53.204	1.46402	1.800	1.338	CCODE = .0
*S << PAAKWEREE BASIN E >>										
COMPUTE NM HYD	BASIN_E	-	1	.01440	30.68	1.227	1.59741	1.500	3.329	PER IMP= 49.00
ADD HYD	106.50	3& 1	15	.69580	593.25	54.431	1.46678	1.800	1.332	
ROUTE MCUNGE	106.60	15	3	.69580	593.25	54.431	1.46678	1.800	1.332	CCODE = .0
*S << PAAKWEREE BASIN B >>										
COMPUTE NM HYD	BASIN_B	-	1	.06410	136.51	5.461	1.59742	1.500	3.328	PER IMP= 49.00
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PERDIZ ST>>										
ADD HYD	107.10	1& 3	2	.75990	727.59	59.892	1.47780	1.500	1.496	
ROUTE MCUNGE	107.20	2	3	.75990	719.42	59.898	1.47793	1.550	1.479	CCODE = .2
*S << PAAKWEREE BASIN F >>										
COMPUTE NM HYD	BASIN_F	-	1	.03360	71.56	2.863	1.59741	1.500	3.328	PER IMP= 49.00
ADD HYD	107.30	1& 3	2	.79350	787.47	62.760	1.48299	1.500	1.551	
ROUTE MCUNGE	107.40	2	3	.79350	786.79	62.706	1.48170	1.550	1.549	CCODE = .1
*S << PAAKWEREE BASIN G >>										
COMPUTE NM HYD	BASIN_G	-	1	.03520	74.97	2.999	1.59742	1.500	3.328	PER IMP= 49.00
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PARDAL ST>>										
ADD HYD	107.50	1& 3	2	.82870	853.67	65.704	1.48661	1.550	1.610	
ROUTE MCUNGE	107.60	2	3	.82870	853.67	65.704	1.48661	1.550	1.610	CCODE = .0
*S LH BASIN NO. 50108										
*S << HALF RESIDENTIAL/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>										
SEDIMENT BULK										PK BF = 1.00
COMPUTE NM HYD	108.00	-	1	.08130	99.90	4.982	1.14903	1.600	1.920	PER IMP= 25.00
*S << TOTAL FLOW DNSTREAM OF PAAKWEREE IN PROPOSED N BORREGA CHANNEL>>										
ADD HYD	108.30	1& 3	2	.91000	946.37	70.687	1.45645	1.550	1.625	
ROUTE MCUNGE	108.40	2	3	.91000	943.74	70.646	1.45563	1.600	1.620	CCODE = .1
*S LH BASIN NO. 50109										
COMPUTE NM HYD	109.10	-	1	.23440	391.32	19.970	1.59742	1.550	2.609	PER IMP= 49.00
*S << TOTAL FLOW IN PROPOSED N BORREGA ARROYO CHANNEL AT AP 109										
ADD HYD	109.30	1& 3	3	1.14440	1332.23	90.616	1.48467	1.600	1.819	
*S ROUTE FLOW ABOVE AP109 TO CONFLUENCE WITH BASIN 50201										
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 12' BOTTOM										
ROUTE MCUNGE	109.50	3	4	1.14440	1323.51	90.625	1.48481	1.600	1.807	CCODE = .2
*S LH BASIN NO. 50110										
COMPUTE NM HYD	110.00	-	1	.10180	212.44	8.490	1.56381	1.500	3.261	PER IMP= 48.00
*S <<ADD 50110 TO CHANNEL. TOTAL CHANNEL FLOW TO DAM>>										
ADD HYD	110.10	1& 4	4	1.24620	1473.08	99.115	1.49126	1.600	1.847	
*S << TOTAL INTO BORREGA DAM >>										

```
*S
*S
*S ************************************************
*S  BORREGA DAM PER WCEA DESIGN.
*S ************************************************
*S  BORREGA DAM PHASE "A' PER WCEA DESIGN. NORTH PART NOT FULLY EXCAVATED BECAUS
*S   BASIN 6B (50201) AND BASINS TO NORTH (B4EAST, B6) NOT ADDED.
*S                    OUTFLOW     STORAGE     ELEV
*S                      0           0         4985
*S                      0.4         2.02      4986
*S                      4           7.94      4987
*S                      8          14.10      4988
*S                     14          20.51      4989
*S                     24          27.17      4990
*S                     36          34.08      4991
*S                     49          41.36      4992
*S                     69          49.21      4993
```

```
*S                    163          57.72       4994
*S                    174          67.03       4995
*S                    184          77.26       4996
*S                    191          88.36       4997
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
*S	225		89.51	4997.1						
*S	1252		100.23	4998						
*S	3176		112.77	4999						
*S	5667		125.94	5000						
*S	8620		139.90	5001						
*S	11966		154.34	5002						
*S	15667		169.38	5003						
ROUTE RESERVOIR	BPOND.OUT	4	99	1.24620	170.49	84.391	1.26972	2.650	.214	AC-FT= 64.061
*S										
*S HYD=BPOND.OUT IS *****AP 51*****										
ROUTE MCUNGE	110.50	99	4	1.24620	170.47	84.225	1.26723	2.750	.214	CCODE = .2
*S LH BASIN NO. 50111										
COMPUTE NM HYD	111.00	-	2	.03790	75.78	3.006	1.48691	1.500	3.124	PER IMP= 45.00
ADD HYD	BR_DMP1.HYD	4& 2	2	1.28410	171.72	87.230	1.27371	2.700	.209	
*S HYD=BR_DMP1.HYD IS *****AP 52*****										
FINISH										

```
(s10H
```

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                     - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =04/10/2000
INPUT FILE = X:\PUBLIC\PROJECTS\99099\AHYM\INTERIM\BOR_INTU.DAT                         USER NO.= AHYMO-I-9702a01000C05-AH

                                FROM  TO               PEAK      RUNOFF              TIME TO   CFS     PAGE =   1
                  HYDROGRAPH    ID    ID     AREA    DISCHARGE   VOLUME    RUNOFF     PEAK     PER
COMMAND         IDENTIFICATION  NO.   NO.   (SQ MI)    (CFS)     (AC-FT)  (INCHES)  (HOURS)   ACRE     NOTATION

                                                                                                       TIME=       .00
START
*S << WILSON&COMPANY (WCEA) AHYMO ANALYSIS FOR DESIGN OF THE BORREGA DAM.
*S   BASED ON LEEDSHILL AHYMO MODEL FOR THE '99 AMOLE-HUBBELL DMP (A-H DMP).
*S   THE LEEDSHILL MODEL WAS BASED ON THE '92 BHI AHYMO MODEL.
*S
*S  FILENAME: BOR_intU.DAT
*S   BORREGA DAM PHASE "A" CONSTRUCTION, INTERIM DEVELOPMENT, 100YR, UNBULKED.
*S
*S  1.BORREGA WATERSHED IS FULLY DEVELOPED.
*S  2.AM SW HOMES (BELL PROPERTY) IS NOT ADDED TO DAM (BASINS B-4EAST & B-6).
*S  3.BASIN 6B (50201) IS NOT ADDED TO DAM.
*S
*S  UNTIL THESE BASINS ARE ADDED, BORREGA DAM DOES NOT REQUIRE FULL EXCAVATION
*S   OF THE NORTH POOL.  THE STAGE-STORAGE TABLE FOR THE BORREGA DAM IS
*S   PER THIS NOT FULLY EXCAVATED CONDITION.
*S***************************************************************************
*S
*S  WCEA CHANGES TO THE AMOLE-HUBBELL DMP (A-H DMP) MODEL NOTED WITH  "<< >>".
*S
*S  MODIFICATIONS INCLUDE MUSKINGUM CUNGE ROUTING. ALSO DIVERTED THE A-H DMP
*S  BASINS 50105WEST, 50103, AND 50104 THRU "POND 7" THEN S IN THE 118TH ST CHAN
*S  & THEN TO THE PROPOSED N BORREGA CHANNEL THRU PAAKWEREE AND ON
*S  EAST TO THE PROPOSED BORREGA DAM.
*S
*S
*S****************************************************************************
*S
*S      BORREGA WATERSHED
*S
*S
*S***********************************************************************
*S PMP LOCAL STORM                                                                                     RAIN6=    16.000
RAINFALL  TYPE= 3
*S***********************************************************************
*S                                                                                                     PK BF =     1.00
SEDIMENT BULK
*S COMPUTE HYDROGRAPH FOR B-2
COMPUTE NM HYD      204.00    -     2      .04450     901.25     30.735    12.95028    2.250   31.645 PER IMP=  34.00
*S ROUTE FLOWS TO POND 8
ROUTE MCUNGE        202.50    2    11      .04450     897.22     30.780    12.96923    2.300   31.504 CCODE =     .2
*S
*S COMPUTE HYDROGRAPH FOR B-4 (WEST) FROM RIO BRAVO REDUCE AREA TO 41 AC
COMPUTE NM HYD      204.00    -     1      .06410    1298.08     44.273    12.95027    2.250   31.642 PER IMP=  34.00
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 202.5 TO THE FLOWS FROM SUB-BASIN 204
ADD HYD             204.10   1&11  11      .10860    2098.52     75.053    12.95803    2.250   30.193
*S
*S ROUTE FLOWS THROUGH POND 8
ROUTE RESERVOIR    POND8.OUT  11   80      .10860     221.17     75.053    12.95804    2.900    3.182 AC-FT=   91.185
*S
*S ROUTE FLOWS TO JUNCTION
*S << FLOW TO CULVERT CROSSING UNDER RIO BRAVO BLVD/118TH ST TO NE
*S   GETS ADDED TO RIO BRAVO CHAN N SIDE OF RIO BRAVO BLVD EXTENSION>>
ROUTE MCUNGE        RB_CULV   80   11      .10860     220.38     75.007    12.95010    3.000    3.171 CCODE =     .2
*S***************************************************************************
```

```
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50104 FROM BORREGA (7B)
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
										PAGE =	2
COMPUTE NM HYD	104.00	-	1	.03930	790.91	26.636	12.70823	2.250	31.445	PER IMP=	32.00
*S											
*S ROUTE FLOWS TO POND 7											
ROUTE MCUNGE	103.50	1	12	.03930	781.01	26.681	12.72932	2.300	31.052	CCODE =	.2
*S											
*S COMPUTE FLOWS FROM SUB-BASIN 50103 FROM BORREGA (7K)											
COMPUTE NM HYD	103.00	-	1	.05400	1089.89	37.044	12.86259	2.250	31.536	PER IMP=	35.00
*S											
*S ROUTE FLOWS TO POND 7											
ROUTE MCUNGE	104.50	1	13	.05400	1049.28	37.084	12.87646	2.300	30.361	CCODE =	.2
*S											
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50103.5 TO THE ROUTED FLOWS											
ADD HYD	104.60	12&13	12	.09330	1830.29	63.765	12.81447	2.300	30.652		
*S											
*S COMPUTE FLOWS FROM SUB-BASIN 50105 (WEST) FROM BORREGA											
COMPUTE NM HYD	105W	-	1	.14130	2592.08	102.202	13.56188	2.250	28.663	PER IMP=	49.00
*S											
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50105 (WEST) TO THE ROUTED FLOWS											
ADD HYD	POND7.IN	1&12	12	.23460	4383.68	165.967	13.26463	2.300	29.197		
*S											
*S ROUTE FLOWS THROUGH POND 7											
ROUTE RESERVOIR	POND7.OUT	12	70	.23460	1341.27	165.960	13.26406	2.550	8.933	AC-FT=	68.063
*S											
*S ROUTE FLOWS IN 118TH ST CHAN TO N BORREGA CHAN INTAKE UNDER 118TH ST											
ROUTE MCUNGE	106.05	70	12	.23460	1339.51	165.956	13.26378	2.550	8.922	CCODE =	.2
SEDIMENT BULK										PK BF =	1.00
*S BASIN NO. 50106											
*S << BASIN CUT OFF AT 118TH/POWERLINE TO DIVERT SOUTH, CALCED NEW AREA & TP											
COMPUTE NM HYD	106.00	-	3	.08560	1640.71	61.914	13.56188	2.250	29.949	PER IMP=	49.00
*S <<ADD 50106 TO ROUTED OLF FROM BASINS 50103,50104,50105WEST											
*S << TOTAL FLOW AT UPSTREAM END OF PROPOSED N BORREGA CHANNEL >>											
ADD HYD	106.20	3&12	2	.32020	2268.01	227.871	13.34347	2.300	11.067		
*S ROUTE FLOW THRU PROPOSED BORREGA CHAN TO 48" PIPE UPSTRM OF AVESTRUZ ST											
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>											
ROUTE MCUNGE	106.30	2	14	.32020	2268.01	227.871	13.34347	2.300	11.067	CCODE =	.0
*S << PAAKWEREE BASIN C >>											
SEDIMENT BULK										PK BF =	1.00
COMPUTE NM HYD	BASIN_C	-	1	.01380	278.89	9.384	12.75063	2.250	31.578	PER IMP=	28.00
*S <<TOTAL FLOW IN CHAN UPSTRM OF 48" PIPE, AT AVESTRUZ ST											
ADD HYD	106.31	1&14	14	.33400	2507.40	237.255	13.31897	2.300	11.730		
*S << PAAKWEREE BASIN A >>											
COMPUTE NM HYD	BASIN_A	-	1	.05130	1020.90	32.264	11.79246	2.250	31.095	PER IMP=	5.00
*S <<TOTAL FLOW IN CHAN DNSTRM OF 48" PIPE, AT AVESTRUZ ST											
ADD HYD	105E.1	1&14	14	.38530	3385.87	269.520	13.11573	2.300	13.731		
ROUTE MCUNGE	106.33	14	13	.38530	3385.87	269.520	13.11573	2.300	13.731	CCODE =	.0
*S LH BASIN NO. 50101											
SEDIMENT BULK										PK BF =	1.00
COMPUTE NM HYD	101.10	-	1	.15400	2726.09	108.509	13.21138	2.300	27.659	PER IMP=	42.00
ROUTE MCUNGE	201.10	1	10	.15400	2612.64	107.991	13.14820	2.400	26.508	CCODE =	.1
*S LH BASIN NO. 50102											
COMPUTE NM HYD	102.10	-	1	.12770	2603.30	92.365	13.56187	2.250	31.853	PER IMP=	49.00
*S <<FLOW INTO THE UPSTREAM END OF THE CULVERT UNDER PAVO ST. >>											
ADD HYD	S_CULV	1&10	5	.28170	3853.85	200.356	13.33572	2.400	21.376		
*S << PAAKWEREE BASIN D >>											
SEDIMENT BULK										PK BF =	1.00
COMPUTE NM HYD	BASIN_D	-	1	.01440	294.45	10.416	13.56188	2.250	31.950	PER IMP=	49.00

```
ADD HYD                    D1  5& 1  15        .29610      3993.71      210.771     13.34673     2.400     21.075
*S <<FLOW IN CHAN DNSTRM OF 8X4 CBC>>
```


COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	106.35	15&13	15	.68140	6968.10	480.291	13.21610	2.300	15.978	
ROUTE MCUNGE	106.40	15	3	.68140	6968.10	480.291	13.21610	2.300	15.978	CCODE = .0
*S << PAAKWEREE BASIN E >>										
COMPUTE NM HYD	BASIN_E	-	1	.01440	294.45	10.416	13.56188	2.250	31.950	PER IMP= 49.00
ADD HYD	106.50	3& 1	15	.69580	7220.36	490.706	13.22325	2.300	16.214	
ROUTE MCUNGE	106.60	15	3	.69580	7220.36	490.706	13.22325	2.300	16.214	CCODE = .0
*S << PAAKWEREE BASIN B >>										
COMPUTE NM HYD	BASIN_B	-	1	.06410	1310.22	46.364	13.56187	2.250	31.938	PER IMP= 49.00
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PERDIZ ST>>										
ADD HYD	107.10	1& 3	2	.75990	8342.90	537.070	13.25182	2.300	17.155	
ROUTE MCUNGE	107.20	2	3	.75990	8342.90	537.070	13.25182	2.300	17.155	CCODE = .0
*S << PAAKWEREE BASIN F >>										
COMPUTE NM HYD	BASIN_F	-	1	.03360	686.89	24.303	13.56187	2.250	31.942	PER IMP= 49.00
ADD HYD	107.30	1& 3	2	.79350	8931.37	561.373	13.26495	2.300	17.587	
ROUTE MCUNGE	107.40	2	3	.79350	8931.37	561.373	13.26495	2.300	17.587	CCODE = .0
*S << PAAKWEREE BASIN G >>										
COMPUTE NM HYD	BASIN_G	-	1	.03520	719.60	25.460	13.56188	2.250	31.942	PER IMP= 49.00
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PARDAL ST>>										
ADD HYD	107.50	1& 3	2	.82870	9639.13	586.833	13.27755	2.250	18.174	
ROUTE MCUNGE	107.60	2	3	.82870	9639.13	586.833	13.27755	2.250	18.174	CCODE = .0
*S LH BASIN NO. 50108										
*S << HALF RESIDENTIAL/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>										
SEDIMENT BULK										PK BF = 1.00
COMPUTE NM HYD	108.00	-	1	.08130	1192.66	53.700	12.38461	2.350	22.922	PER IMP= 25.00
*S << TOTAL FLOW DNSTREAM OF PAAKWEREE IN PROPOSED N BORREGA CHANNEL>>										
ADD HYD	108.30	1& 3	2	.91000	10643.19	640.532	13.19778	2.300	18.275	
ROUTE MCUNGE	108.40	2	3	.91000	10509.22	640.114	13.18916	2.350	18.045	CCODE = .1
*S LH BASIN NO. 50109										
COMPUTE NM HYD	109.10	-	1	.23440	3727.68	169.542	13.56187	2.300	24.849	PER IMP= 49.00
*S << TOTAL FLOW IN PROPOSED N BORREGA ARROYO CHANNEL AT AP 109										
ADD HYD	109.30	1& 3	3	1.14440	14215.45	809.656	13.26551	2.300	19.409	
*S ROUTE FLOW ABOVE AP109 TO CONFLUENCE WITH BASIN 50201										
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 12' BOTTOM										
ROUTE MCUNGE	109.50	3	4	1.14440	14215.45	809.656	13.26551	2.300	19.409	CCODE = .0
*S LH BASIN NO. 50110										
COMPUTE NM HYD	110.00	-	1	.10180	2073.25	73.151	13.47335	2.250	31.822	PER IMP= 48.00
*S <<ADD 50110 TO CHANNEL. TOTAL CHANNEL FLOW TO DAM>>										
ADD HYD	110.10	1& 4	4	1.24620	15993.52	882.807	13.28248	2.300	20.053	

```
*S << TOTAL INTO BORREGA DAM >>
*S
*S
*S ************************************************
*S  BORREGA DAM PER WCEA DESIGN.
*S ************************************************
*S  BORREGA DAM PHASE "A' PER WCEA DESIGN. NORTH PART NOT FULLY EXCAVATED BECAUS
*S   BASIN 6B (50201) AND BASINS TO NORTH (B4EAST, B6) NOT ADDED.
```

*S	OUTFLOW	STORAGE	ELEV
*S	0	0	4985
*S	0.4	2.02	4986
*S	4	7.94	4987
*S	8	14.10	4988
*S	14	20.51	4989
*S	24	27.17	4990
*S	36	34.08	4991
*S	49	41.36	4992
*S	69	49.21	4993

```
  *S                    163          57.72       4994
  *S                    174          67.03       4995
  *S                    184          77.26       4996
  *S                    191          88.36       4997
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 4 NOTATION
*S	225		89.51	4997.1						
*S	1252		100.23	4998						
*S	3176		112.77	4999						
*S	5667		125.94	5000						
*S	8620		139.90	5001						
*S	11966		154.34	5002						
*S	15667		169.38	5003						
ROUTE RESERVOIR	BPOND.OUT	4	99	1.24620	14338.81	869.905	13.08836	2.400	17.978	AC-FT= 163.983
*S										
*S HYD=BPOND.OUT IS *****AP 51*****										
ROUTE MCUNGE	110.50	99	4	1.24620	13979.58	870.316	13.09455	2.450	17.528	CCODE = .2
*S LH BASIN NO. 50111										
COMPUTE NM HYD	111.00	-	2	.03790	769.73	26.826	13.27138	2.250	31.733	PER IMP= 45.00
ADD HYD	BR_DMP1.HYD	4& 2	2	1.28410	14267.00	897.142	13.09977	2.450	17.360	
*S HYD=BR_DMP1.HYD IS *****AP 52*****										
FINISH										

```
(s10H
```

```
START                0.0 HOURS    PC=0   PL=-1
*
*S << WILSON&COMPANY (WCEA) AHYMO ANALYSIS FOR DESIGN OF THE BORREGA DAM.
*S   BASED ON LEEDSHILL AHYMO MODEL FOR THE '99 AMOLE-HUBBELL DMP (A-H DMP).
*S   THE LEEDSHILL MODEL WAS BASED ON THE '92 BHI AHYMO MODEL.
*S
*S  FILENAME: BOR_FUTU.DAT
*S   BORREGA DAM PHASE "B", FUTURE CONDITIONS, FULL DEVELOPMENT, UNBULKED.
*S
*S  1. BORREGA WATERSHED FULLY DEVELOPED
*S  2. AM SW HOMES (BELL PROPERTY) IS DEVELOPED & ADDED TO BORREGA DAM.
*S  3. BASIN 50201 IS DEVELOPED & ADDED TO BORREGA DAM.
*S
*S*************************************************************************
*
*  WCEA CHANGES TO THE AMOLE-HUBBELL DMP (A-H DMP) MODEL NOTED WITH  "<< >>".
*  MODIFICATIONS INCLUDE MUSKINGUM CUNGE ROUTING. (8/99 BY NM OF WCEA)
*
*  THE A-H DMP IS AMENDED SO THAT THE SOUTH POWERLINE BASINS
*  50105 WEST, 50103, AND 50104 UNDER DEVELOPED CONDITIONS
*  ARE DIVERTED SOUTH TO THE N BORREGA CHAN INTAKE CULVERT
*  UNDER 118TH ST.
*
*   WCEA ADJUSTMTS INCLUDE THE FOLLOWING IN THE A-H DMP AHYMO MODEL:
*     AREAS: 50109 WAS INCREASED FROM 0.1914 TO 0.2344
*            50110 WAS REDUCED FROM 0.105 TO 0.0826
*            BASINS 105 & 106 CUT OFF AT 118TH ST EMBANKMENT
*     TP'S: 50105 WAS RECALCED DUE TO SUBDIVISION OF BASIN
*           50106 WAS RECALCED DUE TO SUBDIVISION OF BASIN
*
*   NOTE 1:  50103 & 50104 LABELS WERE SWITCHED IN THE A-H MAP. IN THE
*    A-H AHYMO, 7B=BASIN 104 AND 7K=BASIN 103, WHICH MATCHES THE
*    ORIGINAL BHI MODEL.
*   NOTE 2: WCEA MODIFIED THE BASIN 50201 BOUNDARY.
*    THE BASIN 50201 AREA IS 0.1473 SQ MI IN THE A-H DMP & BHI AHYMO MODELS,
*    BUT THE A-H MAP MEASURED 0.238 SQ MI.  THE BHI MAP USED 2-FT CONTOURS,
*    WHILE THE A-H MAP USED 5-FT CONTOURS. WCEA DECREASED THE 50201 AREA
*    ON THE A-H MAP TO MATCH THE BHI BASIN MAP FOR BASIN 50201.
*   NOTE 3: NICK BELL PROPERTY (TO BE RESID/GOLF COURSE) NORTH OF BORREGA
*    WATERSHED IS DIVERTED TO THE BORREGA WATERSHED AND INTO THE BORREGA DAM.
*S
*S*************************************************************************
*S
*S       BORREGA WATERSHED
*S
*S
* 100-YR, 24-HR STORM
* FILE NAME: BR_DMP1.DAT  (Final Draft Submittal #3)
* BY: RICHARD STOCKTON
* LAST REVISION: 06-03-98
*************************************************************************
* THE PURPOSE OF THIS MODEL IS TO CALCULATE THE RUNOFF FROM THE BORREGA
* BASIN.  FLOWS FROM THIS BASIN IS CONVEYED TO HUBBLE LAKE DETENTION FACILITY
* VIA THE BORREGA DIVERSION CHANNEL.
*
************************************************************************
* ANALYSIS ASSUMPTIONS:
************************************************************************
* 1. ALL LAND IN THIS BASIN IS MODELED AS DEVELOPED CONDITION.  DEVELOPED
*    CONDITIONS ARE BASED ON LH'S RUNOFF CATAGPRY COLOR MAP.
*
* 2. THE PUNCH HYD COMMAND WAS ADDED TO THE END OF THIS FILE SO THE OUTFALL
*    HYDROGRAPH COULD BE USED IN THE AMOLE DEL NORTE DEVELOPED CONDITIONS MODEL
*    AA_DMP1.DAT, WHICH WILL BE USED IN THE ANALYSIS OF THE AMOLE ARROYO SYSTEM.
*
* 3. BULKING FACTORS FOR THE ESCARPMENT EASEMENT UNDER DEVELOPED CONDITIONS,
*    HAVE BEEN REMOVED DUE TO BORREGA DETENTION BASIN IN THIS ALTERNATIVE.
*
************************************************************************
*S 100 YEAR 24HR STORM DEVELOPED CONDITION
RAINFALL              TYPE=2  0.0  1.87  2.20  2.66    DT=0.05
* 10 YEAR 24HR STORM DEVELOPED CONDITION
*RAINFALL             TYPE=2  0.0  1.25  1.47  1.77    DT=0.05
* 5 YEAR 24HR STORM
*RAINFALL             TYPE=2  0.0  1.00  1.30  1.60    DT=0.05
**  2 YEAR 24HR STORM DEVELOPED CONDITION
**RAINFALL            TYPE=2  0.0  0.74  0.95  1.15    DT=0.05
* PMP LOCAL STORM
*RAINFALL              TYPE=3  0.0  11.5  16.0   0   DT=0.05
*S*************************************************************************

*S
*S COMPUTE FLOWS FROM SUB-BASIN B-2 OF RIO BRAVO
*S <<A-H AREA WAS 0.0754. WCEA REDUCED AREA TO 0.0445 BECAUSE THE RIO BRAVO
*S   BLVD EXTENSION DIVIDES THE BASIN >>
COMPUTE NM HYD          ID=1  HYD NO=202.0  DA=0.0445 SQ MI
                        %A=0  %B=33  %C=33  %D=34
                        TP=0.1333 HR
```

```
*COMPUTE TRAVEL TIME     ID=13  REACH NO=2  NO VS=1  L=2000 FT
*                        SLP=0.045
ROUTE MCUNGE             ID=13  HYD=104.5
                         INFLOW ID=1  DT=0.0  L=2000  NS=0  S=0.045
PRINT HYD                ID=13 CODE=1
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50103.5 TO THE ROUTED FLOWS
ADD HYD                  ID=12  HYD=104.6  I=12  II=13
PRINT HYD                ID=12  CODE=1
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50105 (WEST) FROM BORREGA
* << TRY RECALC TP TO COMPARE L-H TP=.1333   3700-FT LONG BASIN
COMPUTE LT TP       LCODE = 1    UPLAND/LAG TIME METHOD
                    NK = 3       ISLOPE = 0
                    LENGTH = 400 FT     SLOPE = 0.120   K = 0.7
                    LENGTH = 1600 FT    SLOPE = 0.078   K = 2.0
                    LENGTH = 1700 FT    SLOPE = 0.044   K = 3.0
                    KN = 0.025   CENTROID DISTANCE = 0 FT
COMPUTE NM HYD          ID=1  HYD=105W  DA=0.1413 SM
                        A=0 B=28 C=23 D=49
                        TP=0.0   RAIN=-1
PRINT HYD               ID=1 CODE=10
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50105 (WEST) TO THE ROUTED FLOWS
ADD HYD                 ID=12  HYD=POND7.IN  I=1  II=12
PRINT HYD               ID=12  CODE=1
*S
*S ROUTE FLOWS THROUGH POND 7
* <<MODIFIED THE A-H DMP POND 7 OUTFLOW CURVE- ASSUMED 2-48" OUTFLOW PIPE>>
* OLD ROUTE RESERVOIR
*                        Q OUT   STORE    ELEV
*                        0          0      10
*                        39.7     3       11
*                        48.6     6       11.5
*                        56.2     9       12
*                        62.8     12       12.5
*                        68.8     15       13
ROUTE RESERVOIR         ID=70 HYD=POND7.OUT I=12 CODE=10
                        Q OUT   STORE    ELEV
                        0         0      10
                        6         2      11
                        48        4      12
                        100       6      13
                        160       9      14
                        220      12      15
PRINT HYD                ID=70 CODE=1
*S
*S ROUTE FLOWS IN 118TH ST CHAN TO N BORREGA CHAN INTAKE UNDER 118TH ST
* <<ASSUMED EARTHEN CHANNEL SECTION, 2:1 SIDE SLOPES, 12' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.005        FP SLP=.02
                     N=.030  DIST=36
                     DIST    ELEV      DIST    ELEV        DIST    ELEV
                     0       106        12     100         24      100
                     36      106
*COMPUTE TRAVEL TIME     ID=12  REACH NO=1  NO VS=1  L=400 FT
*                        SLP=0.01
ROUTE MCUNGE             OUTFLOW ID=12  OUTFLOW HYD=106.05
                         INFLOW ID=70  DT=0.0  L=1200  NS=0  S=0.005
PRINT HYD                ID=12 CODE=1

*S
*S  BASIN NO. 50106
*S << BASIN CUT OFF AT 118TH/POWERLINE TO DIVERT SOUTH, CALCED NEW AREA & TP
*  << L-H AREA FOR 50106 WAS 0.09702, TP WAS .1505>>
COMPUTE LT TP       LCODE = 1    UPLAND/LAG TIME METHOD
                    NK = 3       ISLOPE = 0
                    LENGTH = 400 FT     SLOPE = 0.100   K = 0.7
                    LENGTH = 1600 FT    SLOPE = 0.063   K = 2.0
                    LENGTH = 1390 FT    SLOPE = 0.047   K = 3.0
                    KN = 0.025   CENTROID DISTANCE = 0 FT
COMPUTE NM HYD      ID=3    HYD=106   DA=0.0856 SQ MI
                    PER A=0    PER B=28   PER C=23   PER D=49
                    TP=0.0    RAIN=-1
PRINT HYD           ID=3    CODE=1
*S
*S ADD THE FLOW FROM SUB-BASIN 106 TO THE FLOW FROM POND7
ADD HYD                 ID=3 HYD=106.1 I=3 II=12
PRINT HYD               ID=3 CODE=10
*S

*S ROUTE FLOW THU PROPOSED N BORREGA CHAN TO 48" PIPE UPSTRM OF AVESTRUZ ST
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.05         FP SLP=.05
                     N=.017  DIST=34
```

```
                    L=3500 NS=0  S=0.03
PRINT HYD           ID=10      CODE=1
*
*
*
*S  LH BASIN NO. 50102
*S  << BASIN DIVIDED AT PAAKWEREE BNDRY, OLD AREA WAS 0.182 SQ MI >>
** NO BULKING THIS BASIN
**SEDIMENT BULK       CODE=1  BK=1.0
** COMPUTE HYD ABOVE AP 102  BASIN 7-C
COMPUTE NM HYD      ID=1    HYD=102.1   DA=0.1277 SQ MI
                    PER A=0  PER B=28   PER C=23   PER D=49
                    TP=-0.1333    RAIN=-1
PRINT HYD           ID=1    CODE=1
*
*
*S <<FLOW INTO THE UPSTREAM END OF THE CULVERT UNDER PAVO ST. >>
ADD HYD             ID=5      HYD=S_CULV
                    ID=1       ID=10
PRINT HYD           ID=5      CODE=1


*S  << PAAKWEREE BASIN D >>
** NO BULKING FACTOR THIS BASIN
SEDIMENT BULK           CODE=1  BK=1.0
COMPUTE NM HYD      ID=1    HYD=BASIN_D   DA=0.0144 SQ MI
                    PER A=0    PER B=28   PER C=23 PER D=49
                    TP=-0.1333    RAIN=-1
PRINT HYD           ID=1    CODE=0

ADD HYD             ID=15      HYD=D1
                    ID=5       ID=1
PRINT HYD           ID=15      CODE=1

*S <<FLOW IN CHAN DNSTRM OF 8X4 CBC>>
ADD HYD             ID=15      HYD=106.35
                    ID=15       ID=13
PRINT HYD           ID=15      CODE=1

** <<ROUTE FLOW IN PROPOSED N BORREGA CHANNEL
*  ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=105
                     CH SLP=.03        FP SLP=.03
                     N=.017  STA=34
                     DIST    ELEV      DIST    ELEV        DIST    ELEV
                     0       106        12     100         22      100
                     34      106
ROUTE MCUNGE         ID=3      HYD=106.4
                     INFLOW ID=15     DT=0
                     L=500  NS=0  S=0.03
PRINT HYD            ID=3       CODE=1
*
*S  << PAAKWEREE BASIN E >>
** NO BULKING FACTOR THIS BASIN
**SEDIMENT BULK          CODE=1  BK=1.0
COMPUTE NM HYD      ID=1    HYD=BASIN_E   DA=0.0144 SQ MI
                    PER A=0    PER B=28   PER C=23 PER D=49
                    TP=-0.1333    RAIN=-1
PRINT HYD           ID=1    CODE=0


ADD HYD             ID=15      HYD=106.5
                    ID=3       ID=1
PRINT HYD           ID=15      CODE=1

** <<ROUTE FLOW IN PROPOSED N BORREGA CHANNEL TO PERDIZ ST
*  ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=105
                     CH SLP=.03        FP SLP=.03
                     N=.017  STA=34
                     DIST    ELEV      DIST    ELEV        DIST    ELEV
                     0       106        12     100         22      100
                     34      106
ROUTE MCUNGE         ID=3      HYD=106.6
                     INFLOW ID=15     DT=0
                     L=300  NS=0  S=0.03
PRINT HYD            ID=3       CODE=1
*
*S  << PAAKWEREE BASIN B >>
** NO BULKING FACTOR THIS BASIN
**SEDIMENT BULK          CODE=1  BK=1.0
COMPUTE NM HYD      ID=1    HYD=BASIN_B   DA=0.0641 SQ MI
                    PER A=0    PER B=28   PER C=23 PER D=49
                    TP=-0.1333    RAIN=-1
PRINT HYD           ID=1    CODE=0
*
```

```
*
*S << TOTAL FLOW DNSTREAM OF PAAKWEREE IN PROPOSED N BORREGA CHANNEL>>
ADD HYD                ID=2      HYD=108.3
                       ID=1      ID=3
PRINT HYD              ID=2      CODE=1
*
* <<ROUTE FLOW TO AP BASIN 109
*  ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.02        FP SLP=.02
                     N=.017  STA=34
                     DIST    ELEV      DIST    ELEV        DIST    ELEV
                     0       106        12     100         22      100
                     34      106
*COMPUTE TRAVEL TIME  ID=3      REACH=1     NO VS=1
*                     L=1500    SLP=.0286
ROUTE MCUNGE         ID=3      HYD=108.4
                     INFLOW ID=2     DT=0
                     L=1500  NS=0  S=0.0286
PRINT HYD            ID=3       CODE=1
*
*S  LH BASIN NO. 50109
** COMPUTE HYD ABOVE AP 109  BASIN 7-G
COMPUTE NM HYD       ID=1    HYD=109.1   DA=0.2344 SQ MI
                     PER A=0   PER B=28   PER C=23   PER D=49
                     TP=-0.2031    RAIN=-1
PRINT HYD            ID=1    CODE=1
*
*
*S << FLOW IN PROPOSED N BORREGA ARROYO CHANNEL AT AP 109
ADD HYD              ID=3   HYD=109.3 ID=1      ID=3
PRINT HYD            ID=3      CODE=1
*
** ROUTE FLOW ABOVE AP 109 TO FIRST CHANNEL DROP STRUCTURE
** ASSUME NATURAL ARROYO
*COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
*                     ELMIN=0    ELMAX=5
*                     CH SLP=.0286       FP SLP=.0286
*                     N=.032  STA=60
*                     DIST    ELEV      DIST    ELEV        DIST    ELEV
*                      0       5         20      0           40      0
*                      60      5
*COMPUTE TRAVEL TIME  ID=4      REACH=1     NO VS=1
*                     L=230     SLP=.0286
*ROUTE                ID=4      HYD=109.4
*              INFLOW ID=3     DT=0
*PRINT HYD            ID=4       CODE=1
** ROUTE FLOW FROM FIRST DROP STRUCTURE TO CONFLUENCE WITH BASIN 6-B
* ASSUME NATURAL ARROYO
*COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
*                     ELMIN=0    ELMAX=7
*                     CH SLP=.004        FP SLP=.004
*                     N=.033  STA=60
*                     DIST    ELEV      DIST    ELEV        DIST    ELEV
*                      0       7         28      0           48      0
*                      76      7
*S ROUTE FLOW ABOVE AP109 TO CONFLUENCE WITH BASIN 50201
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 12' BOTTOM
COMPUTE RATING CURVE ID=1    VS NO=1    NO SEGS=1
                     ELMIN=100    ELMAX=106
                     CH SLP=.025       FP SLP=.025
                     N=.017  STA=36
                     DIST    ELEV      DIST    ELEV        DIST    ELEV
                     0       106        12     100         24      100
                     36      106
*COMPUTE TRAVEL TIME  ID=4      REACH=1     NO VS=1
*                     L=1230    SLP=.025
ROUTE MCUNGE         ID=4      HYD=109.5
                     INFLOW ID=3     DT=0
                     L=1230  NS=0  S=0.025
PRINT HYD            ID=4       CODE=1
*

*S  LH BASIN NO. 50110
** COMPUTE HYD ABOVE AP 111  BASIN 7-I
*S <<CHANGED TO HALF RESID/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>
*  <<WAS A=4, B=26, C=22 D=48>>
COMPUTE NM HYD       ID=1    HYD=110.0   DA=0.1018 SQ MI
                     PER A=0   PER B=60   PER C=15   PER D=25
                     TP=-0.1333    RAIN=-1
PRINT HYD            ID=1    CODE=1
*
*S  <<ADD 50110 TO CHANNEL.  TOTAL CHANNEL FLOW TO DAM>>
ADD HYD              ID=2      HYD=110.1
                     ID=1      ID=4
PRINT HYD            ID=2      CODE=1
```

```
                                                  Bor_futu
*S                        69          50.84       4993
*S                        163         61.26       4994
*S                        174         73.20       4995
*S                        184         86.10       4996
*S                        191         99.30       4997
*S                        225        100.64       4997.1
*S                       1252        112.80       4998
*S                       3176        126.55       4999
*S                       5667        140.56       5000
*S                       8620        154.85       5001
*S                      11966        169.29       5002
*S                      15667        184.32       5003
ROUTE RESERVOIR        ID=99  HYD=BPOND.OUT ID=4 CODE=5
                          0           0          4985
                          0.4         2.02       4986
                          4           7.94       4987
                          8          14.10       4988
                          14         20.51       4989
                          24         27.17       4990
                          36         34.08       4991
                          49         41.78       4992
                          69         50.84       4993
                          163        61.26       4994
                          174        73.20       4995
                          184        86.10       4996
                          191        99.30       4997
                          225       100.64       4997.1
                         1252       112.80       4998
                         3176       126.55       4999
                         5667       140.56       5000
                         8620       154.85       5001
                        11966       169.29       5002
                        15667       184.32       5003
PRINT HYD               ID=99 CODE=1
*S HYD=BPOND.OUT IS *****AP 51*****

** ROUTE FLOW ABOVE AP 110 TO THE BORREGA OUTFALL IN HUBBELL
COMPUTE RATING CURVE ID=1     VS NO=1     NO SEGS=1
                     ELMIN=0     ELMAX=7
                     CH SLP=.004         FP SLP=.004
                     N=.033   STA=60
                     DIST     ELEV       DIST     ELEV         DIST     ELEV
                      0        7          28       0            48       0
                      76       7
*COMPUTE TRAVEL TIME  ID=4       REACH=1      NO VS=1
*                      L=1849.5     SLP=.004
ROUTE MCUNGE          ID=4       HYD=110.5
                      INFLOW ID=99      DT=0
                      L=1849.4  NS=0  S=0.004
PRINT HYD             ID=4        CODE=1
*
*S  LH BASIN NO. 50111
** COMPUTE HYD ABOVE AP 111  BASIN 7-I
* << REMOVED THE PART THAT IS IN THE DAM, OLD AREA WAS 0.05247>>
COMPUTE NM HYD        ID=2     HYD=111.0    DA=0.0379 SQ MI
                      PER A=0    PER B=45    PER C=10    PER D=45
                      TP=-0.1333     RAIN=-1
PRINT HYD             ID=2     CODE=1
*
** ADD OLF FROM AP 110 TO BASIN 7-I AT AP 111
ADD HYD               ID=2  HYD=BR_DMP1.HYD  ID=4       ID=2
PRINT HYD             ID=2     CODE=1
*
*S HYD=BR_DMP1.HYD IS *****AP 52*****
PUNCH HYD             ID=2
*
FINISH
```

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =04/09/2000
INPUT FILE = X:\PUBLIC\PROJECTS\99099\AHYM\FUTURE\BOR_FUTU.DAT USER NO.= AHYMO-I-9702a01000C05-AH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
START										TIME=	.00
*S << WILSON&COMPANY (WCEA) AHYMO ANALYSIS FOR DESIGN OF THE BORREGA DAM.											
*S BASED ON LEEDSHILL AHYMO MODEL FOR THE '99 AMOLE-HUBBELL DMP (A-H DMP).											
*S THE LEEDSHILL MODEL WAS BASED ON THE '92 BHI AHYMO MODEL.											
*S											
*S FILENAME: BOR_FUTU.DAT											
*S BORREGA DAM PHASE "B", FUTURE CONDITIONS, FULL DEVELOPMENT, UNBULKED.											
*S											
*S 1. BORREGA WATERSHED FULLY DEVELOPED											
*S 2. AM SW HOMES (BELL PROPERTY) IS DEVELOPED & ADDED TO BORREGA DAM.											
*S 3. BASIN 50201 IS DEVELOPED & ADDED TO BORREGA DAM.											
*S											
*S**********											
*S											
*S**********											
*S											
*S BORREGA WATERSHED											
*S											
*S											
*S 100 YEAR 24HR STORM DEVELOPED CONDITION											
RAINFALL TYPE= 2										RAIN24=	2.660
*S**********											
*S											
*S COMPUTE FLOWS FROM SUB-BASIN B-2 OF RIO BRAVO											
*S <<A-H AREA WAS 0.0754. WCEA REDUCED AREA TO 0.0445 BECAUSE THE RIO BRAVO											
*S BLVD EXTENSION DIVIDES THE BASIN >>											
COMPUTE NM HYD	202.00	-	1	.04450	87.36	3.236	1.36343	1.500	3.067	PER IMP=	34.00
*S											
*S ROUTE FLOWS TO POND 8											
ROUTE MCUNGE	202.50	1	11	.04450	87.31	3.246	1.36779	1.600	3.066	CCODE =	.2
*S											
*S COMPUTE HYDROGRAPH FOR B-4 (WEST) FROM RIO BRAVO REDUCE AREA TO 41 AC											
COMPUTE NM HYD	204.00	-	1	.06410	125.84	4.661	1.36343	1.500	3.067	PER IMP=	34.00
*S											
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 202.5 TO THE FLOWS FROM SUB-BASIN 204											
ADD HYD	204.10	1&11	11	.10860	196.42	7.907	1.36521	1.550	2.826		
*S											
*S ROUTE FLOWS THROUGH POND 8											
ROUTE RESERVOIR	POND8.OUT	11	80	.10860	42.96	7.907	1.36520	2.000	.618	AC-FT=	4.100
*S											
*S ROUTE FLOWS TO JUNCTION											
*S << FLOW TO CULVERT CROSSING UNDER RIO BRAVO BLVD/118TH ST TO NE											
*S GETS ADDED TO RIO BRAVO CHAN N SIDE OF RIO BRAVO BLVD EXTENSION>>											
ROUTE MCUNGE	RB_CULV	80	11	.10860	42.98	7.907	1.36521	2.000	.618	CCODE =	.2
*S											
*S**********											
*S											
*S COMPUTE FLOWS FROM SUB-BASIN 50104 FROM BORREGA (7B)											
COMPUTE NM HYD	104.00	-	1	.03930	72.17	2.667	1.27251	1.500	2.869	PER IMP=	32.00
*S											
*S ROUTE FLOWS TO POND 7											
ROUTE MCUNGE	103.50	1	12	.03930	71.63	2.674	1.27559	1.550	2.848	CCODE =	.2
*S											
*S COMPUTE FLOWS FROM SUB-BASIN 50103 FROM BORREGA (7K)											
COMPUTE NM HYD	103.00	-	1	.05400	102.13	3.834	1.33141	1.500	2.955	PER IMP=	35.00

*S
*S ROUTE FLOWS TO POND 7

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 2 NOTATION	
ROUTE MCUNGE	104.50	1	13	.05400	101.60	3.831	1.33030	1.600	2.940	CCODE =	.1
*S											
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50103.5 TO THE ROUTED FLOWS											
ADD HYD	104.60	12&13	12	.09330	171.56	6.505	1.30724	1.600	2.873		
*S											
*S COMPUTE FLOWS FROM SUB-BASIN 50105 (WEST) FROM BORREGA											
COMPUTE NM HYD	105W	-	1	.14130	270.97	12.038	1.59742	1.500	2.996	PER IMP=	49.00
*S											
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50105 (WEST) TO THE ROUTED FLOWS											
ADD HYD	POND7.IN	1&12	12	.23460	428.46	18.543	1.48201	1.550	2.854		
*S											
*S ROUTE FLOWS THROUGH POND 7											
ROUTE RESERVOIR	POND7.OUT	12	70	.23460	146.29	18.433	1.47323	1.850	.974	AC-FT=	8.314
*S											
*S ROUTE FLOWS IN 118TH ST CHAN TO N BORREGA CHAN INTAKE UNDER 118TH ST											
ROUTE MCUNGE	106.05	70	12	.23460	145.75	18.401	1.47068	1.950	.971	CCODE =	.1
*S											
*S BASIN NO. 50106											
*S << BASIN CUT OFF AT 118TH/POWERLINE TO DIVERT SOUTH, CALCED NEW AREA & TP											
COMPUTE NM HYD	106.00	-	3	.08560	170.83	7.293	1.59741	1.500	3.118	PER IMP=	49.00
*S											
*S ADD THE FLOW FROM SUB-BASIN 106 TO THE FLOW FROM POND7											
ADD HYD	106.10	3&12	3	.32020	198.12	25.694	1.50456	1.800	.967		
*S											
*S ROUTE FLOW THU PROPOSED N BORREGA CHAN TO 48" PIPE UPSTRM OF AVESTRUZ ST											
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>											
ROUTE MCUNGE	106.30	3	14	.32020	198.10	25.681	1.50382	1.800	.967	CCODE =	.1
*S << PAAKWEREE BASIN C >>										PK BF =	1.00
SEDIMENT BULK											
COMPUTE NM HYD	BASIN_C	-	1	.01380	26.52	.946	1.28597	1.500	3.003	PER IMP=	28.00
*S <<TOTAL FLOW IN CHAN UPSTRM OF 48" PIPE, AT AVESTRUZ ST											
ADD HYD	106.31	1&14	14	.33400	205.93	26.628	1.49482	1.800	.963		
*S << PAAKWEREE BASIN A >>											
COMPUTE NM HYD	BASIN_A	-	1	.05130	84.88	2.517	.91999	1.500	2.585	PER IMP=	5.00
*S <<TOTAL FLOW IN CHAN DNSTRM OF 48" PIPE, AT AVESTRUZ ST											
ADD HYD	105E.1	1&14	14	.38530	275.04	29.145	1.41828	1.550	1.115		
ROUTE MCUNGE	106.33	14	13	.38530	275.04	29.145	1.41828	1.550	1.115	CCODE =	.0
*S LH BASIN NO. 50101										PK BF =	1.00
SEDIMENT BULK											
COMPUTE NM HYD	101.10	-	1	.15400	271.03	12.024	1.46394	1.550	2.750	PER IMP=	42.00
ROUTE MCUNGE	201.10	1	10	.15400	259.78	11.953	1.45535	1.800	2.636	CCODE =	.1
*S LH BASIN NO. 50102											
*S << BASIN DIVIDED AT PAAKWEREE BNDRY, OLD AREA WAS 0.182 SQ MI >>											
COMPUTE NM HYD	102.10	-	1	.12770	271.99	10.879	1.59742	1.500	3.328	PER IMP=	49.00
*S <<FLOW INTO THE UPSTREAM END OF THE CULVERT UNDER PAVO ST. >>											
ADD HYD	S_CULV	1&10	5	.28170	345.75	22.833	1.51974	1.800	1.918		
*S << PAAKWEREE BASIN D >>										PK BF =	1.00
SEDIMENT BULK											
COMPUTE NM HYD	BASIN_D	-	1	.01440	30.68	1.227	1.59741	1.500	3.329	PER IMP=	49.00
ADD HYD	D1	5& 1	15	.29610	355.46	24.059	1.52352	1.800	1.876		
*S <<FLOW IN CHAN DNSTRM OF 8X4 CBC>>											
ADD HYD	106.35	15&13	15	.68140	583.55	53.204	1.46402	1.800	1.338		
ROUTE MCUNGE	106.40	15	3	.68140	583.55	53.204	1.46402	1.800	1.338	CCODE =	.0
*S << PAAKWEREE BASIN E >>											
COMPUTE NM HYD	BASIN_E	-	1	.01440	30.68	1.227	1.59741	1.500	3.329	PER IMP=	49.00
ADD HYD	106.50	3& 1	15	.69580	593.25	54.431	1.46678	1.800	1.332		

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE MCUNGE	106.60	15	3	.69580	593.25	54.431	1.46678	1.800	1.332	CCODE = .0
*S << PAAKWEREE BASIN B >>										
COMPUTE NM HYD	BASIN_B	-	1	.06410	136.51	5.461	1.59742	1.500	3.328	PER IMP= 49.00
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PERDIZ ST>>										
ADD HYD	107.10	1& 3	2	.75990	727.59	59.892	1.47780	1.500	1.496	
ROUTE MCUNGE	107.20	2	3	.75990	719.42	59.898	1.47793	1.550	1.479	CCODE = .2
*S << PAAKWEREE BASIN F >>										
COMPUTE NM HYD	BASIN_F	-	1	.03360	71.56	2.863	1.59741	1.500	3.328	PER IMP= 49.00
ADD HYD	107.30	1& 3	2	.79350	787.47	62.760	1.48299	1.500	1.551	
ROUTE MCUNGE	107.40	2	3	.79350	786.79	62.706	1.48170	1.550	1.549	CCODE = .1
*S << PAAKWEREE BASIN G >>										
COMPUTE NM HYD	BASIN_G	-	1	.03520	74.97	2.999	1.59742	1.500	3.328	PER IMP= 49.00
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PARDAL ST>>										
ADD HYD	107.50	1& 3	2	.82870	853.67	65.704	1.48661	1.550	1.610	
ROUTE MCUNGE	107.60	2	3	.82870	853.67	65.704	1.48661	1.550	1.610	CCODE = .0
*S LH BASIN NO. 50108										
*S << HALF RESIDENTIAL/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>										
SEDIMENT BULK										PK BF = 1.00
COMPUTE NM HYD	108.00	-	1	.08130	99.90	4.982	1.14903	1.600	1.920	PER IMP= 25.00
*S << TOTAL FLOW DNSTREAM OF PAAKWEREE IN PROPOSED N BORREGA CHANNEL>>										
ADD HYD	108.30	1& 3	2	.91000	946.37	70.687	1.45645	1.550	1.625	
ROUTE MCUNGE	108.40	2	3	.91000	943.74	70.646	1.45563	1.600	1.620	CCODE = .1
*S LH BASIN NO. 50109										
COMPUTE NM HYD	109.10	-	1	.23440	391.32	19.970	1.59742	1.550	2.609	PER IMP= 49.00
*S << FLOW IN PROPOSED N BORREGA ARROYO CHANNEL AT AP 109										
ADD HYD	109.30	1& 3	3	1.14440	1332.23	90.616	1.48467	1.600	1.819	
*S ROUTE FLOW ABOVE AP109 TO CONFLUENCE WITH BASIN 50201										
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 12' BOTTOM										
ROUTE MCUNGE	109.50	3	4	1.14440	1323.51	90.625	1.48481	1.600	1.807	CCODE = .2
*S LH BASIN NO. 50110										
*S <<CHANGED TO HALF RESID/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>										
COMPUTE NM HYD	110.00	-	1	.10180	177.08	6.238	1.14904	1.500	2.718	PER IMP= 25.00
*S <<ADD 50110 TO CHANNEL. TOTAL CHANNEL FLOW TO DAM>>										
ADD HYD	110.10	1& 4	2	1.24620	1452.14	96.863	1.45738	1.600	1.821	
*S LH BASIN 50201										
COMPUTE NM HYD	201.00	-	1	.14730	229.72	12.549	1.59741	1.600	2.437	PER IMP= 49.00
*S << BORREGA DIVERSION STORM DRAIN >>										
DIVIDE HYD	201DIV1	1	1	.14730	229.72	12.549	1.59741	1.600	2.437	
	201DIV2	and	21	.00000	.00	.000	.00000	-.050	.000	
*S ADD 50201 TO DAM										
ADD HYD	110.15	1& 2	4	1.39350	1681.86	109.413	1.47219	1.600	1.886	
*S <<BASIN NO. 70102 (B-4 EAST) 44 ACRES>>										
COMPUTE NM HYD	B4EAST	-	6	.06770	109.76	4.288	1.18751	1.550	2.533	PER IMP= 16.00
*S <<ROUTE B-4 EAST THROUGH B-6>>										
ROUTE MCUNGE	B4E.1	6	5	.06770	105.13	4.260	1.17984	1.850	2.426	CCODE = .1
*S <<BASIN NO. 70103 (B-6) >>										
*S <<HALF RESID/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>										
COMPUTE NM HYD	B6	-	1	.28690	357.99	17.582	1.14903	1.600	1.950	PER IMP= 25.00
*S <<TOTAL B-4 EAST AND B-6>>										
ADD HYD	B6.1	1& 5	7	.35460	363.95	21.842	1.15491	1.650	1.604	
*S << PROPOSED FUTURE STORM DRAIN FROM BELL PROPERTY TO DAM >>										
DIVIDE HYD	B6.1DIV1	7	7	.35460	363.95	21.842	1.15491	1.650	1.604	
	B6.1DIV2	and	22	.00000	.00	.000	.00000	-.050	.000	
*S << TOTAL INTO BORREGA DAM >>										
ADD HYD	110.20	7& 4	4	1.74810	2045.39	131.254	1.40783	1.600	1.828	
*S										
*S										
*S **********										

```
*S  BORREGA DAM PHASE "B' PER WCEA DESIGN
*S                    OUTFLOW      STORAGE      ELEV
*S                      0             0          4985
*S                      0.4           2.02       4986
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 4 NOTATION
*S	4		7.94	4987						
*S	8		14.10	4988						
*S	14		20.51	4989						
*S	24		27.17	4990						
*S	36		34.08	4991						
*S	49		41.78	4992						
*S	69		50.84	4993						
*S	163		61.26	4994						
*S	174		73.20	4995						
*S	184		86.10	4996						
*S	191		99.30	4997						
*S	225		100.64	4997.1						
*S	1252		112.80	4998						
*S	3176		126.55	4999						
*S	5667		140.56	5000						
*S	8620		154.85	5001						
*S	11966		169.29	5002						
*S	15667		184.32	5003						
ROUTE RESERVOIR	BPOND.OUT	4	99	1.74810	184.95	115.283	1.23652	2.700	.165	AC-FT= 87.899
*S HYD=BPOND.OUT IS *****AP 51*****										
ROUTE MCUNGE	110.50	99	4	1.74810	184.94	115.091	1.23446	2.800	.165	CCODE = .2
*S LH BASIN NO. 50111										
COMPUTE NM HYD	111.00	-	2	.03790	75.78	3.006	1.48691	1.500	3.124	PER IMP= 45.00
ADD HYD	BR_DMP1.HYD	4& 2	2	1.78600	186.15	118.097	1.23982	2.650	.163	
*S HYD=BR_DMP1.HYD IS *****AP 52*****										

```
FINISH
(s10H
```

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =04/09/2000
INPUT FILE = X:\PUBLIC\PROJECTS\99099\AHYM\FUTURE\BOR_FUTU.DAT                                USER NO.= AHYMO-I-9702a01000C05-AH

                                 FROM  TO                   PEAK       RUNOFF                TIME TO   CFS       PAGE =   1
                    HYDROGRAPH   ID    ID       AREA      DISCHARGE    VOLUME     RUNOFF      PEAK     PER
COMMAND           IDENTIFICATION NO.   NO.    (SQ MI)       (CFS)     (AC-FT)   (INCHES)    (HOURS)   ACRE       NOTATION

                                                                                                              TIME=        .00
START
*S << WILSON&COMPANY (WCEA) AHYMO ANALYSIS FOR DESIGN OF THE BORREGA DAM.
*S    BASED ON LEEDSHILL AHYMO MODEL FOR THE '99 AMOLE-HUBBELL DMP (A-H DMP).
*S    THE LEEDSHILL MODEL WAS BASED ON THE '92 BHI AHYMO MODEL.
*S
*S   FILENAME: BOR_FUTU.DAT
*S    BORREGA DAM PHASE "B", FUTURE CONDITIONS, FULL DEVELOPMENT, UNBULKED.
*S
*S   1. BORREGA WATERSHED FULLY DEVELOPED
*S   2. AM SW HOMES (BELL PROPERTY) IS DEVELOPED & ADDED TO BORREGA DAM.
*S   3. BASIN 50201 IS DEVELOPED & ADDED TO BORREGA DAM.
*S
*S****************************************************************************
*S
*S****************************************************************************
*S
*S      BORREGA WATERSHED
*S
*S
*S PMP LOCAL STORM
RAINFALL   TYPE= 3                                                                                            RAIN6=    16.000
*S**************************************************************************
*S
*S COMPUTE FLOWS FROM SUB-BASIN B-2 OF RIO BRAVO
*S <<A-H AREA WAS 0.0754. WCEA REDUCED AREA TO 0.0445 BECAUSE THE RIO BRAVO
*S   BLVD EXTENSION DIVIDES THE BASIN >>
COMPUTE NM HYD         202.00    -     1        .04450      901.25      30.735    12.95028     2.250   31.645 PER IMP=   34.00
*S
*S ROUTE FLOWS TO POND 8
ROUTE MCUNGE           202.50    1    11        .04450      897.22      30.780    12.96923     2.300   31.504 CCODE =      .2
*S
*S COMPUTE HYDROGRAPH FOR B-4 (WEST) FROM RIO BRAVO REDUCE AREA TO 41 AC
COMPUTE NM HYD         204.00    -     1        .06410     1298.08      44.273    12.95027     2.250   31.642 PER IMP=   34.00
*S
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 202.5 TO THE FLOWS FROM SUB-BASIN 204
ADD HYD                204.10  1&11   11        .10860     2098.52      75.053    12.95803     2.250   30.193
*S
*S ROUTE FLOWS THROUGH POND 8
ROUTE RESERVOIR     POND8.OUT   11    80        .10860      221.17      75.053    12.95804     2.900    3.182 AC-FT=   91.185
*S
*S ROUTE FLOWS TO JUNCTION
*S << FLOW TO CULVERT CROSSING UNDER RIO BRAVO BLVD/118TH ST TO NE
*S    GETS ADDED TO RIO BRAVO CHAN N SIDE OF RIO BRAVO BLVD EXTENSION>>
ROUTE MCUNGE          RB_CULV   80    11        .10860      220.38      75.007    12.95010     3.000    3.171 CCODE =      .2
*S
*S************************************************************************
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50104 FROM BORREGA (7B)
COMPUTE NM HYD         104.00    -     1        .03930      790.91      26.636    12.70823     2.250   31.445 PER IMP=   32.00
*S
*S ROUTE FLOWS TO POND 7
ROUTE MCUNGE           103.50    1    12        .03930      781.01      26.681    12.72932     2.300   31.052 CCODE =      .2
*S
*S COMPUTE FLOWS FROM SUB-BASIN 50103 FROM BORREGA (7K)
COMPUTE NM HYD         103.00    -     1        .05400     1089.89      37.044    12.86259     2.250   31.536 PER IMP=   35.00
```

```
*S
*S ROUTE FLOWS TO POND 7
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE MCUNGE	104.50	1	13	.05400	1049.28	37.084	12.87646	2.300	30.361	CCODE = .2
*S										
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50103.5 TO THE ROUTED FLOWS										
ADD HYD	104.60	12&13	12	.09330	1830.29	63.765	12.81447	2.300	30.652	
*S										
*S COMPUTE FLOWS FROM SUB-BASIN 50105 (WEST) FROM BORREGA										
COMPUTE NM HYD	105W	-	1	.14130	2592.08	102.202	13.56188	2.250	28.663	PER IMP= 49.00
*S										
*S ADD THE ROUTED FLOWS FROM SUB-BASIN 50105 (WEST) TO THE ROUTED FLOWS										
ADD HYD	POND7.IN	1&12	12	.23460	4383.68	165.967	13.26463	2.300	29.197	
*S										
*S ROUTE FLOWS THROUGH POND 7										
ROUTE RESERVOIR	POND7.OUT	12	70	.23460	1341.27	165.960	13.26406	2.550	8.933	AC-FT= 68.063
*S										
*S ROUTE FLOWS IN 118TH ST CHAN TO N BORREGA CHAN INTAKE UNDER 118TH ST										
ROUTE MCUNGE	106.05	70	12	.23460	1339.51	165.956	13.26378	2.550	8.922	CCODE = .2
*S										
*S BASIN NO. 50106										
*S << BASIN CUT OFF AT 118TH/POWERLINE TO DIVERT SOUTH, CALCED NEW AREA & TP										
COMPUTE NM HYD	106.00	-	3	.08560	1640.71	61.914	13.56188	2.250	29.949	PER IMP= 49.00
*S										
*S ADD THE FLOW FROM SUB-BASIN 106 TO THE FLOW FROM POND7										
ADD HYD	106.10	3&12	3	.32020	2268.01	227.871	13.34347	2.300	11.067	
*S										
*S ROUTE FLOW THU PROPOSED N BORREGA CHAN TO 48" PIPE UPSTRM OF AVESTRUZ ST										
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 10' BOTTOM>>										
ROUTE MCUNGE	106.30	3	14	.32020	2268.01	227.871	13.34347	2.300	11.067	CCODE = .0
*S << PAAKWEREE BASIN C >>										
SEDIMENT BULK										PK BF = 1.00
COMPUTE NM HYD	BASIN_C	-	1	.01380	278.89	9.384	12.75063	2.250	31.578	PER IMP= 28.00
*S <<TOTAL FLOW IN CHAN UPSTRM OF 48" PIPE, AT AVESTRUZ ST										
ADD HYD	106.31	1&14	14	.33400	2507.40	237.255	13.31897	2.300	11.730	
*S << PAAKWEREE BASIN A >>										
COMPUTE NM HYD	BASIN_A	-	1	.05130	1020.90	32.264	11.79246	2.250	31.095	PER IMP= 5.00
*S <<TOTAL FLOW IN CHAN DNSTRM OF 48" PIPE, AT AVESTRUZ ST										
ADD HYD	105E.1	1&14	14	.38530	3385.87	269.520	13.11573	2.300	13.731	
ROUTE MCUNGE	106.33	14	13	.38530	3385.87	269.520	13.11573	2.300	13.731	CCODE = .0
*S LH BASIN NO. 50101										
SEDIMENT BULK										PK BF = 1.00
COMPUTE NM HYD	101.10	-	1	.15400	2726.09	108.509	13.21138	2.300	27.659	PER IMP= 42.00
ROUTE MCUNGE	201.10	1	10	.15400	2612.64	107.991	13.14820	2.400	26.508	CCODE = .1
*S LH BASIN NO. 50102										
*S << BASIN DIVIDED AT PAAKWEREE BNDRY, OLD AREA WAS 0.182 SQ MI >>										
COMPUTE NM HYD	102.10	-	1	.12770	2603.30	92.365	13.56187	2.250	31.853	PER IMP= 49.00
*S <<FLOW INTO THE UPSTREAM END OF THE CULVERT UNDER PAVO ST. >>										
ADD HYD	S_CULV	1&10	5	.28170	3853.85	200.356	13.33572	2.400	21.376	
*S << PAAKWEREE BASIN D >>										
SEDIMENT BULK										PK BF = 1.00
COMPUTE NM HYD	BASIN_D	-	1	.01440	294.45	10.416	13.56188	2.250	31.950	PER IMP= 49.00
ADD HYD	D1	5& 1	15	.29610	3993.71	210.771	13.34673	2.400	21.075	
*S <<FLOW IN CHAN DNSTRM OF 8X4 CBC>>										
ADD HYD	106.35	15&13	15	.68140	6968.10	480.291	13.21610	2.300	15.978	
ROUTE MCUNGE	106.40	15	3	.68140	6968.10	480.291	13.21610	2.300	15.978	CCODE = .0
*S << PAAKWEREE BASIN E >>										
COMPUTE NM HYD	BASIN_E	-	1	.01440	294.45	10.416	13.56188	2.250	31.950	PER IMP= 49.00
ADD HYD	106.50	3& 1	15	.69580	7220.36	490.706	13.22325	2.300	16.214	

```
ROUTE MCUNGE          106.60   15    3        .69580      7220.36      490.706     13.22325     2.300    16.214 CCODE =       .0
*S  << PAAKWEREE BASIN B >>
```

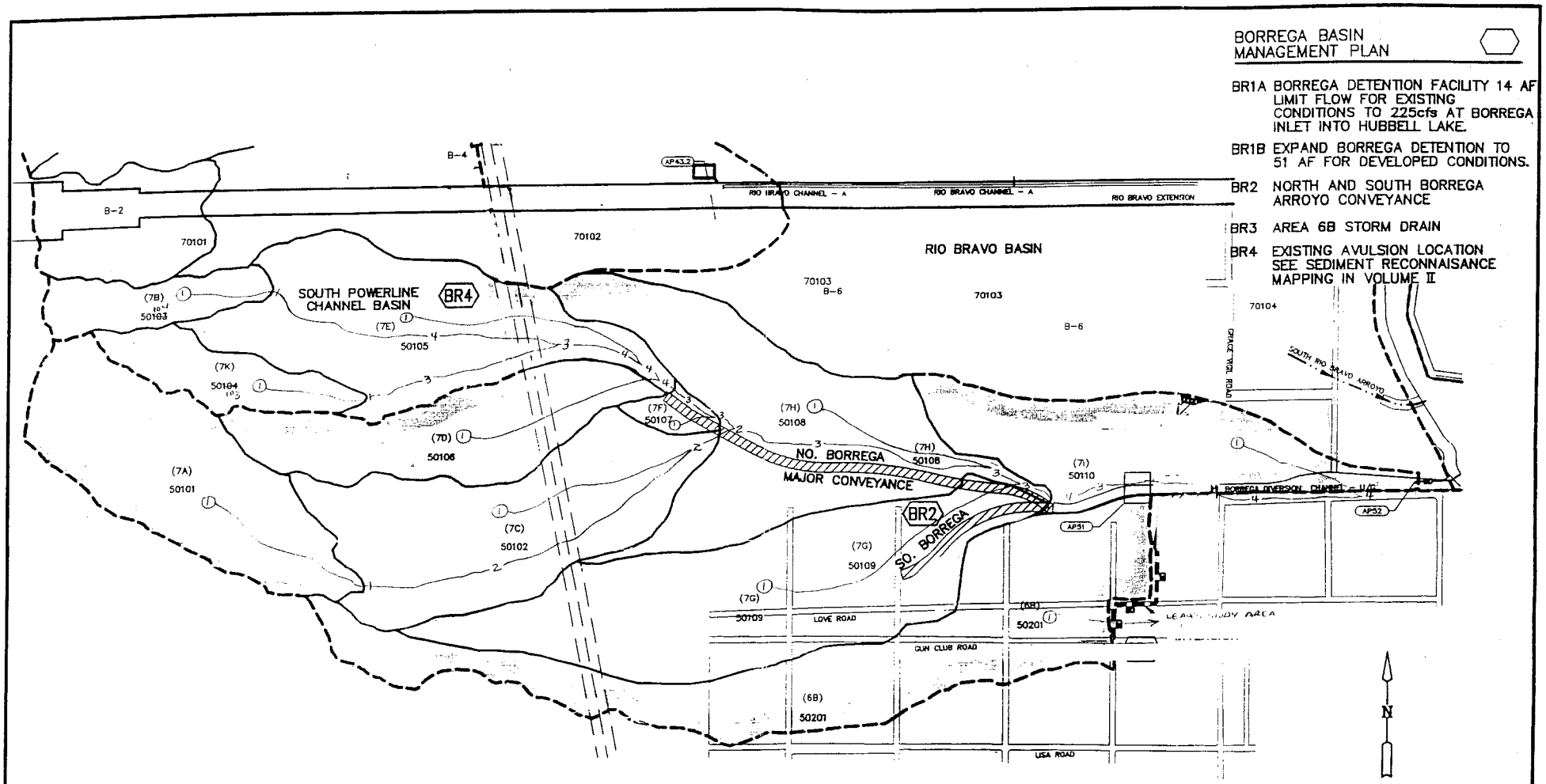
COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
										PAGE = 3
COMPUTE NM HYD	BASIN_B	-	1	.06410	1310.22	46.364	13.56187	2.250	31.938	PER IMP= 49.00
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PERDIZ ST>>										
ADD HYD	107.10	1& 3	2	.75990	8342.90	537.070	13.25182	2.300	17.155	
ROUTE MCUNGE	107.20	2	3	.75990	8342.90	537.070	13.25182	2.300	17.155	CCODE = .0
*S << PAAKWEREE BASIN F >>										
COMPUTE NM HYD	BASIN_F	-	1	.03360	686.89	24.303	13.56187	2.250	31.942	PER IMP= 49.00
ADD HYD	107.30	1& 3	2	.79350	8931.37	561.373	13.26495	2.300	17.587	
ROUTE MCUNGE	107.40	2	3	.79350	8931.37	561.373	13.26495	2.300	17.587	CCODE = .0
*S << PAAKWEREE BASIN G >>										
COMPUTE NM HYD	BASIN_G	-	1	.03520	719.60	25.460	13.56188	2.250	31.942	PER IMP= 49.00
*S TOTAL FLOW IN PROPOSED N BORREGA CHANNEL AT PARDAL ST>>										
ADD HYD	107.50	1& 3	2	.82870	9639.13	586.833	13.27755	2.250	18.174	
ROUTE MCUNGE	107.60	2	3	.82870	9639.13	586.833	13.27755	2.250	18.174	CCODE = .0
*S LH BASIN NO. 50108										
*S << HALF RESIDENTIAL/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>										
										PK BF = 1.00
SEDIMENT BULK										
COMPUTE NM HYD	108.00	-	1	.08130	1192.66	53.700	12.38461	2.350	22.922	PER IMP= 25.00
*S << TOTAL FLOW DNSTREAM OF PAAKWEREE IN PROPOSED N BORREGA CHANNEL>>										
ADD HYD	108.30	1& 3	2	.91000	10643.19	640.532	13.19778	2.300	18.275	
ROUTE MCUNGE	108.40	2	3	.91000	10509.22	640.114	13.18916	2.350	18.045	CCODE = .1
*S LH BASIN NO. 50109										
COMPUTE NM HYD	109.10	-	1	.23440	3727.68	169.542	13.56187	2.300	24.849	PER IMP= 49.00
*S << FLOW IN PROPOSED N BORREGA ARROYO CHANNEL AT AP 109										
ADD HYD	109.30	1& 3	3	1.14440	14215.45	809.656	13.26551	2.300	19.409	
*S ROUTE FLOW ABOVE AP109 TO CONFLUENCE WITH BASIN 50201										
*S <<ASSUMED CONC CHANNEL SECTION, 2:1 SIDE SLOPES, 12' BOTTOM										
ROUTE MCUNGE	109.50	3	4	1.14440	14215.45	809.656	13.26551	2.300	19.409	CCODE = .0
*S LH BASIN NO. 50110										
*S <<CHANGED TO HALF RESID/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>										
COMPUTE NM HYD	110.00	-	1	.10180	2034.61	67.240	12.38461	2.250	31.229	PER IMP= 25.00
*S <<ADD 50110 TO CHANNEL. TOTAL CHANNEL FLOW TO DAM>>										
ADD HYD	110.10	1& 4	2	1.24620	15965.39	876.896	13.19355	2.300	20.018	
*S LH BASIN 50201										
COMPUTE NM HYD	201.00	-	1	.14730	2197.86	106.542	13.56187	2.350	23.314	PER IMP= 49.00
*S << BORREGA DIVERSION STORM DRAIN >>										
DIVIDE HYD	201DIV1	1	1	.05988	230.00	43.311	13.56188	2.150	6.002	
	201DIV2	and	21	.08742	1967.86	63.231	13.56188	2.350	35.173	
*S ADD 50201 TO DAM										
ADD HYD	110.15	1& 2	4	1.30608	16195.39	920.207	13.21043	2.300	19.375	
*S <<BASIN NO. 70102 (B-4 EAST) 44 ACRES>>										
COMPUTE NM HYD	B4EAST	-	6	.06770	1175.35	45.171	12.51057	2.300	27.127	PER IMP= 16.00
*S <<ROUTE B-4 EAST THROUGH B-6>>										
ROUTE MCUNGE	B4E.1	6	5	.06770	1169.13	45.262	12.53560	2.350	26.983	CCODE = .2
*S <<BASIN NO. 70103 (B-6) >>										
*S <<HALF RESID/HALF GOLF COURSE PROPOSED (BELL PROPERTY) >>										
COMPUTE NM HYD	B6	-	1	.28690	4168.26	189.501	12.38461	2.350	22.701	PER IMP= 25.00
*S <<TOTAL B-4 EAST AND B-6>>										
ADD HYD	B6.1	1& 5	7	.35460	5337.39	234.763	12.41344	2.350	23.519	
*S << PROPOSED FUTURE STORM DRAIN FROM BELL PROPERTY TO DAM >>										
DIVIDE HYD	B6.1DIV1	7	7	.11826	450.00	78.293	12.41344	2.150	5.946	
	B6.1DIV2	and	22	.23634	4887.39	156.470	12.41344	2.350	32.312	
*S << TOTAL INTO BORREGA DAM >>										
ADD HYD	110.20	7& 4	4	1.42434	16645.39	998.500	13.14426	2.300	18.260	

```
*S
*S
*S ***************************************************
```

```
*S  BORREGA DAM PHASE "B' PER WCEA DESIGN
*S                    OUTFLOW      STORAGE      ELEV
*S                      0            0          4985
*S                      0.4          2.02       4986
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
*S	4		7.94	4987						
*S	8		14.10	4988						
*S	14		20.51	4989						
*S	24		27.17	4990						
*S	36		34.08	4991						
*S	49		41.78	4992						
*S	69		50.84	4993						
*S	163		61.26	4994						
*S	174		73.20	4995						
*S	184		86.10	4996						
*S	191		99.30	4997						
*S	225		100.64	4997.1						
*S	1252		112.80	4998						
*S	3176		126.55	4999						
*S	5667		140.56	5000						
*S	8620		154.85	5001						
*S	11966		169.29	5002						
*S	15667		184.32	5003						
ROUTE RESERVOIR	BPOND.OUT	4	99	1.42434	14948.60	984.919	12.96548	2.400	16.399	AC-FT= 181.403
*S HYD=BPOND.OUT IS *****AP 51*****										
ROUTE MCUNGE	110.50	99	4	1.42434	14571.53	985.346	12.97110	2.450	15.985	CCODE = .2
*S LH BASIN NO. 50111										
COMPUTE NM HYD	111.00	-	2	.03790	769.73	26.826	13.27138	2.250	31.733	PER IMP= 45.00
ADD HYD	BR_DMP1.HYD	4& 2	2	1.46224	14858.95	1012.172	12.97888	2.450	15.878	
*S HYD=BR_DMP1.HYD IS *****AP 52*****										

```
FINISH
(s10H
```



AMOLE–HUBBELL D.M.P.

BORREGA BASIN MANAGEMENT PLAN

FIGURE NO. III–12

PAAKWEREE VILLAGE DRAINAGE REPORT

AHYMO MAP
EXISTING CONDITIONS

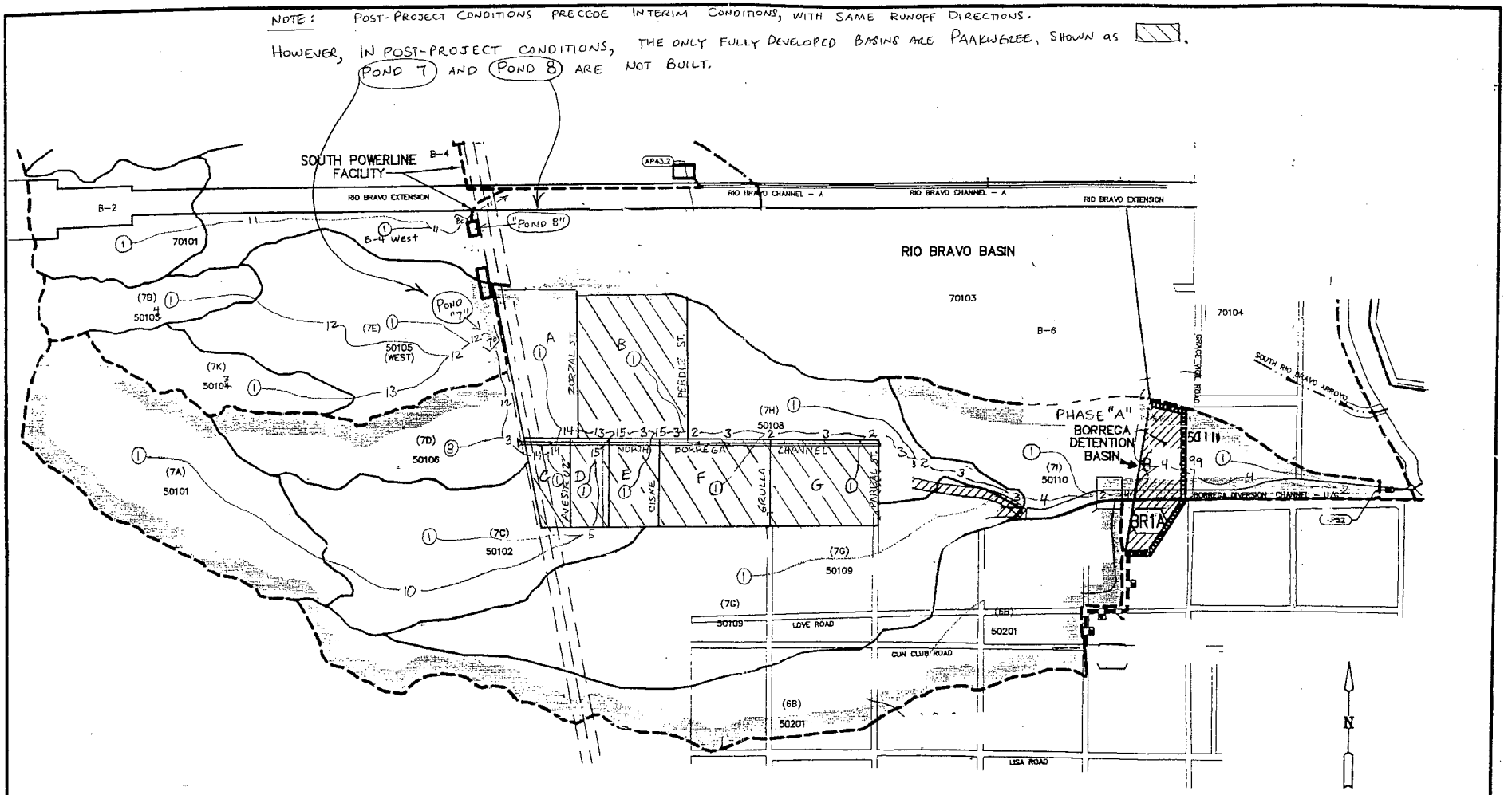
DESIGN	DRAWN	DATE
NM	NM	AUG 1999

FILE NO 98088

WILSON & COMPANY
4775 INDIAN SCHOOL ROAD NE
SUITE 200
ALBUQUERQUE, NEW MEXICO
87110
(505) 254-4000

LEEDSHILL–HERKENHOFF, INC.

P:\95043\95043_32\DWG\C\BR-BASIN.dwg



AMOLE–HUBBELL D.M.P.

BORREGA BASIN MANAGEMENT PLAN

FIGURE NO. III–12

PAAKWEREE VILLAGE DRAINAGE REPORT

AHYMO MAP
INTERIM CONDITIONS

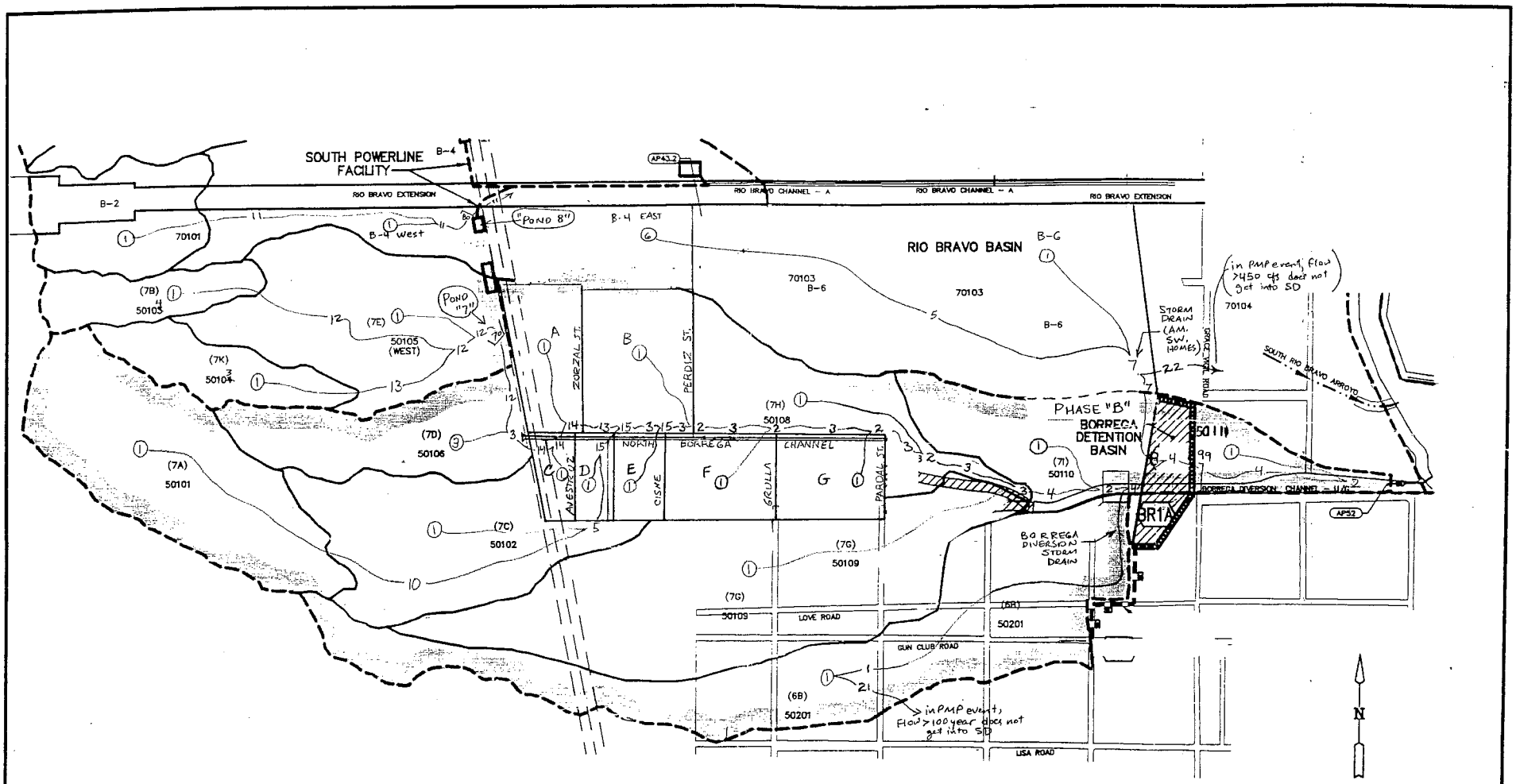
DESIGN	DRAWN	DATE
NM	NM	AUG 1999

FILE NO. 98088

WILSON & COMPANY
4775 INDIAN SCHOOL ROAD NE
SUITE 200
ALBUQUERQUE, NEW MEXICO
87110
(505) 254-4000

LEEDSHILL–HERKENHOFF, INC.

P:\95043\95043_32\DWG\C\BR-BASIN.dwg\12-17-98 KHK



LEGEND

- DMP IMPROVEMENTS
- BASIN BOUNDARIES
- PLATTED EASEMENT/ROW
- SUBBASIN BOUNDARIES
- (AP00) HYDROLOGIC ANALYSIS POINT
- BASIN BOUNDARY THIS SHEET
- 60110 SUBBASIN ID NUMBER
- (SVX) PROJECT ID NUMBER

0 500' 1000' 2000'

1" = 1000'±

AMOLE–HUBBELL D.M.P.

BORREGA BASIN MANAGEMENT PLAN

FIGURE NO. III–12

PAAKWEREE VILLAGE DRAINAGE REPORT

AHYMO MAP
FUTURE CONDITIONS

DESIGN	DRAWN	DATE
NM	NM	AUG 1999

FILE NO. 98088

WILSON & COMPANY
4775 INDIAN SCHOOL ROAD NE
SUITE 200
ALBUQUERQUE, NEW MEXICO
87110
(505) 254–4000

3 OF 3

LEEDSHILL–HERKENHOFF, INC.

P:\95043\95043_32\DWG\C\BR-BASIN.dwg\12-17-98 KHK

APPENDIX B - Sediment

Calculations for sediment discharge to Borrega Dam

Calculations for sediment trapping

Excerpt from Borrega Diversion Sediment Issues

CALCULATIONS FOR WATERSHED SEDIMENT YIELD, Ys
Used RCI's numbers for tons/acre

POST-PROJECT CONDITION (3)			FUTURE CONDITION (4)		
Total Area to dam (acre)	797		Total Area to dam (acre)	1119	
Dev Acreage	145		Dev Acreage	1063	
Undev Acreage	652		Undev Acreage	56	
Ys from Undev Areas:	100-year	Annual	Ys from Undev Areas:	100-year	Annual
(tons/acre)	8.56	0.54	(tons/acre)	8.56	0.54
(tons)	5584	352	(tons)	479	30
(cu ft)(2)	111672	7045	(cu ft)(2)	9577	604
Ys from Dev Areas:	100-year	Annual	Ys from Dev Areas:	100-year	Annual
(tons/acre)	2.36	0.15	(tons/acre)	2.36	0.15
(tons)	343	98	(tons)	2508	8
(cu ft)(2)	6851	1957	(cu ft)(2)	50166	168
TOTAL Post-Project Sediment Storage (1):			TOTAL Post-Project Sediment Storage (1):		
(acre-ft)		3.8	(acre-ft)		1.5

NOTES

(1) TOTAL is one 100-year + 5 times the annual event.
(2) Assume 100 lbs/cu ft. of sediment
(3) Post-Project condition: only Paakweree, the channels, and the dam are built.
(4) Future condition: Assume 95% of the watershed is developed.

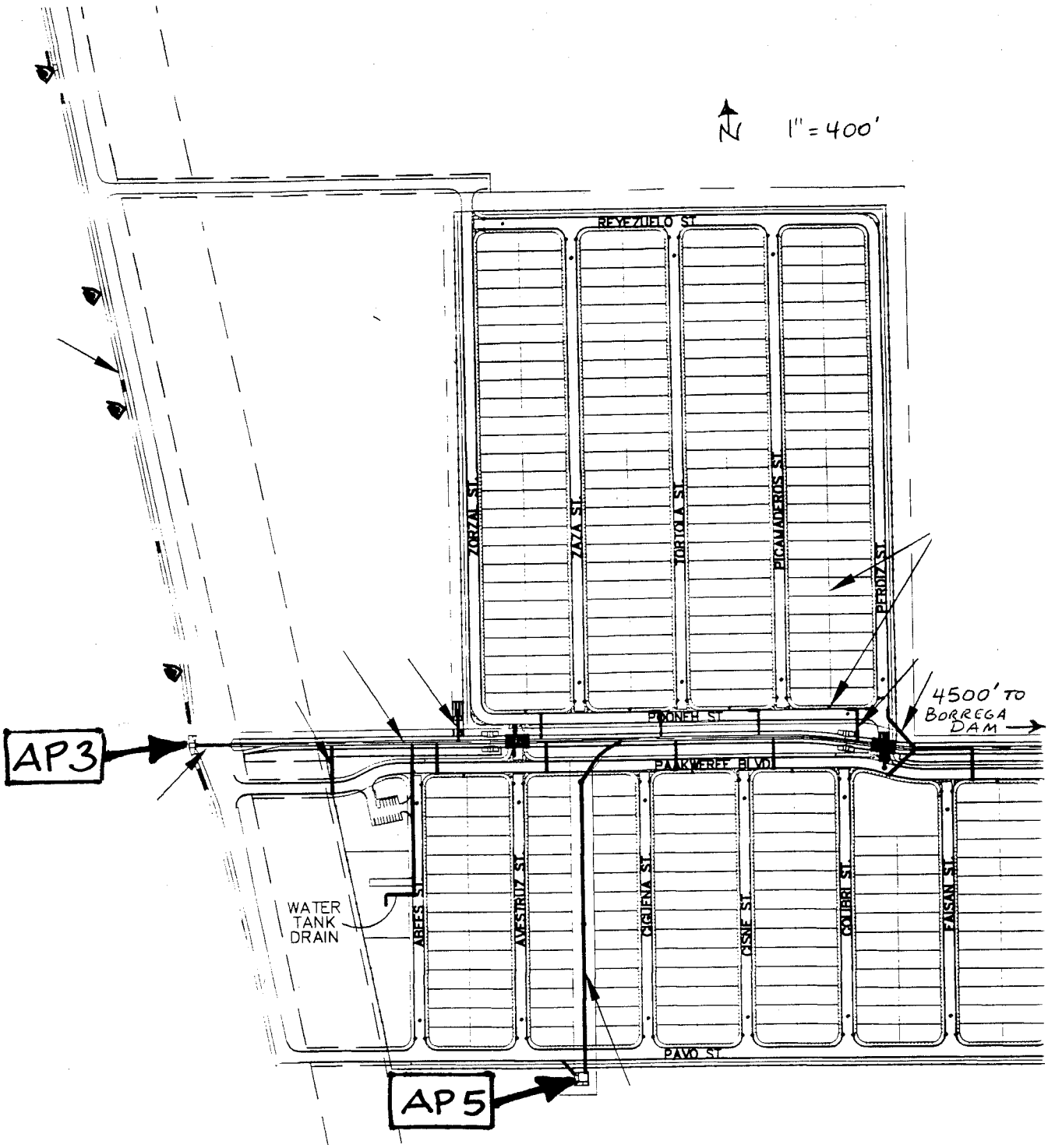


FIGURE D-1
SEDIMENT TRAP LOCATIONS
(AP3 & AP5)

1/22

3-20-2000 17:13

TRAPMIX data set for AP3, Entrance to 96".

Input File: TRAP_AP3.IN

TRAPMIX (Version 1.0)

The computational procedure used in this program is based on concepts presented in
"Solid Particle Settlement in Open Channel Flow"
Li and Shen, 1975, J. Hydraulic Engineering, v101, HY7.
RCE accepts no liability or responsibility for the consequences of any actions resulting from the use of this program.
Use of results obtained from this program and determination of their applicability to a particular problem is entirely the responsibility of the user.
****
Using this software indicates your acceptance of these terms and conditions.

Point #	Average Velocity (fps)	Settling Depth (ft)	Settling Length (ft)	Fines Concentration (ppm)	Percent Trapped
1	1.80	5.50	47.00	196000.	28.5
2	4.00	5.50	104.00	196000.	36.2
3	2.90	5.30	73.00	196000.	33.1
4	.30	5.60	8.00	196000.	27.0
5	.10	5.60	3.00	196000.	27.0

Avg = 30.4 %

2/22

TRAPMIX data set for AP3, Entrance to 96".

3-20-2000 17:13

Input File: TRAP_AP3.IN

TRAPMIX (Version 1.0)

Resource Consultants & Engineers, Inc.

The computational procedure used in this program is based on concepts presented in "Solid Particle Settlement in Open Channel Flow" Li and Shen, 1975, J. Hydraulic Engineering, v101, HY7.
RCE accepts no liability or responsibility for the consequences of any actions resulting from the use of this program.
Use of results obtained from this program and determination of their applicability to a particular problem is entirely the responsibility of the user.
****

==========

TABLE OF RESULTS FOR TRAPPED SEDIMENT MIXTURE

==========

DATA SET # 1

==========

AVERAGE VELOCITY = 1.80 fps
SETTLING DEPTH = 5.50 ft
SETTLING LENGTH = 47.00 ft
INFLOWING SEDIMENT CONCENTRATION = 196000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.97E-02	1023.60	.34	5.98
.200	17.00	.30E-01	325.80	2.76	16.53
.330	23.00	.71E-01	140.09	2.38	22.45
.500	19.00	.12E+00	80.65	7.49	17.58
.690	8.00	.17E+00	57.76	25.45	5.96
1.020	12.00	.24E+00	41.75	75.29	2.97
1.800	9.00	.35E+00	28.59	100.00	.00
4.610	4.00	.58E+00	16.93	100.00	.00

TOTAL % OF MIXTURE PASSING = 71.47

TOTAL % OF MIXTURE TRAPPED = 28.53

==========

DATA SET # 2

==========

AVERAGE VELOCITY = 4.00 fps
SETTLING DEPTH = 5.50 ft
SETTLING LENGTH = 104.00 ft
INFLOWING SEDIMENT CONCENTRATION = 196000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.97E-02	2274.67	.33	5.98
.200	17.00	.30E-01	724.00	5.65	16.04
.330	23.00	.71E-01	311.31	17.42	18.99
.500	19.00	.12E+00	179.22	25.81	14.10
.690	8.00	.17E+00	128.35	41.44	4.69
1.020	12.00	.24E+00	92.78	69.11	3.71
1.800	9.00	.35E+00	63.53	97.18	.25
4.610	4.00	.58E+00	37.62	100.00	.00

TOTAL % OF MIXTURE PASSING = 63.75

TOTAL % OF MIXTURE TRAPPED = 36.25

3/22

DATA SET # 3

AVERAGE VELOCITY = 2.90 fps
SETTLING DEPTH = 5.30 ft
SETTLING LENGTH = 73.00 ft
INFLOWING SEDIMENT CONCENTRATION = 196000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.97E-02	1589.17	.34	5.98
.200	17.00	.30E-01	505.81	5.71	16.03
.330	23.00	.71E-01	217.49	10.11	20.67
.500	19.00	.12E+00	125.21	18.05	15.57
.690	8.00	.17E+00	89.67	35.55	5.16
1.020	12.00	.24E+00	64.82	71.15	3.46
1.800	9.00	.35E+00	44.38	100.00	.00
4.610	4.00	.58E+00	26.29	100.00	.00

TOTAL % OF MIXTURE PASSING = 66.87

TOTAL % OF MIXTURE TRAPPED = 33.13

DATA SET # 4

AVERAGE VELOCITY = .30 fps
SETTLING DEPTH = 5.60 ft
SETTLING LENGTH = 8.00 ft
INFLOWING SEDIMENT CONCENTRATION = 196000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.97E-02	173.70	.00	6.00
.200	17.00	.30E-01	55.29	.00	17.00
.330	23.00	.71E-01	23.77	.00	23.00
.500	19.00	.12E+00	13.69	.00	19.00
.690	8.00	.17E+00	9.80	.23	7.98
1.020	12.00	.24E+00	7.08	100.00	.00
1.800	9.00	.35E+00	4.85	100.00	.00
4.610	4.00	.58E+00	2.87	100.00	.00

TOTAL % OF MIXTURE PASSING = 72.98

TOTAL % OF MIXTURE TRAPPED = 27.02

DATA SET # 5

AVERAGE VELOCITY = .10 fps
SETTLING DEPTH = 5.60 ft
SETTLING LENGTH = 3.00 ft
INFLOWING SEDIMENT CONCENTRATION = 196000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.97E-02	57.90	.00	6.00
.200	17.00	.30E-01	18.43	.00	17.00
.330	23.00	.71E-01	7.92	.00	23.00
.500	19.00	.12E+00	4.56	.00	19.00
.690	8.00	.17E+00	3.27	.26	7.98
1.020	12.00	.24E+00	2.36	100.00	.00
1.800	9.00	.35E+00	1.62	100.00	.00
4.610	4.00	.58E+00	.96	100.00	.00

TOTAL % OF MIXTURE PASSING = 72.98

TOTAL % OF MIXTURE TRAPPED = 27.02

4/22

3-20-2000 17: 4

TRAPMIX data set for AP5, Entrance to 66".

Input File: trap_ap5.in

TRAPMIX (Version 1.0)

The computational procedure used in this program is based on concepts presented in
"Solid Particle Settlement in Open Channel Flow"
Li and Shen, 1975, J. Hydraulic Engineering, v101, HY7.
RCE accepts no liability or responsibility for the consequences of any actions resulting from the use of this program.
Use of results obtained from this program and determination of their applicability to a particular problem is entirely the responsibility of the user.
****
Using this software indicates your acceptance of these terms and conditions.

Point #	Average Velocity (fps)	Settling Depth (ft)	Settling Length (ft)	Fines Concentration (ppm)	Percent Trapped
1	1.90	4.20	38.00	193000.	29.4
2	2.40	5.10	58.00	193000.	31.5
3	1.90	4.30	39.00	193000.	29.5
4	.80	3.10	12.00	193000.	27.0

Avg = 29.4 %

5/22

TRAPMIX data set for AP5, Entrance to 66".

3-20-2000 17: 4

Input File: trap_ap5.in

TRAPMIX (Version 1.0)

Resource Consultants & Engineers, Inc.

The computational procedure used in this program is based on concepts presented in "Solid Particle Settlement in Open Channel Flow" Li and Shen, 1975, J. Hydraulic Engineering, v101, HY7.
RCE accepts no liability or responsibility for the consequences of any actions resulting from the use of this program.
Use of results obtained from this program and determination of their applicability to a particular problem is entirely the responsibility of the user.
****
Using this software indicates your acceptance of these terms and conditions.

==========

TABLE OF RESULTS FOR TRAPPED SEDIMENT MIXTURE

==========

DATA SET # 1

==========

AVERAGE VELOCITY = 1.90 fps
SETTLING DEPTH = 4.20 ft
SETTLING LENGTH = 38.00 ft
INFLOWING SEDIMENT CONCENTRATION = 193000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.99E-02	808.63	.36	5.98
.200	17.00	.31E-01	257.78	3.31	16.44
.330	23.00	.72E-01	111.24	3.02	22.31
.500	19.00	.12E+00	64.30	8.98	17.29
.690	8.00	.17E+00	46.16	27.84	5.77
1.020	12.00	.24E+00	33.44	76.16	2.86
1.800	9.00	.35E+00	22.93	100.00	.00
4.610	4.00	.59E+00	13.59	100.00	.00

TOTAL % OF MIXTURE PASSING = 70.65

TOTAL % OF MIXTURE TRAPPED = 29.35

==========

DATA SET # 2

==========

AVERAGE VELOCITY = 2.40 fps
SETTLING DEPTH = 5.10 ft
SETTLING LENGTH = 58.00 ft
INFLOWING SEDIMENT CONCENTRATION = 193000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.99E-02	1240.30	.35	5.98
.200	17.00	.31E-01	395.39	5.92	15.99
.330	23.00	.72E-01	170.63	6.37	21.54
.500	19.00	.12E+00	98.62	13.80	16.38
.690	8.00	.17E+00	70.80	32.16	5.43
1.020	12.00	.24E+00	51.28	73.16	3.22
1.800	9.00	.35E+00	35.17	100.00	.00
4.610	4.00	.59E+00	20.85	100.00	.00

TOTAL % OF MIXTURE PASSING = 68.53

6/22

TOTAL % OF MIXTURE TRAPPED = 31.47

==========

DATA SET # 3

==========

AVERAGE VELOCITY = 1.90 fps
SETTLING DEPTH = 4.30 ft
SETTLING LENGTH = 39.00 ft
INFLOWING SEDIMENT CONCENTRATION = 193000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.99E-02	827.88	.36	5.98
.200	17.00	.31E-01	263.91	3.34	16.43
.330	23.00	.72E-01	113.89	3.06	22.30
.500	19.00	.12E+00	65.83	9.10	17.27
.690	8.00	.17E+00	47.26	28.15	5.75
1.020	12.00	.24E+00	34.23	76.51	2.82
1.800	9.00	.35E+00	23.48	100.00	.00
4.610	4.00	.59E+00	13.92	100.00	.00

TOTAL % OF MIXTURE PASSING = 70.55

TOTAL % OF MIXTURE TRAPPED = 29.45

==========

DATA SET # 4

==========

AVERAGE VELOCITY = .80 fps
SETTLING DEPTH = 3.10 ft
SETTLING LENGTH = 12.00 ft
INFLOWING SEDIMENT CONCENTRATION = 193000. ppm by weight

Dg(mm)	DELTA%	FALL VELOCITY (fps)	AVG. SETTLING LENGTH(ft)	%TRAPPED	%MIXTURE PASSING
.110	6.00	.99E-02	251.30	.37	5.98
.200	17.00	.31E-01	80.11	.07	16.99
.330	23.00	.72E-01	34.57	.05	22.99
.500	19.00	.12E+00	19.98	.40	18.92
.690	8.00	.17E+00	14.35	11.88	7.05
1.020	12.00	.24E+00	10.39	91.09	1.07
1.800	9.00	.35E+00	7.13	100.00	.00
4.610	4.00	.59E+00	4.22	100.00	.00

TOTAL % OF MIXTURE PASSING = 73.00

TOTAL % OF MIXTURE TRAPPED = 27.00

7/22

COMP. NSM

CK.

DATE 3/20/00

WILSON & COMPANY

LOC. BORREGA FILE 99099

PROJ. SHEET

SUBJ. TRAPMIX SEDIMENT OF

TRAPMIX PROGRAM

PARTICLE SIZE DISTRIBUTION - USING BORREGA ARROYO GRADATION DATA (FIGURE D-2), BREAK INTO SIZE RANGES, COMPUTE GEOMETRIC MEAN OF EACH SIZE range, & PERCENT MATERIAL IN THE SIZE RANGE.

RANGE no. i	UPPER SIZE (mm) D_i	LOWER SIZE (mm) D_{i+1}	GEOMETRIC* MEAN (mm)	% PASSING UPPER SIZE	% PASSING LOWER SIZE	% IN i^{th} SIZE RANGE
1	8.5	2.5	4.61	100	96	4
2	2.5	1.3	1.80	96	87	9
3	1.3	0.8	1.02	87	75	12
4	0.8	0.6	0.69	75	67	8
5	0.6	0.42	0.50	67	48	19
6	0.42	0.26	0.33	48	25	23
7	0.26	0.16	0.20	25	8	17
8	0.16	0.07	0.11	8	2	6

* GEOMETRIC MEAN = $\sqrt{D_i D_{i+1}}$

8/22

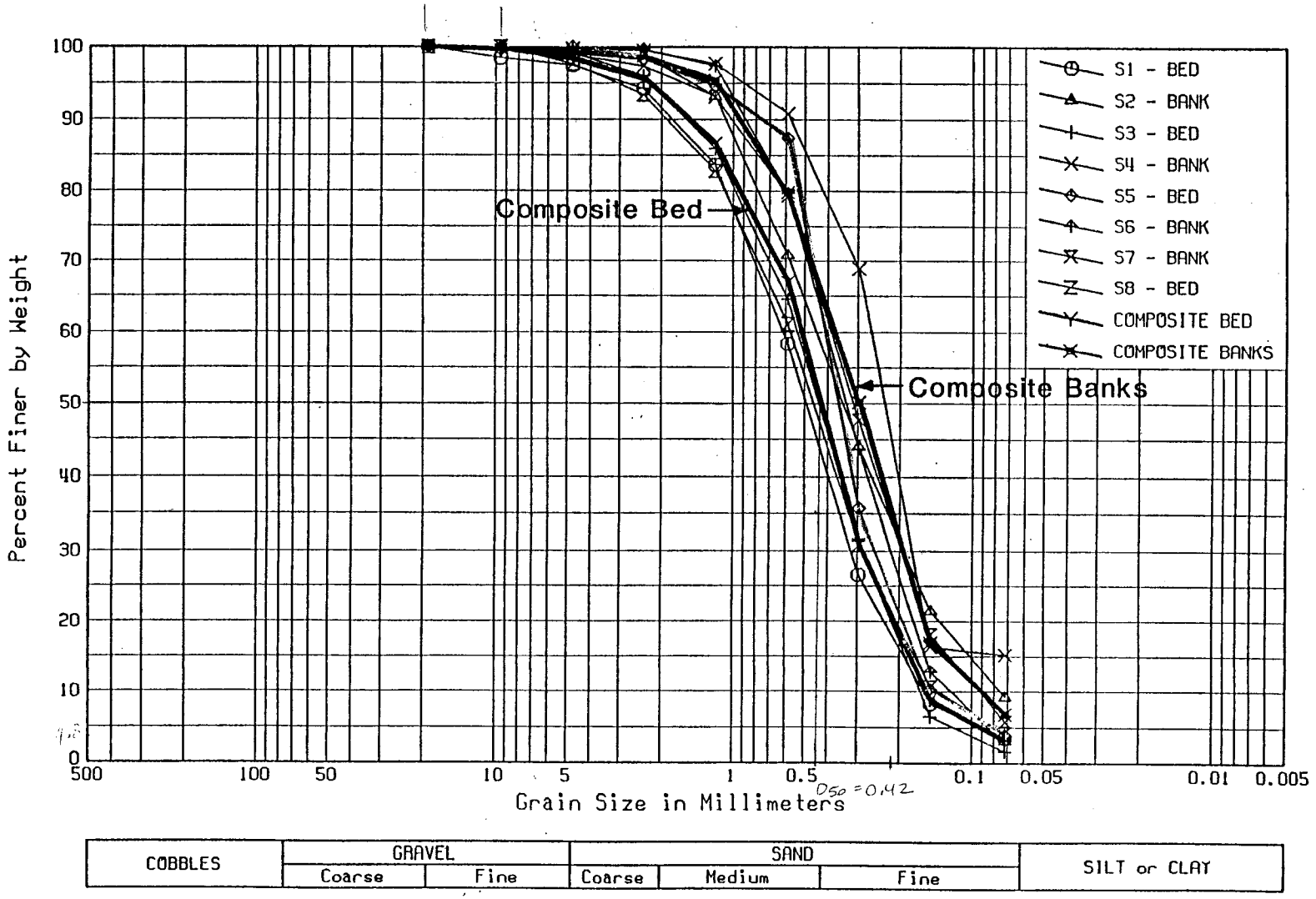


Figure 5.3: INDIVIDUAL AND REPRESENTATIVE GRAIN SIZE DISTRIBUTIONS
(See Figure ~~1.2~~ 5.2 for Sample Locations)

25

From: "Borrega Diversion Sediment Issues"

FIGURE D-2
SEDIMENT GRADATION
9/22

COMP. NM

CK.

DATE 3/20/00

WILSON & COMPANY

LOC. BORREGA FILE 99099

PROJ. SHEET

SUBJ. TRAPMIX SEDIMENT OF

CONDITION IS UNDEVELOPED DISCHARGE, EVENT IS 100-YR

COMPUTE INFLOWING SEDIMENT CONCENTRATION -

$$C_S = 10^6 \, W_S / (W_S + W_W) = \text{ppm}$$

Assume 100 lbs/cu ft = Wt. of Sediment

	100-yr Water Volume (ac-ft)	100-yr Sediment Volume (ac-ft)	W_W (tons)	W_S (tons)	C_S (decimal fraction)
AP 3	8.78	1.32	11,900	2,900	0.196
AP 5	7.22	1.08	9800	2350	0.193

$$W_W = \boxed{\text{VOL}}\ \text{ac-ft} \times \frac{43560\ \text{ft}^2}{\text{ac}} \times \frac{62.4\ \text{lbs}}{\text{ft}^3} \times \frac{\text{ton}}{2000\ \text{lbs}} = \text{tons}$$

W_{sed} $\frac{100\ \text{lbs}}{\text{ft}^3}$

10/22

PRINTED ON RECYCLED PAPER

COMP. NM

CK.

DATE 3/20/00

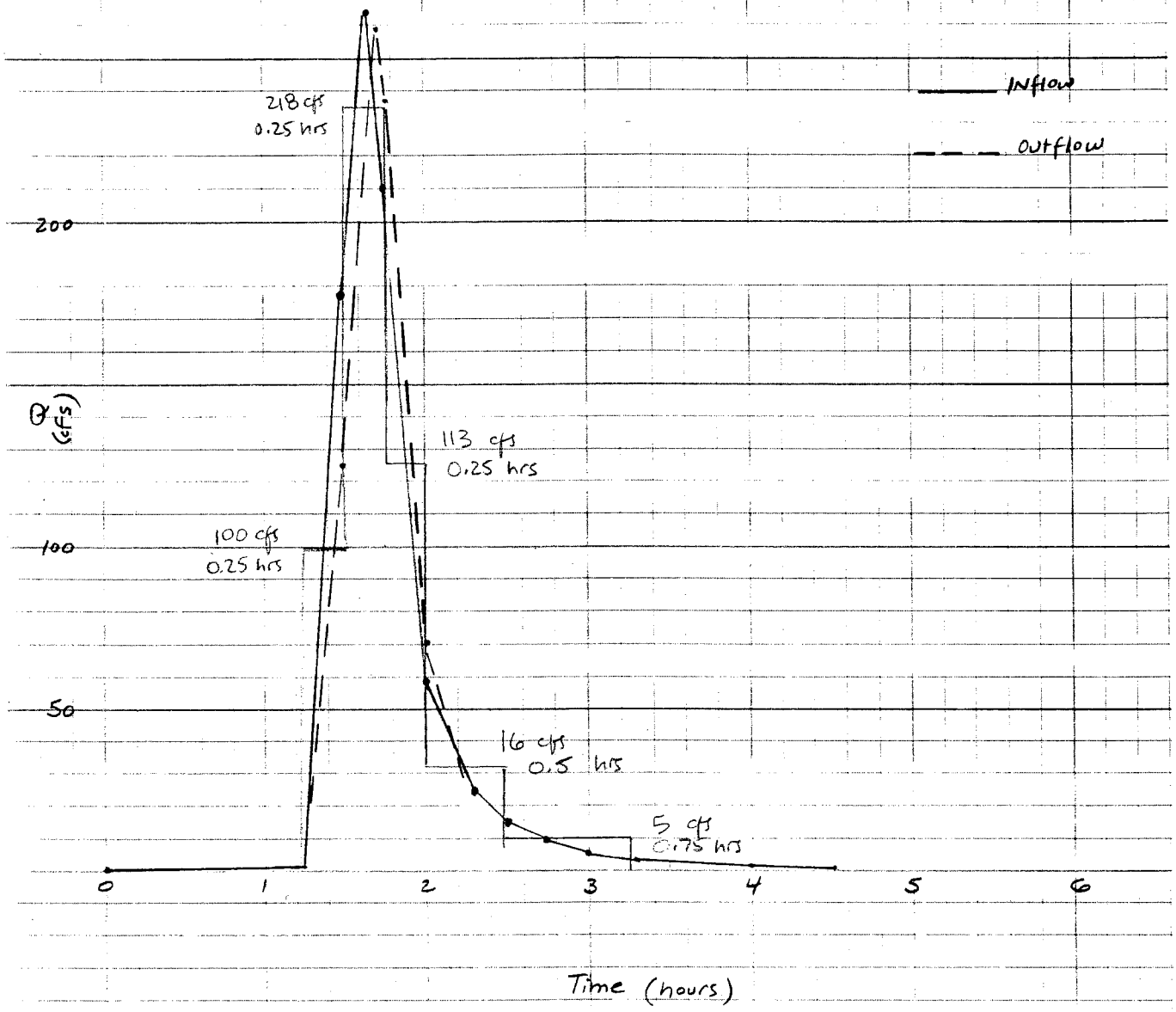
WILSON & COMPANY

LOC. BORREGA FILE 99099

PROJ. SHEET

SUBJ. TRAPMIX SEDIMENT OF

DISCRETIZED HYDROGRAPH - AP 3



11/22

COMP. NM

CK.

DATE 3/20/00

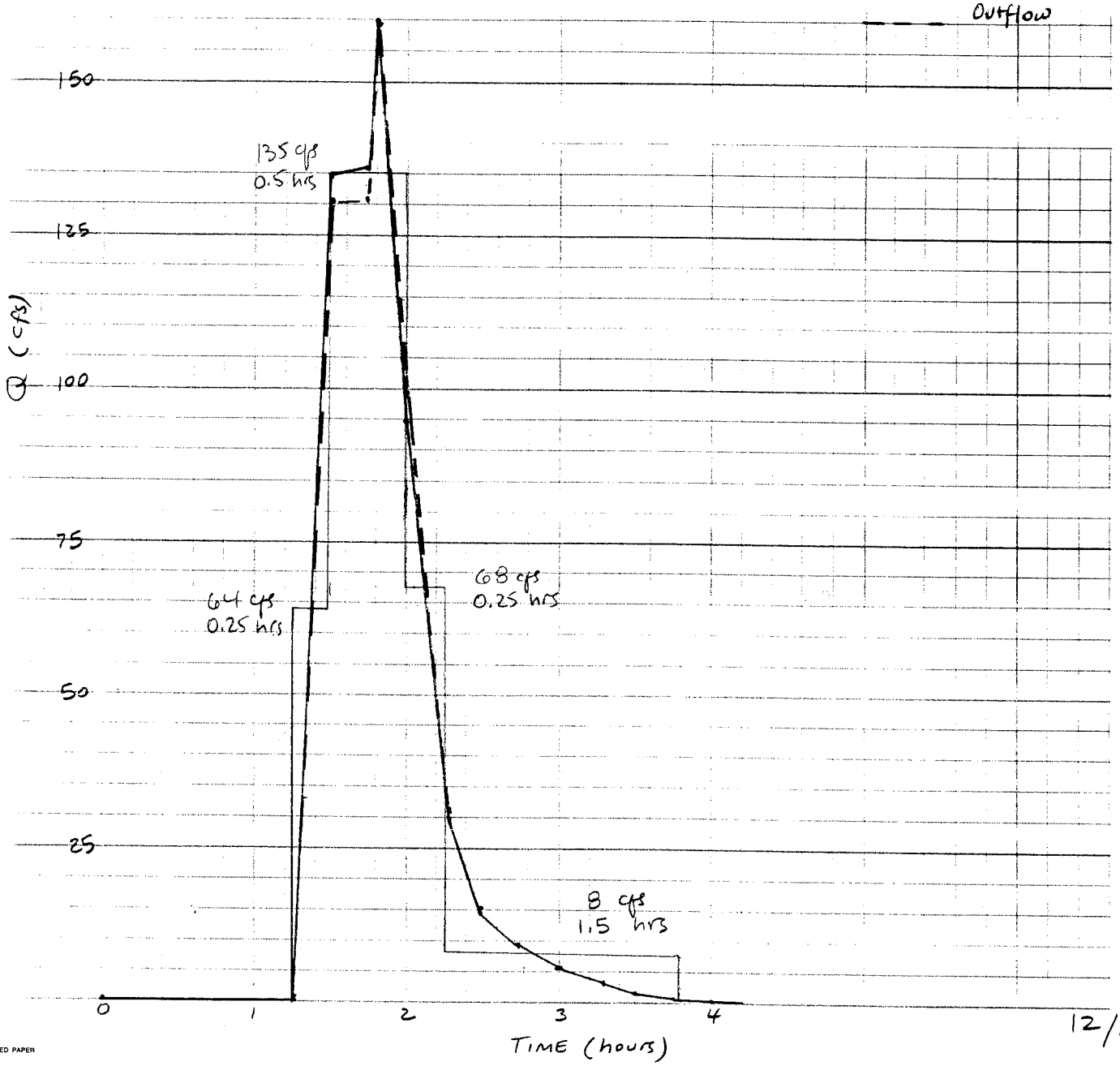
WILSON & COMPANY

LOC. BORREGA FILE 99099

PROJ. SHEET

SUBJ. TRAPMIX SEDIMENT OF

DISCRETIZED HYDROGRAPH – AP 5



12/22

RATING CURVE FOR SEDIMENTATION POND AT ENTRANCE TO 66" SD (AP5)

TOTAL Q	STORAGE (ac-ft)	ELEV	ELEV	AREA (sq ft)	AREA (acre)	INCR. VOL (ac-ft)	CUMUL VOL
0	0.00	5154.5	5154.5	676	0.01	0.00	0.00
10	0.02	5156	5156	784	0.02	0.02	0.02
45	0.04	5157	5157	841	0.02	0.02	0.04
177	0.08	5159	5159	961	0.02	0.04	0.08
221	0.10	5160	5160	1024	0.02	0.02	0.10
291	0.16	5162	5162	1296	0.03	0.05	0.16
347	0.22	5164	5164	1600	0.04	0.07	0.22
395	0.36	5166	5166	4800	0.11	0.14	0.36

RATING CURVE FOR SEDIMENTATION POND AT ENTRANCE TO 96" (AP3)

TOTAL Q	STORAGE (ac-ft)	ELEV	ELEV	AREA (sq ft)	AREA (acre)	INCR. VOL (ac-ft)	CUMUL VOL
			5192.4				
[illegible] 0	0.00	5191.7	~~5191.7~~	750	0.01	0.00	0.00
10	0.02	5193	5193	1200	0.03	0.02	0.02
20	0.06	5194	5194	2240	0.05	0.04	0.06
80	0.15	5195.3	5195.3	3400	0.08	0.08	0.15
140	0.32	5197	5197	5760	0.13	0.18	0.32
200	0.47	5198	5198	7220	0.17	0.15	0.47
280	0.66	5199	5199	9000	0.21	0.19	0.66
345	0.90	5200	5200	12480	0.29	0.25	0.90

```
HYDROGRAPHS FOR SEDIMENTATION PONDS

    AHYMO PROGRAM (AHYMO_97) -                          - Version:  1997.02c
         RUN DATE (MON/DAY/YR) = 03/16/2000
         START TIME (HR:MIN:SEC) = 18:10:44     USER NO.= AHYMO-I-9702a01000C05-AH
         INPUT FILE = X:\PUBLIC\PROJECTS\99099\AHYM\POSTPAAK\SED_REVB.DAT


*S  FILENAME:  SED_REVB.DAT  - POST-PROJECT CONDITIONS, ALL LANDS UPSTREAM OF
*S                            PAAKWEREE ARE UNDEVELOPED
*S
*S  USE 'ROUTE RESERVOIRS' FOR SEDIMENTATION CONDITION AT 2 CULVERT ENTRANCES:
*S    96" UNDER 118TH ST (HYD=106.20)  AND 66" S BORREGA TRIB (HYD=S_CULV)
*S



*S <<ADD 50106 TO ROUTED OLF FROM BASINS 50103,50104,50105WEST
*S << TOTAL FLOW AT UPSTREAM END OF PROPOSED N BORREGA CHANNEL >>
ADD HYD              ID=2      HYD=106.2
                     ID=3      ID=2
PRINT HYD            ID=2      CODE=5
```

(AP3)

PARTIAL HYDROGRAPH 106.20

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.500	177.1	3.000	5.4	4.500	.3	6.000	.0
.250	.0	1.750	219.9	3.250	3.2	4.750	.2	6.250	.0
.500	.0	2.000	58.9	3.500	1.9	5.000	.1	6.500	.0
.750	.0	2.250	25.3	3.750	1.2	5.250	.0		
1.000	.0	2.500	15.0	4.000	.7	5.500	.0		
1.250	.0	2.750	9.1	4.250	.4	5.750	.0		

```
    RUNOFF VOLUME =      .59398 INCHES     =      10.1436 ACRE-FEET
    PEAK DISCHARGE RATE =     264.01 CFS  AT   1.650 HOURS   BASIN AREA =    .3202 SQ. MI.


*S****************** SEDIMENT POND AT 96" ************************************
ROUTE RESERVOIR      ID=99  HYD=106.25  ID=2    CODE=5
                     OUTFLOW     STORAGE     ELEV
                      0           0           5191.7
                      20          0.06        5194
                      80          0.15        5195.3
                      140         0.32        5197
                      200         0.47        5198
                      280         0.66        5199
                      345         0.90        5200

  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *

    TIME      INFLOW    ELEV      VOLUME    OUTFLOW
    (HRS)     (CFS)     (FEET)    (AC-FT)   (CFS)

      .00        .00   5191.70       .000       .00
      .25        .00   5191.70       .000       .00
      .50        .00   5191.70       .000       .00
      .75        .00   5191.70       .000       .00
     1.00        .00   5191.70       .000       .00
     1.25        .00   5191.70       .000       .00
```

1.50	177.07	5196.58	.278	125.04
1.75	219.91	5198.48	.562	238.54
2.00	58.94	5195.08	.135	70.04
2.25	25.34	5194.14	.070	26.44
2.50	15.02	5193.56	.049	16.21
2.75	9.06	5192.82	.029	9.77
3.00	5.43	5192.38	.018	5.87
3.25	3.24	5192.10	.011	3.50
3.50	1.94	5191.94	.006	2.09
3.75	1.16	5191.84	.004	1.25
4.00	.70	5191.79	.002	.75
4.25	.42	5191.75	.001	.45
4.50	.25	5191.73	.001	.27
4.75	.15	5191.72	.000	.17
5.00	.09	5191.71	.000	.10
5.25	.05	5191.71	.000	.05
5.50	.03	5191.70	.000	.03
5.75	.02	5191.70	.000	.02
6.00	.01	5191.70	.000	.01
6.25	.00	5191.70	.000	.01
6.50	.00	5191.70	.000	.00

PEAK DISCHARGE = 258.797 CFS - PEAK OCCURS AT HOUR 1.70
MAXIMUM WATER SURFACE ELEVATION = 5198.735
MAXIMUM STORAGE = .6096 AC-FT INCREMENTAL TIME= .050000HRS

PRINT HYD ID=99 CODE=5

PARTIAL HYDROGRAPH 106.25

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.500	125.0	3.000	5.9	4.500	.3	6.000	.0
.250	.0	1.750	238.5	3.250	3.5	4.750	.2	6.250	.0
.500	.0	2.000	70.0	3.500	2.1	5.000	.1	6.500	.0
.750	.0	2.250	26.4	3.750	1.3	5.250	.1		
1.000	.0	2.500	16.2	4.000	.8	5.500	.0		
1.250	.0	2.750	9.8	4.250	.5	5.750	.0		

RUNOFF VOLUME = .59398 INCHES = 10.1436 ACRE-FEET
PEAK DISCHARGE RATE = 258.80 CFS AT 1.700 HOURS BASIN AREA = .3202 SQ. MI.

*S <<FLOW INTO THE UPSTREAM END OF THE CULVERT UNDER PAVO ST. >>
ADD HYD ID=5 HYD=S_CULV
ID=1 ID=10
PRINT HYD ID=5 CODE=5

AP5

HYDROGRAPH FROM AREA S_CULV

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.500	134.0	3.000	5.7	4.500	.3	6.000	.0
.250	.0	1.750	137.4	3.250	3.6	4.750	.2	6.250	.0
.500	.0	2.000	94.5	3.500	2.2	5.000	.1	6.500	.0
.750	.0	2.250	29.4	3.750	1.4	5.250	.1	6.750	.0
1.000	.0	2.500	14.7	4.000	.9	5.500	.1	7.000	.0
1.250	.0	2.750	9.1	4.250	.5	5.750	.0		

14/22

RUNOFF VOLUME = .55006 INCHES = 8.2640 ACRE-FEET
PEAK DISCHARGE RATE = 161.21 CFS AT 1.800 HOURS BASIN AREA = .2817 SQ. MI.

*S****************** SEDIMENT POND AT 66" ************************************
ROUTE RESERVOIR ID=99 HYD=102.15 ID=5 CODE=5

OUTFLOW	STORAGE	ELEV
0	0	5154.5
20	0.02	5156
45	0.04	5157
116	0.08	5159
177	0.10	5160
259	0.16	5162
320	0.22	5164
395	0.36	5166

* * * * * * * * * * * * * * * * * *

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	5154.50	.000	.00
.25	.00	5154.50	.000	.00
.50	.00	5154.50	.000	.00
.75	.00	5154.50	.000	.00
1.00	.00	5154.50	.000	.00
1.25	.00	5154.50	.000	.00
1.50	134.02	5159.28	.086	132.90
1.75	137.41	5159.29	.086	133.44
2.00	94.47	5158.50	.070	98.12
2.25	29.40	5156.43	.029	30.71
2.50	14.70	5155.63	.015	15.05
2.75	9.15	5155.20	.009	9.36
3.00	5.70	5154.94	.006	5.83
3.25	3.56	5154.77	.004	3.64
3.50	2.22	5154.67	.002	2.27
3.75	1.39	5154.61	.001	1.42
4.00	.87	5154.57	.001	.89
4.25	.55	5154.54	.001	.56
4.50	.34	5154.53	.000	.35
4.75	.22	5154.52	.000	.22
5.00	.14	5154.51	.000	.14
5.25	.09	5154.51	.000	.09
5.50	.05	5154.50	.000	.06
5.75	.03	5154.50	.000	.03
6.00	.02	5154.50	.000	.02
6.25	.01	5154.50	.000	.01
6.50	.01	5154.50	.000	.01
6.75	.00	5154.50	.000	.00

PEAK DISCHARGE = 160.832 CFS - PEAK OCCURS AT HOUR 1.80
MAXIMUM WATER SURFACE ELEVATION = 5159.735
MAXIMUM STORAGE = .0947 AC-FT INCREMENTAL TIME= .050000HRS

PRINT HYD ID=99 CODE=5

PARTIAL HYDROGRAPH 102.15

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.500	132.9	3.000	5.8	4.500	.4	6.000	.0

.250	.0	1.750	133.4	3.250	3.6	4.750	.2	6.250	.0
.500	.0	2.000	98.1	3.500	2.3	5.000	.1	6.500	.0
.750	.0	2.250	30.7	3.750	1.4	5.250	.1	6.750	.0
1.000	.0	2.500	15.1	4.000	.9	5.500	.1	7.000	.0
1.250	.0	2.750	9.4	4.250	.6	5.750	.0		

RUNOFF VOLUME = .55006 INCHES = 8.2640 ACRE-FEET
PEAK DISCHARGE RATE = 160.83 CFS AT 1.800 HOURS BASIN AREA = .2817 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 18:10:46

16/22

COMP. MM

WILSON & COMPANY

LOC. BORREGA FILE 99099

CK. PROJ. SHEET

DATE 3/20/00 SUBJ. TRAPMIX SEDIMENT OF

AP 3 HYDRAULIC & SEDIMENT DATA - TRAPMIX

Q (cfs) per hydrograph segment	INLET FLOW ELEV Sta 1200	EL MIN at Sta 1200	ELEV @ MIDPOINT OF FLOW Sta 1200	ELEV @ OUTLET Sta 1050	AVG SETTLING DEPTH D	AVG VELOCITY V	PARTICLE SETTLING VELOCITY V_s	SETTLING LENGTH (see note 1 below) Tan θ = V_s/V	L = D/Tan θ
100	5198.64	5197.20	97.92	5192.40	5.5	1.8	0.21	0.117	47
218	5198.68	5197.20	97.94	5192.40	5.5	4.0	0.21	0.053	104
113	5198.23	"	97.72	"	5.3	2.9	0.21	0.072	73
16	5198.76	"	97.98	"	5.6	0.3	0.21	0.70	8
5	5198.76	"	97.98	"	5.6	0.1	0.21	2.1	3

Note 1:

Tan θ = V_s/V = D/L

D = depth available for settling

L = D/Tan θ

COMP. NM

WILSON &COMPANY

LOC. BORREGA FILE 99099

PROJ. SHEET

DATE 03/20/00 SUBJ. TRAPMIX SEDIMENT OF

AP 5 HYDRAULIC & SEDIMENT DATA - TRAPMIX

Q (cfs) per hydrograph segment	INLET FLOW ELEV Sta 10.4	EL MIN at Sta 10.4	ELEV @ MIDPOINT OF FLOW Sta 10.4	ELEV @ OUTLET Sta 10.04	AVG SETTLING DEPTH D	AVG VELOCITY, V	PARTICLE SETTLING VELOCITY Vs	SETTLING LENGTH (see note 1, pg ___) tan θ =Vs/V	L (ft) =D/tan θ
64	5162.42	5155	58.71	5154.5	4.2	1.9	0.21	0.111	38
135	64.24	5155	59.62	5154.5	5.1	2.4	0.21	0.088	58
68	62.53	"	58.77	"	4.3	1.9	0.21	0.111	39
8	60.14	"	57.57	"	3.1	0.8	0.21	0.263	12

COMP. NM

CK.

DATE 3/20/00

WILSON & COMPANY

LOC. BORREGA FILE 99099

PROJ. SHEET

SUBJ. TRAPMIX SEDIMENT OF

HYDRAULIC DATA FOR TRAPMIX

	Q (cfs) per hydrograph segment	ZONE VELOCITIES HEC-RAS SEC. NOS			AVG POND VELOCITY (FPS)
AP3		Sta 1200	Sta 1100	Sta 1050	
	100	4.2	0.8	0.5	1.8
	218	9.0	1.9	1.1	4.0
	113	7.3	0.9	0.6	2.9
	16	0.6	0.1	0.1	0.3
	5	0.2	0.0	0.0	0.1
AP5		Sta 17	Sta 10.4	Sta 10.2	
	64	4.2	0.3	0.3	1.6
	135	5.5	0.5	0.5	2.2
	68	4.3	0.3	0.3	1.6
	8	1.9	0.1	0.1	0.7

file: x|public|projects|99099|hecras|c118-sed. rundate 3/20/00

HEC-RAS Plan: trapmix_AP3 River: 118StChannel Reach: channel

Reach	River Sta	Q Total	Min Ch El	Max Chl Dpth	Hydr Depth	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
channel	1300	100	5199.20	1.16	0.95	5200.36	5200.36	5200.84	0.01390	5.6	18.0	19.0	1.01
channel	1300	218	5199.20	1.84	1.40	5201.04	5201.04	5201.75	0.01229	6.8	32.3	23.0	1.01
channel	1300	113	5199.20	1.25	1.01	5200.45	5200.45	5200.96	0.01349	5.7	19.8	19.5	1.00
channel	1300	16	5199.20	0.37	0.34	5199.57	5199.57	5199.74	0.01871	3.3	4.9	14.2	0.99
channel	1300	5	5199.20	0.21	0.20	5199.41	5199.41	5199.47	0.01164	1.8	2.7	13.3	0.72
channel	1200	100	5197.20	1.44	1.14	5198.64		5198.92	0.00634	4.2	23.6	20.7	0.70
channel	1200	218	5197.20	1.48	1.16	5198.68	5199.05	5199.93	0.02767	9.0	24.3	20.9	1.47
channel	1200	113	5197.20	1.03	0.86	5198.23	5198.45	5199.05	0.02709	7.3	15.6	18.2	1.38
channel	1200	16	5197.20	1.56	1.22	5198.76		5198.76	0.00012	0.6	26.0	21.3	0.10
channel	1200	5	5197.20	1.56	1.22	5198.76		5198.76	0.00001	0.2	26.0	21.4	0.03
channel	1175.*	100	5196.40	2.33	1.70	5198.73		5198.81	0.00107	2.3	44.2	26.0	0.31
channel	1175.*	218	5196.40	1.44	1.14	5197.84	5198.24	5199.18	0.03067	9.3	23.4	20.6	1.54
channel	1175.*	113	5196.40	2.32	1.70	5198.72		5198.82	0.00138	2.6	44.0	25.9	0.35
channel	1175.*	16	5196.40	2.36	1.72	5198.76		5198.76	0.00003	0.4	45.0	26.1	0.05
channel	1175.*	5	5196.40	2.36	1.72	5198.76		5198.76	0.00000	0.1	45.0	26.1	0.01
channel	1150.*	100	5195.60	3.15	2.18	5198.75		5198.78	0.00033	1.5	67.4	30.9	0.18
channel	1150.*	218	5195.60	3.10	2.16	5198.70		5198.87	0.00167	3.3	65.9	30.6	0.40
channel	1150.*	113	5195.60	3.14	2.18	5198.74		5198.79	0.00042	1.7	67.4	30.9	0.20
channel	1150.*	16	5195.60	3.16	2.19	5198.76		5198.76	0.00001	0.2	67.8	30.9	0.03
channel	1150.*	5	5195.60	3.16	2.19	5198.76		5198.76	0.00000	0.1	67.8	30.9	0.01
channel	1125.*	100	5194.80	3.95	2.64	5198.75		5198.77	0.00013	1.1	94.3	35.7	0.11
channel	1125.*	218	5194.80	3.93	2.63	5198.73		5198.82	0.00064	2.3	93.5	35.6	0.25
channel	1125.*	113	5194.80	3.95	2.64	5198.75		5198.78	0.00017	1.2	94.3	35.7	0.13
channel	1125.*	16	5194.80	3.96	2.64	5198.76		5198.76	0.00000	0.2	94.5	35.7	0.02
channel	1125.*	5	5194.80	3.96	2.64	5198.76		5198.76	0.00000	0.1	94.5	35.7	0.01
channel	1100.*	100	5194.00	4.76	3.08	5198.76		5198.77	0.00006	0.8	124.9	40.5	0.08
channel	1100.*	218	5194.00	4.75	3.08	5198.75		5198.79	0.00029	1.8	124.5	40.5	0.18
channel	1100.*	113	5194.00	4.76	3.08	5198.76		5198.77	0.00008	0.9	124.9	40.5	0.09
channel	1100.*	16	5194.00	4.76	3.08	5198.76		5198.76	0.00000	0.1	125.0	40.5	0.01
channel	1100.*	5	5194.00	4.76	3.08	5198.76		5198.76	0.00000	0.0	125.0	40.5	0.00
channel	1075.*	100	5193.20	5.56	3.59	5198.76		5198.77	0.00003	0.6	159.0	44.3	0.06
channel	1075.*	218	5193.20	5.56	3.59	5198.76		5198.78	0.00014	1.4	158.9	44.3	0.12
channel	1075.*	113	5193.20	5.56	3.59	5198.76		5198.77	0.00004	0.7	159.0	44.3	0.06
channel	1075.*	16	5193.20	5.56	3.59	5198.76		5198.76	0.00000	0.1	159.1	44.3	0.01
channel	1075.*	5	5193.20	5.56	3.59	5198.76		5198.76	0.00000	0.0	159.1	44.3	0.00
channel	1050	100	5192.40	6.36	4.16	5198.76	5193.56	5198.76	0.00002	0.5	195.5	46.9	0.04

Sta 1200

Sta 1100

22/02 →

HEC-RAS Plan: trapmix_AP3 River: 118StChannel Reach: channel (Continued)

Reach	River Sta	Q Total	Min Ch El	Max Chl Dpth	Hydr Depth	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
channel	1050	218	5192.40	6.36	4.16	5198.76	5194.24	5198.78	0.00007	1.1	195.5	46.9	0.09
channel	1050	113	5192.40	6.36	4.16	5198.76	5193.65	5198.77	0.00002	0.6	195.5	46.9	0.05
channel	1050	16	5192.40	6.36	4.16	5198.76	5192.77	5198.76	0.00000	0.1	195.5	46.9	0.01
channel	1050	5	5192.40	6.36	4.16	5198.76	5192.61	5198.76	0.00000	0.0	195.5	46.9	0.00

Sta 1050

21/22

file k:\public\project\99099\hecras\sbt_sed rundate 3/20/00

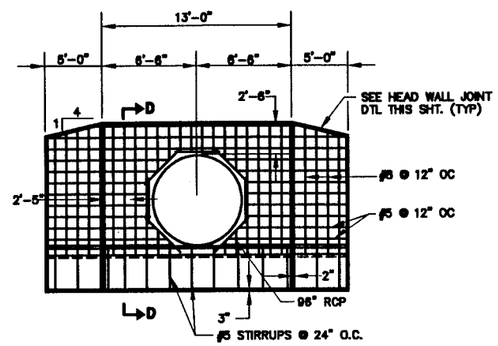
HEC-RAS Plan: AP5 trapmix

Reach	River Sta	Q Total	Min Ch El	Max Chl Dpth	Hydr Depth	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
BR 1	23	64	5195.70	0.66	0.40	5196.36	5196.36	5196.57	0.01864	3.7	17.3	42.8	1.02
BR 1	23	135	5195.70	0.94	0.55	5196.64	5196.64	5196.93	0.01631	4.3	31.7	57.1	1.01
BR 1	23	68	5195.70	0.68	0.42	5196.38	5196.38	5196.59	0.01804	3.7	18.3	44.0	1.01
BR 1	23	8	5195.70	0.22	0.16	5195.92	5195.92	5196.01	0.02360	2.3	3.5	21.2	0.99
BR 1	21	64	5186.70	0.37	0.24	5187.07	5187.34	5188.12	0.18406	8.2	7.8	32.1	2.95
BR 1	21	135	5186.70	0.51	0.32	5187.21	5187.59	5188.92	0.20713	10.5	12.9	40.6	3.28
BR 1	21	68	5186.70	0.39	0.25	5187.09	5187.35	5188.11	0.16924	8.1	8.4	33.2	2.85
BR 1	21	8	5186.70	0.14	0.11	5186.84	5186.91	5187.09	0.12952	4.0	2.0	18.4	2.17
BR 1	20	64	5183.70	0.60	0.36	5184.30	5184.30	5184.48	0.01907	3.4	18.6	52.0	1.02
BR 1	20	135	5183.70	0.85	0.48	5184.55	5184.55	5184.80	0.01749	4.0	33.5	69.2	1.02
BR 1	20	68	5183.70	0.62	0.37	5184.32	5184.32	5184.51	0.01910	3.5	19.4	53.1	1.02
BR 1	20	8	5183.70	0.20	0.14	5183.90	5183.90	5183.99	0.03074	2.4	3.4	24.0	1.10
BR 1	19	64	5178.70	0.43	0.30	5179.13	5179.43	5180.25	0.14518	8.5	7.6	25.1	2.72
BR 1	19	135	5178.70	0.64	0.42	5179.34	5179.76	5180.88	0.12931	10.0	13.6	32.4	2.71
BR 1	19	68	5178.70	0.45	0.31	5179.15	5179.45	5180.27	0.13920	8.5	8.0	25.7	2.68
BR 1	19	8	5178.70	0.16	0.13	5178.86	5178.94	5179.09	0.08619	3.8	2.1	15.7	1.83
BR 1	18	64	5175.70	0.57	0.34	5176.27	5176.27	5176.45	0.01976	3.4	18.9	55.9	1.02
BR 1	18	135	5175.70	0.81	0.46	5176.51	5176.51	5176.75	0.01748	3.9	34.6	75.0	1.01
BR 1	18	68	5175.70	0.60	0.35	5176.30	5176.30	5176.47	0.01872	3.4	20.2	57.7	1.00
BR 1	18	8	5175.70	0.21	0.14	5175.91	5175.91	5175.98	0.02357	2.1	3.8	26.7	0.97
BR 1	17	64	5173.20	0.33	0.29	5173.53	5173.60	5173.80	0.03674	4.2	15.4	53.2	1.36
BR 1	17	135	5173.20	0.49	0.41	5173.69	5173.83	5174.16	0.04027	5.5	24.6	59.7	1.51
BR 1	17	68	5173.20	0.34	0.30	5173.54	5173.61	5173.83	0.03843	4.3	15.8	53.5	1.40
BR 1	17	8	5173.20	0.10	0.10	5173.30	5173.31	5173.36	0.03116	1.9	4.3	44.1	1.05
S Borrega Trib	10.4	64	5155.00	7.42	6.34	5162.42		5162.42	0.00000	0.3	212.5	33.5	0.02
S Borrega Trib	10.4	135	5155.00	9.24	6.22	5164.24		5164.25	0.00000	0.5	284.9	45.8	0.03
S Borrega Trib	10.4	68	5155.00	7.53	6.31	5162.53		5162.53	0.00000	0.3	216.4	34.3	0.02
S Borrega Trib	10.4	8	5155.00	5.14	4.83	5160.14		5160.14	0.00000	0.1	143.0	29.6	0.00
S Borrega Trib	10.2	64	5154.50	7.92	6.56	5162.42	5155.06	5162.42	0.00000	0.3	227.8	34.7	0.02
S Borrega Trib	10.2	135	5154.50	9.74	6.51	5164.24	5155.43	5164.25	0.00000	0.5	301.9	46.4	0.03
S Borrega Trib	10.2	68	5154.50	8.03	6.54	5162.53	5155.10	5162.53	0.00000	0.3	231.9	35.5	0.02
S Borrega Trib	10.2	8	5154.50	5.64	5.28	5160.14	5154.64	5160.14	0.00000	0.1	157.4	29.8	0.00
S Borrega Trib	10.04	Culvert											

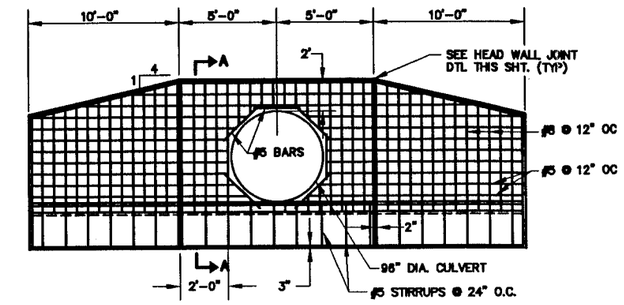
Sta 10.4

Sta 10.2

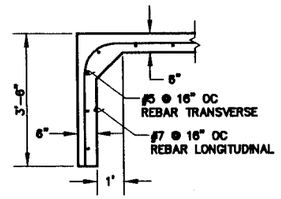
22/22



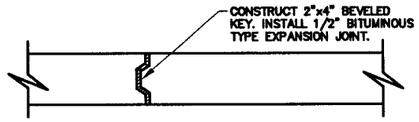
118TH STREET
INTAKE STRUCTURE DETAIL ELEVATION
N.T.S.



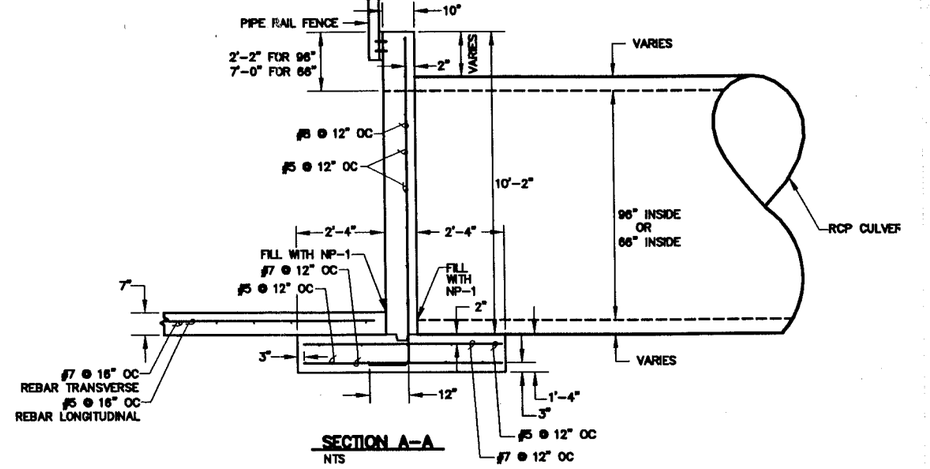
118TH STREET
OUTLET STRUCTURE DETAIL ELEVATION
NTS



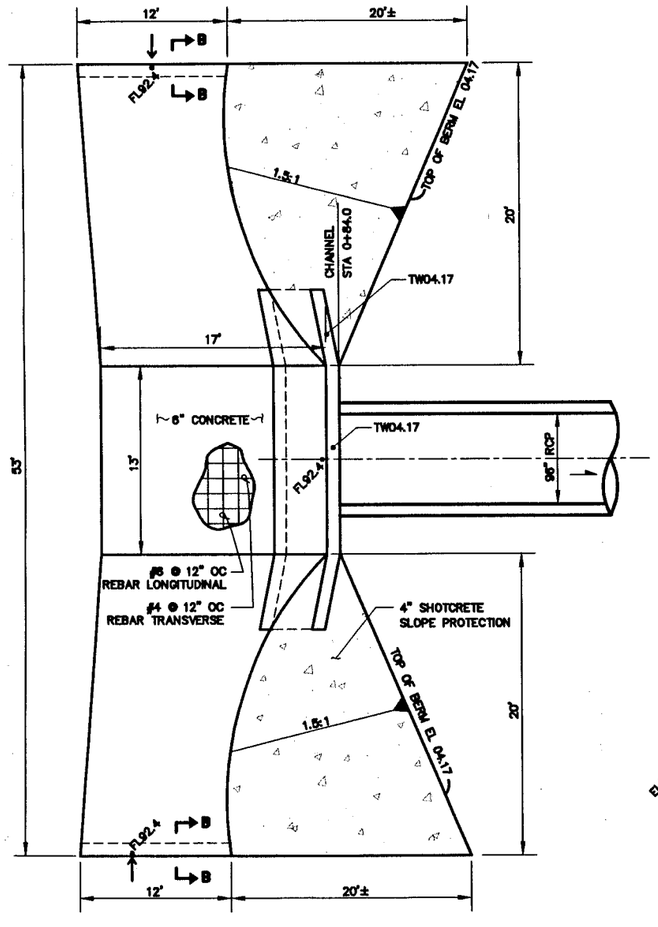
SECTION B-B
1" = 2'



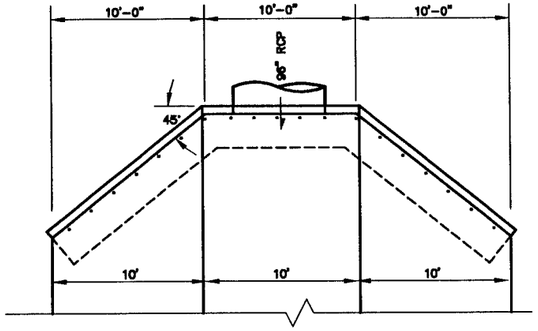
PLAN VIEW
HEADWALL JOINT DETAIL
N.T.S.



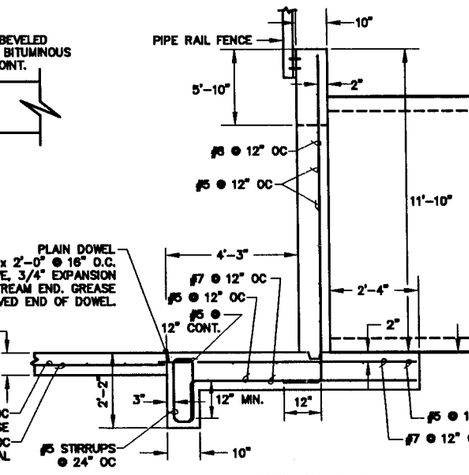
SECTION A-A
NTS



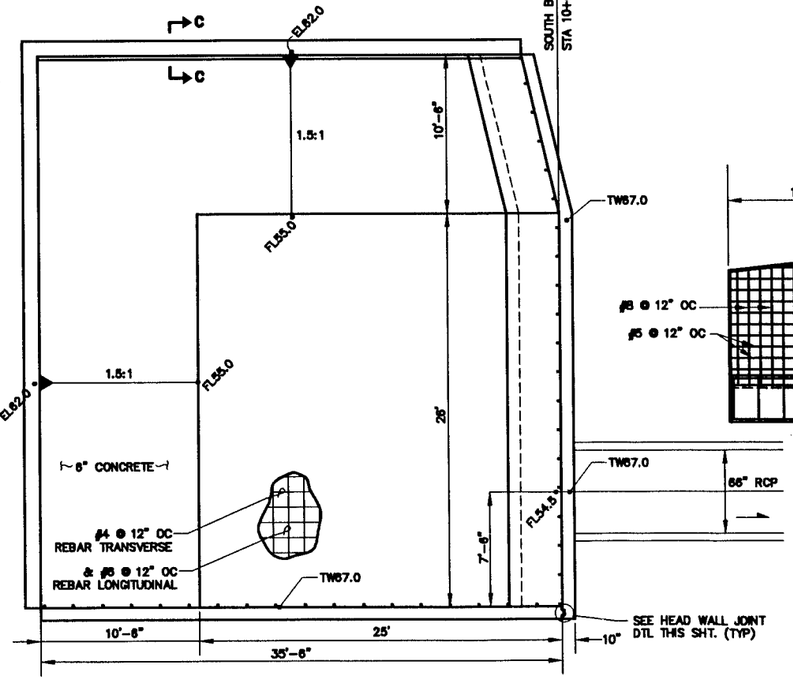
118TH STREET
INTAKE STRUCTURE DETAIL-PLAN
1" = 5'



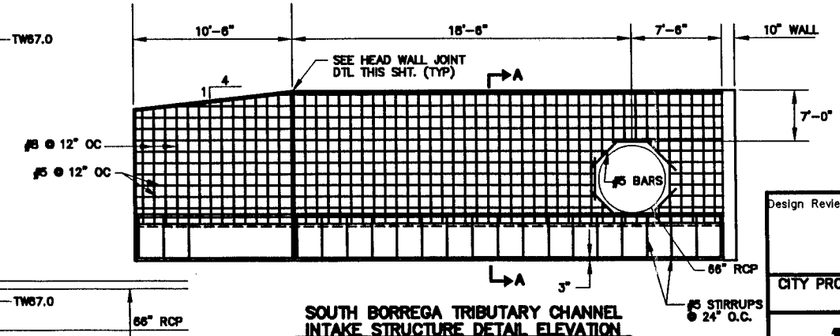
118TH STREET
OUTLET STRUCTURE - PLAN
1" = 5'



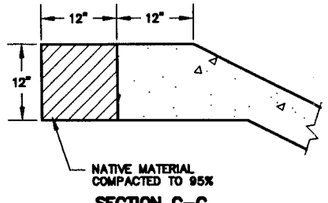
SECTION D-D
1" = 2'



SOUTH BORREGA TRIBUTARY CHANNEL
INTAKE STRUCTURE DETAIL-PLAN
1" = 5'



SOUTH BORREGA TRIBUTARY CHANNEL
INTAKE STRUCTURE DETAIL ELEVATION
NTS



SECTION C-C
1" = 1'

GENERAL NOTES:

1. ALL CONCRETE SHALL BE 3000 PSI 28 DAY STRENG
2. ALL REBAR SHALL BE GRADE 60 CONFORMING TO ASTM A 615.

CONSTRUCTION NOTES:

1. BACK FILL SHALL BE COMPACTED TO 95% PER ASTM D 1557.
2. SPLICES OF REBAR SHALL BE LAPPED AT 24 BAR DIAMETERS OR 12" MINIMUM.
3. CONSTRUCTION KEY JOINTS SHALL CONFORM TO SECTION 510.13 OF THE STANDARD SPECIFICATIONS.

Design Review Committee	City Engineer Approval	Last Design Update	Mo./Day/Yr.	Mo./Day/

CITY PROJECT NO. 629781

WILSON & COMPANY
4900 LANG AVENUE NE
ALBUQUERQUE, NM 87109
(505) 348-4000

DATE JULY 1999
FILE NO. 98088
DESIGN S.M | D J

BERNALILLO COUNTY
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

DRAINAGE DETAILS - OFFSITE

County Project No.	Zone Map No.	Sheet	Of
PWD-98-6	P-8, P9	58	6

BORREGA DIVERSION SEDIMENT ISSUES
FLOODPLAIN STUDY FOR AMAFCA

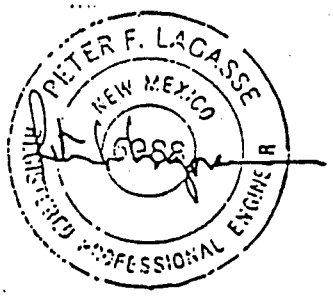
Prepared for:

Bohannan-Huston, Inc.

Prepared by:

Resource Consultants, Inc.
P.O. Box Q
Fort Collins, Colorado 80522

Ref: 91-612



June 1992

$$Q_s = aQ^b \quad (5.2)$$

where Q_s is the bed material load in cubic feet per second (cfs), Q is the instantaneous water discharge in cfs and a and b are constants. The resulting rating curves are summarized in Table 5.1. These rating curves reflect the bed material transport capacity assuming relatively low suspended sediment concentrations. In computing the total sediment load associated with each discharge, the clear water bed material load was estimated using the rating curves and then adjusted to account for the high concentration of suspended load using the Colby procedure. This computational procedure is discussed in detail in RCI, 1991. Average suspended sediment concentrations for each storm event were estimated from the results of the watershed sediment yield analysis discussed above.

5.4. Calibration of the Sediment Load Relationships

The sediment yields associated with each storm hydrograph were computed by integrating the bed material loads, corrected for suspended sediment concentration, over the individual storm hydrographs and adding the result to the watershed sediment yield estimates. The results were then calibrated, to the extent possible, using available data.

Previous studies have indicated annual sediment yields for existing watershed conditions in the Albuquerque area ranging from about 1 to 3.5 tons/acre. (RCI, 1989; BHI, 1990 and 1991) In addition, RCI (1989) estimated sediment yields associated with the 100 , 25 and 10 year storm for Calabacillas Arroyo for existing conditions of 19.0, 10.5 and 5.1 tons/acre respectively. As discussed in RCI, 1991, watershed conditions vary considerably throughout the Albuquerque area which can be expected to result in considerable variation in the sediment yield. For this reason, data from watersheds in the Northwest Quadrant (e.g. Calabacillas, Black or Ladera) may not be directly applicable to watersheds in the Southwest quadrant.

Table 5.2. Fluid matrix characteristics (O'Brien, 1986).

Type of Flow	Solids Concentration by Volume C_v	Solids Concentration by Weight C_w	Flow Characteristics
Landslide	>64%	>88%	Will not flow; failure by block sliding or tumbling. Unsaturated soil conditions.
Landslide	50%-64%	73%-88%	Will not flow; block sliding failure with some internal deformation, slow creep prior to failure; saturated.
Mudflow	45%-50%	69%-73%	Flow initiates; plastic deformation with slow sustained creep. Begins spreading; moves subject to repeated vibration.
Mudflow	40%-45%	65%-69%	Mixes easily; shows some fluid properties. Surface may be inclined at rest. Waves dissipate rapidly.
Mud flood	35%-40%	59%-65%	Spreads on horizontal surface; marked particle settling, liquid horizontal surface, two-phase separation in quiescent condition; waves travel easily.
Mud flood	30%-35%	54%-59%	Sand and gravel settle; distinct wave action.
Mud flood	20%-30%	41%-54%	Particles rest on bottom in wave motion.
Water flood	<20%	<41%	Water flood with bed and suspended load.

Table 5.3. Summary of Borrega Watershed sediment yields computations using MUSLE.

	EXISTING CONDITIONS				DEVELOPED CONDITIONS			
Return Period (yrs)	QP (cfs)	VW (ac-ft)	Sediment Yield (t/ac)	Concentration (ppm)	QP (cfs)	VW (ac-ft)	Sediment Yield (t/ac)	Concentration (ppm)
2	0	0.00	0.00	0	321.4	24.7	0.00	0
5	22	2.22	0.32	77,700	552.3	37.68	0.09	1,300
10	94.4	7.01	1.39	106,000	767.9	48.69	0.38	4,200
25	248	15.53	3.72	128,300	1067.9	63.71	1.03	8,600
50	401.7	22.91	6.07	141,600	1302.4	75.59	1.67	11,800
100	561	30.35	8.56	151,000	1534.0	86.35	2.36	14,600
ANNUAL		2.42	0.54			26.29	0.15	

Table 5.4. Sediment yields at tributary confluence and Hubbell Lake Inlet for Existing and Developed Conditions.

Return Period	Total Sediment Yields (Tons/Acre) REACH		
	Main Channel[1] U/S Tributary	Tributary[2]	Main Channel[3] Hubbell Lake Inlet
	Existing Condition		
100	21.9	7.4	10.4
50	15.0	4.9	6.9
25	8.0	2.8	4.0
10	2.4	0.9	1.4
5	0.5	0.2	0.3
2	---	---	---
Annual	1.2	0.4	0.6
	Developed Condition		
100	11.7	8.0	4.3
50	8.9	6.4	3.1
25	6.5	5.0	2.1
10	4.1	3.3	1.1
5	2.6	2.2	.6
2	1.3	1.1	.3
Annual	1.9	1.6	.5

[1] Drainage Area = 604 acres
[2] Drainage Area = 122.5 acres
[3] Drainage Area = 821 acres

over time. This process will eventually result in a long-term reduction in the annual sediment yield from the Borrega Arroyo watershed.

Until the incision process has occurred, sediment yields from the main arroyo and tributary channel appear to be significantly greater than the transport capacity of the channelized portion of the main arroyo between the tributary confluence and the Hubbell Lake inlet. The annual sediment yield at the Hubbell Lake inlet for existing and developed conditions is approximately 0.6 tons/acre and 0.5 tons/acre, respectively. Significant deposition in that reach can, therefore, be expected until the channels reach a state of equilibrium. The characteristics of this depositional tendency will be addressed in more detail in next chapter.

The total sediment yield delivered to the Hubbell Lake inlet for each of the storms and on an average annual basis is summarized in Table 5.6. For existing conditions, due to the potential for debris blockage and channel avulsion, the amount of material that will actually pass through the inlet structure into Hubbell Lake is unclear. For developed conditions, if the inlet structure is modified to insure adequate hydraulic capacity and minimal debris blockage, the quantities in Table 5.4 should represent the amount of sediment that will be delivered to the Hubbell Lake detention area.

5.7. Bulking Factors for 100-year Peak Discharge

Based on the total sediment yield calculations, bulking factors and bulked discharges for the 100-year peak discharge were computed. The results are summarized in Table 5.7. The bulking factors vary considerably depending on the location of interest. For example, for existing conditions, the bulking factor in the main arroyo just upstream of the tributary confluence (Hydrograph Number 108.3) is 1.54 increasing the peak discharge from 464 cfs for clear water conditions to 715 cfs when the sediment load is included. Since the sediment yield is significantly less from the tributary channel and the bed material transport capacity of the main arroyo

Table 5.7. Summary of Bulking Factors for 100-year Peak Discharge (see Figure 1.2 for hydrograph locations).

	Existing Conditions			Developed Conditions		
HYMO Hydrograph II	Clear Water Peak Discharge (cfs)	Peak Bulking Factor	Bulked Peak Discharge (cfs)	Clear Water Peak Discharge (cfs)	Peak Bulking Factor	Bulked Peak Discharge (cfs)
108.3	464	1.54	715	1221	1.06	1294
109.1	103	1.10	113	319	1.05	335
109.3	561	1.20	673	1533	1.03	1578
110.3	642	1.13	725	1733	1.02	1768

APPENDIX C - Hydraulics

North Borrega Channel HEC-RAS Analysis

Exhibit 1. HEC-RAS Cross Section Stations

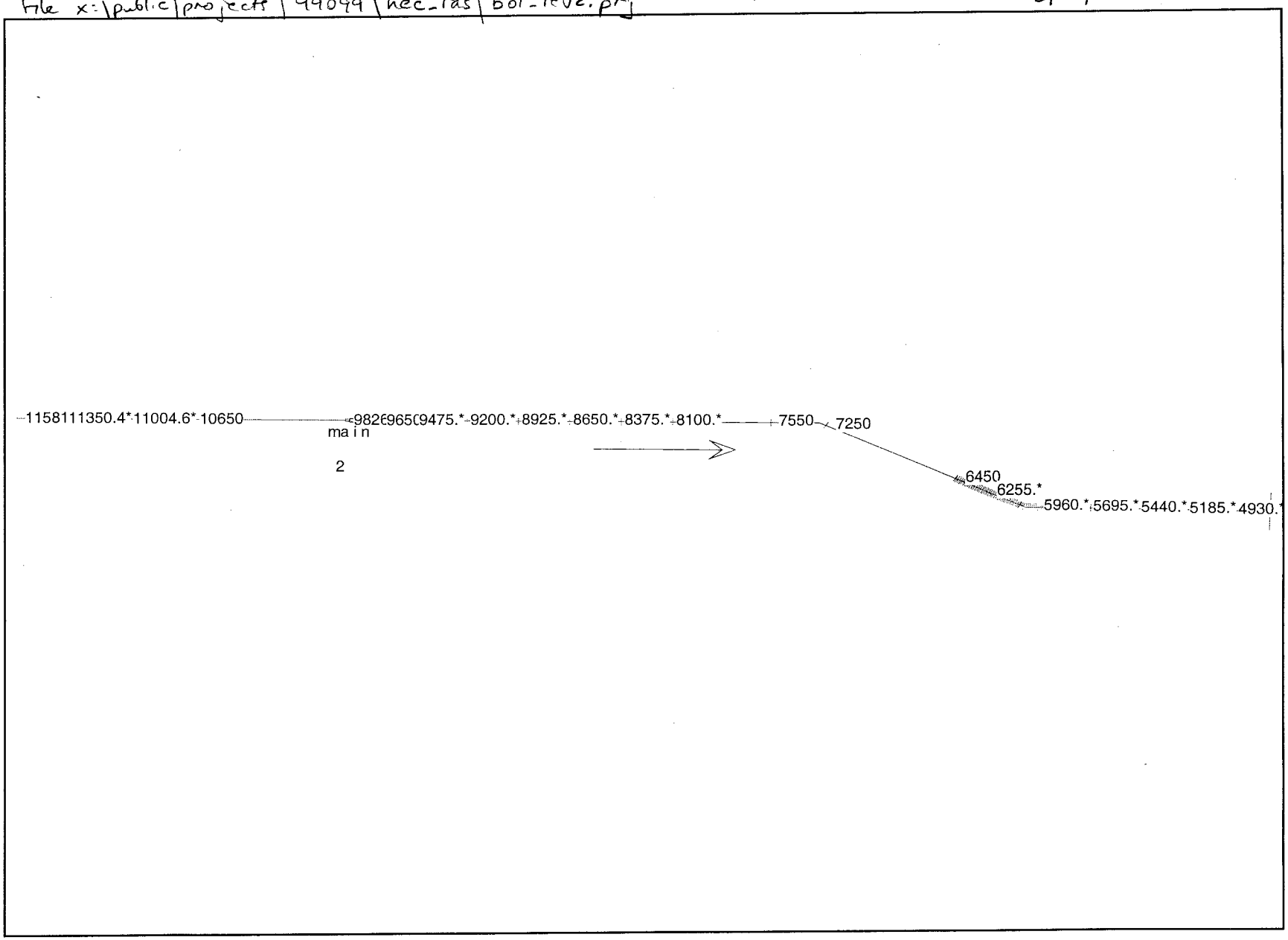
Freeboard Calculations North Borrega Channel

Calculations for 96" RCP Intake for North Borrega Channel

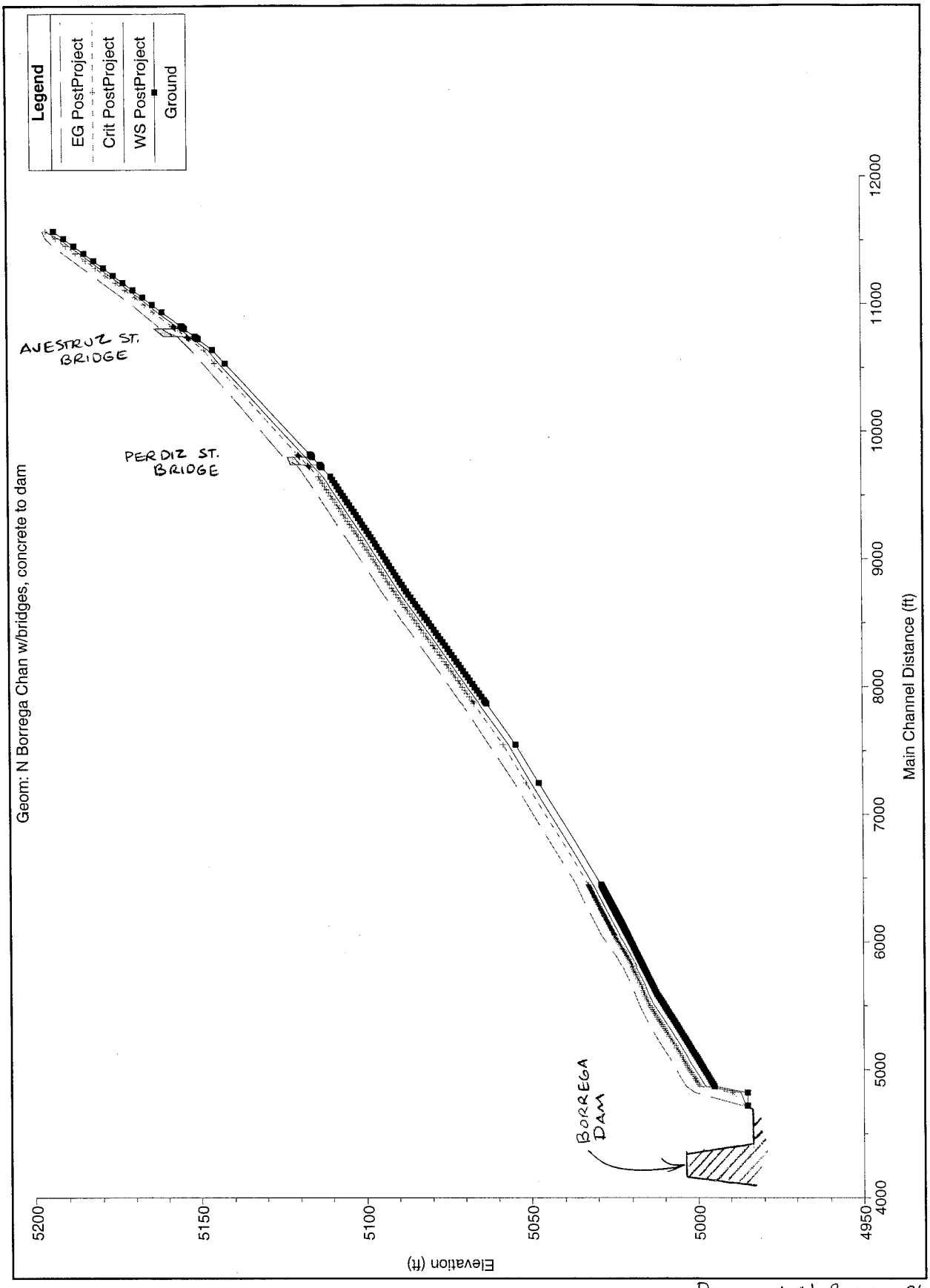
Borrega Dam Storage-Discharge Calculations

Principal Spillway Outlet Calculations

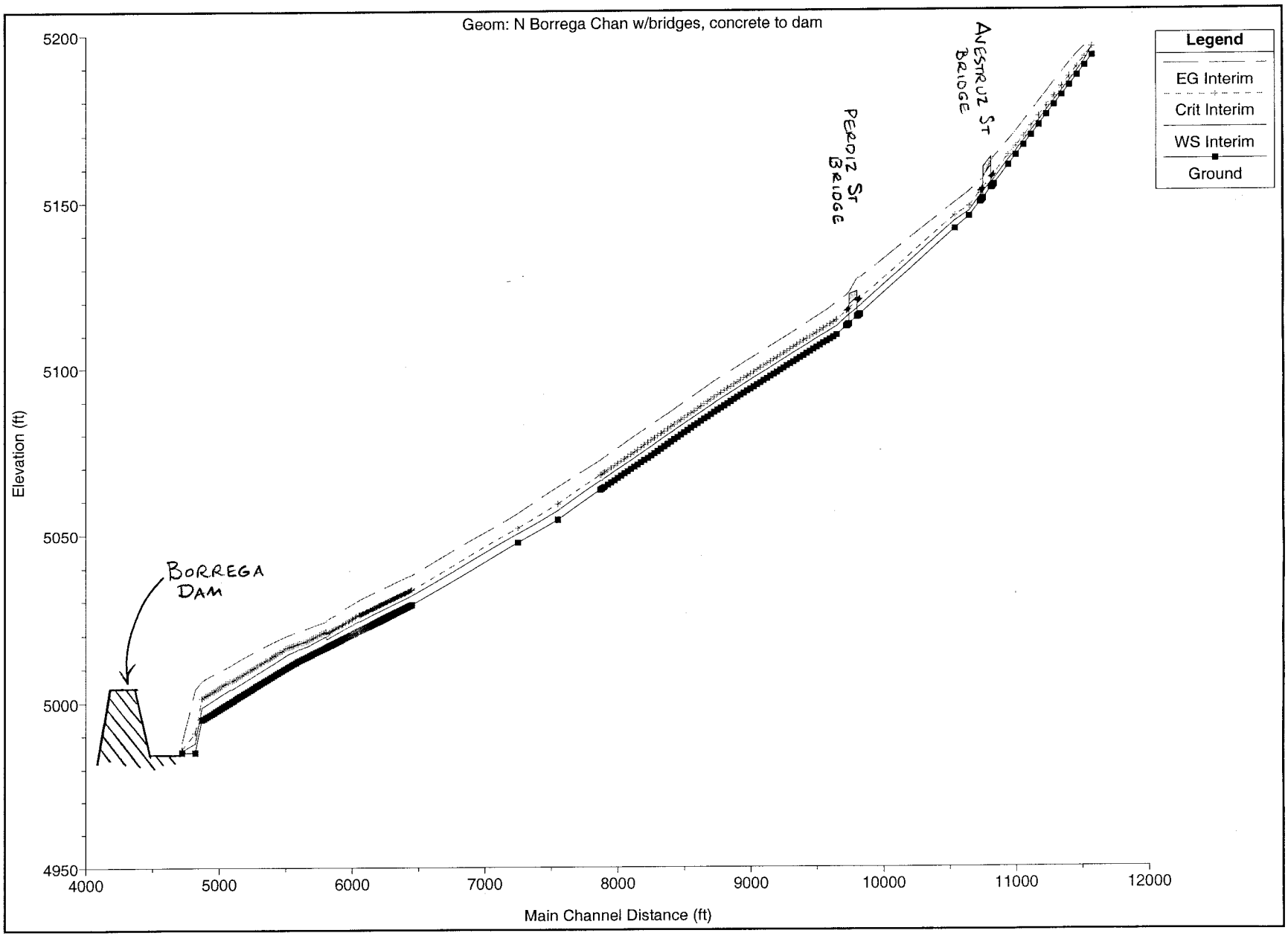
File x:\public\projects\99099\hec_ras\bor_reve.prj 3/07/00



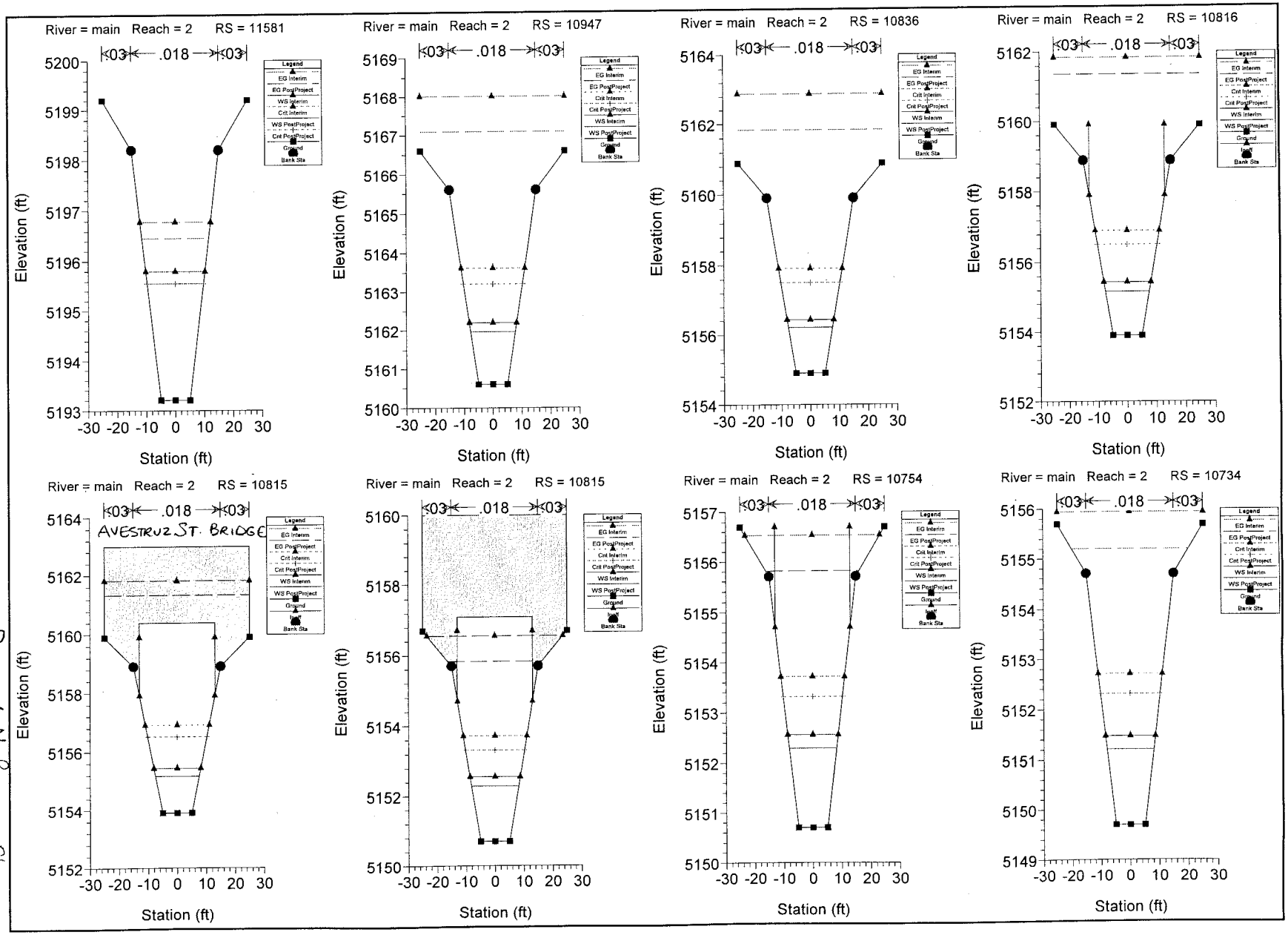
Proposed N. Borrega Chan.
1/20



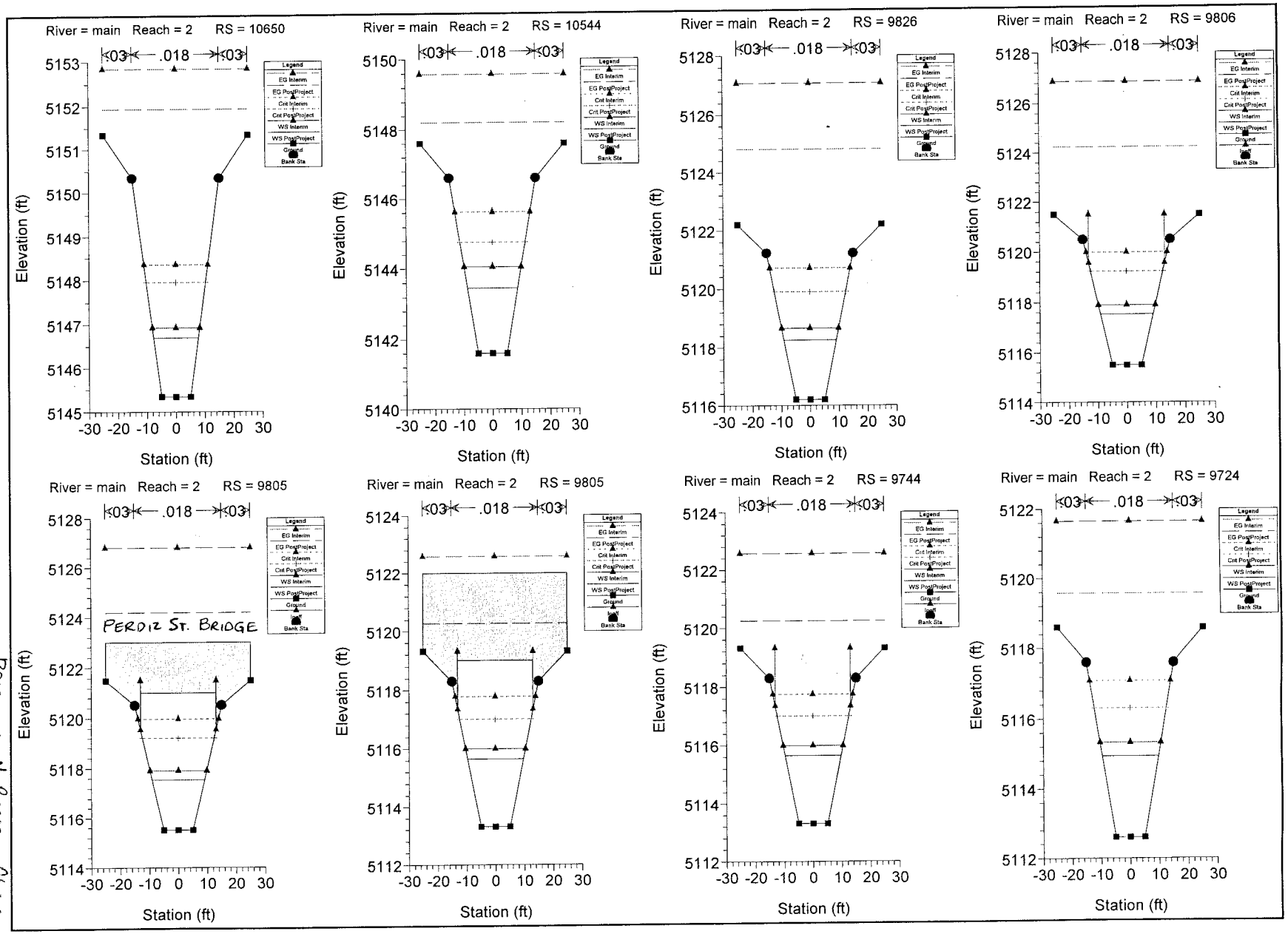
Proposed N. Borrega Chan
2/20



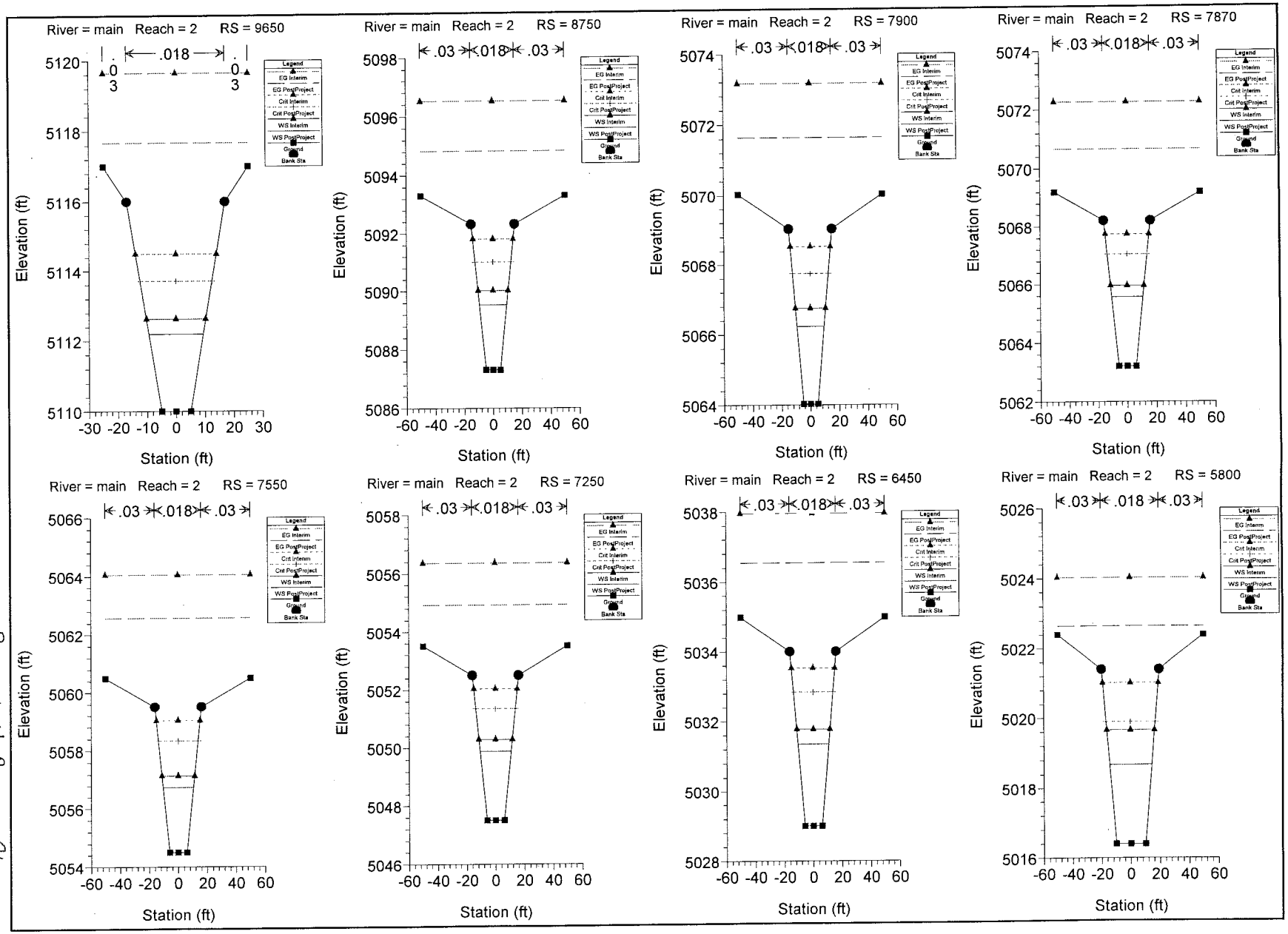
Proposed N. Borrega Chan
3/20



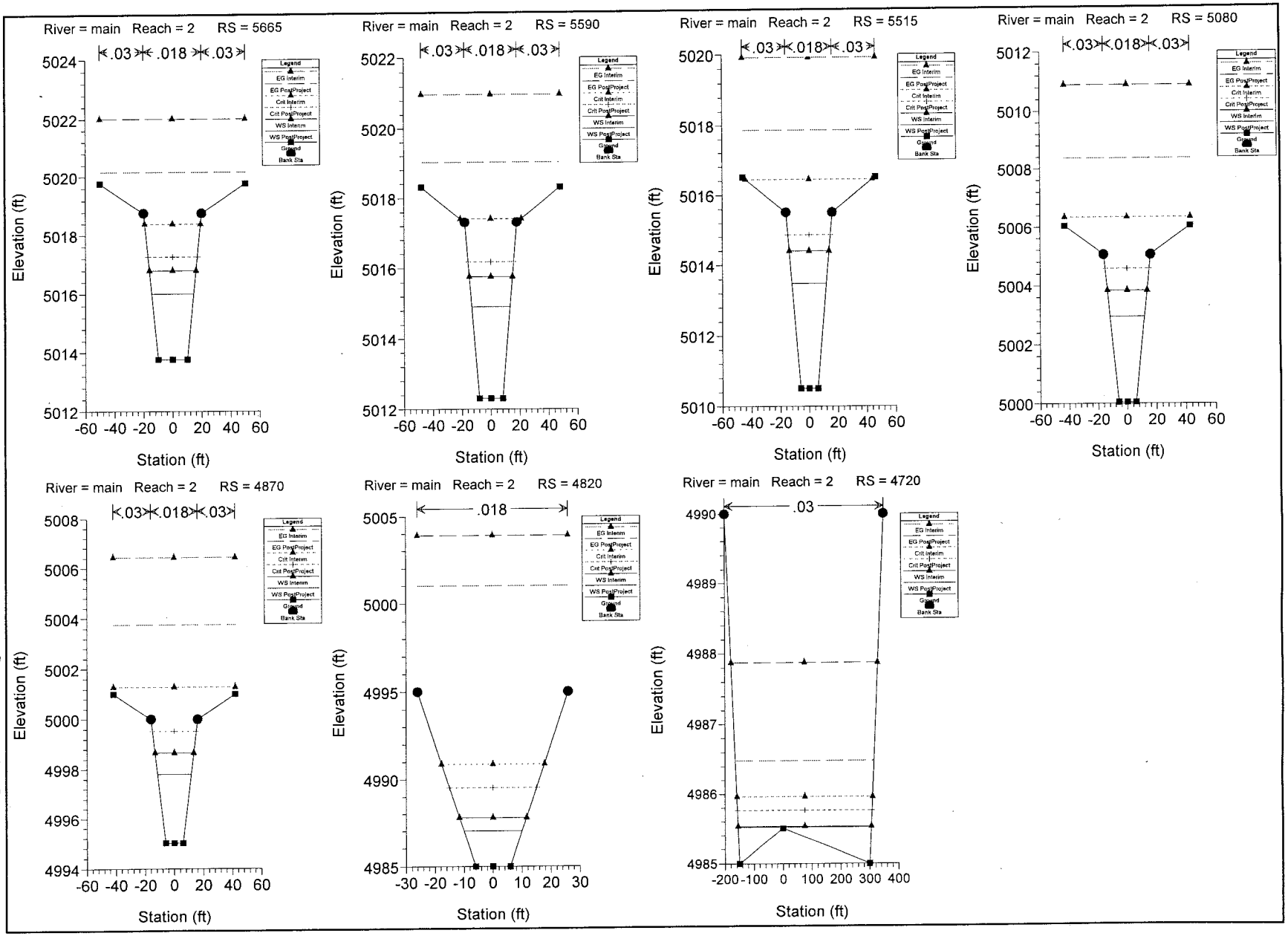
Proposed N. Borrego Chan
4/20



Proposed N. Borrego Chan.
5/20



Proposed N. Borrega Chan.
6/20



Proposed N. Borrego Chan
7/20

99099\hec_ras\bor_rev2.prj

HEC-RAS Plan: NBorregaChan River: main Reach: 2

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	11581	PostProject	264	5193.20	2.36	5195.56	5195.56	5196.46	0.45	0.00422	7.6	34.7	19.4	1.00
2	11523.3*	PostProject	264	5190.24	1.30	5191.54	5192.60	5195.57	2.34	0.03622	16.1	16.4	15.2	2.73
2	11465.7*	PostProject	264	5187.27	1.22	5188.49	5189.62	5193.17	2.78	0.04523	17.4	15.2	14.9	3.03
2	11408.0*	PostProject	264	5184.31	1.21	5185.52	5186.67	5190.35	2.88	0.04739	17.6	15.0	14.8	3.09
2	11350.4*	PostProject	264	5181.35	1.19	5182.54	5183.70	5187.54	2.99	0.04982	17.9	14.7	14.7	3.17
2	11292.8*	PostProject	264	5178.38	1.18	5179.56	5180.74	5184.63	3.04	0.05084	18.1	14.6	14.7	3.20
2	11235.1*	PostProject	264	5175.42	1.19	5176.61	5177.77	5181.61	2.99	0.04990	18.0	14.7	14.7	3.17
2	11177.5*	PostProject	264	5172.45	1.18	5173.63	5174.81	5178.68	3.02	0.05055	18.0	14.6	14.7	3.19
2	11119.9*	PostProject	264	5169.49	1.19	5170.68	5171.84	5175.71	3.02	0.05040	18.0	14.7	14.7	3.18
2	11062.2*	PostProject	264	5166.53	1.19	5167.72	5168.89	5172.73	3.00	0.05004	18.0	14.7	14.7	3.17
2	11004.6*	PostProject	264	5163.56	1.18	5164.74	5165.92	5169.81	3.04	0.05084	18.1	14.6	14.7	3.20
2	10947	PostProject	316	5160.60	1.37	5161.97	5163.21	5167.09	2.95	0.04371	18.2	17.4	15.5	3.02
2	10836	PostProject	316	5154.90	1.32	5156.22	5157.51	5161.83	3.26	0.04998	19.0	16.6	15.3	3.21
2	10834.*	PostProject	316	5154.80	1.31	5156.11	5157.41	5161.83	3.34	0.05141	19.2	16.5	15.2	3.25
2	10832.*	PostProject	316	5154.70	1.30	5156.00	5157.31	5161.77	3.36	0.05189	19.3	16.4	15.2	3.27
2	10830.*	PostProject	316	5154.60	1.30	5155.90	5157.21	5161.70	3.39	0.05244	19.3	16.3	15.2	3.28
2	10828.*	PostProject	316	5154.50	1.29	5155.79	5157.11	5161.65	3.42	0.05314	19.4	16.3	15.2	3.31
2	10826.*	PostProject	316	5154.40	1.29	5155.69	5157.01	5161.62	3.47	0.05407	19.5	16.2	15.1	3.33
2	10824.*	PostProject	316	5154.30	1.28	5155.58	5156.91	5161.60	3.52	0.05525	19.7	16.1	15.1	3.37
2	10822.*	PostProject	316	5154.20	1.28	5155.48	5156.81	5161.53	3.55	0.05570	19.7	16.0	15.1	3.38
2	10820.*	PostProject	316	5154.10	1.27	5155.37	5156.71	5161.46	3.57	0.05623	19.8	16.0	15.1	3.39
2	10818.*	PostProject	316	5154.00	1.27	5155.27	5156.61	5161.41	3.61	0.05692	19.9	15.9	15.1	3.41
2	10816	PostProject	316	5153.90	1.26	5155.16	5156.51	5161.37	3.65	0.05791	20.0	15.8	15.0	3.44
2	10815		Bridge											
2	10754	PostProject	316	5150.70	1.59	5152.29	5153.31	5155.81	1.94	0.02539	15.1	21.0	16.4	2.34
2	10752.*	PostProject	316	5150.60	1.58	5152.18	5153.21	5155.76	1.97	0.02589	15.2	20.8	16.3	2.37
2	10750.*	PostProject	316	5150.50	1.57	5152.07	5153.11	5155.70	2.01	0.02647	15.3	20.7	16.3	2.39
2	10748.*	PostProject	316	5150.40	1.56	5151.96	5153.01	5155.65	2.04	0.02703	15.4	20.5	16.2	2.41
2	10746.*	PostProject	316	5150.30	1.56	5151.86	5152.91	5155.59	2.07	0.02755	15.5	20.4	16.2	2.44
2	10744.*	PostProject	316	5150.20	1.55	5151.75	5152.81	5155.52	2.10	0.02802	15.6	20.3	16.2	2.45
2	10742.*	PostProject	316	5150.10	1.54	5151.64	5152.71	5155.47	2.13	0.02860	15.7	20.1	16.2	2.48
2	10740.*	PostProject	316	5150.00	1.53	5151.53	5152.61	5155.41	2.16	0.02909	15.8	20.0	16.1	2.50
2	10738.*	PostProject	316	5149.90	1.53	5151.43	5152.51	5155.34	2.18	0.02949	15.9	19.9	16.1	2.51
2	10736.*	PostProject	316	5149.80	1.52	5151.32	5152.41	5155.28	2.21	0.03000	16.0	19.8	16.1	2.53
2	10734	PostProject	316	5149.70	1.51	5151.21	5152.31	5155.20	2.23	0.03040	16.0	19.7	16.1	2.55
2	10650	PostProject	316	5145.34	1.35	5146.69	5147.95	5151.94	3.03	0.04524	18.4	17.2	15.4	3.07
2	10544	PostProject	444	5141.60	1.85	5143.45	5144.76	5148.21	2.52	0.02905	17.5	25.4	17.4	2.56
2	9826	PostProject	593	5116.20	2.05	5118.25	5119.90	5124.80	3.37	0.03585	20.5	28.9	18.2	2.87
2	9824.*	PostProject	593	5116.13	2.05	5118.18	5119.84	5124.73	3.37	0.03585	20.5	28.9	18.2	2.87
2	9822.*	PostProject	593	5116.06	2.05	5118.11	5119.77	5124.68	3.38	0.03598	20.6	28.8	18.2	2.88
2	9820.*	PostProject	593	5115.99	2.04	5118.04	5119.70	5124.62	3.39	0.03610	20.6	28.8	18.2	2.88
2	9818.*	PostProject	593	5115.92	2.04	5117.96	5119.62	5124.57	3.40	0.03623	20.6	28.8	18.2	2.89
2	9816.*	PostProject	593	5115.85	2.04	5117.89	5119.56	5124.51	3.41	0.03639	20.7	28.7	18.2	2.89
2	9814.*	PostProject	593	5115.78	2.04	5117.82	5119.49	5124.46	3.42	0.03655	20.7	28.7	18.1	2.90
2	9812.*	PostProject	593	5115.71	2.03	5117.74	5119.41	5124.42	3.44	0.03677	20.7	28.6	18.1	2.91

Proposed N. Borrega Chan 8/20

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	9810.*	PostProject	593	5115.64	2.03	5117.67	5119.35	5124.38	3.46	0.03703	20.8	28.5	18.1	2.92
2	9808.*	PostProject	593	5115.57	2.03	5117.60	5119.27	5124.34	3.48	0.03729	20.8	28.5	18.1	2.93
2	9806	PostProject	593	5115.50	2.03	5117.53	5119.22	5124.24	3.46	0.03710	20.8	28.5	18.1	2.92
2	9805		Bridge											
2	9744	PostProject	593	5113.30	2.34	5115.64	5117.00	5120.26	2.29	0.02183	17.2	34.4	19.4	2.28
2	9742.*	PostProject	593	5113.23	2.35	5115.58	5116.94	5120.18	2.29	0.02178	17.2	34.4	19.4	2.28
2	9740.*	PostProject	593	5113.16	2.34	5115.50	5116.87	5120.13	2.30	0.02193	17.3	34.3	19.4	2.28
2	9738.*	PostProject	593	5113.09	2.34	5115.43	5116.80	5120.04	2.29	0.02179	17.2	34.4	19.4	2.28
2	9736.*	PostProject	593	5113.02	2.34	5115.36	5116.73	5119.99	2.30	0.02195	17.3	34.3	19.4	2.29
2	9734.*	PostProject	593	5112.95	2.35	5115.30	5116.66	5119.90	2.28	0.02174	17.2	34.4	19.4	2.28
2	9732.*	PostProject	593	5112.88	2.34	5115.22	5116.59	5119.86	2.30	0.02198	17.3	34.3	19.3	2.29
2	9730.*	PostProject	593	5112.81	2.35	5115.16	5116.52	5119.76	2.29	0.02178	17.2	34.4	19.4	2.28
2	9728.*	PostProject	593	5112.74	2.34	5115.08	5116.45	5119.71	2.30	0.02193	17.3	34.3	19.4	2.28
2	9726.*	PostProject	593	5112.67	2.34	5115.01	5116.38	5119.62	2.29	0.02179	17.2	34.4	19.4	2.28
2	9724	PostProject	593	5112.60	2.34	5114.94	5116.31	5119.57	2.30	0.02198	17.3	34.3	19.4	2.29
2	9650	PostProject	593	5110.00	2.19	5112.19	5113.71	5117.67	2.77	0.02783	18.8	31.6	18.8	2.55
2	9625.*	PostProject	593	5109.37	2.20	5111.57	5113.08	5117.02	2.75	0.02763	18.7	31.6	18.8	2.54
2	9600.*	PostProject	593	5108.74	2.20	5110.94	5112.45	5116.37	2.74	0.02748	18.7	31.7	18.8	2.54
2	9575.*	PostProject	593	5108.11	2.21	5110.32	5111.82	5115.73	2.73	0.02735	18.7	31.8	18.8	2.53
2	9550.*	PostProject	593	5107.48	2.21	5109.69	5111.18	5115.07	2.71	0.02711	18.6	31.9	18.8	2.52
2	9525.*	PostProject	593	5106.85	2.21	5109.06	5110.55	5114.42	2.70	0.02696	18.6	31.9	18.8	2.52
2	9500.*	PostProject	593	5106.22	2.22	5108.44	5109.92	5113.77	2.69	0.02677	18.5	32.0	18.9	2.51
2	9475.*	PostProject	593	5105.59	2.22	5107.81	5109.29	5113.13	2.68	0.02671	18.5	32.0	18.9	2.50
2	9450.*	PostProject	593	5104.96	2.22	5107.18	5108.66	5112.49	2.67	0.02659	18.5	32.1	18.9	2.50
2	9425.*	PostProject	593	5104.33	2.23	5106.56	5108.03	5111.84	2.66	0.02642	18.4	32.1	18.9	2.49
2	9400.*	PostProject	593	5103.70	2.23	5105.93	5107.40	5111.19	2.65	0.02629	18.4	32.2	18.9	2.49
2	9375.*	PostProject	593	5103.07	2.22	5105.29	5106.78	5110.59	2.67	0.02653	18.5	32.1	18.9	2.50
2	9350.*	PostProject	593	5102.44	2.23	5104.67	5106.14	5109.95	2.66	0.02643	18.4	32.1	18.9	2.49
2	9325.*	PostProject	593	5101.81	2.23	5104.04	5105.52	5109.31	2.65	0.02631	18.4	32.2	18.9	2.49
2	9300.*	PostProject	593	5101.18	2.23	5103.41	5104.88	5108.66	2.64	0.02618	18.4	32.3	18.9	2.48
2	9275.*	PostProject	593	5100.55	2.23	5102.78	5104.26	5108.06	2.66	0.02641	18.4	32.2	18.9	2.49
2	9250.*	PostProject	593	5099.92	2.23	5102.15	5103.63	5107.41	2.65	0.02628	18.4	32.2	18.9	2.49
2	9225.*	PostProject	593	5099.29	2.22	5101.51	5102.99	5106.81	2.66	0.02650	18.5	32.1	18.9	2.50
2	9200.*	PostProject	593	5098.65	2.22	5100.87	5102.35	5106.20	2.69	0.02676	18.5	32.0	18.9	2.51
2	9175.*	PostProject	593	5098.02	2.22	5100.24	5101.73	5105.55	2.67	0.02659	18.5	32.1	18.9	2.50
2	9150.*	PostProject	593	5097.39	2.22	5099.61	5101.10	5104.91	2.67	0.02654	18.5	32.1	18.9	2.50
2	9125.*	PostProject	593	5096.76	2.23	5098.99	5100.47	5104.27	2.66	0.02643	18.5	32.1	18.9	2.49
2	9100.*	PostProject	593	5096.13	2.23	5098.36	5099.83	5103.63	2.65	0.02631	18.4	32.2	18.9	2.49
2	9075.*	PostProject	593	5095.50	2.23	5097.73	5099.21	5102.98	2.64	0.02618	18.4	32.3	18.9	2.48
2	9050.*	PostProject	593	5094.87	2.24	5097.11	5098.57	5102.33	2.63	0.02603	18.4	32.3	18.9	2.47
2	9025.*	PostProject	593	5094.24	2.23	5096.47	5097.95	5101.73	2.64	0.02621	18.4	32.2	18.9	2.48
2	9000.*	PostProject	593	5093.61	2.23	5095.84	5097.31	5101.11	2.66	0.02637	18.4	32.2	18.9	2.49
2	8975.*	PostProject	593	5092.98	2.23	5095.21	5096.68	5100.47	2.65	0.02629	18.4	32.2	18.9	2.49
2	8950.*	PostProject	593	5092.35	2.23	5094.58	5096.05	5099.83	2.64	0.02614	18.4	32.3	18.9	2.48
2	8925.*	PostProject	593	5091.72	2.23	5093.95	5095.43	5099.22	2.65	0.02634	18.4	32.2	18.9	2.49

Proposed N. Borrega Chan
9/20

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	8900.*	PostProject	593	5091.09	2.23	5093.32	5094.79	5098.58	2.64	0.02624	18.4	32.2	18.9	2.48
2	8875.*	PostProject	593	5090.46	2.23	5092.69	5094.16	5097.97	2.66	0.02644	18.5	32.1	18.9	2.49
2	8850.*	PostProject	593	5089.83	2.23	5092.06	5093.53	5097.33	2.65	0.02633	18.4	32.2	18.9	2.49
2	8825.*	PostProject	593	5089.20	2.23	5091.43	5092.90	5096.68	2.64	0.02621	18.4	32.2	18.9	2.48
2	8800.*	PostProject	593	5088.57	2.23	5090.80	5092.28	5096.04	2.63	0.02611	18.4	32.3	18.9	2.48
2	8775.*	PostProject	593	5087.94	2.23	5090.17	5091.65	5095.43	2.65	0.02629	18.4	32.2	18.9	2.49
2	8750	PostProject	593	5087.31	2.22	5089.53	5091.01	5094.82	2.66	0.02648	18.5	32.1	18.9	2.49
2	8725.*	PostProject	593	5086.63	2.23	5088.86	5090.34	5094.10	2.63	0.02610	18.4	32.3	18.9	2.48
2	8700.*	PostProject	593	5085.94	2.23	5088.17	5089.65	5093.44	2.65	0.02633	18.4	32.2	18.9	2.49
2	8675.*	PostProject	593	5085.26	2.23	5087.49	5088.97	5092.74	2.64	0.02616	18.4	32.3	18.9	2.48
2	8650.*	PostProject	593	5084.57	2.23	5086.79	5088.28	5092.08	2.66	0.02646	18.5	32.1	18.9	2.49
2	8625.*	PostProject	593	5083.89	2.23	5086.12	5087.60	5091.38	2.65	0.02629	18.4	32.2	18.9	2.49
2	8600.*	PostProject	593	5083.20	2.22	5085.42	5086.91	5090.73	2.67	0.02659	18.5	32.1	18.9	2.50
2	8575.*	PostProject	593	5082.52	2.21	5084.73	5086.23	5090.12	2.72	0.02720	18.6	31.8	18.8	2.53
2	8550.*	PostProject	593	5081.83	2.22	5084.05	5085.54	5089.38	2.69	0.02676	18.5	32.0	18.9	2.51
2	8525.*	PostProject	593	5081.15	2.21	5083.36	5084.86	5088.76	2.72	0.02725	18.6	31.8	18.8	2.53
2	8500.*	PostProject	593	5080.46	2.22	5082.68	5084.17	5088.02	2.69	0.02685	18.6	32.0	18.9	2.51
2	8475.*	PostProject	593	5079.78	2.23	5082.00	5083.49	5087.29	2.66	0.02646	18.5	32.1	18.9	2.49
2	8450.*	PostProject	593	5079.09	2.23	5081.32	5082.80	5086.59	2.65	0.02633	18.4	32.2	18.9	2.49
2	8425.*	PostProject	593	5078.41	2.23	5080.64	5082.12	5085.89	2.64	0.02618	18.4	32.3	18.9	2.48
2	8400.*	PostProject	593	5077.72	2.23	5079.95	5081.43	5085.22	2.65	0.02635	18.4	32.2	18.9	2.49
2	8375.*	PostProject	593	5077.04	2.23	5079.27	5080.75	5084.52	2.64	0.02620	18.4	32.2	18.9	2.48
2	8350.*	PostProject	593	5076.35	2.23	5078.58	5080.06	5083.86	2.66	0.02640	18.4	32.2	18.9	2.49
2	8325.*	PostProject	593	5075.67	2.23	5077.90	5079.38	5083.16	2.65	0.02629	18.4	32.2	18.9	2.49
2	8300.*	PostProject	593	5074.99	2.23	5077.22	5078.70	5082.46	2.63	0.02610	18.4	32.3	18.9	2.48
2	8275.*	PostProject	593	5074.30	2.23	5076.53	5078.01	5081.80	2.65	0.02631	18.4	32.2	18.9	2.49
2	8250.*	PostProject	593	5073.62	2.23	5075.85	5077.33	5081.10	2.64	0.02614	18.4	32.3	18.9	2.48
2	8225.*	PostProject	593	5072.93	2.23	5075.16	5076.64	5080.44	2.66	0.02642	18.4	32.1	18.9	2.49
2	8200.*	PostProject	593	5072.25	2.23	5074.48	5075.96	5079.75	2.65	0.02633	18.4	32.2	18.9	2.49
2	8175.*	PostProject	593	5071.56	2.22	5073.78	5075.27	5079.08	2.67	0.02652	18.5	32.1	18.9	2.50
2	8150.*	PostProject	593	5070.88	2.23	5073.11	5074.59	5078.39	2.66	0.02642	18.4	32.1	18.9	2.49
2	8125.*	PostProject	593	5070.19	2.23	5072.42	5073.90	5077.68	2.64	0.02625	18.4	32.2	18.9	2.48
2	8100.*	PostProject	593	5069.51	2.24	5071.75	5073.22	5076.97	2.62	0.02599	18.3	32.3	18.9	2.47
2	8075.*	PostProject	593	5068.82	2.23	5071.05	5072.53	5076.31	2.65	0.02627	18.4	32.2	18.9	2.49
2	8050.*	PostProject	593	5068.14	2.23	5070.37	5071.85	5075.62	2.64	0.02620	18.4	32.2	18.9	2.48
2	8025.*	PostProject	593	5067.45	2.23	5069.68	5071.16	5074.96	2.66	0.02640	18.4	32.2	18.9	2.49
2	8000.*	PostProject	593	5066.77	2.23	5069.00	5070.48	5074.26	2.65	0.02629	18.4	32.2	18.9	2.49
2	7975.*	PostProject	593	5066.08	2.22	5068.30	5069.79	5073.61	2.67	0.02659	18.5	32.1	18.9	2.50
2	7950.*	PostProject	593	5065.40	2.21	5067.61	5069.11	5073.00	2.72	0.02720	18.6	31.8	18.8	2.53
2	7925.*	PostProject	593	5064.71	2.22	5066.93	5068.42	5072.26	2.69	0.02676	18.5	32.0	18.9	2.51
2	7900	PostProject	593	5064.03	2.21	5066.23	5067.74	5071.64	2.73	0.02731	18.7	31.8	18.8	2.53
2	7890.*	PostProject	593	5063.76	2.12	5065.88	5067.38	5071.35	2.78	0.02832	18.8	31.6	19.1	2.57
2	7880.*	PostProject	593	5063.48	2.04	5065.52	5067.02	5071.04	2.82	0.02941	18.9	31.4	19.5	2.62
2	7870	PostProject	716	5063.21	2.36	5065.57	5067.05	5070.67	2.49	0.02282	18.1	39.5	21.5	2.35
2	7550	PostProject	716	5054.50	2.24	5056.74	5058.34	5062.57	2.89	0.02764	19.4	37.0	21.0	2.57

Proposed N. Borrega Chan
9/20

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	7250	PostProject	716	5047.50	2.37	5049.87	5051.34	5054.91	2.46	0.02246	18.0	39.7	21.5	2.34
2	6450	PostProject	716	5029.00	2.34	5031.34	5032.84	5036.55	2.55	0.02349	18.3	39.1	21.4	2.38
2	6445.*	PostProject	716	5028.90	2.34	5031.24	5032.74	5036.47	2.57	0.02366	18.4	39.0	21.4	2.39
2	6440.*	PostProject	716	5028.81	2.34	5031.15	5032.65	5036.36	2.56	0.02354	18.3	39.1	21.4	2.39
2	6435.*	PostProject	716	5028.71	2.34	5031.05	5032.55	5036.28	2.57	0.02366	18.4	39.0	21.4	2.39
2	6430.*	PostProject	716	5028.61	2.34	5030.95	5032.45	5036.20	2.58	0.02383	18.4	38.9	21.3	2.40
2	6425.*	PostProject	716	5028.51	2.33	5030.84	5032.35	5036.12	2.60	0.02401	18.4	38.8	21.3	2.41
2	6420.*	PostProject	716	5028.42	2.33	5030.75	5032.26	5036.02	2.59	0.02393	18.4	38.9	21.3	2.41
2	6415.*	PostProject	716	5028.32	2.33	5030.65	5032.16	5035.95	2.61	0.02416	18.5	38.7	21.3	2.42
2	6410.*	PostProject	716	5028.22	2.32	5030.54	5032.06	5035.88	2.62	0.02434	18.5	38.6	21.3	2.42
2	6405.*	PostProject	716	5028.12	2.32	5030.44	5031.96	5035.80	2.64	0.02455	18.6	38.5	21.3	2.43
2	6400.*	PostProject	716	5028.02	2.32	5030.34	5031.86	5035.69	2.63	0.02445	18.6	38.6	21.3	2.43
2	6395.*	PostProject	716	5027.93	2.32	5030.25	5031.77	5035.59	2.63	0.02436	18.5	38.6	21.3	2.43
2	6390.*	PostProject	716	5027.83	2.32	5030.15	5031.67	5035.52	2.64	0.02457	18.6	38.5	21.3	2.43
2	6385.*	PostProject	716	5027.73	2.32	5030.05	5031.57	5035.41	2.64	0.02449	18.6	38.5	21.3	2.43
2	6380.*	PostProject	716	5027.64	2.32	5029.96	5031.48	5035.30	2.63	0.02440	18.5	38.6	21.3	2.43
2	6375.*	PostProject	716	5027.54	2.32	5029.86	5031.38	5035.23	2.65	0.02460	18.6	38.5	21.3	2.44
2	6370.*	PostProject	716	5027.44	2.32	5029.76	5031.28	5035.12	2.64	0.02453	18.6	38.5	21.3	2.43
2	6365.*	PostProject	716	5027.34	2.32	5029.66	5031.18	5035.01	2.63	0.02443	18.6	38.6	21.3	2.43
2	6360.*	PostProject	716	5027.25	2.32	5029.57	5031.09	5034.90	2.62	0.02432	18.5	38.6	21.3	2.42
2	6355.*	PostProject	716	5027.15	2.32	5029.47	5030.99	5034.83	2.64	0.02451	18.6	38.5	21.3	2.43
2	6350.*	PostProject	716	5027.05	2.31	5029.36	5030.89	5034.76	2.66	0.02474	18.6	38.4	21.2	2.44
2	6345.*	PostProject	716	5026.95	2.31	5029.26	5030.79	5034.68	2.67	0.02493	18.7	38.3	21.2	2.45
2	6340.*	PostProject	716	5026.85	2.31	5029.16	5030.69	5034.57	2.66	0.02481	18.7	38.4	21.2	2.45
2	6335.*	PostProject	716	5026.76	2.31	5029.07	5030.60	5034.46	2.65	0.02466	18.6	38.5	21.2	2.44
2	6330.*	PostProject	716	5026.66	2.31	5028.97	5030.50	5034.38	2.67	0.02487	18.7	38.3	21.2	2.45
2	6325.*	PostProject	716	5026.56	2.30	5028.86	5030.40	5034.31	2.69	0.02508	18.7	38.2	21.2	2.46
2	6320.*	PostProject	716	5026.46	2.31	5028.77	5030.30	5034.20	2.68	0.02500	18.7	38.3	21.2	2.45
2	6315.*	PostProject	716	5026.37	2.31	5028.68	5030.21	5034.10	2.67	0.02491	18.7	38.3	21.2	2.45
2	6310.*	PostProject	716	5026.27	2.30	5028.57	5030.11	5034.03	2.69	0.02512	18.7	38.2	21.2	2.46
2	6305.*	PostProject	716	5026.17	2.30	5028.47	5030.01	5033.92	2.68	0.02504	18.7	38.2	21.2	2.46
2	6300.*	PostProject	716	5026.08	2.31	5028.39	5029.92	5033.81	2.67	0.02495	18.7	38.3	21.2	2.45
2	6295.*	PostProject	716	5025.98	2.31	5028.29	5029.82	5033.70	2.67	0.02485	18.7	38.3	21.2	2.45
2	6290.*	PostProject	716	5025.88	2.30	5028.18	5029.72	5033.63	2.68	0.02506	18.7	38.2	21.2	2.46
2	6285.*	PostProject	716	5025.78	2.31	5028.09	5029.62	5033.52	2.68	0.02499	18.7	38.3	21.2	2.45
2	6280.*	PostProject	716	5025.69	2.31	5028.00	5029.53	5033.41	2.67	0.02487	18.7	38.3	21.2	2.45
2	6275.*	PostProject	716	5025.59	2.30	5027.89	5029.43	5033.34	2.69	0.02508	18.7	38.2	21.2	2.46
2	6270.*	PostProject	716	5025.49	2.30	5027.79	5029.33	5033.23	2.68	0.02502	18.7	38.3	21.2	2.46
2	6265.*	PostProject	716	5025.39	2.31	5027.70	5029.23	5033.12	2.67	0.02493	18.7	38.3	21.2	2.45
2	6260.*	PostProject	716	5025.29	2.31	5027.60	5029.13	5033.01	2.66	0.02481	18.7	38.4	21.2	2.45
2	6255.*	PostProject	716	5025.20	2.31	5027.51	5029.04	5032.90	2.65	0.02468	18.6	38.4	21.2	2.44
2	6250.*	PostProject	716	5025.10	2.31	5027.42	5028.94	5032.79	2.65	0.02462	18.6	38.5	21.2	2.44
2	6245.*	PostProject	716	5025.00	2.32	5027.32	5028.84	5032.68	2.64	0.02455	18.6	38.5	21.3	2.43
2	6240.*	PostProject	716	5024.91	2.32	5027.23	5028.75	5032.58	2.63	0.02447	18.6	38.6	21.3	2.43
2	6235.*	PostProject	716	5024.81	2.31	5027.12	5028.65	5032.51	2.65	0.02470	18.6	38.4	21.2	2.44

Proposed N. Borrega Chan
10/20

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	6230.*	PostProject	716	5024.71	2.31	5027.02	5028.55	5032.41	2.65	0.02464	18.6	38.5	21.2	2.44
2	6225.*	PostProject	716	5024.61	2.32	5026.93	5028.45	5032.30	2.64	0.02457	18.6	38.5	21.3	2.43
2	6220.*	PostProject	716	5024.52	2.32	5026.84	5028.36	5032.19	2.63	0.02442	18.6	38.6	21.3	2.43
2	6215.*	PostProject	716	5024.42	2.31	5026.73	5028.26	5032.11	2.65	0.02462	18.6	38.5	21.2	2.44
2	6210.*	PostProject	716	5024.32	2.32	5026.64	5028.16	5032.00	2.64	0.02455	18.6	38.5	21.3	2.43
2	6205.*	PostProject	716	5024.22	2.32	5026.54	5028.06	5031.89	2.63	0.02447	18.6	38.6	21.3	2.43
2	6200.*	PostProject	716	5024.13	2.32	5026.45	5027.97	5031.79	2.63	0.02436	18.5	38.6	21.3	2.43
2	6195.*	PostProject	716	5024.03	2.32	5026.35	5027.87	5031.72	2.64	0.02457	18.6	38.5	21.3	2.43
2	6190.*	PostProject	716	5023.93	2.32	5026.25	5027.77	5031.61	2.64	0.02451	18.6	38.5	21.3	2.43
2	6185.*	PostProject	716	5023.83	2.31	5026.14	5027.67	5031.54	2.66	0.02474	18.6	38.4	21.2	2.44
2	6180.*	PostProject	716	5023.74	2.32	5026.06	5027.58	5031.43	2.65	0.02460	18.6	38.5	21.3	2.44
2	6175.*	PostProject	716	5023.64	2.32	5025.96	5027.48	5031.32	2.64	0.02453	18.6	38.5	21.3	2.43
2	6170.*	PostProject	716	5023.54	2.32	5025.86	5027.38	5031.21	2.63	0.02443	18.6	38.6	21.3	2.43
2	6165.*	PostProject	716	5023.44	2.31	5025.75	5027.28	5031.14	2.65	0.02466	18.6	38.5	21.2	2.44
2	6160.*	PostProject	716	5023.35	2.32	5025.67	5027.19	5031.03	2.64	0.02453	18.6	38.5	21.3	2.43
2	6155.*	PostProject	716	5023.25	2.32	5025.57	5027.09	5030.92	2.63	0.02443	18.6	38.6	21.3	2.43
2	6150.*	PostProject	716	5023.15	2.31	5025.46	5026.99	5030.85	2.65	0.02466	18.6	38.5	21.2	2.44
2	6145.*	PostProject	716	5023.05	2.32	5025.37	5026.89	5030.74	2.65	0.02460	18.6	38.5	21.3	2.44
2	6140.*	PostProject	716	5022.96	2.32	5025.28	5026.80	5030.63	2.63	0.02445	18.6	38.6	21.3	2.43
2	6135.*	PostProject	716	5022.86	2.31	5025.17	5026.70	5030.56	2.65	0.02468	18.6	38.4	21.2	2.44
2	6130.*	PostProject	716	5022.76	2.31	5025.07	5026.60	5030.45	2.65	0.02462	18.6	38.5	21.2	2.44
2	6125.*	PostProject	716	5022.66	2.32	5024.98	5026.50	5030.35	2.64	0.02457	18.6	38.5	21.3	2.43
2	6120.*	PostProject	716	5022.56	2.32	5024.88	5026.40	5030.24	2.64	0.02449	18.6	38.5	21.3	2.43
2	6115.*	PostProject	716	5022.47	2.32	5024.79	5026.31	5030.13	2.63	0.02440	18.5	38.6	21.3	2.43
2	6110.*	PostProject	716	5022.37	2.32	5024.69	5026.21	5030.06	2.65	0.02460	18.6	38.5	21.3	2.44
2	6105.*	PostProject	716	5022.27	2.32	5024.59	5026.11	5029.95	2.64	0.02453	18.6	38.5	21.3	2.43
2	6100.*	PostProject	716	5022.18	2.32	5024.50	5026.02	5029.85	2.63	0.02445	18.6	38.6	21.3	2.43
2	6095.*	PostProject	716	5022.08	2.31	5024.39	5025.92	5029.78	2.65	0.02468	18.6	38.4	21.2	2.44
2	6090.*	PostProject	716	5021.98	2.31	5024.29	5025.82	5029.67	2.65	0.02462	18.6	38.5	21.2	2.44
2	6085.*	PostProject	716	5021.88	2.32	5024.20	5025.72	5029.56	2.64	0.02455	18.6	38.5	21.3	2.43
2	6080.*	PostProject	716	5021.79	2.32	5024.11	5025.63	5029.46	2.63	0.02447	18.6	38.6	21.3	2.43
2	6075.*	PostProject	716	5021.69	2.31	5024.00	5025.53	5029.39	2.65	0.02470	18.6	38.4	21.2	2.44
2	6070.*	PostProject	716	5021.59	2.31	5023.90	5025.43	5029.29	2.65	0.02464	18.6	38.5	21.2	2.44
2	6065.*	PostProject	716	5021.49	2.32	5023.81	5025.33	5029.18	2.64	0.02458	18.6	38.5	21.3	2.44
2	6060.*	PostProject	716	5021.40	2.32	5023.72	5025.24	5029.08	2.64	0.02449	18.6	38.5	21.3	2.43
2	6055.*	PostProject	716	5021.30	2.31	5023.61	5025.14	5029.00	2.65	0.02472	18.6	38.4	21.2	2.44
2	6050	PostProject	755	5021.20	2.45	5023.65	5025.16	5028.83	2.51	0.02231	18.3	41.3	21.8	2.34
2	6040.*	PostProject	755	5021.01	2.42	5023.43	5024.92	5028.55	2.48	0.02213	18.1	41.6	22.0	2.33
2	6030.*	PostProject	755	5020.82	2.39	5023.21	5024.69	5028.31	2.48	0.02223	18.1	41.7	22.2	2.33
2	6020.*	PostProject	755	5020.62	2.36	5022.98	5024.46	5028.07	2.48	0.02242	18.1	41.7	22.4	2.34
2	6010.*	PostProject	755	5020.43	2.34	5022.77	5024.23	5027.80	2.46	0.02227	18.0	41.9	22.6	2.33
2	6000.*	PostProject	755	5020.24	2.31	5022.55	5024.01	5027.53	2.43	0.02212	17.9	42.2	22.8	2.32
2	5990.*	PostProject	755	5020.05	2.29	5022.34	5023.77	5027.26	2.40	0.02193	17.8	42.4	23.1	2.31
2	5980.*	PostProject	755	5019.86	2.27	5022.13	5023.55	5026.99	2.38	0.02175	17.7	42.7	23.3	2.30
2	5970.*	PostProject	755	5019.66	2.24	5021.90	5023.32	5026.75	2.38	0.02193	17.7	42.7	23.5	2.31

Proposed N. Borrega Chan
11/20

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	5960.*	PostProject	755	5019.47	2.22	5021.69	5023.10	5026.49	2.35	0.02178	17.6	43.0	23.8	2.30
2	5950.*	PostProject	755	5019.28	2.21	5021.48	5022.87	5026.22	2.33	0.02164	17.5	43.2	24.0	2.29
2	5940.*	PostProject	755	5019.09	2.19	5021.28	5022.65	5025.96	2.31	0.02151	17.4	43.5	24.3	2.29
2	5930.*	PostProject	755	5018.90	2.17	5021.07	5022.43	5025.70	2.28	0.02136	17.3	43.7	24.5	2.28
2	5920.*	PostProject	755	5018.70	2.14	5020.84	5022.19	5025.47	2.29	0.02158	17.3	43.7	24.7	2.29
2	5910.*	PostProject	755	5018.51	2.12	5020.63	5021.97	5025.22	2.27	0.02149	17.2	43.9	25.0	2.28
2	5900.*	PostProject	755	5018.32	2.10	5020.42	5021.75	5024.96	2.25	0.02139	17.1	44.2	25.2	2.28
2	5890.*	PostProject	755	5018.13	2.09	5020.22	5021.53	5024.71	2.23	0.02129	17.0	44.4	25.5	2.27
2	5880.*	PostProject	755	5017.94	2.07	5020.01	5021.31	5024.46	2.21	0.02122	16.9	44.6	25.7	2.27
2	5870.*	PostProject	755	5017.74	2.04	5019.78	5021.08	5024.24	2.23	0.02151	17.0	44.5	25.9	2.28
2	5860.*	PostProject	755	5017.55	2.01	5019.56	5020.86	5024.07	2.26	0.02208	17.0	44.3	26.1	2.31
2	5850.*	PostProject	755	5017.36	1.98	5019.34	5020.65	5023.86	2.27	0.02241	17.1	44.2	26.3	2.32
2	5840.*	PostProject	755	5017.17	1.95	5019.12	5020.43	5023.66	2.28	0.02273	17.1	44.2	26.5	2.33
2	5830.*	PostProject	755	5016.98	1.93	5018.91	5020.22	5023.44	2.29	0.02295	17.1	44.2	26.8	2.34
2	5820.*	PostProject	755	5016.78	1.90	5018.68	5019.99	5023.24	2.31	0.02336	17.1	44.1	27.0	2.36
2	5810.*	PostProject	755	5016.59	1.88	5018.47	5019.77	5023.01	2.30	0.02346	17.1	44.2	27.2	2.36
2	5800	PostProject	896	5016.40	2.28	5018.68	5019.90	5022.66	1.91	0.01651	16.0	56.0	29.1	2.03
2	5785.*	PostProject	896	5016.11	2.27	5018.38	5019.61	5022.40	1.94	0.01679	16.1	55.7	29.1	2.05
2	5770.*	PostProject	896	5015.82	2.26	5018.08	5019.31	5022.14	1.96	0.01703	16.2	55.4	29.0	2.06
2	5755.*	PostProject	896	5015.52	2.25	5017.77	5019.02	5021.88	1.98	0.01733	16.3	55.1	29.0	2.08
2	5740.*	PostProject	896	5015.23	2.24	5017.47	5018.72	5021.61	2.00	0.01750	16.3	54.9	29.0	2.09
2	5725.*	PostProject	896	5014.94	2.25	5017.19	5018.44	5021.31	1.99	0.01742	16.3	55.0	29.0	2.09
2	5710.*	PostProject	896	5014.65	2.25	5016.90	5018.14	5021.01	1.98	0.01732	16.3	55.1	29.0	2.08
2	5695.*	PostProject	896	5014.35	2.24	5016.59	5017.85	5020.74	2.00	0.01755	16.3	54.8	29.0	2.09
2	5680.*	PostProject	896	5014.06	2.24	5016.30	5017.55	5020.43	1.99	0.01743	16.3	54.9	29.0	2.09
2	5665	PostProject	896	5013.77	2.24	5016.01	5017.26	5020.16	2.01	0.01761	16.4	54.8	29.0	2.10
2	5650.*	PostProject	896	5013.48	2.31	5015.79	5017.04	5019.92	1.98	0.01706	16.3	54.9	28.4	2.07
2	5635.*	PostProject	896	5013.19	2.38	5015.57	5016.83	5019.69	1.97	0.01662	16.3	55.0	27.9	2.05
2	5620.*	PostProject	896	5012.89	2.44	5015.33	5016.60	5019.46	1.96	0.01628	16.3	54.9	27.4	2.03
2	5605.*	PostProject	896	5012.60	2.52	5015.12	5016.39	5019.24	1.94	0.01588	16.3	55.0	26.9	2.01
2	5590	PostProject	896	5012.31	2.60	5014.91	5016.18	5019.02	1.93	0.01552	16.3	55.0	26.4	1.99
2	5575.*	PostProject	896	5011.95	2.65	5014.60	5015.92	5018.82	1.97	0.01571	16.5	54.4	25.8	2.00
2	5560.*	PostProject	896	5011.59	2.73	5014.32	5015.64	5018.58	1.98	0.01562	16.6	54.1	25.3	2.00
2	5545.*	PostProject	896	5011.23	2.80	5014.03	5015.38	5018.34	2.00	0.01553	16.7	53.8	24.8	1.99
2	5530.*	PostProject	896	5010.87	2.88	5013.75	5015.12	5018.10	2.01	0.01545	16.7	53.5	24.3	1.99
2	5515	PostProject	896	5010.51	2.97	5013.48	5014.85	5017.87	2.02	0.01535	16.8	53.3	23.9	1.98
2	5500.*	PostProject	896	5010.15	2.94	5013.09	5014.49	5017.61	2.09	0.01600	17.1	52.5	23.7	2.02
2	5485.*	PostProject	896	5009.79	2.91	5012.70	5014.13	5017.35	2.15	0.01664	17.3	51.8	23.6	2.06
2	5470.*	PostProject	896	5009.43	2.88	5012.31	5013.77	5017.08	2.21	0.01722	17.5	51.2	23.5	2.09
2	5455.*	PostProject	896	5009.07	2.86	5011.93	5013.41	5016.80	2.26	0.01776	17.7	50.6	23.4	2.12
2	5440.*	PostProject	896	5008.71	2.84	5011.55	5013.05	5016.51	2.31	0.01826	17.9	50.1	23.3	2.15
2	5425.*	PostProject	896	5008.35	2.82	5011.17	5012.69	5016.22	2.36	0.01869	18.0	49.7	23.3	2.18
2	5410.*	PostProject	896	5007.98	2.80	5010.78	5012.32	5015.92	2.41	0.01918	18.2	49.2	23.2	2.20
2	5395.*	PostProject	896	5007.62	2.78	5010.40	5011.96	5015.62	2.44	0.01957	18.3	48.9	23.1	2.22
2	5380.*	PostProject	896	5007.26	2.77	5010.03	5011.60	5015.31	2.48	0.01992	18.4	48.6	23.1	2.24

Proposed N. Borrega Chan
12/20

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	5365.*	PostProject	896	5006.90	2.76	5009.66	5011.24	5015.00	2.51	0.02025	18.6	48.3	23.0	2.26
2	5350.*	PostProject	896	5006.54	2.75	5009.29	5010.88	5014.69	2.54	0.02059	18.7	48.0	23.0	2.28
2	5335.*	PostProject	896	5006.18	2.74	5008.92	5010.52	5014.38	2.57	0.02086	18.8	47.8	22.9	2.29
2	5320.*	PostProject	896	5005.82	2.73	5008.55	5010.16	5014.05	2.59	0.02110	18.8	47.6	22.9	2.30
2	5305.*	PostProject	896	5005.46	2.72	5008.18	5009.80	5013.72	2.61	0.02131	18.9	47.4	22.9	2.31
2	5290.*	PostProject	896	5005.10	2.71	5007.81	5009.44	5013.40	2.63	0.02154	19.0	47.2	22.8	2.32
2	5275.*	PostProject	896	5004.74	2.70	5007.44	5009.08	5013.07	2.66	0.02178	19.0	47.1	22.8	2.34
2	5260.*	PostProject	896	5004.38	2.70	5007.08	5008.72	5012.74	2.67	0.02196	19.1	46.9	22.8	2.34
2	5245.*	PostProject	896	5004.02	2.70	5006.72	5008.36	5012.35	2.66	0.02178	19.0	47.1	22.8	2.34
2	5230.*	PostProject	896	5003.66	2.70	5006.36	5008.00	5012.02	2.67	0.02197	19.1	46.9	22.8	2.35
2	5215.*	PostProject	896	5003.30	2.69	5005.99	5007.64	5011.69	2.69	0.02215	19.2	46.8	22.8	2.35
2	5200.*	PostProject	896	5002.94	2.70	5005.64	5007.28	5011.30	2.67	0.02197	19.1	46.9	22.8	2.35
2	5185.*	PostProject	896	5002.57	2.69	5005.26	5006.91	5010.97	2.70	0.02222	19.2	46.7	22.7	2.36
2	5170.*	PostProject	896	5002.21	2.69	5004.90	5006.55	5010.59	2.68	0.02207	19.1	46.8	22.8	2.35
2	5155.*	PostProject	896	5001.85	2.70	5004.55	5006.19	5010.21	2.67	0.02194	19.1	46.9	22.8	2.34
2	5140.*	PostProject	896	5001.49	2.69	5004.18	5005.83	5009.88	2.69	0.02212	19.1	46.8	22.8	2.35
2	5125.*	PostProject	896	5001.13	2.70	5003.83	5005.47	5009.50	2.68	0.02200	19.1	46.9	22.8	2.35
2	5110.*	PostProject	896	5000.77	2.70	5003.47	5005.11	5009.11	2.66	0.02184	19.1	47.0	22.8	2.34
2	5095.*	PostProject	896	5000.41	2.71	5003.12	5004.75	5008.73	2.65	0.02169	19.0	47.1	22.8	2.33
2	5080	PostProject	967	5000.05	2.91	5002.96	5004.57	5008.36	2.50	0.01934	18.7	51.8	23.6	2.22
2	5065.*	PostProject	967	4999.69	2.89	5002.58	5004.21	5008.07	2.54	0.01973	18.8	51.5	23.6	2.24
2	5050.*	PostProject	967	4999.33	2.88	5002.21	5003.85	5007.76	2.57	0.02004	18.9	51.2	23.5	2.26
2	5035.*	PostProject	967	4998.97	2.87	5001.84	5003.49	5007.45	2.60	0.02035	19.0	50.9	23.5	2.27
2	5020.*	PostProject	967	4998.61	2.86	5001.47	5003.13	5007.14	2.64	0.02066	19.1	50.6	23.4	2.29
2	5005.*	PostProject	967	4998.25	2.85	5001.10	5002.77	5006.81	2.66	0.02090	19.2	50.4	23.4	2.30
2	4990.*	PostProject	967	4997.89	2.84	5000.73	5002.41	5006.50	2.69	0.02117	19.3	50.2	23.3	2.32
2	4975.*	PostProject	967	4997.52	2.83	5000.35	5002.04	5006.17	2.71	0.02146	19.4	49.9	23.3	2.33
2	4960.*	PostProject	967	4997.16	2.82	4999.98	5001.68	5005.84	2.73	0.02166	19.4	49.8	23.3	2.34
2	4945.*	PostProject	967	4996.80	2.81	4999.61	5001.32	5005.52	2.76	0.02187	19.5	49.6	23.2	2.35
2	4930.*	PostProject	967	4996.44	2.82	4999.26	5000.96	5005.14	2.74	0.02176	19.5	49.7	23.3	2.35
2	4915.*	PostProject	967	4996.08	2.81	4998.89	5000.60	5004.81	2.76	0.02194	19.5	49.5	23.2	2.36
2	4900.*	PostProject	967	4995.72	2.82	4998.54	5000.24	5004.42	2.75	0.02177	19.5	49.7	23.3	2.35
2	4885.*	PostProject	967	4995.36	2.81	4998.17	4999.88	5004.09	2.76	0.02196	19.5	49.5	23.2	2.36
2	4870	PostProject	967	4995.00	2.80	4997.80	4999.52	5003.76	2.78	0.02217	19.6	49.4	23.2	2.37
2	4820	PostProject	967	4985.00	2.01	4987.01	4989.52	5001.02	7.17	0.07483	30.0	32.2	20.0	4.18
2	4720	PostProject	967	4985.00	0.52	4985.52	4985.77	4986.48	2.46	0.14785	7.9	122.6	460.3	2.69

Proposed N. Borrega Chan
13/20

99099\hec_ras\bor_rev2.prj

HEC-RAS Plan: NBorregaChan River: main Reach: 2

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	11581	Interim	198	5193.20	1.99	5195.19	5195.19	5195.98	0.41	0.00441	7.1	27.9	18.0	1.01
2	11523.3*	Interim	198	5190.24	1.04	5191.28	5192.24	5195.15	2.40	0.04497	15.8	12.5	14.1	2.96
2	11465.7*	Interim	198	5187.27	1.01	5188.28	5189.27	5192.44	2.61	0.05018	16.4	12.1	14.0	3.11
2	11408.0*	Interim	198	5184.31	1.01	5185.32	5186.31	5189.50	2.62	0.05043	16.4	12.1	14.0	3.12
2	11350.4*	Interim	198	5181.35	1.01	5182.36	5183.35	5186.48	2.58	0.04926	16.3	12.2	14.0	3.08
2	11292.8*	Interim	198	5178.38	1.01	5179.39	5180.38	5183.55	2.61	0.05018	16.4	12.1	14.0	3.11
2	11235.1*	Interim	198	5175.42	1.01	5176.43	5177.42	5180.61	2.62	0.05043	16.4	12.1	14.0	3.12
2	11177.5*	Interim	198	5172.45	1.00	5173.45	5174.45	5177.70	2.67	0.05164	16.5	12.0	14.0	3.15
2	11119.9*	Interim	198	5169.49	0.99	5170.48	5171.49	5174.78	2.70	0.05253	16.6	11.9	14.0	3.18
2	11062.2*	Interim	198	5166.53	0.99	5167.52	5168.53	5171.83	2.71	0.05280	16.7	11.9	14.0	3.18
2	11004.6*	Interim	198	5163.56	0.99	5164.55	5165.56	5168.88	2.73	0.05307	16.7	11.9	14.0	3.19
2	10947	Interim	275	5160.60	1.29	5161.89	5163.01	5166.32	2.59	0.04018	16.9	16.3	15.2	2.87
2	10836	Interim	275	5154.90	1.22	5156.12	5157.31	5161.22	3.03	0.04940	18.1	15.2	14.9	3.16
2	10834.*	Interim	275	5154.80	1.21	5156.01	5157.21	5161.20	3.09	0.05062	18.3	15.0	14.8	3.20
2	10832.*	Interim	275	5154.70	1.21	5155.91	5157.11	5161.11	3.10	0.05084	18.3	15.0	14.8	3.21
2	10830.*	Interim	275	5154.60	1.21	5155.81	5157.01	5161.03	3.11	0.05106	18.3	15.0	14.8	3.21
2	10828.*	Interim	275	5154.50	1.21	5155.71	5156.91	5160.95	3.12	0.05135	18.4	15.0	14.8	3.22
2	10826.*	Interim	275	5154.40	1.20	5155.60	5156.81	5160.87	3.14	0.05171	18.4	14.9	14.8	3.23
2	10824.*	Interim	275	5154.30	1.20	5155.50	5156.71	5160.80	3.16	0.05223	18.5	14.9	14.8	3.25
2	10822.*	Interim	275	5154.20	1.20	5155.40	5156.61	5160.75	3.19	0.05299	18.6	14.8	14.8	3.27
2	10820.*	Interim	275	5154.10	1.19	5155.29	5156.52	5160.71	3.24	0.05391	18.7	14.7	14.8	3.29
2	10818.*	Interim	275	5154.00	1.18	5155.18	5156.41	5160.68	3.29	0.05517	18.8	14.6	14.7	3.33
2	10816	Interim	275	5153.90	1.18	5155.08	5156.31	5160.61	3.32	0.05571	18.9	14.6	14.7	3.34
2	10815		Bridge											
2	10754	Interim	275	5150.70	1.52	5152.22	5153.11	5155.23	1.68	0.02291	13.9	19.7	16.1	2.21
2	10752.*	Interim	275	5150.60	1.50	5152.10	5153.01	5155.17	1.72	0.02352	14.1	19.6	16.0	2.24
2	10750.*	Interim	275	5150.50	1.49	5151.99	5152.91	5155.12	1.75	0.02410	14.2	19.4	16.0	2.27
2	10748.*	Interim	275	5150.40	1.48	5151.88	5152.81	5155.06	1.78	0.02467	14.3	19.2	15.9	2.29
2	10746.*	Interim	275	5150.30	1.48	5151.77	5152.71	5155.00	1.81	0.02526	14.4	19.1	15.9	2.32
2	10744.*	Interim	275	5150.20	1.46	5151.67	5152.61	5154.94	1.85	0.02589	14.5	18.9	15.8	2.34
2	10742.*	Interim	275	5150.10	1.46	5151.56	5152.51	5154.88	1.88	0.02645	14.6	18.8	15.8	2.37
2	10740.*	Interim	275	5150.00	1.45	5151.45	5152.41	5154.82	1.91	0.02700	14.7	18.7	15.8	2.39
2	10738.*	Interim	275	5149.90	1.44	5151.34	5152.31	5154.76	1.94	0.02749	14.8	18.5	15.8	2.41
2	10736.*	Interim	275	5149.80	1.43	5151.23	5152.21	5154.70	1.97	0.02813	15.0	18.4	15.7	2.44
2	10734	Interim	275	5149.70	1.42	5151.12	5152.11	5154.64	2.00	0.02873	15.1	18.3	15.7	2.46
2	10650	Interim	275	5145.34	1.24	5146.58	5147.75	5151.46	2.88	0.04633	17.7	15.5	15.0	3.07
2	10544	Interim	584	5141.60	2.32	5143.92	5145.27	5148.52	2.29	0.02202	17.2	33.9	19.3	2.29
2	9826	Interim	728	5116.20	2.21	5118.41	5120.35	5126.51	4.09	0.04083	22.8	31.9	18.8	3.10
2	9824.*	Interim	728	5116.13	2.21	5118.34	5120.27	5126.48	4.10	0.04106	22.9	31.8	18.8	3.10
2	9822.*	Interim	728	5116.06	2.21	5118.27	5120.20	5126.43	4.12	0.04123	22.9	31.8	18.8	3.11
2	9820.*	Interim	728	5115.99	2.20	5118.19	5120.13	5126.38	4.13	0.04140	23.0	31.7	18.8	3.12
2	9818.*	Interim	728	5115.92	2.20	5118.12	5120.06	5126.33	4.14	0.04157	23.0	31.7	18.8	3.12
2	9816.*	Interim	728	5115.85	2.20	5118.05	5119.99	5126.29	4.16	0.04181	23.0	31.6	18.8	3.13
2	9814.*	Interim	728	5115.78	2.19	5117.97	5119.92	5126.25	4.18	0.04205	23.1	31.5	18.8	3.14
2	9812.*	Interim	728	5115.71	2.19	5117.90	5119.85	5126.21	4.20	0.04233	23.1	31.5	18.7	3.15
2	9810.*	Interim	728	5115.64	2.19	5117.83	5119.78	5126.18	4.23	0.04264	23.2	31.4	18.7	3.16

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	9808.*	Interim	728	5115.57	2.18	5117.75	5119.71	5126.15	4.25	0.04296	23.3	31.3	18.7	3.17
2	9806	Interim	728	5115.50	2.17	5117.67	5119.66	5126.14	4.29	0.04346	23.4	31.2	18.7	3.19
2	9805		Bridge											
2	9744	Interim	728	5113.30	2.47	5115.77	5117.42	5121.80	2.95	0.02690	19.7	37.0	19.9	2.55
2	9742.*	Interim	728	5113.23	2.48	5115.71	5117.37	5121.70	2.93	0.02667	19.6	37.1	19.9	2.54
2	9740.*	Interim	728	5113.16	2.49	5115.65	5117.30	5121.60	2.91	0.02642	19.6	37.2	19.9	2.53
2	9738.*	Interim	728	5113.09	2.49	5115.58	5117.23	5121.51	2.89	0.02628	19.5	37.3	19.9	2.52
2	9736.*	Interim	728	5113.02	2.49	5115.51	5117.16	5121.42	2.88	0.02613	19.5	37.3	20.0	2.51
2	9734.*	Interim	728	5112.95	2.50	5115.45	5117.09	5121.33	2.87	0.02597	19.5	37.4	20.0	2.51
2	9732.*	Interim	728	5112.88	2.50	5115.38	5117.02	5121.23	2.85	0.02579	19.4	37.5	20.0	2.50
2	9730.*	Interim	728	5112.81	2.51	5115.32	5116.95	5121.13	2.84	0.02560	19.4	37.6	20.0	2.49
2	9728.*	Interim	728	5112.74	2.51	5115.25	5116.88	5121.05	2.83	0.02552	19.3	37.7	20.0	2.49
2	9726.*	Interim	728	5112.67	2.51	5115.18	5116.81	5120.97	2.82	0.02543	19.3	37.7	20.0	2.48
2	9724	Interim	728	5112.60	2.52	5115.12	5116.75	5120.87	2.80	0.02523	19.3	37.8	20.1	2.47
2	9650	Interim	728	5110.00	2.42	5112.42	5114.13	5118.81	3.14	0.02922	20.3	35.9	19.7	2.65
2	9625.*	Interim	728	5109.37	2.44	5111.81	5113.51	5118.04	3.06	0.02819	20.0	36.3	19.8	2.60
2	9600.*	Interim	728	5108.74	2.46	5111.20	5112.87	5117.32	3.00	0.02748	19.8	36.7	19.8	2.57
2	9575.*	Interim	728	5108.11	2.46	5110.57	5112.25	5116.67	2.99	0.02736	19.8	36.7	19.8	2.57
2	9550.*	Interim	728	5107.48	2.47	5109.95	5111.62	5116.02	2.98	0.02723	19.8	36.8	19.9	2.56
2	9525.*	Interim	728	5106.85	2.47	5109.32	5110.99	5115.37	2.96	0.02707	19.7	36.9	19.9	2.55
2	9500.*	Interim	728	5106.22	2.47	5108.69	5110.36	5114.72	2.95	0.02693	19.7	36.9	19.9	2.55
2	9475.*	Interim	728	5105.59	2.48	5108.07	5109.73	5114.07	2.94	0.02680	19.7	37.0	19.9	2.54
2	9450.*	Interim	728	5104.96	2.48	5107.44	5109.10	5113.43	2.93	0.02665	19.6	37.1	19.9	2.54
2	9425.*	Interim	728	5104.33	2.48	5106.81	5108.47	5112.78	2.92	0.02653	19.6	37.1	19.9	2.53
2	9400.*	Interim	728	5103.70	2.49	5106.19	5107.84	5112.14	2.91	0.02642	19.6	37.2	19.9	2.53
2	9375.*	Interim	728	5103.07	2.49	5105.56	5107.21	5111.49	2.90	0.02635	19.6	37.2	19.9	2.52
2	9350.*	Interim	728	5102.44	2.49	5104.93	5106.57	5110.85	2.89	0.02625	19.5	37.3	20.0	2.52
2	9325.*	Interim	728	5101.81	2.49	5104.30	5105.95	5110.21	2.88	0.02617	19.5	37.3	20.0	2.51
2	9300.*	Interim	728	5101.18	2.49	5103.67	5105.32	5109.61	2.90	0.02636	19.6	37.2	19.9	2.52
2	9275.*	Interim	728	5100.55	2.49	5103.04	5104.68	5108.96	2.89	0.02623	19.5	37.3	20.0	2.52
2	9250.*	Interim	728	5099.92	2.49	5102.41	5104.06	5108.32	2.88	0.02613	19.5	37.3	20.0	2.51
2	9225.*	Interim	728	5099.29	2.49	5101.78	5103.42	5107.70	2.89	0.02627	19.5	37.3	20.0	2.52
2	9200.*	Interim	728	5098.65	2.49	5101.14	5102.79	5107.08	2.91	0.02642	19.6	37.2	19.9	2.53
2	9175.*	Interim	728	5098.02	2.49	5100.51	5102.16	5106.45	2.90	0.02633	19.6	37.2	19.9	2.52
2	9150.*	Interim	728	5097.39	2.49	5099.88	5101.53	5105.81	2.89	0.02627	19.5	37.3	19.9	2.52
2	9125.*	Interim	728	5096.76	2.49	5099.25	5100.90	5105.17	2.89	0.02620	19.5	37.3	19.9	2.52
2	9100.*	Interim	728	5096.13	2.49	5098.62	5100.27	5104.56	2.90	0.02640	19.6	37.2	19.9	2.52
2	9075.*	Interim	728	5095.50	2.49	5097.99	5099.64	5103.92	2.90	0.02634	19.6	37.2	19.9	2.52
2	9050.*	Interim	728	5094.87	2.49	5097.36	5099.01	5103.29	2.89	0.02626	19.5	37.3	19.9	2.52
2	9025.*	Interim	728	5094.24	2.49	5096.73	5098.38	5102.64	2.88	0.02616	19.5	37.3	20.0	2.51
2	9000.*	Interim	728	5093.61	2.49	5096.10	5097.75	5102.03	2.90	0.02632	19.5	37.2	19.9	2.52
2	8975.*	Interim	728	5092.98	2.49	5095.47	5097.12	5101.38	2.89	0.02618	19.5	37.3	20.0	2.51
2	8950.*	Interim	728	5092.35	2.49	5094.84	5096.49	5100.78	2.90	0.02640	19.6	37.2	19.9	2.52
2	8925.*	Interim	728	5091.72	2.49	5094.21	5095.85	5100.14	2.90	0.02629	19.5	37.2	19.9	2.52
2	8900.*	Interim	728	5091.09	2.49	5093.58	5095.24	5099.50	2.89	0.02622	19.5	37.3	19.9	2.52
2	8875.*	Interim	728	5090.46	2.49	5092.95	5094.60	5098.90	2.91	0.02644	19.6	37.2	19.9	2.53

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	8850.*	Interim	728	5089.83	2.49	5092.32	5093.97	5098.25	2.90	0.02632	19.5	37.2	19.9	2.52
2	8825.*	Interim	728	5089.20	2.48	5091.68	5093.34	5097.65	2.92	0.02654	19.6	37.1	19.9	2.53
2	8800.*	Interim	728	5088.57	2.49	5091.06	5092.72	5097.00	2.90	0.02639	19.6	37.2	19.9	2.52
2	8775.*	Interim	728	5087.94	2.49	5090.43	5092.08	5096.36	2.90	0.02630	19.5	37.3	19.9	2.52
2	8750	Interim	728	5087.31	2.48	5089.79	5091.46	5095.75	2.91	0.02643	19.6	37.2	19.9	2.53
2	8725.*	Interim	728	5086.63	2.48	5089.11	5090.77	5095.12	2.94	0.02681	19.7	37.0	19.9	2.54
2	8700.*	Interim	728	5085.94	2.48	5088.42	5090.08	5094.40	2.92	0.02661	19.6	37.1	19.9	2.53
2	8675.*	Interim	728	5085.26	2.47	5087.73	5089.40	5093.78	2.96	0.02707	19.7	36.9	19.9	2.55
2	8650.*	Interim	728	5084.57	2.46	5087.03	5088.71	5093.17	3.01	0.02761	19.9	36.6	19.8	2.58
2	8625.*	Interim	728	5083.89	2.45	5086.34	5088.03	5092.50	3.02	0.02774	19.9	36.6	19.8	2.58
2	8600.*	Interim	728	5083.20	2.45	5085.65	5087.34	5091.83	3.03	0.02788	20.0	36.5	19.8	2.59
2	8575.*	Interim	728	5082.52	2.45	5084.97	5086.66	5091.18	3.05	0.02807	20.0	36.4	19.8	2.60
2	8550.*	Interim	728	5081.83	2.44	5084.27	5085.97	5090.51	3.06	0.02826	20.0	36.3	19.8	2.61
2	8525.*	Interim	728	5081.15	2.44	5083.59	5085.29	5089.87	3.09	0.02851	20.1	36.2	19.7	2.62
2	8500.*	Interim	728	5080.46	2.43	5082.89	5084.60	5089.20	3.10	0.02870	20.2	36.1	19.7	2.63
2	8475.*	Interim	728	5079.78	2.43	5082.21	5083.92	5088.51	3.09	0.02862	20.1	36.1	19.7	2.62
2	8450.*	Interim	728	5079.09	2.43	5081.52	5083.23	5087.82	3.09	0.02860	20.1	36.2	19.7	2.62
2	8425.*	Interim	728	5078.41	2.44	5080.85	5082.55	5087.13	3.09	0.02853	20.1	36.2	19.7	2.62
2	8400.*	Interim	728	5077.72	2.43	5080.15	5081.86	5086.47	3.11	0.02875	20.2	36.1	19.7	2.63
2	8375.*	Interim	728	5077.04	2.43	5079.47	5081.18	5085.77	3.09	0.02860	20.1	36.2	19.7	2.62
2	8350.*	Interim	728	5076.35	2.43	5078.78	5080.49	5085.07	3.09	0.02855	20.1	36.2	19.7	2.62
2	8325.*	Interim	728	5075.67	2.44	5078.11	5079.81	5084.38	3.08	0.02843	20.1	36.2	19.7	2.61
2	8300.*	Interim	728	5074.99	2.44	5077.43	5079.13	5083.68	3.07	0.02832	20.1	36.3	19.7	2.61
2	8275.*	Interim	728	5074.30	2.44	5076.73	5078.44	5083.02	3.09	0.02853	20.1	36.2	19.7	2.62
2	8250.*	Interim	728	5073.62	2.44	5076.06	5077.76	5082.33	3.08	0.02843	20.1	36.2	19.7	2.61
2	8225.*	Interim	728	5072.93	2.43	5075.36	5077.07	5081.66	3.10	0.02864	20.1	36.1	19.7	2.62
2	8200.*	Interim	728	5072.25	2.43	5074.68	5076.39	5080.98	3.09	0.02860	20.1	36.2	19.7	2.62
2	8175.*	Interim	728	5071.56	2.43	5073.99	5075.70	5080.28	3.09	0.02855	20.1	36.2	19.7	2.62
2	8150.*	Interim	728	5070.88	2.44	5073.32	5075.02	5079.59	3.08	0.02843	20.1	36.2	19.7	2.61
2	8125.*	Interim	728	5070.19	2.43	5072.62	5074.33	5078.92	3.10	0.02864	20.1	36.1	19.7	2.62
2	8100.*	Interim	728	5069.51	2.43	5071.94	5073.65	5078.24	3.09	0.02860	20.1	36.2	19.7	2.62
2	8075.*	Interim	728	5068.82	2.43	5071.25	5072.96	5077.54	3.09	0.02855	20.1	36.2	19.7	2.62
2	8050.*	Interim	728	5068.14	2.44	5070.58	5072.28	5076.85	3.08	0.02845	20.1	36.2	19.7	2.61
2	8025.*	Interim	728	5067.45	2.43	5069.88	5071.59	5076.19	3.10	0.02870	20.2	36.1	19.7	2.63
2	8000.*	Interim	728	5066.77	2.43	5069.20	5070.91	5075.50	3.09	0.02862	20.1	36.1	19.7	2.62
2	7975.*	Interim	728	5066.08	2.43	5068.51	5070.22	5074.81	3.09	0.02860	20.1	36.2	19.7	2.62
2	7950.*	Interim	728	5065.40	2.44	5067.84	5069.54	5074.12	3.09	0.02851	20.1	36.2	19.7	2.62
2	7925.*	Interim	728	5064.71	2.43	5067.14	5068.85	5073.45	3.10	0.02870	20.2	36.1	19.7	2.63
2	7900	Interim	728	5064.03	2.43	5066.46	5068.17	5072.75	3.09	0.02853	20.1	36.2	19.7	2.62
2	7890.*	Interim	728	5063.76	2.35	5066.11	5067.80	5072.45	3.13	0.02948	20.2	36.0	20.0	2.66
2	7880.*	Interim	728	5063.48	2.26	5065.74	5067.45	5072.15	3.18	0.03051	20.3	35.8	20.4	2.70
2	7870	Interim	854	5063.21	2.54	5065.75	5067.45	5071.76	2.88	0.02487	19.7	43.4	22.2	2.48
2	7550	Interim	854	5054.50	2.48	5056.98	5058.74	5063.40	3.10	0.02731	20.3	42.0	21.9	2.59
2	7250	Interim	854	5047.50	2.61	5050.11	5051.74	5055.73	2.68	0.02265	19.0	44.9	22.4	2.37
2	6450	Interim	854	5029.00	2.58	5031.58	5033.24	5037.34	2.75	0.02338	19.3	44.4	22.3	2.41
2	6445.*	Interim	854	5028.90	2.58	5031.48	5033.14	5037.26	2.76	0.02353	19.3	44.3	22.3	2.41

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	6440.*	Interim	854	5028.81	2.58	5031.39	5033.05	5037.16	2.76	0.02345	19.3	44.3	22.3	2.41
2	6435.*	Interim	854	5028.71	2.58	5031.29	5032.95	5037.08	2.77	0.02361	19.3	44.2	22.3	2.42
2	6430.*	Interim	854	5028.61	2.57	5031.18	5032.85	5037.00	2.78	0.02373	19.4	44.1	22.3	2.42
2	6425.*	Interim	854	5028.51	2.57	5031.08	5032.75	5036.92	2.79	0.02388	19.4	44.0	22.3	2.43
2	6420.*	Interim	854	5028.42	2.57	5030.99	5032.66	5036.81	2.78	0.02376	19.4	44.1	22.3	2.43
2	6415.*	Interim	854	5028.32	2.57	5030.89	5032.56	5036.74	2.80	0.02391	19.4	44.0	22.3	2.43
2	6410.*	Interim	854	5028.22	2.56	5030.78	5032.46	5036.67	2.82	0.02411	19.5	43.9	22.2	2.44
2	6405.*	Interim	854	5028.12	2.56	5030.68	5032.36	5036.59	2.83	0.02432	19.5	43.7	22.2	2.45
2	6400.*	Interim	854	5028.02	2.55	5030.57	5032.26	5036.52	2.85	0.02449	19.6	43.6	22.2	2.46
2	6395.*	Interim	854	5027.93	2.56	5030.49	5032.17	5036.41	2.84	0.02439	19.5	43.7	22.2	2.45
2	6390.*	Interim	854	5027.83	2.55	5030.38	5032.07	5036.34	2.86	0.02456	19.6	43.6	22.2	2.46
2	6385.*	Interim	854	5027.73	2.54	5030.27	5031.97	5036.27	2.88	0.02477	19.6	43.5	22.2	2.47
2	6380.*	Interim	854	5027.64	2.55	5030.19	5031.88	5036.17	2.87	0.02470	19.6	43.5	22.2	2.47
2	6375.*	Interim	854	5027.54	2.55	5030.09	5031.78	5036.06	2.86	0.02463	19.6	43.6	22.2	2.47
2	6370.*	Interim	854	5027.44	2.54	5029.98	5031.68	5035.99	2.88	0.02484	19.7	43.4	22.2	2.48
2	6365.*	Interim	854	5027.34	2.54	5029.88	5031.58	5035.88	2.88	0.02478	19.7	43.5	22.2	2.47
2	6360.*	Interim	854	5027.25	2.55	5029.80	5031.49	5035.77	2.86	0.02464	19.6	43.5	22.2	2.47
2	6355.*	Interim	854	5027.15	2.54	5029.69	5031.39	5035.70	2.88	0.02485	19.7	43.4	22.2	2.48
2	6350.*	Interim	854	5027.05	2.54	5029.59	5031.29	5035.59	2.88	0.02480	19.7	43.4	22.2	2.47
2	6345.*	Interim	854	5026.95	2.54	5029.50	5031.19	5035.49	2.88	0.02477	19.6	43.5	22.2	2.47
2	6340.*	Interim	854	5026.85	2.55	5029.40	5031.09	5035.38	2.87	0.02470	19.6	43.5	22.2	2.47
2	6335.*	Interim	854	5026.76	2.55	5029.31	5031.00	5035.27	2.86	0.02459	19.6	43.6	22.2	2.46
2	6330.*	Interim	854	5026.66	2.55	5029.21	5030.90	5035.16	2.85	0.02452	19.6	43.6	22.2	2.46
2	6325.*	Interim	854	5026.56	2.55	5029.11	5030.80	5035.09	2.87	0.02473	19.6	43.5	22.2	2.47
2	6320.*	Interim	854	5026.46	2.55	5029.01	5030.70	5034.98	2.87	0.02466	19.6	43.5	22.2	2.47
2	6315.*	Interim	854	5026.37	2.55	5028.92	5030.61	5034.88	2.86	0.02457	19.6	43.6	22.2	2.46
2	6310.*	Interim	854	5026.27	2.54	5028.81	5030.51	5034.81	2.88	0.02478	19.7	43.5	22.2	2.47
2	6305.*	Interim	854	5026.17	2.55	5028.72	5030.41	5034.70	2.87	0.02473	19.6	43.5	22.2	2.47
2	6300.*	Interim	854	5026.08	2.55	5028.63	5030.32	5034.60	2.87	0.02466	19.6	43.5	22.2	2.47
2	6295.*	Interim	854	5025.98	2.54	5028.52	5030.22	5034.53	2.89	0.02487	19.7	43.4	22.2	2.48
2	6290.*	Interim	854	5025.88	2.54	5028.42	5030.12	5034.43	2.88	0.02484	19.7	43.4	22.2	2.48
2	6285.*	Interim	854	5025.78	2.54	5028.32	5030.02	5034.32	2.88	0.02478	19.7	43.5	22.2	2.47
2	6280.*	Interim	854	5025.69	2.55	5028.24	5029.93	5034.21	2.86	0.02464	19.6	43.5	22.2	2.47
2	6275.*	Interim	854	5025.59	2.54	5028.13	5029.83	5034.14	2.88	0.02485	19.7	43.4	22.2	2.48
2	6270.*	Interim	854	5025.49	2.54	5028.03	5029.73	5034.04	2.88	0.02482	19.7	43.4	22.2	2.48
2	6265.*	Interim	854	5025.39	2.54	5027.94	5029.63	5033.93	2.88	0.02477	19.6	43.5	22.2	2.47
2	6260.*	Interim	854	5025.29	2.55	5027.84	5029.53	5033.82	2.87	0.02470	19.6	43.5	22.2	2.47
2	6255.*	Interim	854	5025.20	2.55	5027.75	5029.44	5033.72	2.86	0.02461	19.6	43.6	22.2	2.47
2	6250.*	Interim	854	5025.10	2.55	5027.65	5029.34	5033.60	2.85	0.02452	19.6	43.6	22.2	2.46
2	6245.*	Interim	854	5025.00	2.55	5027.55	5029.24	5033.53	2.87	0.02473	19.6	43.5	22.2	2.47
2	6240.*	Interim	854	5024.91	2.55	5027.46	5029.15	5033.43	2.87	0.02466	19.6	43.5	22.2	2.47
2	6235.*	Interim	854	5024.81	2.54	5027.35	5029.05	5033.36	2.89	0.02487	19.7	43.4	22.2	2.48
2	6230.*	Interim	854	5024.71	2.54	5027.25	5028.95	5033.26	2.88	0.02484	19.7	43.4	22.2	2.48
2	6225.*	Interim	854	5024.61	2.54	5027.15	5028.85	5033.15	2.88	0.02478	19.7	43.5	22.2	2.47
2	6220.*	Interim	854	5024.52	2.55	5027.07	5028.76	5033.04	2.86	0.02464	19.6	43.5	22.2	2.47
2	6215.*	Interim	854	5024.42	2.54	5026.96	5028.66	5032.97	2.88	0.02485	19.7	43.4	22.2	2.48

17/20

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	6210.*	Interim	854	5024.32	2.54	5026.86	5028.56	5032.86	2.88	0.02480	19.7	43.4	22.2	2.47
2	6205.*	Interim	854	5024.22	2.54	5026.77	5028.46	5032.76	2.88	0.02477	19.6	43.5	22.2	2.47
2	6200.*	Interim	854	5024.13	2.55	5026.68	5028.37	5032.66	2.87	0.02468	19.6	43.5	22.2	2.47
2	6195.*	Interim	854	5024.03	2.55	5026.58	5028.27	5032.54	2.86	0.02459	19.6	43.6	22.2	2.46
2	6190.*	Interim	854	5023.93	2.55	5026.48	5028.17	5032.43	2.85	0.02452	19.6	43.6	22.2	2.46
2	6185.*	Interim	854	5023.83	2.55	5026.38	5028.07	5032.36	2.87	0.02473	19.6	43.5	22.2	2.47
2	6180.*	Interim	854	5023.74	2.55	5026.29	5027.98	5032.26	2.87	0.02466	19.6	43.5	22.2	2.47
2	6175.*	Interim	854	5023.64	2.54	5026.18	5027.88	5032.19	2.89	0.02487	19.7	43.4	22.2	2.48
2	6170.*	Interim	854	5023.54	2.54	5026.08	5027.78	5032.09	2.88	0.02484	19.7	43.4	22.2	2.48
2	6165.*	Interim	854	5023.44	2.54	5025.98	5027.68	5031.98	2.88	0.02478	19.7	43.5	22.2	2.47
2	6160.*	Interim	854	5023.35	2.55	5025.90	5027.59	5031.87	2.86	0.02464	19.6	43.5	22.2	2.47
2	6155.*	Interim	854	5023.25	2.54	5025.79	5027.49	5031.80	2.88	0.02485	19.7	43.4	22.2	2.48
2	6150.*	Interim	854	5023.15	2.54	5025.69	5027.39	5031.69	2.88	0.02480	19.7	43.4	22.2	2.47
2	6145.*	Interim	854	5023.05	2.55	5025.60	5027.29	5031.59	2.87	0.02475	19.6	43.5	22.2	2.47
2	6140.*	Interim	854	5022.96	2.55	5025.51	5027.20	5031.49	2.87	0.02468	19.6	43.5	22.2	2.47
2	6135.*	Interim	854	5022.86	2.55	5025.41	5027.10	5031.37	2.86	0.02459	19.6	43.6	22.2	2.46
2	6130.*	Interim	854	5022.76	2.55	5025.31	5027.00	5031.26	2.85	0.02451	19.6	43.6	22.2	2.46
2	6125.*	Interim	854	5022.66	2.55	5025.21	5026.90	5031.15	2.85	0.02444	19.6	43.7	22.2	2.46
2	6120.*	Interim	854	5022.56	2.55	5025.11	5026.80	5031.08	2.86	0.02463	19.6	43.6	22.2	2.47
2	6115.*	Interim	854	5022.47	2.55	5025.02	5026.71	5030.98	2.86	0.02454	19.6	43.6	22.2	2.46
2	6110.*	Interim	854	5022.37	2.55	5024.92	5026.61	5030.91	2.87	0.02475	19.6	43.5	22.2	2.47
2	6105.*	Interim	854	5022.27	2.55	5024.82	5026.51	5030.80	2.87	0.02468	19.6	43.5	22.2	2.47
2	6100.*	Interim	854	5022.18	2.55	5024.73	5026.42	5030.69	2.86	0.02459	19.6	43.6	22.2	2.46
2	6095.*	Interim	854	5022.08	2.55	5024.63	5026.32	5030.58	2.85	0.02451	19.6	43.6	22.2	2.46
2	6090.*	Interim	854	5021.98	2.55	5024.53	5026.22	5030.51	2.87	0.02471	19.6	43.5	22.2	2.47
2	6085.*	Interim	854	5021.88	2.55	5024.43	5026.12	5030.40	2.86	0.02464	19.6	43.5	22.2	2.47
2	6080.*	Interim	854	5021.79	2.55	5024.34	5026.03	5030.30	2.86	0.02456	19.6	43.6	22.2	2.46
2	6075.*	Interim	854	5021.69	2.54	5024.23	5025.93	5030.23	2.88	0.02477	19.6	43.5	22.2	2.47
2	6070.*	Interim	854	5021.59	2.55	5024.14	5025.83	5030.12	2.87	0.02470	19.6	43.5	22.2	2.47
2	6065.*	Interim	854	5021.49	2.55	5024.04	5025.73	5030.01	2.86	0.02464	19.6	43.5	22.2	2.47
2	6060.*	Interim	854	5021.40	2.55	5023.95	5025.64	5029.91	2.86	0.02454	19.6	43.6	22.2	2.46
2	6055.*	Interim	854	5021.30	2.55	5023.85	5025.54	5029.84	2.87	0.02475	19.6	43.5	22.2	2.47
2	6050	Interim	946	5021.20	2.83	5024.03	5025.67	5029.61	2.61	0.02061	19.0	49.9	23.3	2.28
2	6040.*	Interim	946	5021.01	2.79	5023.80	5025.43	5029.39	2.62	0.02082	19.0	49.8	23.5	2.30
2	6030.*	Interim	946	5020.82	2.75	5023.57	5025.21	5029.16	2.62	0.02096	19.0	49.9	23.6	2.30
2	6020.*	Interim	946	5020.62	2.71	5023.33	5024.97	5028.93	2.63	0.02120	19.0	49.8	23.8	2.31
2	6010.*	Interim	946	5020.43	2.68	5023.11	5024.74	5028.70	2.63	0.02135	19.0	49.8	24.0	2.32
2	6000.*	Interim	946	5020.24	2.64	5022.88	5024.51	5028.48	2.64	0.02155	19.0	49.8	24.2	2.33
2	5990.*	Interim	946	5020.05	2.61	5022.66	5024.29	5028.24	2.64	0.02166	19.0	49.9	24.3	2.33
2	5980.*	Interim	946	5019.86	2.58	5022.44	5024.05	5028.01	2.64	0.02180	19.0	49.9	24.5	2.34
2	5970.*	Interim	946	5019.66	2.54	5022.20	5023.81	5027.78	2.65	0.02202	19.0	49.9	24.7	2.35
2	5960.*	Interim	946	5019.47	2.52	5021.99	5023.59	5027.51	2.62	0.02188	18.9	50.2	24.9	2.34
2	5950.*	Interim	946	5019.28	2.49	5021.77	5023.37	5027.27	2.62	0.02197	18.8	50.3	25.2	2.35
2	5940.*	Interim	946	5019.09	2.47	5021.56	5023.13	5027.00	2.59	0.02182	18.7	50.5	25.4	2.34
2	5930.*	Interim	946	5018.90	2.45	5021.35	5022.91	5026.73	2.56	0.02166	18.6	50.8	25.6	2.33
2	5920.*	Interim	946	5018.70	2.42	5021.12	5022.68	5026.50	2.57	0.02184	18.6	50.8	25.8	2.34

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	5910.*	Interim	946	5018.51	2.40	5020.91	5022.45	5026.24	2.55	0.02178	18.5	51.0	26.1	2.33
2	5900.*	Interim	946	5018.32	2.38	5020.70	5022.23	5025.99	2.54	0.02174	18.5	51.2	26.3	2.33
2	5890.*	Interim	946	5018.13	2.36	5020.49	5022.01	5025.73	2.51	0.02163	18.4	51.5	26.5	2.32
2	5880.*	Interim	946	5017.94	2.34	5020.28	5021.79	5025.48	2.50	0.02157	18.3	51.7	26.8	2.32
2	5870.*	Interim	946	5017.74	2.31	5020.05	5021.56	5025.25	2.50	0.02174	18.3	51.7	27.0	2.33
2	5860.*	Interim	946	5017.55	2.29	5019.84	5021.34	5024.99	2.48	0.02167	18.2	51.9	27.2	2.32
2	5850.*	Interim	946	5017.36	2.26	5019.62	5021.11	5024.82	2.52	0.02225	18.3	51.6	27.4	2.35
2	5840.*	Interim	946	5017.17	2.22	5019.39	5020.90	5024.63	2.54	0.02263	18.4	51.5	27.6	2.37
2	5830.*	Interim	946	5016.98	2.20	5019.18	5020.68	5024.42	2.55	0.02290	18.4	51.5	27.8	2.38
2	5820.*	Interim	946	5016.78	2.17	5018.95	5020.45	5024.22	2.57	0.02328	18.4	51.4	28.0	2.40
2	5810.*	Interim	946	5016.59	2.15	5018.74	5020.22	5023.99	2.57	0.02344	18.4	51.4	28.3	2.40
2	5800	Interim	1332	5016.40	3.21	5019.61	5020.81	5023.44	1.67	0.01084	15.7	84.8	32.8	1.72
2	5785.*	Interim	1332	5016.11	3.16	5019.27	5020.52	5023.25	1.74	0.01144	16.0	83.3	32.6	1.76
2	5770.*	Interim	1332	5015.82	3.12	5018.94	5020.23	5023.05	1.81	0.01199	16.3	81.9	32.5	1.80
2	5755.*	Interim	1332	5015.52	3.08	5018.60	5019.93	5022.84	1.87	0.01256	16.5	80.6	32.3	1.84
2	5740.*	Interim	1332	5015.23	3.05	5018.28	5019.64	5022.64	1.93	0.01307	16.8	79.5	32.2	1.88
2	5725.*	Interim	1332	5014.94	3.02	5017.96	5019.35	5022.42	1.98	0.01352	16.9	78.6	32.1	1.91
2	5710.*	Interim	1332	5014.65	2.99	5017.64	5019.06	5022.20	2.03	0.01396	17.1	77.7	32.0	1.94
2	5695.*	Interim	1332	5014.35	2.97	5017.32	5018.76	5021.97	2.08	0.01439	17.3	76.9	31.9	1.96
2	5680.*	Interim	1332	5014.06	2.95	5017.01	5018.47	5021.75	2.12	0.01476	17.5	76.2	31.8	1.99
2	5665	Interim	1332	5013.77	2.93	5016.70	5018.18	5021.51	2.16	0.01511	17.6	75.6	31.7	2.01
2	5650.*	Interim	1332	5013.48	3.00	5016.48	5017.97	5021.30	2.15	0.01486	17.6	75.6	31.2	1.99
2	5635.*	Interim	1332	5013.19	3.07	5016.26	5017.76	5021.12	2.16	0.01474	17.7	75.3	30.7	1.99
2	5620.*	Interim	1332	5012.89	3.14	5016.03	5017.55	5020.93	2.17	0.01465	17.8	75.0	30.2	1.99
2	5605.*	Interim	1332	5012.60	3.22	5015.82	5017.39	5020.73	2.16	0.01443	17.8	74.9	29.7	1.97
2	5590	Interim	1332	5012.31	3.31	5015.62	5017.16	5020.53	2.16	0.01421	17.8	74.9	29.2	1.96
2	5575.*	Interim	1332	5011.95	3.38	5015.33	5016.94	5020.34	2.19	0.01436	18.0	74.1	28.7	1.97
2	5560.*	Interim	1332	5011.59	3.45	5015.04	5016.66	5020.15	2.23	0.01453	18.1	73.4	28.2	1.98
2	5545.*	Interim	1332	5011.23	3.52	5014.75	5016.44	5019.96	2.27	0.01469	18.3	72.7	27.7	1.99
2	5530.*	Interim	1332	5010.87	3.62	5014.49	5016.24	5019.74	2.28	0.01463	18.4	72.4	27.3	1.99
2	5515	Interim	1332	5010.51	3.71	5014.22	5016.07	5019.52	2.30	0.01458	18.5	72.1	26.9	1.99
2	5500.*	Interim	1332	5010.15	3.68	5013.83	5015.71	5019.27	2.37	0.01515	18.7	71.1	26.7	2.02
2	5485.*	Interim	1332	5009.79	3.64	5013.43	5015.31	5019.02	2.44	0.01572	19.0	70.2	26.6	2.06
2	5470.*	Interim	1332	5009.43	3.61	5013.04	5015.01	5018.76	2.50	0.01622	19.2	69.4	26.4	2.09
2	5455.*	Interim	1332	5009.07	3.58	5012.65	5014.64	5018.50	2.56	0.01673	19.4	68.6	26.3	2.12
2	5440.*	Interim	1332	5008.71	3.56	5012.27	5014.23	5018.23	2.61	0.01717	19.6	68.0	26.2	2.14
2	5425.*	Interim	1332	5008.35	3.54	5011.89	5013.87	5017.95	2.66	0.01760	19.8	67.4	26.1	2.17
2	5410.*	Interim	1332	5007.98	3.51	5011.49	5013.55	5017.67	2.72	0.01804	19.9	66.8	26.0	2.19
2	5395.*	Interim	1332	5007.62	3.50	5011.12	5013.19	5017.37	2.76	0.01838	20.1	66.4	26.0	2.21
2	5380.*	Interim	1332	5007.26	3.48	5010.74	5012.77	5017.09	2.80	0.01877	20.2	65.9	25.9	2.24
2	5365.*	Interim	1332	5006.90	3.46	5010.36	5012.41	5016.79	2.84	0.01910	20.4	65.4	25.8	2.25
2	5350.*	Interim	1332	5006.54	3.45	5009.99	5012.11	5016.49	2.88	0.01941	20.5	65.1	25.8	2.27
2	5335.*	Interim	1332	5006.18	3.43	5009.61	5011.74	5016.20	2.92	0.01973	20.6	64.7	25.7	2.29
2	5320.*	Interim	1332	5005.82	3.42	5009.24	5011.37	5015.90	2.95	0.02004	20.7	64.3	25.7	2.30
2	5305.*	Interim	1332	5005.46	3.41	5008.87	5010.97	5015.59	2.98	0.02031	20.8	64.0	25.6	2.32
2	5290.*	Interim	1332	5005.10	3.40	5008.50	5010.61	5015.27	3.01	0.02054	20.9	63.8	25.6	2.33

HEC-RAS Plan: NBorregaChan River: main Reach: 2 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	Max Chl Dpth	W.S. Elev	Crit W.S.	E.G. Elev	Shear Chan	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(lb/sq ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	5275.*	Interim	1332	5004.74	3.39	5008.13	5010.30	5014.95	3.03	0.02073	21.0	63.5	25.5	2.34
2	5260.*	Interim	1332	5004.38	3.38	5007.76	5009.93	5014.63	3.05	0.02094	21.0	63.3	25.5	2.35
2	5245.*	Interim	1332	5004.02	3.37	5007.39	5009.52	5014.31	3.08	0.02116	21.1	63.1	25.5	2.36
2	5230.*	Interim	1332	5003.66	3.36	5007.02	5009.17	5013.98	3.10	0.02133	21.2	62.9	25.4	2.37
2	5215.*	Interim	1332	5003.30	3.35	5006.65	5008.86	5013.66	3.12	0.02150	21.2	62.7	25.4	2.38
2	5200.*	Interim	1332	5002.94	3.35	5006.29	5008.49	5013.33	3.14	0.02166	21.3	62.6	25.4	2.39
2	5185.*	Interim	1332	5002.57	3.34	5005.91	5008.07	5013.00	3.16	0.02188	21.4	62.3	25.3	2.40
2	5170.*	Interim	1332	5002.21	3.33	5005.54	5007.71	5012.67	3.18	0.02204	21.4	62.2	25.3	2.41
2	5155.*	Interim	1332	5001.85	3.33	5005.18	5007.36	5012.34	3.20	0.02220	21.5	62.0	25.3	2.42
2	5140.*	Interim	1332	5001.49	3.33	5004.82	5007.04	5011.96	3.19	0.02209	21.4	62.1	25.3	2.41
2	5125.*	Interim	1332	5001.13	3.33	5004.46	5006.63	5011.59	3.18	0.02201	21.4	62.2	25.3	2.41
2	5110.*	Interim	1332	5000.77	3.33	5004.10	5006.27	5011.25	3.19	0.02216	21.5	62.0	25.3	2.42
2	5095.*	Interim	1332	5000.41	3.33	5003.74	5005.91	5010.87	3.18	0.02204	21.4	62.2	25.3	2.41
2	5080	Interim	1473	5000.05	3.66	5003.71	5006.13	5010.45	2.94	0.01887	20.8	70.7	26.6	2.25
2	5065.*	Interim	1473	4999.69	3.65	5003.34	5005.77	5010.15	2.97	0.01915	21.0	70.3	26.6	2.27
2	5050.*	Interim	1473	4999.33	3.63	5002.96	5005.44	5009.86	3.01	0.01948	21.1	69.9	26.5	2.29
2	5035.*	Interim	1473	4998.97	3.62	5002.59	5005.08	5009.56	3.05	0.01977	21.2	69.5	26.5	2.30
2	5020.*	Interim	1473	4998.61	3.60	5002.21	5004.69	5009.26	3.08	0.02004	21.3	69.2	26.4	2.32
2	5005.*	Interim	1473	4998.25	3.59	5001.84	5004.35	5008.95	3.11	0.02030	21.4	68.8	26.4	2.33
2	4990.*	Interim	1473	4997.89	3.58	5001.47	5003.99	5008.64	3.14	0.02054	21.5	68.5	26.3	2.35
2	4975.*	Interim	1473	4997.52	3.57	5001.09	5003.63	5008.32	3.17	0.02078	21.6	68.3	26.3	2.36
2	4960.*	Interim	1473	4997.16	3.56	5000.72	5003.27	5008.01	3.20	0.02101	21.7	68.0	26.2	2.37
2	4945.*	Interim	1473	4996.80	3.55	5000.35	5002.89	5007.68	3.22	0.02119	21.7	67.8	26.2	2.38
2	4930.*	Interim	1473	4996.44	3.54	4999.98	5002.54	5007.36	3.24	0.02138	21.8	67.6	26.2	2.39
2	4915.*	Interim	1473	4996.08	3.53	4999.61	5002.18	5007.04	3.26	0.02157	21.9	67.3	26.1	2.40
2	4900.*	Interim	1473	4995.72	3.53	4999.25	5001.82	5006.71	3.28	0.02170	21.9	67.2	26.1	2.41
2	4885.*	Interim	1473	4995.36	3.52	4998.88	5001.46	5006.38	3.30	0.02186	22.0	67.0	26.1	2.42
2	4870	Interim	1473	4995.00	3.51	4998.51	5000.96	5006.05	3.32	0.02202	22.0	66.9	26.1	2.42
2	4820	Interim	1473	4985.00	2.66	4987.66	4990.67	5003.57	7.55	0.06275	32.0	46.0	22.6	3.96
2	4720	Interim	1473	4985.00	0.52	4985.52	4985.93	4987.70	5.52	0.32690	11.8	124.4	460.4	4.01

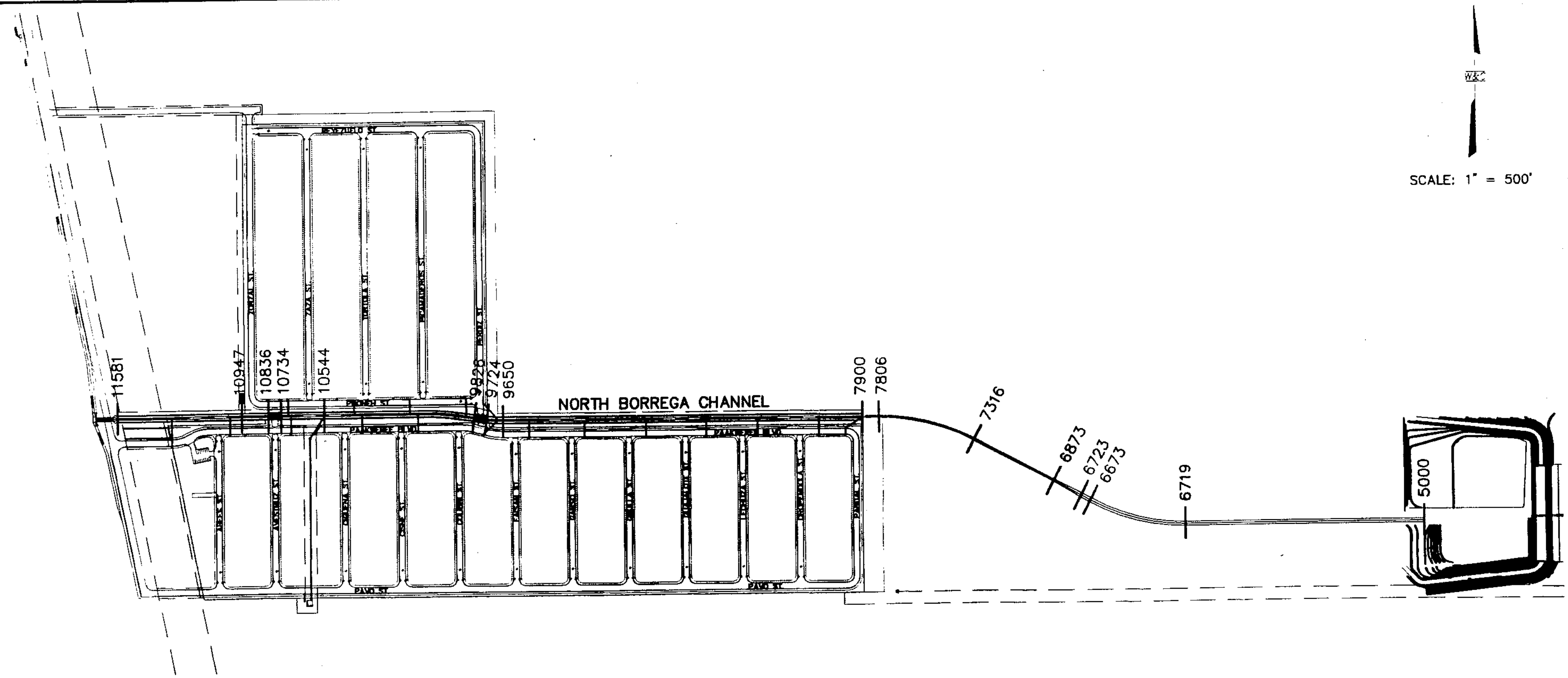


EXHIBIT 1

WILSON & COMPANY	NORTH BORREGA CHANNEL		
	HEC – RAS CROSS SECTION STATIONS		
	DSGN. NM	DRAWN NM	CK.
	FILE 99099	DATE DEC 1999	SHEET 1 OF 1

x:\public\projects\99099\hec-ras\freeboard.xls

River Sta	Profile	Q Total (cfs)	Max Chl Dpth (ft)	Vel Chnl (ft/s)	Free board (ABQ DPM) (ft)
11581	PostProject	264	2.36	7.6	1.58
11523.3*	PostProject	264	1.3	16.1	1.71
11465.7*	PostProject	264	1.22	17.4	1.73
11408.0*	PostProject	264	1.21	17.6	1.73
11350.4*	PostProject	264	1.19	17.9	1.73
11292.8*	PostProject	264	1.18	18.1	1.73
11235.1*	PostProject	264	1.19	18	1.73
11177.5*	PostProject	264	1.18	18	1.73
11119.9*	PostProject	264	1.19	18	1.73
11062.2*	PostProject	264	1.19	18	1.73
11004.6*	PostProject	264	1.18	18.1	1.73
10947	PostProject	316	1.37	18.2	1.75
10836	PostProject	316	1.32	19	1.76
10834.*	PostProject	316	1.31	19.2	1.77
10832.*	PostProject	316	1.3	19.3	1.77
10830.*	PostProject	316	1.3	19.3	1.77
10828.*	PostProject	316	1.29	19.4	1.77
10826.*	PostProject	316	1.29	19.5	1.77
10824.*	PostProject	316	1.28	19.7	1.77
10822.*	PostProject	316	1.28	19.7	1.77
10820.*	PostProject	316	1.27	19.8	1.78
10818.*	PostProject	316	1.27	19.9	1.78
10816	PostProject	316	1.26	20	1.78
10815		Bridge			
10754	PostProject	316	1.59	15.1	1.71
10752.*	PostProject	316	1.58	15.2	1.71
10750.*	PostProject	316	1.57	15.3	1.71
10748.*	PostProject	316	1.56	15.4	1.71
10746.*	PostProject	316	1.56	15.5	1.71
10744.*	PostProject	316	1.55	15.6	1.72
10742.*	PostProject	316	1.54	15.7	1.72
10740.*	PostProject	316	1.53	15.8	1.72
10738.*	PostProject	316	1.53	15.9	1.72
10736.*	PostProject	316	1.52	16	1.72
10734	PostProject	316	1.51	16	1.72
10650	PostProject	316	1.35	18.4	1.76

Freeboard 1/9

River Sta	Profile	Q Total (cfs)	Max Chl Dpth (ft)	Vel Chnl (ft/s)	Free board (ABQ DPM) (ft)
11581	Interim	198	1.99	7.1	1.56
11523.3*	Interim	198	1.04	15.8	1.68
11465.7*	Interim	198	1.01	16.4	1.69
11408.0*	Interim	198	1.01	16.4	1.69
11350.4*	Interim	198	1.01	16.3	1.69
11292.8*	Interim	198	1.01	16.4	1.69
11235.1*	Interim	198	1.01	16.4	1.69
11177.5*	Interim	198	1	16.5	1.69
11119.9*	Interim	198	0.99	16.6	1.69
11062.2*	Interim	198	0.99	16.7	1.69
11004.6*	Interim	198	0.99	16.7	1.69
10947	Interim	275	1.29	16.9	1.72
10836	Interim	275	1.22	18.1	1.74
10834.*	Interim	275	1.21	18.3	1.74
10832.*	Interim	275	1.21	18.3	1.74
10830.*	Interim	275	1.21	18.3	1.74
10828.*	Interim	275	1.21	18.4	1.74
10826.*	Interim	275	1.2	18.4	1.74
10824.*	Interim	275	1.2	18.5	1.74
10822.*	Interim	275	1.2	18.6	1.75
10820.*	Interim	275	1.19	18.7	1.75
10818.*	Interim	275	1.18	18.8	1.75
10816	Interim	275	1.18	18.9	1.75
10815		Bridge			
10754	Interim	275	1.52	13.9	1.68
10752.*	Interim	275	1.5	14.1	1.68
10750.*	Interim	275	1.49	14.2	1.68
10748.*	Interim	275	1.48	14.3	1.69
10746.*	Interim	275	1.48	14.4	1.69
10744.*	Interim	275	1.46	14.5	1.69
10742.*	Interim	275	1.46	14.6	1.69
10740.*	Interim	275	1.45	14.7	1.69
10738.*	Interim	275	1.44	14.8	1.69
10736.*	Interim	275	1.43	15	1.70
10734	Interim	275	1.42	15.1	1.70
10650	Interim	275	1.24	17.7	1.73

10544	PostProject	444	1.85	17.5	1.78
9826	PostProject	593	2.05	20.5	1.86
9824.*	PostProject	593	2.05	20.5	1.86
9822.*	PostProject	593	2.05	20.6	1.86
9820.*	PostProject	593	2.04	20.6	1.86
9818.*	PostProject	593	2.04	20.6	1.86
9816.*	PostProject	593	2.04	20.7	1.86
9814.*	PostProject	593	2.04	20.7	1.86
9812.*	PostProject	593	2.03	20.7	1.86
9810.*	PostProject	593	2.03	20.8	1.86
9808.*	PostProject	593	2.03	20.8	1.86
9806	PostProject	593	2.03	20.8	1.86
9805		Bridge			1.40
9744	PostProject	593	2.34	17.2	1.80
9742.*	PostProject	593	2.35	17.2	1.80
9740.*	PostProject	593	2.34	17.3	1.80
9738.*	PostProject	593	2.34	17.2	1.80
9736.*	PostProject	593	2.34	17.3	1.80
9734.*	PostProject	593	2.35	17.2	1.80
9732.*	PostProject	593	2.34	17.3	1.80
9730.*	PostProject	593	2.35	17.2	1.80
9728.*	PostProject	593	2.34	17.3	1.80
9726.*	PostProject	593	2.34	17.2	1.80
9724	PostProject	593	2.34	17.3	1.80
9650	PostProject	593	2.19	18.8	1.83
9625.*	PostProject	593	2.2	18.7	1.83
9600.*	PostProject	593	2.2	18.7	1.83
9575.*	PostProject	593	2.21	18.7	1.83
9550.*	PostProject	593	2.21	18.6	1.82
9525.*	PostProject	593	2.21	18.6	1.82
9500.*	PostProject	593	2.22	18.5	1.82
9475.*	PostProject	593	2.22	18.5	1.82
9450.*	PostProject	593	2.22	18.5	1.82
9425.*	PostProject	593	2.23	18.4	1.82
9400.*	PostProject	593	2.23	18.4	1.82
9375.*	PostProject	593	2.22	18.5	1.82
9350.*	PostProject	593	2.23	18.4	1.82
9325.*	PostProject	593	2.23	18.4	1.82
9300.*	PostProject	593	2.23	18.4	1.82
9275.*	PostProject	593	2.23	18.4	1.82

Freeboard 2/9

10544	Interim	584	2.32	17.2	1.80
9826	Interim	728	2.21	22.8	1.92
9824.*	Interim	728	2.21	22.9	1.92
9822.*	Interim	728	2.21	22.9	1.92
9820.*	Interim	728	2.2	23	1.92
9818.*	Interim	728	2.2	23	1.92
9816.*	Interim	728	2.2	23	1.92
9814.*	Interim	728	2.19	23.1	1.92
9812.*	Interim	728	2.19	23.1	1.92
9810.*	Interim	728	2.19	23.2	1.93
9808.*	Interim	728	2.18	23.3	1.93
9806	Interim	728	2.17	23.4	1.93
9805		Bridge			1.40
9744	Interim	728	2.47	19.7	1.87
9742.*	Interim	728	2.48	19.6	1.86
9740.*	Interim	728	2.49	19.6	1.86
9738.*	Interim	728	2.49	19.5	1.86
9736.*	Interim	728	2.49	19.5	1.86
9734.*	Interim	728	2.5	19.5	1.86
9732.*	Interim	728	2.5	19.4	1.86
9730.*	Interim	728	2.51	19.4	1.86
9728.*	Interim	728	2.51	19.3	1.86
9726.*	Interim	728	2.51	19.3	1.86
9724	Interim	728	2.52	19.3	1.86
9650	Interim	728	2.42	20.3	1.88
9625.*	Interim	728	2.44	20	1.87
9600.*	Interim	728	2.46	19.8	1.87
9575.*	Interim	728	2.46	19.8	1.87
9550.*	Interim	728	2.47	19.8	1.87
9525.*	Interim	728	2.47	19.7	1.87
9500.*	Interim	728	2.47	19.7	1.87
9475.*	Interim	728	2.48	19.7	1.87
9450.*	Interim	728	2.48	19.6	1.86
9425.*	Interim	728	2.48	19.6	1.86
9400.*	Interim	728	2.49	19.6	1.86
9375.*	Interim	728	2.49	19.6	1.86
9350.*	Interim	728	2.49	19.5	1.86
9325.*	Interim	728	2.49	19.5	1.86
9300.*	Interim	728	2.49	19.6	1.86
9275.*	Interim	728	2.49	19.5	1.86

9250.*	PostProject	593	2.23	18.4	1.82
9225.*	PostProject	593	2.22	18.5	1.82
9200.*	PostProject	593	2.22	18.5	1.82
9175.*	PostProject	593	2.22	18.5	1.82
9150.*	PostProject	593	2.22	18.5	1.82
9125.*	PostProject	593	2.23	18.5	1.82
9100.*	PostProject	593	2.23	18.4	1.82
9075.*	PostProject	593	2.23	18.4	1.82
9050.*	PostProject	593	2.24	18.4	1.82
9025.*	PostProject	593	2.23	18.4	1.82
9000.*	PostProject	593	2.23	18.4	1.82
8975.*	PostProject	593	2.23	18.4	1.82
8950.*	PostProject	593	2.23	18.4	1.82
8925.*	PostProject	593	2.23	18.4	1.82
8900.*	PostProject	593	2.23	18.4	1.82
8875.*	PostProject	593	2.23	18.5	1.82
8850.*	PostProject	593	2.23	18.4	1.82
8825.*	PostProject	593	2.23	18.4	1.82
8800.*	PostProject	593	2.23	18.4	1.82
8775.*	PostProject	593	2.23	18.4	1.82
8750	PostProject	593	2.22	18.5	1.82
8725.*	PostProject	593	2.23	18.4	1.82
8700.*	PostProject	593	2.23	18.4	1.82
8675.*	PostProject	593	2.23	18.4	1.82
8650.*	PostProject	593	2.23	18.5	1.82
8625.*	PostProject	593	2.23	18.4	1.82
8600.*	PostProject	593	2.22	18.5	1.82
8575.*	PostProject	593	2.21	18.6	1.82
8550.*	PostProject	593	2.22	18.5	1.82
8525.*	PostProject	593	2.21	18.6	1.82
8500.*	PostProject	593	2.22	18.6	1.82
8475.*	PostProject	593	2.23	18.5	1.82
8450.*	PostProject	593	2.23	18.4	1.82
8425.*	PostProject	593	2.23	18.4	1.82
8400.*	PostProject	593	2.23	18.4	1.82
8375.*	PostProject	593	2.23	18.4	1.82
8350.*	PostProject	593	2.23	18.4	1.82
8325.*	PostProject	593	2.23	18.4	1.82
8300.*	PostProject	593	2.23	18.4	1.82
8275.*	PostProject	593	2.23	18.4	1.82

Freeboard 3/9

9250.*	Interim	728	2.49	19.5	1.86
9225.*	Interim	728	2.49	19.5	1.86
9200.*	Interim	728	2.49	19.6	1.86
9175.*	Interim	728	2.49	19.6	1.86
9150.*	Interim	728	2.49	19.5	1.86
9125.*	Interim	728	2.49	19.5	1.86
9100.*	Interim	728	2.49	19.6	1.86
9075.*	Interim	728	2.49	19.6	1.86
9050.*	Interim	728	2.49	19.5	1.86
9025.*	Interim	728	2.49	19.5	1.86
9000.*	Interim	728	2.49	19.5	1.86
8975.*	Interim	728	2.49	19.5	1.86
8950.*	Interim	728	2.49	19.6	1.86
8925.*	Interim	728	2.49	19.5	1.86
8900.*	Interim	728	2.49	19.5	1.86
8875.*	Interim	728	2.49	19.6	1.86
8850.*	Interim	728	2.49	19.5	1.86
8825.*	Interim	728	2.48	19.6	1.86
8800.*	Interim	728	2.49	19.6	1.86
8775.*	Interim	728	2.49	19.5	1.86
8750	Interim	728	2.48	19.6	1.86
8725.*	Interim	728	2.48	19.7	1.87
8700.*	Interim	728	2.48	19.6	1.86
8675.*	Interim	728	2.47	19.7	1.87
8650.*	Interim	728	2.46	19.9	1.87
8625.*	Interim	728	2.45	19.9	1.87
8600.*	Interim	728	2.45	20	1.87
8575.*	Interim	728	2.45	20	1.87
8550.*	Interim	728	2.44	20	1.87
8525.*	Interim	728	2.44	20.1	1.87
8500.*	Interim	728	2.43	20.2	1.88
8475.*	Interim	728	2.43	20.1	1.87
8450.*	Interim	728	2.43	20.1	1.87
8425.*	Interim	728	2.44	20.1	1.87
8400.*	Interim	728	2.43	20.2	1.88
8375.*	Interim	728	2.43	20.1	1.87
8350.*	Interim	728	2.43	20.1	1.87
8325.*	Interim	728	2.44	20.1	1.87
8300.*	Interim	728	2.44	20.1	1.87
8275.*	Interim	728	2.44	20.1	1.87

8250.*	PostProject	593	2.23	18.4	1.82
8225.*	PostProject	593	2.23	18.4	1.82
8200.*	PostProject	593	2.23	18.4	1.82
8175.*	PostProject	593	2.22	18.5	1.82
8150.*	PostProject	593	2.23	18.4	1.82
8125.*	PostProject	593	2.23	18.4	1.82
8100.*	PostProject	593	2.24	18.3	1.82
8075.*	PostProject	593	2.23	18.4	1.82
8050.*	PostProject	593	2.23	18.4	1.82
8025.*	PostProject	593	2.23	18.4	1.82
8000.*	PostProject	593	2.23	18.4	1.82
7975.*	PostProject	593	2.22	18.5	1.82
7950.*	PostProject	593	2.21	18.6	1.82
7925.*	PostProject	593	2.22	18.5	1.82
7900	PostProject	593	2.21	18.7	1.83
7890.*	PostProject	593	2.12	18.8	1.82
7880.*	PostProject	593	2.04	18.9	1.82
7870	PostProject	716	2.36	18.1	1.82
7550	PostProject	716	2.24	19.4	1.84
7500.*	PostProject	716	2.29	18.9	1.84
7450.*	PostProject	716	2.32	18.6	1.83
7400.*	PostProject	716	2.32	18.6	1.83
7350.*	PostProject	716	2.32	18.5	1.83
7300.*	PostProject	716	2.33	18.5	1.83
7250	PostProject	716	2.33	18.4	1.83
7200.*	PostProject	716	2.34	18.4	1.83
7150.*	PostProject	716	2.34	18.4	1.83
7100.*	PostProject	716	2.33	18.4	1.83
7050.*	PostProject	716	2.34	18.4	1.83
7000.*	PostProject	716	2.34	18.4	1.83
6950.*	PostProject	716	2.34	18.4	1.83
6900.*	PostProject	716	2.34	18.4	1.83
6850.*	PostProject	716	2.34	18.3	1.83
6800.*	PostProject	716	2.34	18.4	1.83
6750.*	PostProject	716	2.34	18.4	1.83
6700.*	PostProject	716	2.33	18.4	1.83
6650.*	PostProject	716	2.34	18.4	1.83
6600.*	PostProject	716	2.34	18.4	1.83
6550.*	PostProject	716	2.34	18.4	1.83
6500.*	PostProject	716	2.34	18.4	1.83

8250.*	Interim	728	2.44	20.1	1.87
8225.*	Interim	728	2.43	20.1	1.87
8200.*	Interim	728	2.43	20.1	1.87
8175.*	Interim	728	2.43	20.1	1.87
8150.*	Interim	728	2.44	20.1	1.87
8125.*	Interim	728	2.43	20.1	1.87
8100.*	Interim	728	2.43	20.1	1.87
8075.*	Interim	728	2.43	20.1	1.87
8050.*	Interim	728	2.44	20.1	1.87
8025.*	Interim	728	2.43	20.2	1.88
8000.*	Interim	728	2.43	20.1	1.87
7975.*	Interim	728	2.43	20.1	1.87
7950.*	Interim	728	2.44	20.1	1.87
7925.*	Interim	728	2.43	20.2	1.88
7900	Interim	728	2.43	20.1	1.87
7890.*	Interim	728	2.35	20.2	1.87
7880.*	Interim	728	2.26	20.3	1.87
7870	Interim	854	2.54	19.7	1.87
7550	Interim	854	2.48	20.3	1.88
7500.*	Interim	854	2.52	19.9	1.87
7450.*	Interim	854	2.55	19.6	1.87
7400.*	Interim	854	2.55	19.5	1.87
7350.*	Interim	854	2.56	19.5	1.87
7300.*	Interim	854	2.56	19.5	1.87
7250	Interim	854	2.56	19.4	1.86
7200.*	Interim	854	2.57	19.4	1.87
7150.*	Interim	854	2.57	19.4	1.87
7100.*	Interim	854	2.58	19.3	1.86
7050.*	Interim	854	2.58	19.3	1.86
7000.*	Interim	854	2.57	19.4	1.87
6950.*	Interim	854	2.57	19.4	1.87
6900.*	Interim	854	2.57	19.4	1.87
6850.*	Interim	854	2.58	19.3	1.86
6800.*	Interim	854	2.57	19.4	1.87
6750.*	Interim	854	2.57	19.4	1.87
6700.*	Interim	854	2.58	19.3	1.86
6650.*	Interim	854	2.58	19.3	1.86
6600.*	Interim	854	2.58	19.3	1.86
6550.*	Interim	854	2.57	19.4	1.87
6500.*	Interim	854	2.57	19.4	1.87

Freeboard 4/9

6450	PostProject	716	2.34	18.4	1.83
6445.*	PostProject	716	2.33	18.4	1.83
6440.*	PostProject	716	2.33	18.4	1.83
6435.*	PostProject	716	2.33	18.5	1.83
6430.*	PostProject	716	2.32	18.5	1.83
6425.*	PostProject	716	2.32	18.6	1.83
6420.*	PostProject	716	2.32	18.5	1.83
6415.*	PostProject	716	2.32	18.6	1.83
6410.*	PostProject	716	2.32	18.6	1.83
6405.*	PostProject	716	2.32	18.6	1.83
6400.*	PostProject	716	2.31	18.6	1.83
6395.*	PostProject	716	2.32	18.6	1.83
6390.*	PostProject	716	2.32	18.6	1.83
6385.*	PostProject	716	2.31	18.6	1.83
6380.*	PostProject	716	2.32	18.6	1.83
6375.*	PostProject	716	2.32	18.6	1.83
6370.*	PostProject	716	2.31	18.6	1.83
6365.*	PostProject	716	2.32	18.6	1.83
6360.*	PostProject	716	2.32	18.6	1.83
6355.*	PostProject	716	2.31	18.6	1.83
6350.*	PostProject	716	2.31	18.6	1.83
6345.*	PostProject	716	2.32	18.6	1.83
6340.*	PostProject	716	2.32	18.6	1.83
6335.*	PostProject	716	2.32	18.5	1.83
6330.*	PostProject	716	2.32	18.6	1.83
6325.*	PostProject	716	2.32	18.6	1.83
6320.*	PostProject	716	2.32	18.6	1.83
6315.*	PostProject	716	2.32	18.5	1.83
6310.*	PostProject	716	2.32	18.6	1.83
6305.*	PostProject	716	2.31	18.6	1.83
6300.*	PostProject	716	2.32	18.6	1.83
6295.*	PostProject	716	2.32	18.6	1.83
6290.*	PostProject	716	2.32	18.6	1.83
6285.*	PostProject	716	2.31	18.6	1.83
6280.*	PostProject	716	2.32	18.6	1.83
6275.*	PostProject	716	2.32	18.6	1.83
6270.*	PostProject	716	2.32	18.5	1.83
6265.*	PostProject	716	2.32	18.6	1.83
6260.*	PostProject	716	2.32	18.6	1.83
6255.*	PostProject	716	2.32	18.5	1.83

6450	Interim	854	2.57	19.4	1.87
6445.*	Interim	854	2.57	19.4	1.87
6440.*	Interim	854	2.57	19.4	1.87
6435.*	Interim	854	2.57	19.4	1.87
6430.*	Interim	854	2.56	19.5	1.87
6425.*	Interim	854	2.55	19.6	1.87
6420.*	Interim	854	2.56	19.5	1.87
6415.*	Interim	854	2.55	19.6	1.87
6410.*	Interim	854	2.55	19.6	1.87
6405.*	Interim	854	2.55	19.6	1.87
6400.*	Interim	854	2.54	19.7	1.87
6395.*	Interim	854	2.55	19.6	1.87
6390.*	Interim	854	2.55	19.6	1.87
6385.*	Interim	854	2.54	19.7	1.87
6380.*	Interim	854	2.55	19.6	1.87
6375.*	Interim	854	2.55	19.6	1.87
6370.*	Interim	854	2.54	19.7	1.87
6365.*	Interim	854	2.54	19.7	1.87
6360.*	Interim	854	2.55	19.6	1.87
6355.*	Interim	854	2.54	19.7	1.87
6350.*	Interim	854	2.54	19.7	1.87
6345.*	Interim	854	2.54	19.6	1.87
6340.*	Interim	854	2.55	19.6	1.87
6335.*	Interim	854	2.55	19.6	1.87
6330.*	Interim	854	2.55	19.6	1.87
6325.*	Interim	854	2.55	19.6	1.87
6320.*	Interim	854	2.55	19.6	1.87
6315.*	Interim	854	2.55	19.6	1.87
6310.*	Interim	854	2.54	19.7	1.87
6305.*	Interim	854	2.55	19.6	1.87
6300.*	Interim	854	2.55	19.6	1.87
6295.*	Interim	854	2.54	19.7	1.87
6290.*	Interim	854	2.54	19.7	1.87
6285.*	Interim	854	2.54	19.7	1.87
6280.*	Interim	854	2.55	19.6	1.87
6275.*	Interim	854	2.54	19.7	1.87
6270.*	Interim	854	2.54	19.7	1.87
6265.*	Interim	854	2.54	19.6	1.87
6260.*	Interim	854	2.55	19.6	1.87
6255.*	Interim	854	2.55	19.6	1.87

Freeboard 5/6

6250.*	PostProject	716	2.32	18.6	1.83	6250.*	Interim	854	2.55	19.6	1.87
6245.*	PostProject	716	2.32	18.6	1.83	6245.*	Interim	854	2.55	19.6	1.87
6240.*	PostProject	716	2.32	18.6	1.83	6240.*	Interim	854	2.55	19.6	1.87
6235.*	PostProject	716	2.31	18.6	1.83	6235.*	Interim	854	2.54	19.7	1.87
6230.*	PostProject	716	2.31	18.6	1.83	6230.*	Interim	854	2.54	19.7	1.87
6225.*	PostProject	716	2.32	18.6	1.83	6225.*	Interim	854	2.54	19.7	1.87
6220.*	PostProject	716	2.32	18.6	1.83	6220.*	Interim	854	2.55	19.6	1.87
6215.*	PostProject	716	2.31	18.6	1.83	6215.*	Interim	854	2.54	19.7	1.87
6210.*	PostProject	716	2.31	18.6	1.83	6210.*	Interim	854	2.54	19.7	1.87
6205.*	PostProject	716	2.32	18.6	1.83	6205.*	Interim	854	2.54	19.6	1.87
6200.*	PostProject	716	2.32	18.6	1.83	6200.*	Interim	854	2.55	19.6	1.87
6195.*	PostProject	716	2.31	18.6	1.83	6195.*	Interim	854	2.55	19.6	1.87
6190.*	PostProject	716	2.31	18.7	1.83	6190.*	Interim	854	2.55	19.6	1.87
6185.*	PostProject	716	2.31	18.7	1.83	6185.*	Interim	854	2.55	19.6	1.87
6180.*	PostProject	716	2.31	18.6	1.83	6180.*	Interim	854	2.55	19.6	1.87
6175.*	PostProject	716	2.31	18.6	1.83	6175.*	Interim	854	2.54	19.7	1.87
6170.*	PostProject	716	2.32	18.6	1.83	6170.*	Interim	854	2.54	19.7	1.87
6165.*	PostProject	716	2.32	18.6	1.83	6165.*	Interim	854	2.54	19.7	1.87
6160.*	PostProject	716	2.32	18.5	1.83	6160.*	Interim	854	2.55	19.6	1.87
6155.*	PostProject	716	2.32	18.6	1.83	6155.*	Interim	854	2.54	19.7	1.87
6150.*	PostProject	716	2.32	18.6	1.83	6150.*	Interim	854	2.54	19.7	1.87
6145.*	PostProject	716	2.31	18.6	1.83	6145.*	Interim	854	2.55	19.6	1.87
6140.*	PostProject	716	2.32	18.6	1.83	6140.*	Interim	854	2.55	19.6	1.87
6135.*	PostProject	716	2.32	18.6	1.83	6135.*	Interim	854	2.55	19.6	1.87
6130.*	PostProject	716	2.31	18.6	1.83	6130.*	Interim	854	2.55	19.6	1.87
6125.*	PostProject	716	2.31	18.7	1.83	6125.*	Interim	854	2.55	19.6	1.87
6120.*	PostProject	716	2.31	18.7	1.83	6120.*	Interim	854	2.55	19.6	1.87
6115.*	PostProject	716	2.31	18.6	1.83	6115.*	Interim	854	2.55	19.6	1.87
6110.*	PostProject	716	2.31	18.6	1.83	6110.*	Interim	854	2.55	19.6	1.87
6105.*	PostProject	716	2.32	18.6	1.83	6105.*	Interim	854	2.55	19.6	1.87
6100.*	PostProject	716	2.32	18.6	1.83	6100.*	Interim	854	2.55	19.6	1.87
6095.*	PostProject	716	2.31	18.6	1.83	6095.*	Interim	854	2.55	19.6	1.87
6090.*	PostProject	716	2.31	18.6	1.83	6090.*	Interim	854	2.55	19.6	1.87
6085.*	PostProject	716	2.32	18.6	1.83	6085.*	Interim	854	2.55	19.6	1.87
6080.*	PostProject	716	2.32	18.6	1.83	6080.*	Interim	854	2.55	19.6	1.87
6075.*	PostProject	716	2.31	18.6	1.83	6075.*	Interim	854	2.54	19.6	1.87
6070.*	PostProject	716	2.32	18.6	1.83	6070.*	Interim	854	2.55	19.6	1.87
6065.*	PostProject	716	2.32	18.6	1.83	6065.*	Interim	854	2.55	19.6	1.87
6060.*	PostProject	716	2.32	18.5	1.83	6060.*	Interim	854	2.55	19.6	1.87
6055.*	PostProject	716	2.32	18.6	1.83	6055.*	Interim	854	2.55	19.6	1.87

Freeboard 6/9

6050	PostProject	755	2.45	18.2	1.83
6040.*	PostProject	755	2.43	18.1	1.83
6030.*	PostProject	755	2.4	18.1	1.82
6020.*	PostProject	755	2.37	18	1.82
6010.*	PostProject	755	2.35	17.9	1.82
6000.*	PostProject	755	2.32	17.9	1.81
5990.*	PostProject	755	2.3	17.8	1.81
5980.*	PostProject	755	2.27	17.7	1.81
5970.*	PostProject	755	2.24	17.7	1.81
5960.*	PostProject	755	2.22	17.6	1.80
5950.*	PostProject	755	2.2	17.5	1.80
5940.*	PostProject	755	2.18	17.4	1.79
5930.*	PostProject	755	2.16	17.4	1.79
5920.*	PostProject	755	2.13	17.4	1.79
5910.*	PostProject	755	2.09	17.5	1.79
5900.*	PostProject	755	2.06	17.5	1.79
5890.*	PostProject	755	2.04	17.5	1.79
5880.*	PostProject	755	2.01	17.5	1.79
5870.*	PostProject	755	1.98	17.5	1.78
5860.*	PostProject	755	1.96	17.5	1.78
5850.*	PostProject	755	1.94	17.4	1.78
5840.*	PostProject	755	1.92	17.4	1.78
5830.*	PostProject	755	1.91	17.3	1.78
5820.*	PostProject	755	1.88	17.3	1.77
5810.*	PostProject	755	1.87	17.2	1.77
5800	PostProject	896	2.26	16.2	1.77
5785.*	PostProject	896	2.26	16.2	1.77
5770.*	PostProject	896	2.25	16.3	1.77
5755.*	PostProject	896	2.24	16.3	1.77
5740.*	PostProject	896	2.24	16.3	1.77
5725.*	PostProject	896	2.25	16.3	1.77
5710.*	PostProject	896	2.24	16.3	1.77
5695.*	PostProject	896	2.23	16.4	1.77
5680.*	PostProject	896	2.24	16.4	1.78
5665	PostProject	896	2.24	16.3	1.77
5650.*	PostProject	896	2.31	16.3	1.78
5635.*	PostProject	896	2.38	16.3	1.78
5620.*	PostProject	896	2.45	16.3	1.78
5605.*	PostProject	896	2.52	16.3	1.79
5590	PostProject	896	2.6	16.3	1.79

Freeboard 7/9

6050	Interim	946	2.83	19	1.87
6040.*	Interim	946	2.79	19	1.87
6030.*	Interim	946	2.75	19	1.87
6020.*	Interim	946	2.71	19	1.86
6010.*	Interim	946	2.68	19	1.86
6000.*	Interim	946	2.64	19	1.86
5990.*	Interim	946	2.61	19	1.86
5980.*	Interim	946	2.58	19	1.86
5970.*	Interim	946	2.54	19	1.85
5960.*	Interim	946	2.52	18.9	1.85
5950.*	Interim	946	2.49	18.8	1.85
5940.*	Interim	946	2.47	18.7	1.84
5930.*	Interim	946	2.45	18.6	1.84
5920.*	Interim	946	2.42	18.6	1.84
5910.*	Interim	946	2.4	18.5	1.83
5900.*	Interim	946	2.38	18.5	1.83
5890.*	Interim	946	2.36	18.4	1.83
5880.*	Interim	946	2.34	18.3	1.83
5870.*	Interim	946	2.31	18.3	1.82
5860.*	Interim	946	2.29	18.2	1.82
5850.*	Interim	946	2.26	18.3	1.82
5840.*	Interim	946	2.22	18.4	1.82
5830.*	Interim	946	2.2	18.4	1.82
5820.*	Interim	946	2.17	18.4	1.82
5810.*	Interim	946	2.15	18.4	1.82
5800	Interim	1332	3.21	15.7	1.81
5785.*	Interim	1332	3.16	16	1.81
5770.*	Interim	1332	3.12	16.3	1.82
5755.*	Interim	1332	3.08	16.5	1.82
5740.*	Interim	1332	3.05	16.8	1.83
5725.*	Interim	1332	3.02	16.9	1.83
5710.*	Interim	1332	2.99	17.1	1.83
5695.*	Interim	1332	2.97	17.3	1.84
5680.*	Interim	1332	2.95	17.5	1.84
5665	Interim	1332	2.93	17.6	1.84
5650.*	Interim	1332	3	17.6	1.84
5635.*	Interim	1332	3.07	17.7	1.85
5620.*	Interim	1332	3.14	17.8	1.86
5605.*	Interim	1332	3.22	17.8	1.86
5590	Interim	1332	3.31	17.8	1.86

5575.*	PostProject	896	2.66	16.4	1.80
5560.*	PostProject	896	2.72	16.6	1.81
5545.*	PostProject	896	2.79	16.7	1.81
5530.*	PostProject	896	2.88	16.8	1.82
5515	PostProject	896	2.96	16.9	1.82
5500.*	PostProject	896	2.93	17.1	1.83
5485.*	PostProject	896	2.9	17.4	1.83
5470.*	PostProject	896	2.88	17.6	1.84
5455.*	PostProject	896	2.85	17.8	1.84
5440.*	PostProject	896	2.83	17.9	1.84
5425.*	PostProject	896	2.81	18.1	1.85
5410.*	PostProject	896	2.79	18.2	1.85
5395.*	PostProject	896	2.78	18.4	1.85
5380.*	PostProject	896	2.77	18.5	1.85
5365.*	PostProject	896	2.75	18.6	1.86
5350.*	PostProject	896	2.74	18.7	1.86
5335.*	PostProject	896	2.73	18.8	1.86
5320.*	PostProject	896	2.72	18.9	1.86
5305.*	PostProject	896	2.72	18.9	1.86
5290.*	PostProject	896	2.71	19	1.86
5275.*	PostProject	896	2.7	19.1	1.87
5260.*	PostProject	896	2.71	19	1.86
5245.*	PostProject	896	2.7	19.1	1.87
5230.*	PostProject	896	2.7	19.1	1.87
5215.*	PostProject	896	2.7	19.1	1.87
5200.*	PostProject	896	2.7	19.1	1.87
5185.*	PostProject	896	2.69	19.2	1.87
5170.*	PostProject	896	2.69	19.1	1.86
5155.*	PostProject	896	2.7	19.1	1.87
5140.*	PostProject	896	2.69	19.1	1.86
5125.*	PostProject	896	2.7	19.1	1.87
5110.*	PostProject	896	2.7	19	1.86
5095.*	PostProject	896	2.7	19.1	1.87
5080	PostProject	967	2.9	18.7	1.87
5065.*	PostProject	967	2.89	18.9	1.87
5050.*	PostProject	967	2.87	19	1.87
5035.*	PostProject	967	2.86	19	1.87
5020.*	PostProject	967	2.85	19.1	1.87
5005.*	PostProject	967	2.85	19.2	1.88
4990.*	PostProject	967	2.84	19.3	1.88

Page 8/9

5575.*	Interim	1332	3.38	18	1.87
5560.*	Interim	1332	3.45	18.1	1.88
5545.*	Interim	1332	3.52	18.3	1.89
5530.*	Interim	1332	3.62	18.4	1.89
5515	Interim	1332	3.71	18.5	1.90
5500.*	Interim	1332	3.68	18.7	1.91
5485.*	Interim	1332	3.64	19	1.91
5470.*	Interim	1332	3.61	19.2	1.92
5455.*	Interim	1332	3.58	19.4	1.92
5440.*	Interim	1332	3.56	19.6	1.92
5425.*	Interim	1332	3.54	19.8	1.93
5410.*	Interim	1332	3.51	19.9	1.93
5395.*	Interim	1332	3.5	20.1	1.93
5380.*	Interim	1332	3.48	20.2	1.94
5365.*	Interim	1332	3.46	20.4	1.94
5350.*	Interim	1332	3.45	20.5	1.94
5335.*	Interim	1332	3.43	20.6	1.94
5320.*	Interim	1332	3.42	20.7	1.95
5305.*	Interim	1332	3.41	20.8	1.95
5290.*	Interim	1332	3.4	20.9	1.95
5275.*	Interim	1332	3.39	21	1.95
5260.*	Interim	1332	3.38	21	1.95
5245.*	Interim	1332	3.37	21.1	1.95
5230.*	Interim	1332	3.36	21.2	1.96
5215.*	Interim	1332	3.35	21.2	1.96
5200.*	Interim	1332	3.35	21.3	1.96
5185.*	Interim	1332	3.34	21.4	1.96
5170.*	Interim	1332	3.33	21.4	1.96
5155.*	Interim	1332	3.33	21.5	1.96
5140.*	Interim	1332	3.33	21.4	1.96
5125.*	Interim	1332	3.33	21.4	1.96
5110.*	Interim	1332	3.33	21.5	1.96
5095.*	Interim	1332	3.33	21.4	1.96
5080	Interim	1473	3.66	20.8	1.96
5065.*	Interim	1473	3.65	21	1.97
5050.*	Interim	1473	3.63	21.1	1.97
5035.*	Interim	1473	3.62	21.2	1.97
5020.*	Interim	1473	3.6	21.3	1.97
5005.*	Interim	1473	3.59	21.4	1.97
4990.*	Interim	1473	3.58	21.5	1.98

4975.*	PostProject	967	2.83	19.4	1.88
4960.*	PostProject	967	2.82	19.4	1.88
4945.*	PostProject	967	2.81	19.5	1.88
4930.*	PostProject	967	2.82	19.5	1.88
4915.*	PostProject	967	2.81	19.5	1.88
4900.*	PostProject	967	2.82	19.5	1.88
4885.*	PostProject	967	2.81	19.5	1.88
4870	PostProject	967	2.8	19.6	1.88
4820	PostProject	967	2.06	29	2.05
4720	PostProject	967	0.26	8.3	1.49

4975.*	Interim	1473	3.57	21.6	1.98
4960.*	Interim	1473	3.56	21.7	1.98
4945.*	Interim	1473	3.55	21.7	1.98
4930.*	Interim	1473	3.54	21.8	1.98
4915.*	Interim	1473	3.53	21.9	1.98
4900.*	Interim	1473	3.53	21.9	1.98
4885.*	Interim	1473	3.52	22	1.99
4870	Interim	1473	3.51	22	1.99
4820	Interim	1473	2.72	31	2.16
4720	Interim	1473	0.27	12.1	1.54

Freeboard 9/9

COMP. TJA

CK.

DATE 2-14-2000

WILSON & COMPANY

LOC. N. Borrega Channel FILE 99000

PROJ. SHEET 1

SUBJ. FREEBOARD – SUPERELEVATION OF 2

1st curve

$$S = \frac{1.3\,V^2(b+2zD)}{2gr}$$

$r = 500'$ $b = 10'$ $V = 25.3\ ft/s$

$g = 32.2\ ft/sec^2$ $z = 2$

$D = 2.42'$

$$= \frac{1.3(25.3)^2(10+2(2)(2.42)}{2(32.2)(500')} = .508'$$

$$L_E = .32(b+2zD)\frac{V}{\sqrt{D}} = .32(10+2(2)(2.42)\frac{25.3}{\sqrt{2.42}}$$

$$= \underline{102.42} \quad w/r = 1000'$$

2nd curve

PC $S = \frac{1.3\,V^2(b+2zD)}{2gr}$

$r = 375'$ $b = 10'$

$g = 32.2\ ft/s^2$ $V = 23.6\ ft/s$

$z = 2$

$D = 2.72'$

$$= \frac{1.3(23.6)^2(10+2(2)(2.72)}{2(32.2)(375} = .626$$

$$L_E = .32(b+2zD)\frac{V}{\sqrt{D}} = .32(10+2(2)(2.72)\frac{23.6}{\sqrt{2.72}}$$

$$= \underline{95.6'} \quad w/r = 750'$$

mid $S = \frac{1.3(24.2)^2(20+4(2.42)}{2(32.2)(375)}$

$r = 375$ $D = 2.42$

$g = 32.2$ $b = 20$

$z = 2$ $V = 24.2$

$$= \underline{.936}$$

PT $S = \frac{1.3(24.4)^2(16+4(2.68)}{2(32.2)(370)}$

$r = 370'$ $D = 2.68$

$g = 32.2$ $b = 16'$

$z = 2$ $V = 24.4'$

$$= \underline{.868'}$$

$$L_E = .32(16+4(2.68))\frac{24.4}{\sqrt{2.68}}$$

$$= \underline{127.44'} \quad w/r = 740$$

COMP.

CK.

DATE

WILSON &COMPANY

LOC. N. BORREGA CHANNEL FILE 99099

PROJ. SHEET 2

SUBJ. FREEBOARD— SUPERELEVATION OF 2

3rd curve

$$S = \frac{1.3(26.8)^2(12+4(3))}{2(32.2)(600)}$$

$$= .580'$$

$$L_E = .32(12+4(3))\frac{26.8}{\sqrt{3}}$$

$$= 118.83'$$

$r = 600'$ $D = 3'$

$g = 32.2$ $t = 12$

$z = 2$ $v = 26.8$

Culvert Designer/Analyzer Report

96" under 118th St

96" RCP INTAKE CULVERT FOR N. BORREGA CHAN

Peak Discharge Method: User-Specified			
Design Discharge	264.00 cfs	Check Discharge	198.00 cfs
Grades Model: Inverts			
Invert Upstream	5,192.40 ft	Invert Downstream	5,191.72 ft
Length	94.60 ft	Slope	0.007188 ft/ft
Drop	0.68 ft		
Headwater Model: Maximum Allowable HW			
Headwater Elevation	5,199.90 ft		
Tailwater properties: Trapezoidal Channel			
Slope	0.050000 ft/ft	Mannings Coefficient	0.018
Depth	1.19 ft	Left Side Slope	2 H : V
Right Side Slope	2 H : V	Bottom Width	10.00 ft
Tailwater conditions for Design Storm.			
Discharge	264.00 cfs	Bottom Elevation	5,191.70 ft
Depth	1.19 ft	Velocity	17.96 ft/s
Tailwater conditions for Check Storm.			
Discharge	198.00 cfs	Bottom Elevation	5,191.70 ft
Depth	1.01 ft	Velocity	16.36 ft/s

	Name	Desc	Discharge	HW Elev	Velocity
x	Trial-1	1-96 inch Circular	264.00 cfs	5,198.92 ft	12.62 ft/s

96" RCP

Culvert Designer/Analyzer Report
96" under 118th St

96" RCP INTAKE CULVERT FOR N. BORREGA CHAN.

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	5,199.90 ft	Storm Event	Design
Computed Headwater Elevation	5,198.92 ft	Discharge	264.00 cfs
Headwater Depth/ Height	0.81	Tailwater Elevation	5,192.89 ft
Inlet Control HW Elev	5,198.35 ft	Control Type	Outlet Control
Outlet Control HW Elev	5,198.92 ft		

Grades			
Upstream Invert	5,192.40 ft	Downstream Invert	5,191.72 ft
Length	94.60 ft	Constructed Slope	0.007188 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	3.47 ft
Slope Type	Steep	Normal Depth	3.22 ft
Flow Regime	Supercritical	Critical Depth	4.09 ft
Velocity Downstream	12.62 ft/s	Critical Slope	0.003102 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	8.00 ft
Section Size	96 inch	Rise	8.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev	5,198.92 ft	Upstream Velocity Head	1.62 ft
Ke	0.50	Entrance Loss	0.81 ft

Inlet Control Properties			
Inlet Control HW Elev	5,198.35 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	50.3 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

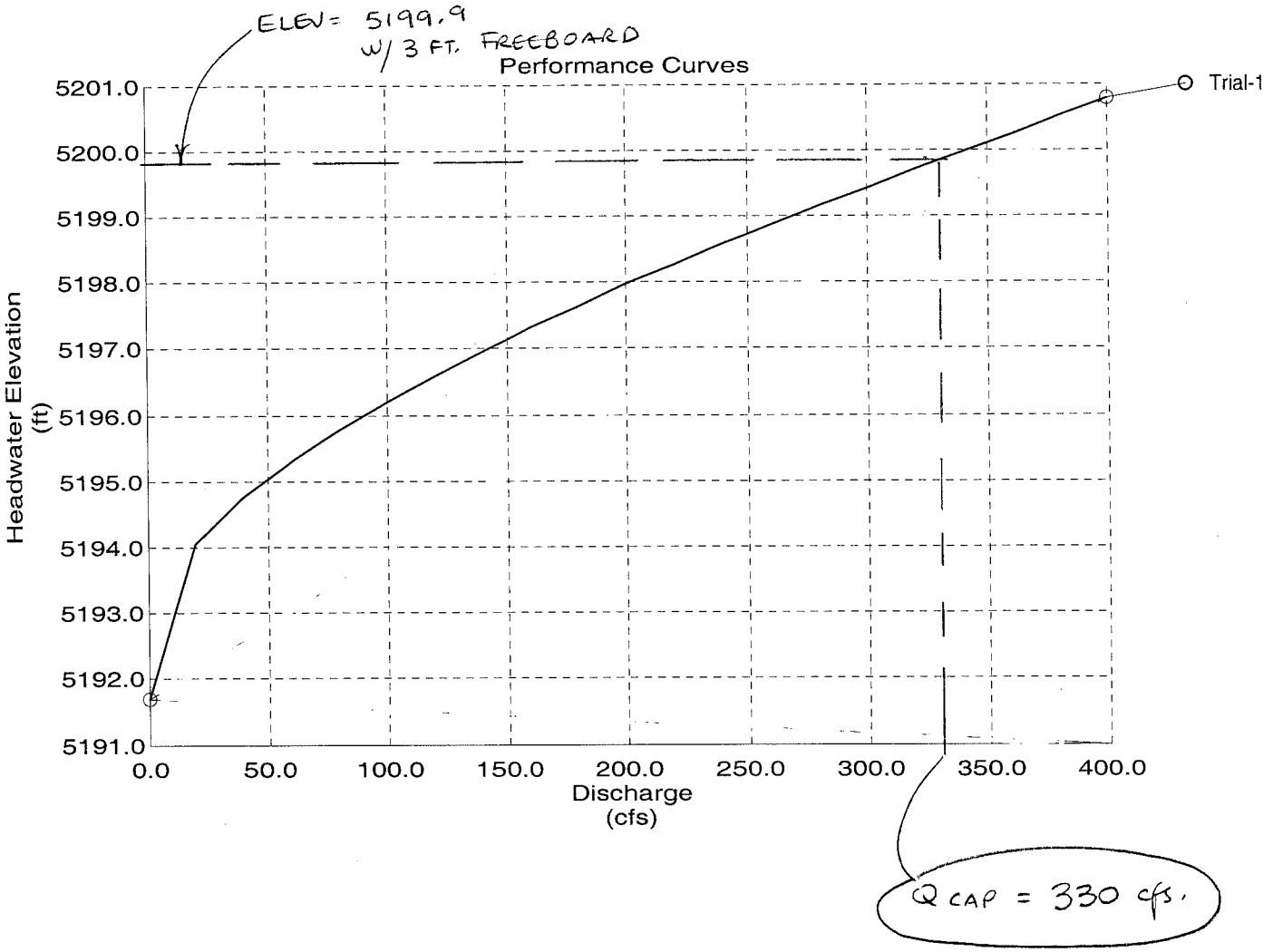
96" RCP

Wilson & Company
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Performance Curves Report
96" RCP Intake Culv for N Borrega Chan

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	400.00	20.00 cfs

CAPACITY BASED ON ROAD OVERFLOW POINT
118± ST, LOW PT STA 9+01
ELEV = 5202.9



Borrega Dam Outflow Calculations

INITIAL DAM - TO BE BUILT WITH NORTH POOL NOT FULLY EXCAVATED

TOTAL Q	STORAGE (ac-ft)	ELEV	ELEV	AREA (sq ft)	AREA (acre)	INCR. VOL (ac-ft)	CUMUL VOL
0	0.00	4985	4985	100	0.01	0.00	0.00
0.4	2.02	4986	4986	253025.3	5.81	2.02	2.02
4	7.94	4987	4987	262909.7	6.04	5.92	7.94
8	14.10	4988	4988	273525	6.28	6.16	14.10
14	20.51	4989	4989	284870.6	6.54	6.41	20.51
24	27.17	4990	4990	295499.7	6.78	6.66	27.17
36	34.08	4991	4991	306205	7.03	6.91	34.08
49	41.36	4992	4992	328452.7	7.54	7.28	41.36
69	49.21	4993	4993	355786.5	8.17	7.85	49.21
163	57.72	4994	4994	385667.4	8.85	8.51	57.72
174	67.03	4995	4995	426041.7	9.78	9.31	67.03
184	77.26	4996	4996	464974.3	10.67	10.22	77.26
191	88.36	4997	4997	502367	11.53	11.10	88.36
225	89.51	4997.1	4997.1	505327	11.60	1.16	89.51
1252	100.23	4998	4998	531972.5	12.21	10.71	100.23
3176	112.77	4999	4999	560346.9	12.86	12.54	112.77
5667	125.94	5000	5000	587772.7	13.49	13.18	125.94
8620	139.90	5001	5001	628296.4	14.42	13.96	139.90
11966	154.34	5002	5002	630000	14.46	14.44	154.34
15667	169.38	5003	5003	680000	15.61	15.03	169.38

BORREGA DAM
STORAGE - DISCHARGE
1/3

Borrega Dam Outflow Calculations

Fully Excavated Dam

PRINC SPILLWAY	PRINCIPAL SPILLWAY			PMF SPILLWAY	
8" ORIFICES					
	ORIFICE =	**47.5**	inches		
	C=	0.67			
	g=	32.2	ft/sec^2		
	ORIF R=	1.979167	ft		
	AREA=	12.31	sq ft		
	ORIF Q=	C * A * (2 * g * H)^.5		WEIR Q=	CLH^3/2
	PIPE INV=	4984.7			C=3.0

	RISER ORIFICES		PRINCIPAL SPILLWAY			PMF SPILLWAY			TOTAL	STORAGE	
				47.5	" ORIF						
ELEV		Q			Q	L	H	Q	Q	(ac-ft)	ELEV
4985		0			0				0	0.00	4985
4986		0.4			0.4				0.4	2.02	4986
4987		4			4				4	7.94	4987
4988		8			8				8	14.10	4988
4989		14			14				14	20.51	4989
4990		24			24				24	27.17	4990
4991		36			36				36	34.08	4991
4992		49			49				49	41.78	4992
4993		69			69				69	50.84	4993
4994	top of riser	91			163				163	61.26	4994
4995					174				174	73.20	4995
4996					184				184	86.10	4996
4997	spillway crest				191	350	0	0.0	191	99.30	4997
4997.1					192	350	0.1	33.2	225	100.64	4997.1
4998					202	350	1	1050.0	1252	112.80	4998
4999					206	350	2	2969.8	3176	126.55	4999
5000					211	350	3	5456.0	5667	140.56	5000
5001					220	350	4	8400.0	8620	154.85	5001
5002					227	350	5	11739.4	11966	169.29	5002
5003					235	350	6	15431.8	15667	184.32	5003

ELEV	AREA (sq ft)	AREA (acre)	INCR. VOL (ac-ft)	CUMUL VOL
4985	100	0.01	0.00	0.00
4986	253025.3	5.81	2.02	2.02
4987	262909.7	6.04	5.92	7.94
4988	273525	6.28	6.16	14.10
4989	284870.6	6.54	6.41	20.51
4990	295499.7	6.78	6.66	27.17
4991	306205	7.03	6.91	34.08
4992	365671	8.39	7.70	41.78
4993	424653	9.75	9.06	50.84
4994	484012	11.11	10.42	61.26
4995	556757.6	12.78	11.94	73.20
4996	566912.9	13.01	12.90	86.10
4997	582943	13.38	13.20	99.30
4997.1	584021	13.41	1.34	100.64
4998	593724.7	13.63	12.17	112.80
4999	604403.7	13.88	13.75	126.55
5000	616051.5	14.14	14.01	140.56
5001	628296.4	14.42	14.28	154.85
5002	630000	14.46	14.44	169.29
5003	680000	15.61	15.03	184.32

BORREGA DAM
STORAGE - DISCHARGE
2/3

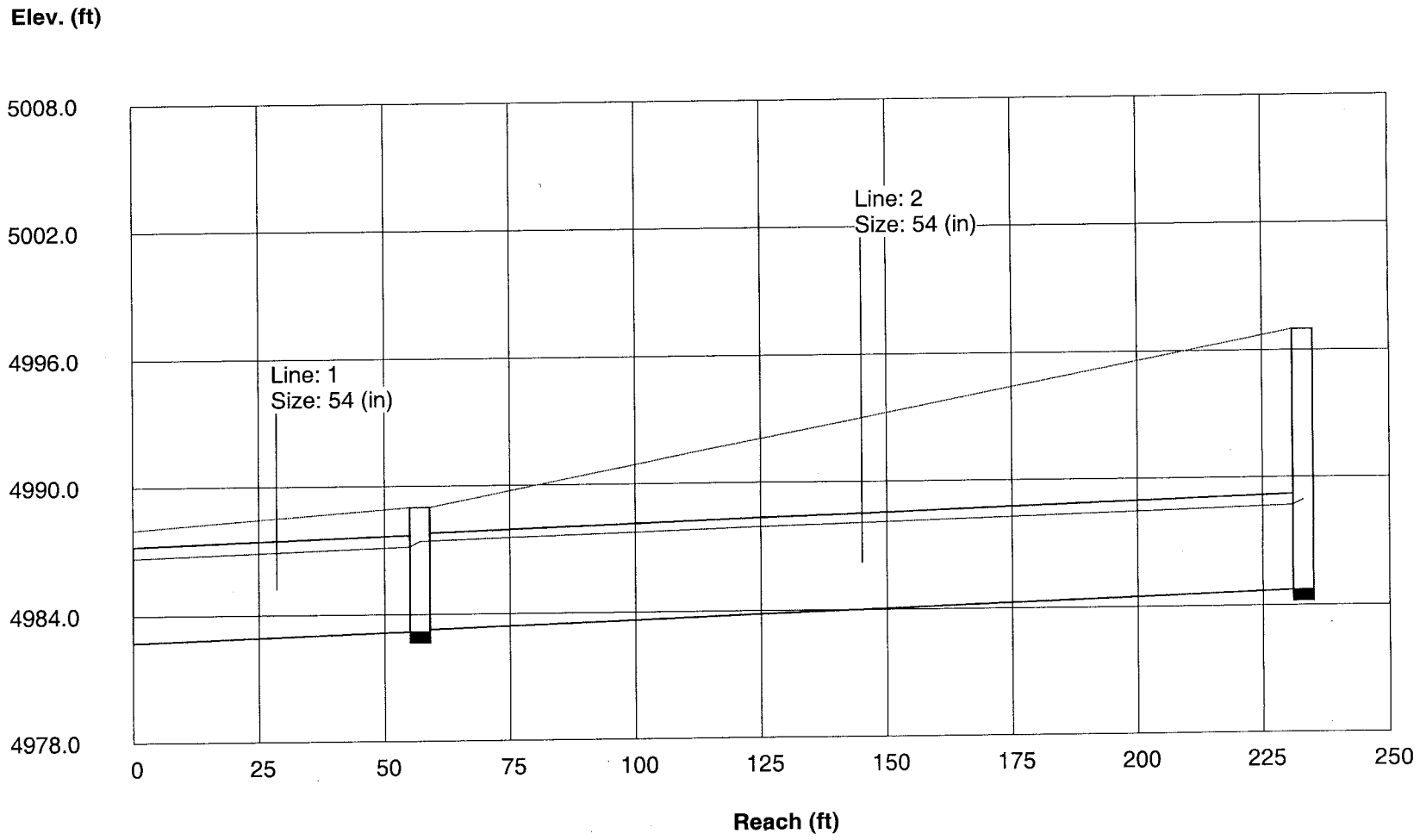
8" ORIFICES														
WSEL	#	H1	A1	Q1	#	H2	A2	Q2	#	H3	A3	Q3	Qtotal	WSEL
	9	inv=	4985.0		9	inv=	4988.0		12	inv=	4991.0			
		Atot=	3.15			Atot=	3.15			Atot=	4.2			
4985		0	0	0.0									0	4985
4986		0.5	1.575	0.4									0.4	4986
4987		1.5	3.15	3.9									4	4987
4988		2.5	3.15	8.3									8	4988
4989		3.5	3.15	13.8		0.5	1.575	0.4					14	4989
4990		4.5	3.15	20.1		1.5	3.15	3.9					24	4990
4991		5.5	3.15	27.2		2.5	3.15	8.3					36	4991
4992		6.5	3.15	35.0		3.5	3.15	13.8		0.5	2.1	0.5	49	4992
4993		7.5	3.15	43.3		4.5	3.15	20.1		1.5	4.2	5.2	69	4993
4994		8.5	3.15	52.3		5.5	3.15	27.2		2.5	4.2	11.1	91	4994

OUTFLOW PIPE						
S = 0.8%	3					
Orfice Inv	4984.70					
Orfice Dia	47.5	3.96	From orifice Eqn			
OrficeArea	12.31		$\Delta h = \left(\frac{Q}{CA}\right)^2 / 2g$			
Q<190, Non-pressure flow						
Q	d normal	HGL@orif	delta h	WSEL		
140	2.87	4987.57	4.47	4992.04	4992	140
152	3.04	4987.74	5.27	4993.01	4993	152
163	3.20	4987.90	6.06	4993.96	4994	163
174	3.38	4988.08	6.91	4994.99	4995	174
184	3.56	4988.26	7.73	4995.99	4996	184
Q>190, Pressure flow						
191		4988.69	8.33	4997.02	4997	191
202		4988.78	9.31	4998.09	4998	202
206		4989.09	9.69	4998.78	4999	206
211		4989.80	10.16	4999.96	5000	211
220		4990.02	11.05	5001.07	5001	220
227		4990.21	11.76	5001.97	5002	227
235		4990.42	12.60	5003.02	5003	235

BORREGA DAM
STORAGE - DISCHARGE
3/3

Stor Sewer Profile

Proj. fi' rinspil.stm



PRINCIPAL SPILLWAY OUTLET

1/4

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		190.0	54 c	57.0	4982.74	4983.20	0.807	4986.72	4987.18	0.25	End
2		190.0	54 c	176.0	4983.30	4984.71	0.801	4987.43	4988.69	0.25	1

Δh for orifice flow starts here. see sheet 3/3 BORREGA DAM SPILLWAY DISCHARGE.

Project File: prinspil.stm	I-D-F File: SAMPLE.IDF	Total No. Lines: 2	Run Date: 04-07-2000

NOTES: c = circular; e = elliptical; b = box; Return period = 100 Yrs.; * Indicates surcharge condition.

PRINCIPAL SPILLWAY OUTLET

Hydr low Storm Sewer Inventory Repor

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	57.0	180.0	MH	190.00	0.00	0.00	0.0	4982.74	0.81	4983.20	54	Cir	0.012	0.10	4989.00	
2	1	176.0	0.0	MH	190.00	0.00	0.00	0.0	4983.30	0.80	4984.71	54	Cir	0.012	0.10	4997.00	

Project File: prinspil.stm | I-D-F File: SAMPLE.IDF | Total number of lines: 2 | Date: 04-07-2000

PRINCIPAL SPILLWAY OUTLET 3/4

Hydr[illegible]ow Hydraulic Grade Line Comput[illegible]ons

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
	(in)	(cfs)									(ft)											(K)	(ft)
1	54	190.0	4982.74	4986.72	3.98	14.87	12.78	2.54	4989.25	0.713	57.0	4983.20	4987.18	3.98**	14.87	12.78	2.54	4989.71	0.712	0.712	N/A	0.10	0.25
2	54	190.0	4983.30	4987.43	4.13	15.28	12.43	2.40	4989.83	0.691	176	4984.71	4988.69	3.98**	14.87	12.78	2.54	4991.22	0.712	0.702	N/A	0.10	0.25

Project File: prinspil.stm | I-D-F File: SAMPLE.IDF | Total number of lines: 2 | Run Date: 04-07-2000

NOTES: Initial tailwater elevation = 4986.716 (ft) , * Critical depth assumed., ** Critical depth assumed.

Principal Spillway Outlet

APPENDIX D

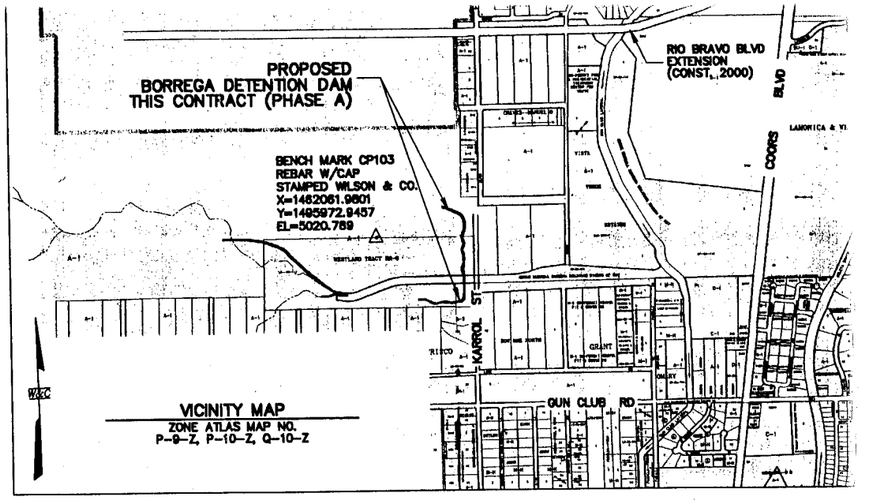
Sheets from Construction Plans, including Dam Filing Sheet

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

CONSTRUCTION PLANS FOR

BORREGA DETENTION DAM

AMAFCA



REFERENCE DOCUMENTS

Arroyo-Hubbell Drainage Management Plan, for AMAFCA by Leedshill-Herkenhoff, Inc., 1999.

Borrego Diversion Sediment Issues Floodplain Study for AMAFCA, for Bohannan-Huston Inc. by Resource Consultants, Inc. June 1992.

Design Analysis Report for Borrego Detention Dam and North Borrego Channel, for AMAFCA by Wilson & Company, March 2000.

INDEX

* = SHEETS INCLUDED IN DESIGN ANALYSIS REPORT

APPROVED FOR CONSTRUCTION

JOHN P. KELLY, P.E. — DATE
EXECUTIVE ENGINEER
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

WCEA FILE NO. 99099

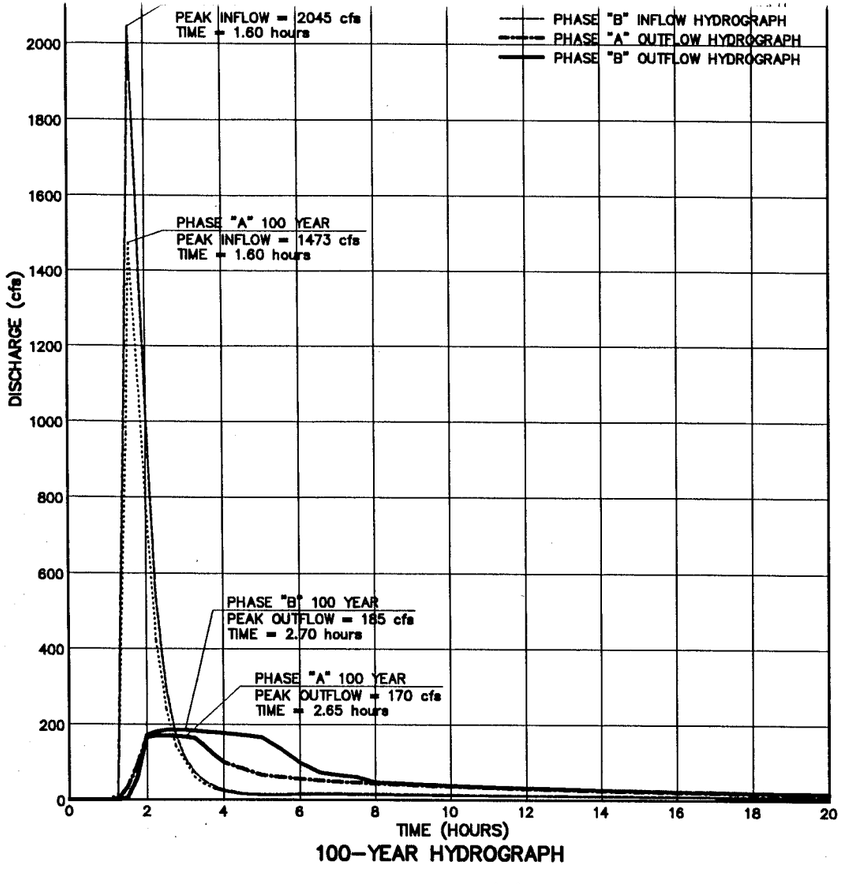
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

BORREGA DETENTION DAM
COVER SHEET

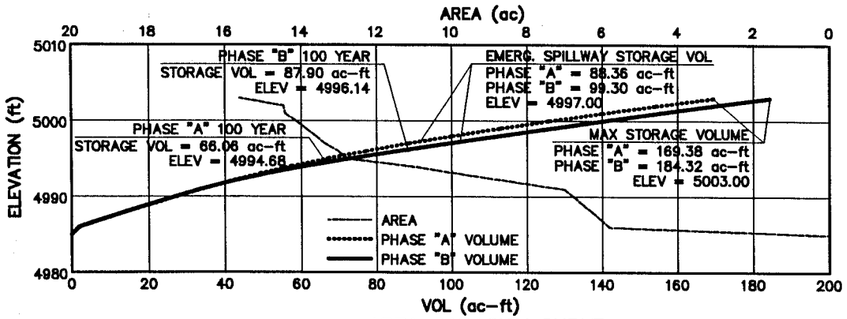
DANIEL S. AGUIRRE NEW MEXICO 11955 REGISTERED PROFESSIONAL ENGINEER

WILSON & COMPANY
4900 LANG AVENUE N.E.
ALBUQUERQUE, NM
87109
(505) 348-4000

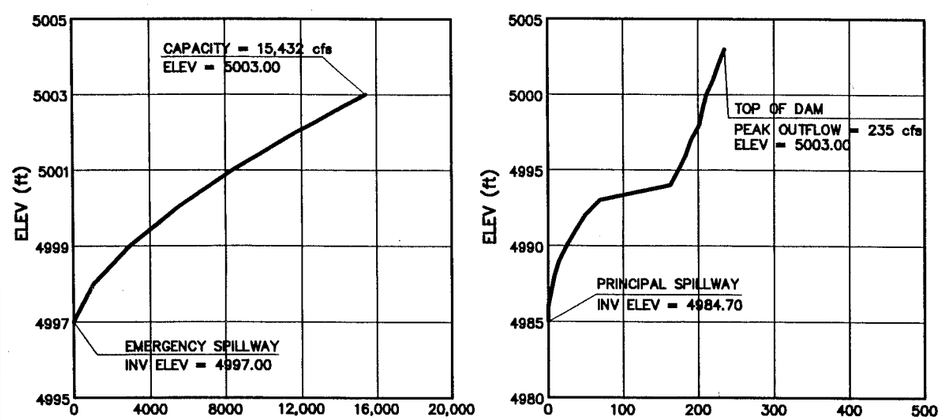
DATE: APRIL 2000
FILE: 99099
SHEET 1 OF 34

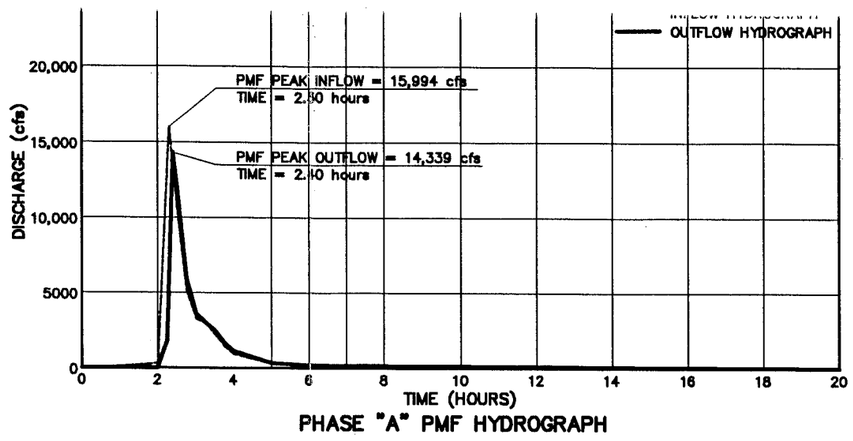


100-YEAR HYDROGRAPH

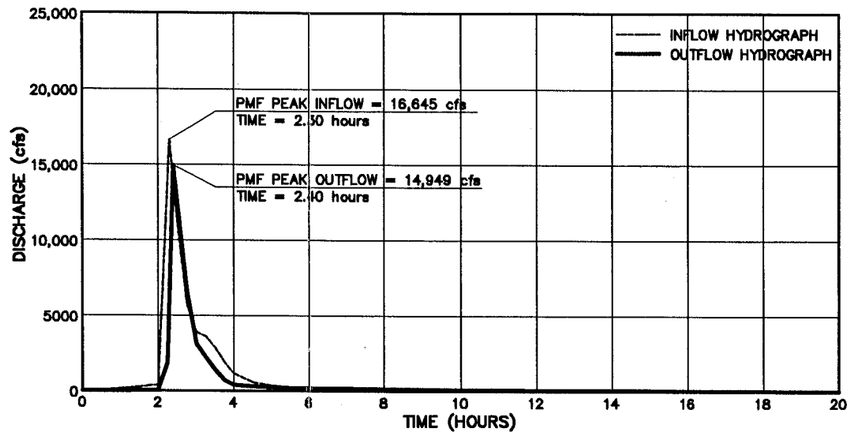


AREA CAPACITY CURVE





PHASE "A" PMF HYDROGRAPH



PHASE "B" PMF HYDROGRAPH

I HEREBY CERTIFY THAT THE ACCOMPANYING MAP(S) AND STATEMENTS HAVE BEEN EXAMINED BY ME AND APPROVED AS TO FORM AND CONTENT, AND WERE DULY ACCEPTED FOR FILING ON THE _____ DAY OF _____ , 2000.

THOMAS C. TURNEY, P.E.
NEW MEXICO STATE ENGINEER

I, JOHN P. KELLY, EXECUTIVE ENGINEER OF THE ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY, ALBUQUERQUE, NEW MEXICO, BEING FIRST DULY SWORN AUTHORITY UPON MY OATH, STATE I HAVE READ AND EXAMINED THE ACCOMPANYING MAP AND STATEMENTS (MAP AND STATEMENTS CONSISTING OF 34 SHEETS) AND KNOW THE CONTENTS THEREOF AND REPRESENTATIONS THEREON AND STATE THAT THE SAME ARE TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

JOHN P. KELLY, P.E.
EXECUTIVE ENGINEER
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

SUBSCRIBED AND SWORN TO BEFORE ME THIS ____ DAY OF _____ 20____

I, DANIEL S. AGUIRRE, BEING FIRST DULY SWORN UPON MY OATH, STATE THAT I AM THE REGISTERED PROFESSIONAL ENGINEER WHO MADE THE MAP(S) OF BORREGA DAM, THAT SUCH MAP(S) CONSISTING OF 34 SHEETS WERE PREPARED FROM FIELD NOTES OF ACTUAL SURVEYS MADE BY ME OR UNDER MY DIRECTION, AND THAT THE SAME ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

DANIEL S. AGUIRRE, P.E.
NEW MEXICO REGISTERED PROFESSIONAL ENGINEER
LICENSE NO. 11995

SUBSCRIBED AND SWORN TO BEFORE ME THIS ____ DAY OF _____ 20____

THE PLANS WERE DESIGNED AND ASSEMBLED BY WILSON & COMPANY.
(505)348-4000. CONTACT PERSON: DANIEL S. AGUIRRE, P.E. _____

BORREGA DAM CHARACTERISTICS

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)		AREA (ac)
		PHASE "A"	PHASE "B"	
4984.7 = PRINCIPAL SPILLWAY INV	0	0	0	0
4985	0	0	0	0
4986	0.4	2.02	2.02	5.81
4987	4	7.94	7.94	6.04
4988	8	14.10	14.10	6.28
4989	14	20.51	20.51	6.54
4990	24	27.17	27.17	6.78
4991	36	34.08	34.08	7.03
4992	49	41.36	41.78	8.39
4993	69	49.21	50.84	9.75
4994	163	57.72	61.26	11.07
4995	174	67.03	73.20	12.78
4996	184	77.26	86.10	13.01
4997 = EMERG. SPILLWAY INV	191	88.36	99.30	13.38
4998	1252	100.23	112.80	13.63
4999	3176	112.77	126.55	13.88
5000	5667	125.94	140.56	14.14
5001	8620	139.90	154.85	14.42
5002	11,966	154.34	169.29	14.46
5003	15,667	169.38	184.32	15.61

BORREGA DAM PROPERTIES

MAXIMUM GRADE ABOVE EXISTING GRADE AT CENTERLINE	13 FT
LENGTH	2300 FT
MAXIMUM WIDTH AT BASE	150 FT
CREST WIDTH	20 FT
SLOPE UPSTREAM FACE	3:1
SLOPE DOWNSTREAM FACE	VARIES 2.5:1 TO 6:1
ELEVATION AT TOP OF DAM	5003
FLOWLINE ELEVATION OF PRINCIPAL SPILLWAY OUTLET AT INTAKE	4984.70
ELEVATION OF EMERGENCY SPILLWAY CREST	4997
WIDTH OF EMERGENCY SPILLWAY PERPENDICULAR TO FLOW	350 FT
DISCHARGE CAPACITY OF EMERG. SPILLWAY AT TOP OF DAM ELEV 5003	15,432 cfs
OUTLET CONDUIT SIZE AND TYPE	47 1/2" ORIFICE PLATE ON 54" PCCP
OUTLET CONDUIT CAPACITY AT ELEVATION 4997	191 cfs
EVACUATION TIME FOR 100-YR EVENT (PHASE "A", Qout < 2 cfs)	57 hours
DRAINAGE AREA PHASE "A"/ PHASE "B"	1.246/ 1.748 sq. mi.
100-YEAR 24 HOUR DESIGN RAINFALL	2.66 inches
HAZARD CLASSIFICATION (NCRS DEFINITION)	HIGH
PMF 6 HOUR LOCAL STORM DESIGN RAINFALL	16.0 inches

NOTE:

BORREGA DAM PHASE "A" AND ONLY PHASE "A" SHALL BE CONSTRUCTED WITH THIS PROJECT.

NO.	DATE	REMARKS	BY

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

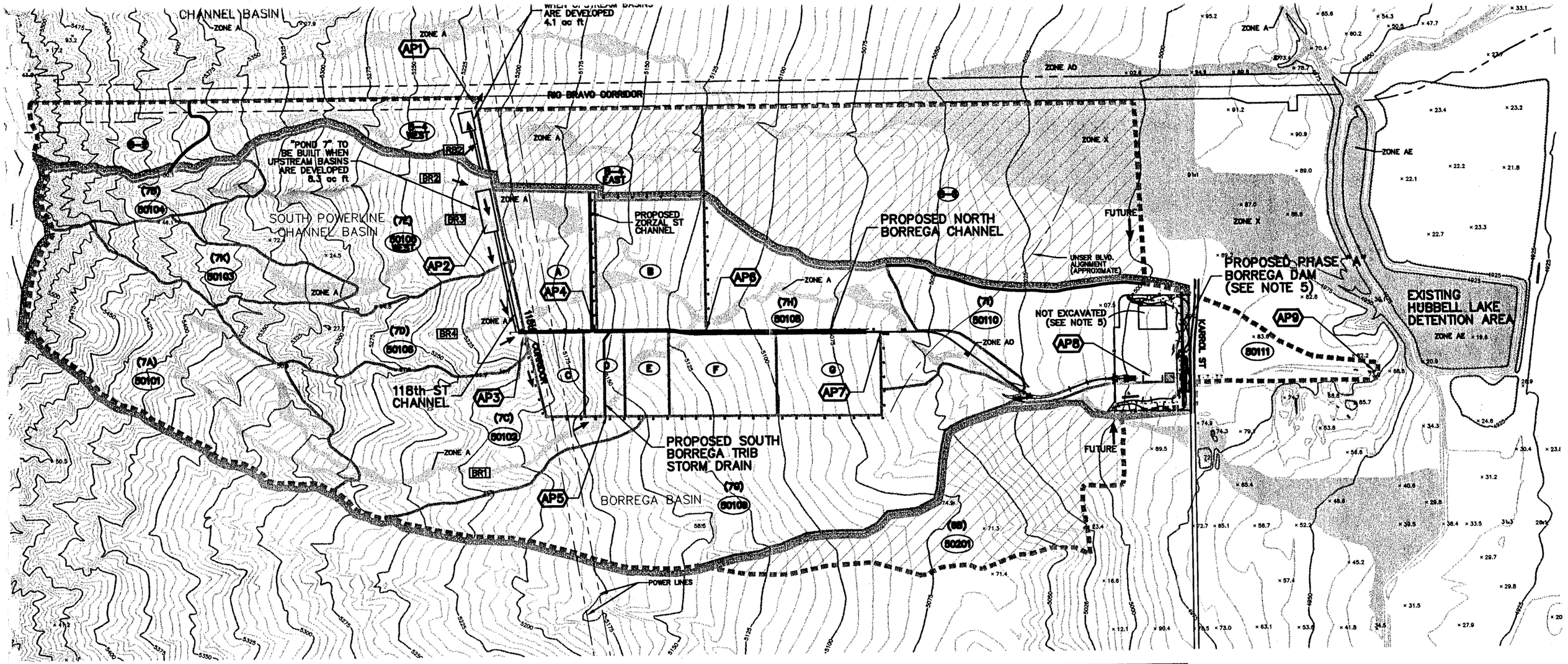
BORREGA DETENTION DAM

DAM FILING SHEET

DANIEL S. AGUIRRE NEW MEXICO 11955 REGISTERED PROFESSIONAL ENGINEER

WILSON & COMPANY
4900 LANG AVENUE N.E.
ALBUQUERQUE, NM

DATE MARC
FILE 9
SHEET C



ANALYSIS POINT SUMMARY

AP NO.	DESCRIPTION	INTERIM AHYMO HYD NO.	INTERIM DRAINAGE AREA (sq mi)	INTERIM Q100 24 hr (cfs)	INTERIM VOL100 24 hr (ac-ft)
1	Culvert to north under Rio Bravo Blvd @ 118th St.	RB_CULV	0.1086	43	7.9
2	Inflow to "Pond 7"	POND7.IN	0.2348	428	18.5
3	118th St Channel @ North Borrega Channel	106.20	0.3202	198	25.7
4	N. Borrega Chan @ Avestruz St	105E.1	0.3853	275	29.1
5	Intake of culvert @ South property line of Paakweree	S_CULV	0.2814	344	22.8
6	N. Borrega Chan @ Perdiz St	107.10	0.7599	728	59.9
7	N. Borrega Chan @ Pardal St	107.50	0.8287	854	65.7
8	Borrega Dam	110.20	1.2462	1473	99.1
9	Borrega Inlet to Hubbell Lake	BR_DMP1.HYD	1.2841	192	96.9

BASIN SUMMARY

BASIN	AREA (sq mi)	AREA (ac)	%A	%B	%C	%D	INTERIM Q100 24 hr (cfs)	INTERIM VOL100 24 hr (ac-ft)
B-2	0.0448	28.5	0	33	33	34	67	3.2
B-4 West	0.0641	41.0	0	33	33	34	126	4.7
50101	0.1540	98.6	0	38	20	42	271	12.0
50102	0.1277	81.7	0	28	23	49	272	10.9
50103	0.0540	34.5	0	48	17	35	102	3.8
50104	0.0393	25.2	0	53	15	32	72	2.7
50105West	0.1413	90.4	0	28	23	49	271	12.0
50106	0.0856	54.8	0	28	23	49	171	7.3
50108	0.0813	52.0	0	60	15	25	100	5.0
50109	0.2344	150.0	0	28	23	49	391	20.0
50110	0.1018	65.2	4	26	22	48	212	8.5
50111	0.0379	24.3	0	45	10	45	76	3.0
A	0.0513	32.8	0	40	55	5	85	2.5
B	0.0641	41.0	0	28	23	49	137	5.5
C	0.0138	8.8	0	30	42	28	27	0.9
D	0.0144	9.2	0	28	23	49	31	1.2
E	0.0144	9.2	0	28	23	49	31	1.2
F	0.0336	21.5	0	28	23	49	72	2.9
G	0.0362	22.5	0	28	23	49	75	3.0

INTERIM CONDITIONS – PHASE "A" DAM:

ALL BASINS DISCHARGING TO THE DAM ARE ANALYZED AS DEVELOPED WITH NO BULKING.

BASINS 50103, 50104, & 50105 WEST ARE ANALYZED AS DEVELOPED WITH NO BULKING, AND ARE ROUTED THROUGH "POND 7" PER THE AMOLE–HUBBELL DMP (A–H DMP). DISCHARGE FROM "POND 7" IS ROUTED SOUTH TO THE CULVERT UNDER 118TH ST (AP3).

BASINS B–2 AND B–4 WEST ARE ANALYZED AS DEVELOPED WITH NO BULKING, ROUTED TO "POND 8" PER THE A–H DMP, THEN DISCHARGED THROUGH A CULVERT TO THE CHANNEL ON THE NORTH SIDE OF RIO BRAVO BLVD.

PONDS ALONG WEST SIDE OF 118TH ST PER THE A–H DMP.
POND 7 IS TO BE LOCATED IN BASIN 50105 WEST.
STORAGE VOLUME = 8.3 AC–FT.
POND 8 IS TO BE LOCATED IN BASIN B–4 WEST.
STORAGE VOLUME = 4.1 AC–FT.

THE BORREGA DAM IS TO BE BUILT IN 2 PHASES: PHASE "A" & PHASE "B". THE FIRST PHASE (NOT–FULLY EXCAVATED) IS CALLED "PHASE "A". WHEN BASINS B–4 EAST AND B–6 ARE DEVELOPED, THEY WILL BE DIVERTED TO THE BORREGA DAM. WHEN BASIN 50201 IS DEVELOPED, IT WILL BE DIVERTED TO THE BORREGA DAM. THE DAM WILL THEN BE FULLY EXCAVATED. THE FULLY EXCAVATED BORREGA DAM IS CALLED PHASE "B".

LEGEND

- 5070 — EXISTING INTERMEDIATE CONTOUR
- 5071 — EXISTING INDEX CONTOUR
- DRAINAGE STUDY AREA BOUNDARY
- BASIN BOUNDARY
- AREA DISCHARGING TO DAM
- PAAKWEREE DEVELOPMENT BOUNDARY
- E2 — ANALYSIS POINT
- BR1 — ARROYO CHANNEL NUMBER FROM FIGURE SH–4 AMOLE–HUBBELL DMP
- 50108 — BASIN ID
- FEMA FLOOD PLAIN
- BASINS TO BE DIVERTED TO THE DAM IN THE FUTURE. THE DAM WILL BE THEN BE FULLY EXCAVATED PER PHASE "B" DAM
- DIRECTION OF FLOW

GRAPHIC SCALE

600 0 300 600 1000 2000

(IN FEET)
1 inch = 500 ft.

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

BORREGA DETENTION DAM

BASIN MAP INTERIM CONDITIONS – PHASE "A" DA

DANIEL S. AGUIRRE NEW MEXICO 11955 REGISTERED PROFESSIONAL ENGINEER

WILSON & COMPANY
4900 LANG AVENUE N.E.
ALBUQUERQUE, NM
87109
(505) 348–4000

DATE: APRIL 2000
FILE: 99099
SHEET 3 OF XX

1. STORM DRAIN W/ ENERGY DISSIPATOR AT OUTLET TO BE DESIGNED AND BUILT BY OTHERS AT THE TIME OF PHASE "B" GRADING.

LEGEND

- BD-5 ⊡ FUTURE PERMANENT MONUMENT LOCATION (SET BY OTHERS)
- PROPERTY, ROW LINE
- ROAD
- FENCE

PERMANENT MONUMENT LOCATION TABLE					
MONUMENT	STA	ELEV	X	Y	DATE
BD-1					
BD-2					
BD-3					
BD-4					
BD-5					

BORREGA DAM – PHASE "B" GRADING

FOR INFORMATION PURPOSE ONLY
FUTURE

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

NO.	DATE	REMARKS	BY
		REVISIONS	

WILSON & COMPANY, ENGINEERS & ARCHITECTS
DESIGNED BY NM NOV 1999
DRAWN BY DNV NOV 1999

ALBUQUERQUE METROPOLITAN
ARROYO FLOOD
CONTROL AUTHORITY

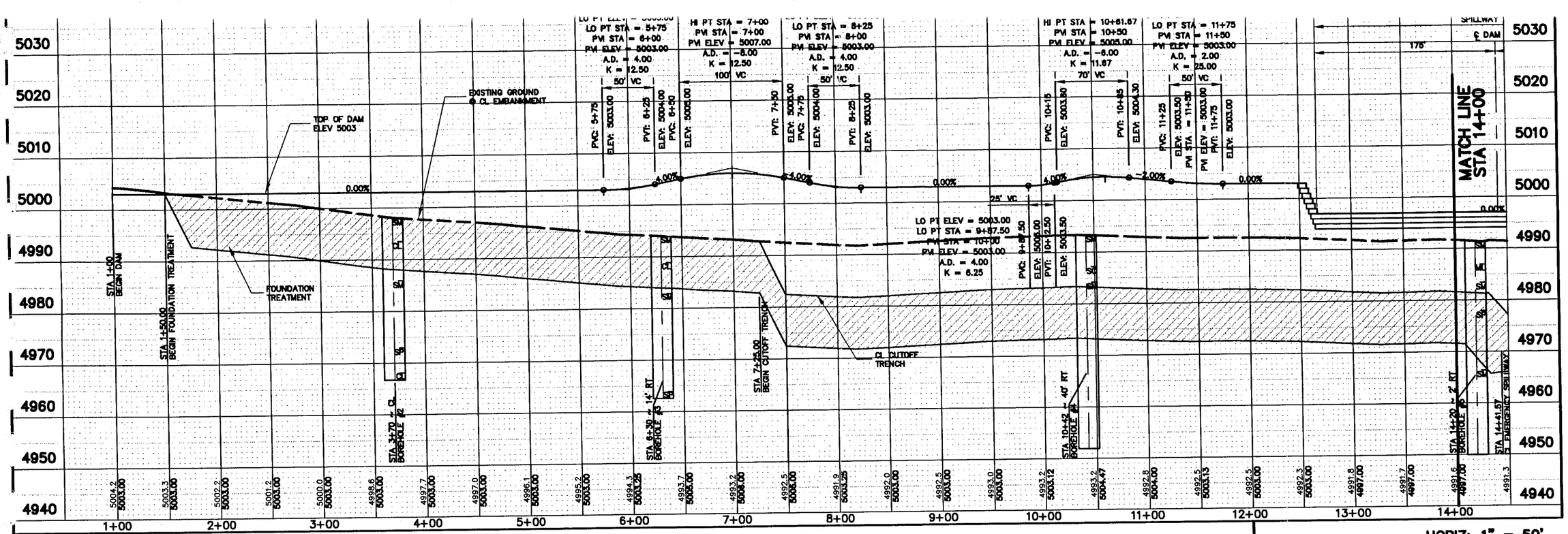
BORREGA DETENTION DAM

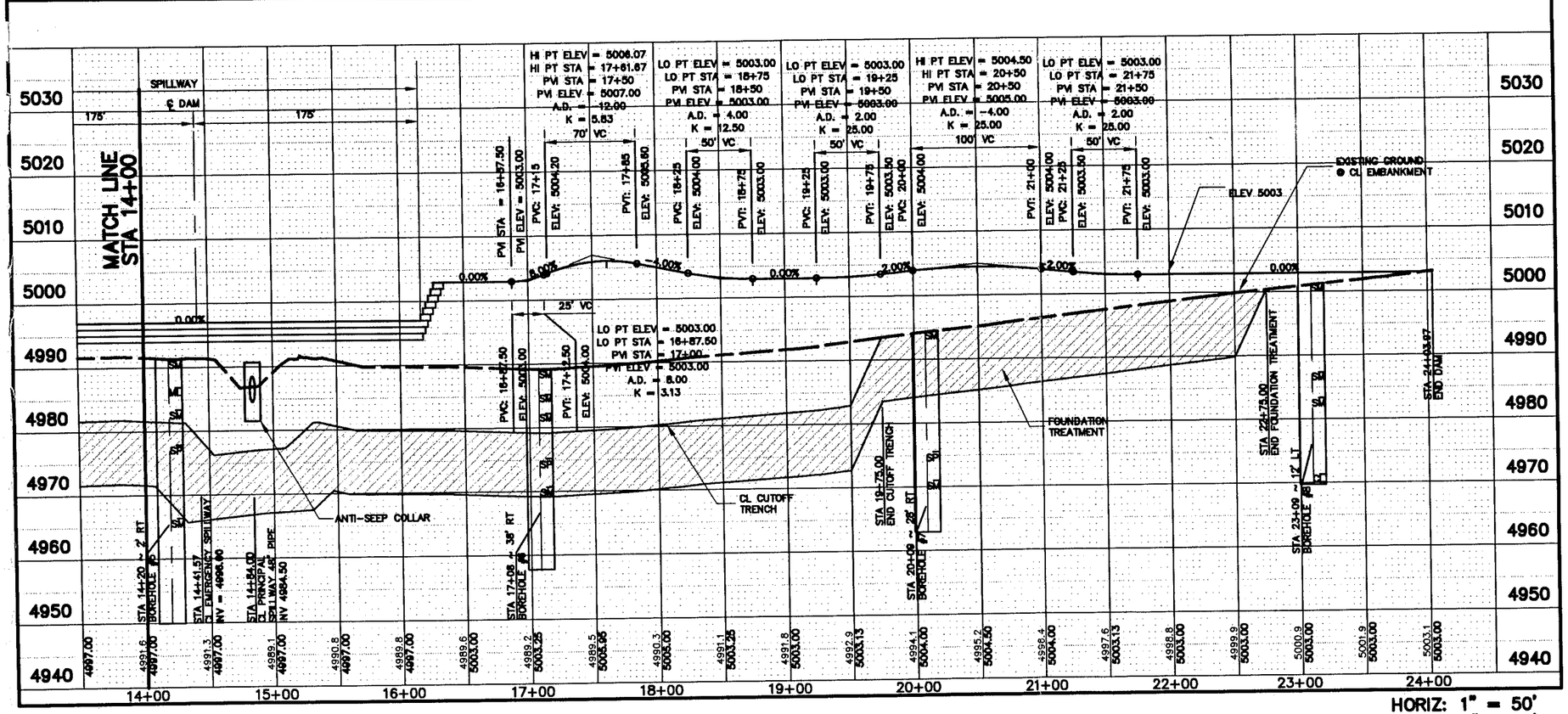
DAM LAYOUT – PHASE "B" GRADIN

DANIEL S. AGUIRRE NEW MEXICO 11955 REGISTERED ENGINEER

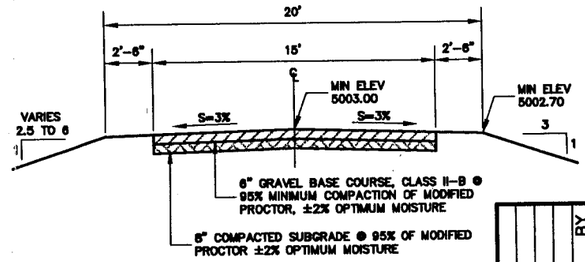
WILSON & COMPANY
4900 LANG AVENUE N.E.
ALBUQUERQUE, NM

DATE APRIL 2000
FILE 99099
SHEET OF





HORIZ: 1" = 50'
VERT: 1" = 10'



TYPICAL DAM CREST SECTION

STA 1+00 TO STA 12+45
STA 21+40 TO STA 25+00

NOTE:

1. FOR TYPICAL EMBANKMENT SECTION SEE SHEET 5.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

NO.	DATE	REMARKS	BY
		REVISIONS	

WILSON & COMPANY, ENGINEERS & ARCHITECTS — NOV 1999
DESIGNED BY NM

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

BORREGA DETENTION DAM

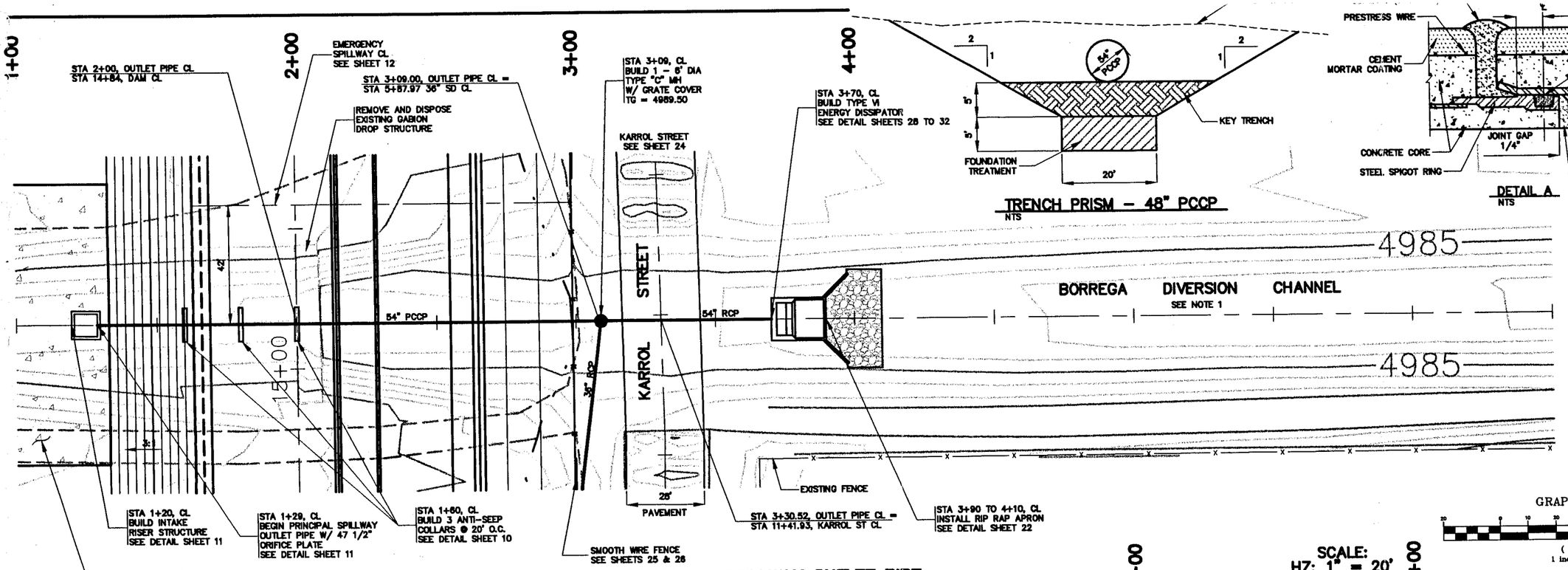
DAM CENTERLINE PROFILE

DANIEL S. AGUIRRE NEW MEXICO 11955 REGISTERED PROFESSIONAL ENGINEER

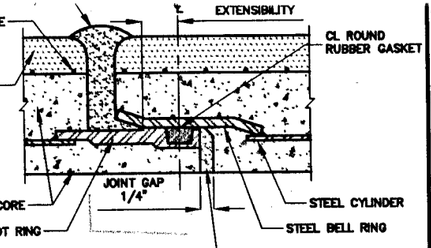
WILSON & COMPANY
4900 LANG AVENUE N.E.
ALBUQUERQUE, NM
87109

DATE MARCH 200
FILE 99099
SHEET 7 OF 3

\SHEETS\DAM\99099PPLDWG\3-7-00\PJM



PRINCIPAL SPILLWAY OUTLET PIPE
PLAN



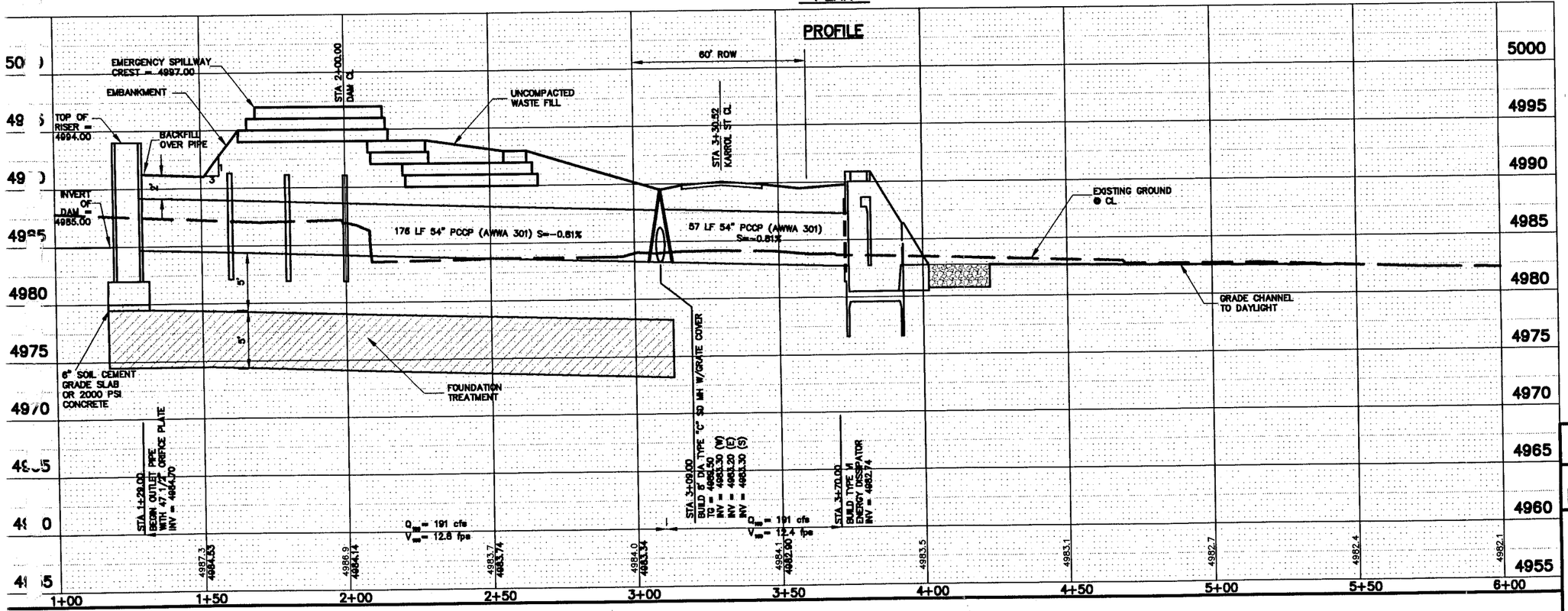
TRENCH PRISM - 48" PCCP
NTS

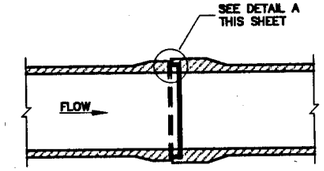
DETAIL A
NTS

GRAPHIC SCALE

20 0 10 20 40 60
(IN FEET)
1 inch = 20 ft.

SCALE:
HZ: 1" = 20'
VT: 1" = 5'





PIPE JOINT DETAIL
NTS

NOTES:

1. GRADE BOTTOM OF CHANNEL APPROXIMATELY 125' TO DAY LIGHT. THIS COST SHALL BE CONSIDERED AS AN INCIDENTAL COST TO THE PROJECT.

AS-BUILT INFORMATION
CONTRACTOR — DATE
STORED BY — DATE
INSPECTOR'S FIELD NOTATIONS BY — DATE
DIGITIZED BY — DATE
RECORDED BY — DATE

BENCH MARKS
CP103 (SEE SHEET 1 FOR LOCATION)
REBAR W/ ALUMINUM CAP
STAMPED WILSON & COMPANY
N = 1462061.9801
E = 1495972.9457
ELEVATION = 5020.789 FT

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY
REVISIONS			

WILSON & COMPANY, ENGINEERS & ARCHITECTS — NOV 1999
DESIGNED BY — NM

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

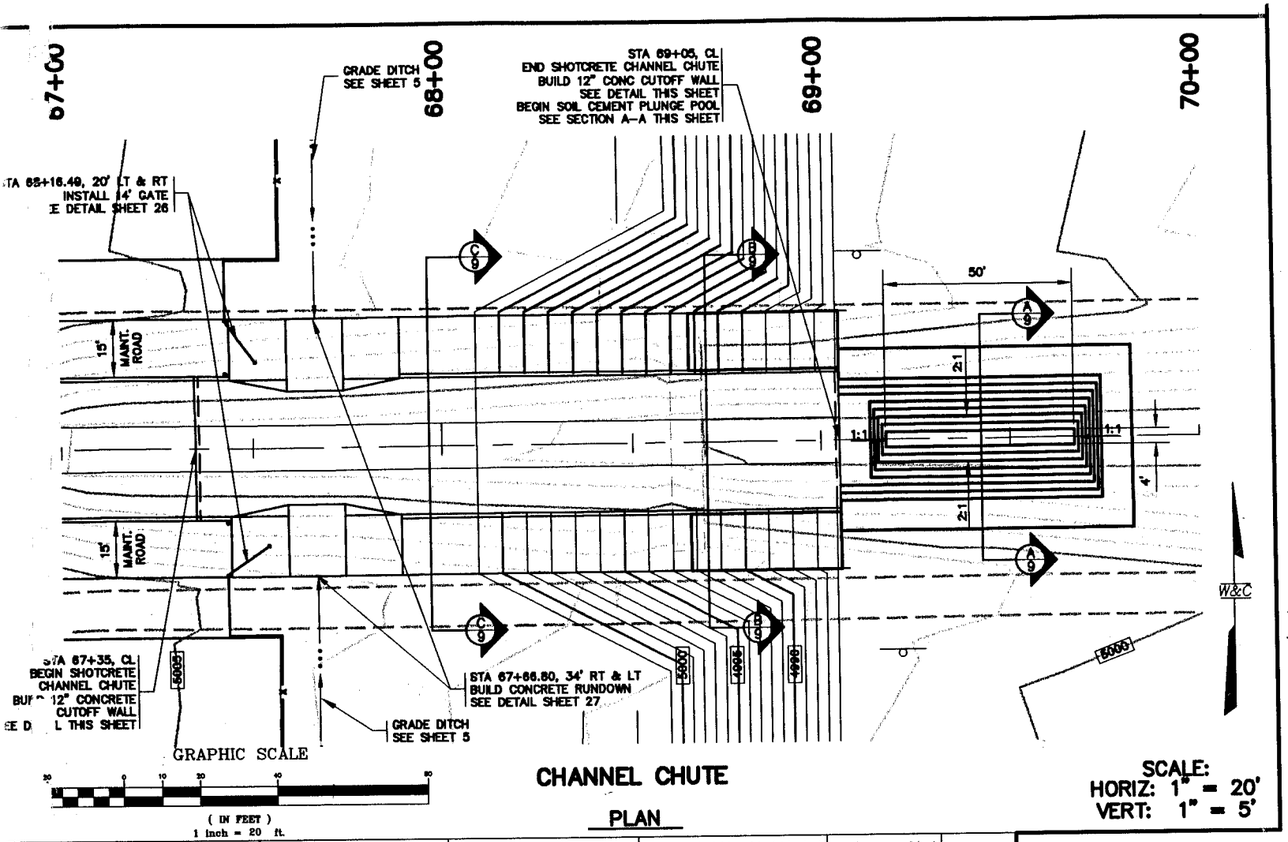
BORREGA DETENTION DAM

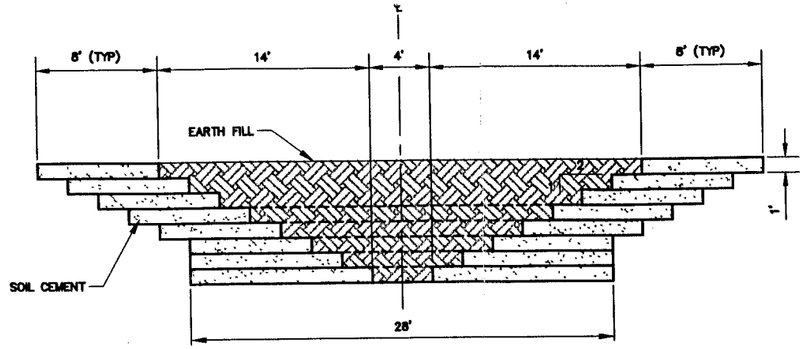
PRINCIPAL SPILLWAY OUTLET PIPE P &

DANIEL S. AGUIRRE NEW MEXICO 11955 REGISTERED PROFESSIONAL ENGINEER

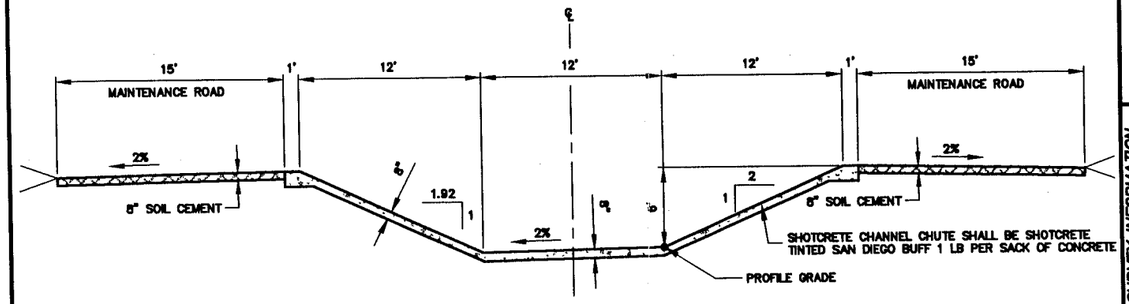
WILSON & COMPANY
4900 LANG AVENUE N.E.
ALBUQUERQUE, NM
87109
(505) 348-4000

DATE: APRIL 2000
FILE: 99099
SHEET: 8 OF 34

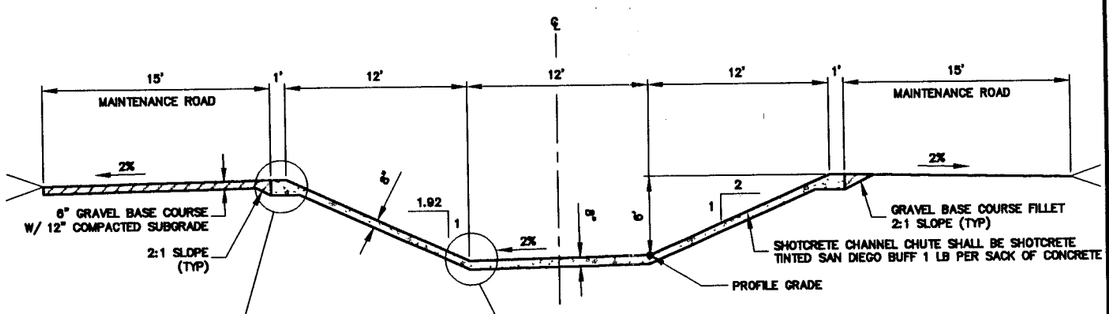




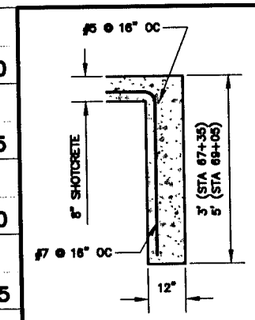
SOIL CEMENT PLUNGE POOL SECTION A-A
SCALE 1" = 5'



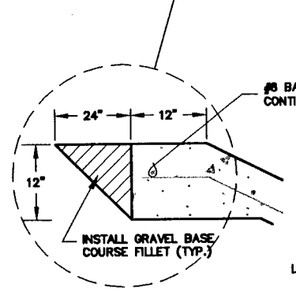
CHANNEL CHUTE TYPICAL SECTION B-B
SCALE 1" = 5' STA 68+64 TO 61+04



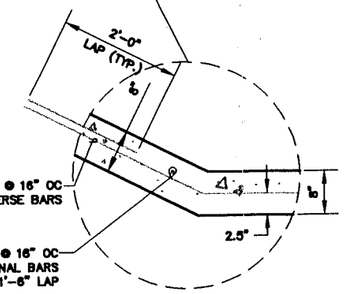
CHANNEL CHUTE TYPICAL SECTION C-C
SCALE 1" = 5' STA 67+35 TO 68+64



CUTOFF WALL DETAIL
SCALE 1" = 2'



THICKENED EDGE DETAIL
NTS



CHANNEL INVERT-SIDE SLOPE INTERSECTION DETAIL
NTS

NOTE: EXPANSION/CONTRACTION AND CONSTRUCTION JOINTS SHALL COMPLY WITH SECTION 602 WHEN APPROVED BY THE ENGINEER. WHERE SAW-CUT JOINTS ARE PROVIDED, A JOINT SEALANT SHALL BE REQUIRED; SONALASTIC NP-1 OR APPROVED EQUAL.

AS-BUILT INFORMATION
CONTRACTOR — DATE
STAKED BY — DATE
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWING BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE

BENCH MARKS
CP103 (SEE SHEET 1 FOR LOCATION)
REBAR W/ ALUMINUM CAP
STAMPED WILSON & COMPANY
N = 1462061.9801
E = 1495972.9457
ELEVATION = 5020.789 FT

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

NO.	DATE	REMARKS	BY
		REVISIONS	
		WILSON & COMPANY, ENGINEERS & ARCHITECTS	
		DESIGNED BY	NM
			NOV 1999

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

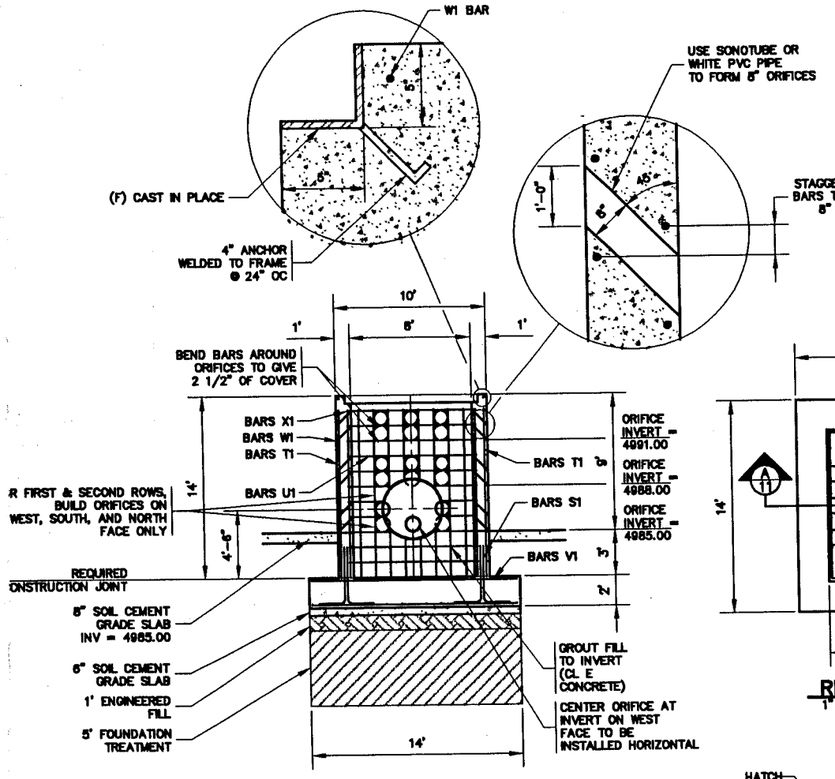
BORREGA DETENTION DAM

CHANNEL CHUTE - PLAN & PROFILE

DANIEL S. AGUIRRE NEW MEXICO 11955 REGISTERED PROFESSIONAL ENGINEER

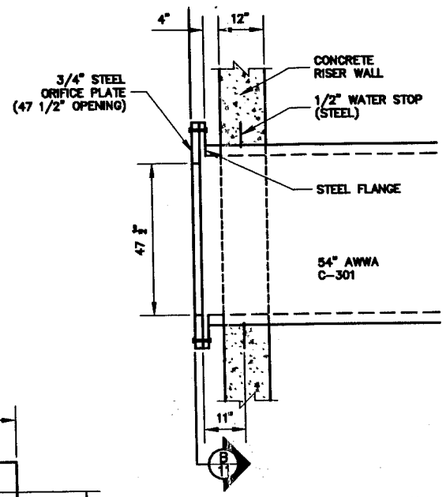
WILSON & COMPANY
4900 LANG AVENUE N.E.
ALBUQUERQUE, NM
87109
(505) 348-4000

DATE: APRIL 2000
FILE: 99099
SHEET 9 OF 34

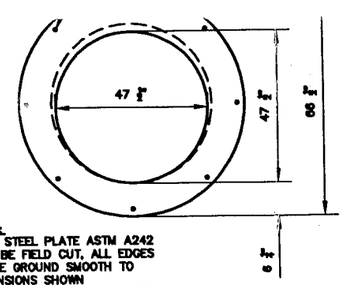


WEST ELEVATION

CROSS-SECTION A-A RISER DETAIL
1" = 5'

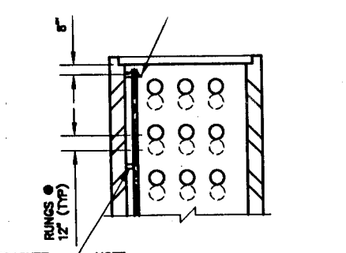


ORIFICE PLATE DETAIL
NTS



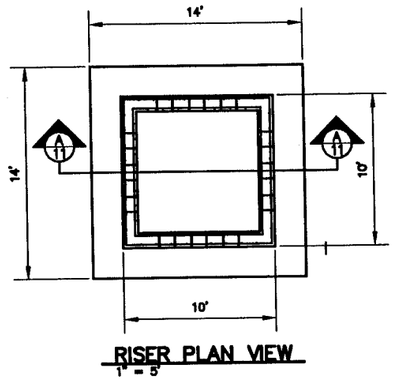
NOTE:
3/4" STEEL PLATE ASTM A242 MAY BE FIELD CUT, ALL EDGES TO BE GROUND SMOOTH TO DIMENSIONS SHOWN (PAYMENT INCIDENTAL TO PIPE)

SECTION B-B
NTS

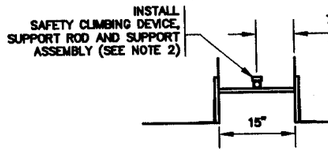


NOTE:
3/4" ø STAINLESS STEEL WEDGE ANCHOR 3" MIN EMBEDMENT (REDHEAD HILTI OR EQUAL)

SECTION G-G
1" = 5'



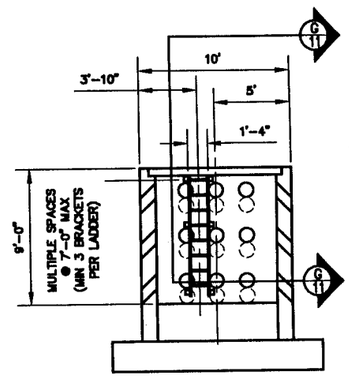
RISER PLAN VIEW
1" = 5'



SAFETY LADDER NOTES:

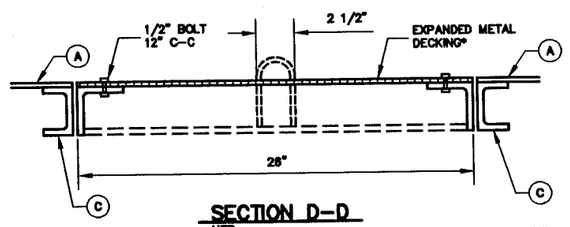
1. SAFETY LADDER SHALL BE GALVANIZED A-36 STEEL AND SHALL MEET ALL REQUIREMENTS OF OSHA REGARDLESS OF DETAILS SHOWN
2. SAFETY CLIMBING DEVICE AND ASSEMBLY SHALL BE "SAF-T-CLIMB" FALL PREVENTION SYSTEM BY
   NORTH CONSUMER PRODUCTS
   2684B SATURN STREET
   BREA CALIFORNIA 92621
   (714) 524-1555
   ATTACHMENT DETAILS SHALL MEET OSHA REQUIREMENTS REGARDLESS OF DETAILS SHOWN

DETAIL "A" SAFETY LADDER CLIMBING DEVICE
NTS

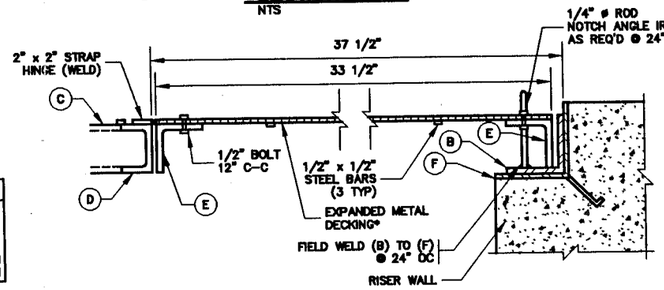


RISER LADDER ELEVATION
1" = 5'

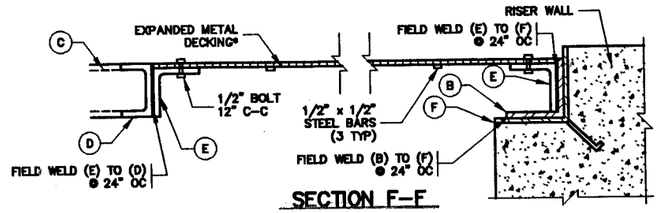
SECTION C-C
NTS



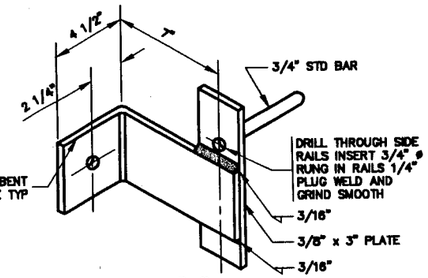
SECTION D-D
NTS



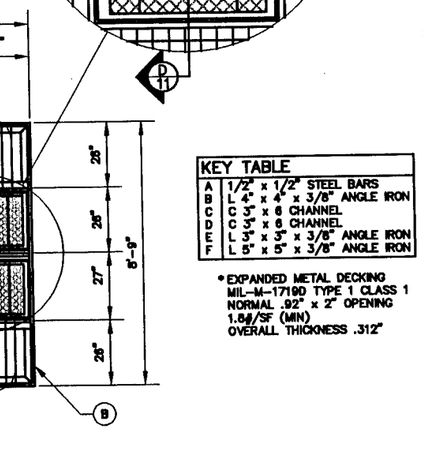
SECTION E-E
NTS



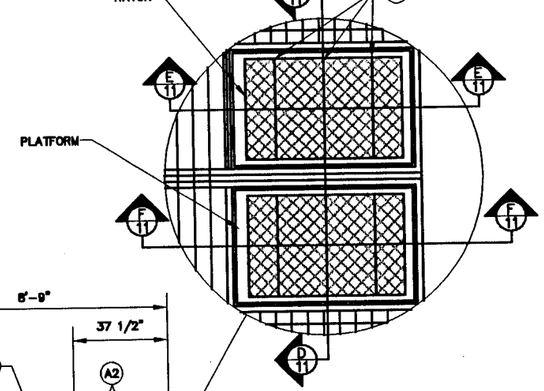
SECTION F-F
NTS



DETAIL "B" LADDER BRACKET DETAIL
NTS

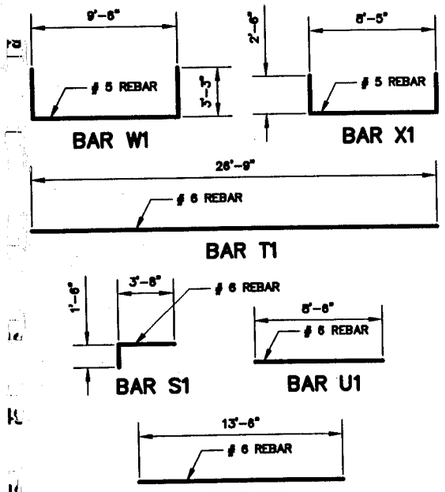


RISER GRATE-PLAN
NTS



KEY TABLE	
A	1/2" x 1/2" STEEL BARS
B	L 4" x 4" x 3/8" ANGLE IRON
C	C 3" x 6 CHANNEL
D	C 3" x 6 CHANNEL
E	L 3" x 3" x 3/8" ANGLE IRON
F	L 5" x 5" x 3/8" ANGLE IRON

* EXPANDED METAL DECKING
MIL-M-17190 TYPE 1 CLASS 1
NORMAL .92" x 2" OPENING
1.0#/SF (MIN)
OVERALL THICKNESS .312"



REBAR DETAILS

NO.	DATE	REMARKS	BY
		REVISIONS	

WILSON & COMPANY, ENGINEERS & ARCHITECTS NOV 1999
DESIGNED BY NM NOV 1999
DRAWN BY PJM

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

BORREGA DETENTION DAM

RISER DETAILS

DANIEL S. AGUIRRE NEW MEXICO 11955 REGISTERED PROFESSIONAL ENGINEER

WILSON & COMPANY
4900 LANG AVENUE N.E.
ALBUQUERQUE, NM
87109

DATE MARCH 2000
FILE 99099
SHEET 44 OF 74

APPENDIX E

Basin Maps (pockets):

Exhibit 3. Existing Conditions

Exhibit 4. Revised (Post-Project) Conditions

Exhibit 4a. Interim – Phase "A" Dam

Exhibit 5. Future – Phase "B" Dam

APPENDIX F

AMAFCA Agreements

AGREEMENT
BORREGA DETENTION DAM
AND UPSTREAM BORREGA ARROYO CHANNEL

This Agreement is entered into this 10th day of August, 1999, by and among the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), a political subdivision of the State of New Mexico, Paakweree Development Corporation (PAAKWEREE), a New Mexico Corporation and Westland Development Corporation (WESTLAND), a New Mexico Corporation.

RECITALS:

1. Whereas, AMAFCA's Amole Hubbell Drainage Management Plan, adopted by the AMAFCA Board of Directors on June 24, 1999, has established the need to restrict flow rates in the Borrega Diversion Channel, in order not to exceed the capacity of AMAFCA's existing Borrega Inlet to the Hubbell Lake Detention Dam; and

2. Whereas, the recommended solution in the Amole Hubbell Drainage Management Plan is to construct a storm water detention facility just upstream of Karrol Road; and

3. Whereas, recognizing the need for some upgrade of the existing Borrega Diversion Channel, AMAFCA has programmed funds for such an upgrade on its annual Project Schedule since 1994; and

4. Whereas, it was anticipated that AMAFCA would construct the recommended detention dam and upgrade the existing Borrega Channel at an estimated cost of $1.52 million; and

5. Whereas, construction of the detention dam and upgrade of the Borrega Channel is appropriate for AMAFCA, in that:

   a. It is consistent with AMAFCA's mission; and

   b. It limits flow rates to the capacity of AMAFCA's Borrega Inlet to Hubbell Lake; and

   c. It provides flood protection to existing development in the Southwest Valley; and

   d. It provides a major regional drainage facility which can be utilized for optimum storm water management, including (1) control of the entire Borrega Arroyo Watershed; (2) potential reduction of future downstream storm drainage facilities; (3) the consolidation of public operations and maintenance operations into one single large facility, rather than several small ones; and (4) provides the means to obtain a FEMA Letter of Map Revision for removal of 45 acres of floodplain below the detention dam.

1) A detention dam storing approximately 55 acre feet, with an outfall pipe to the existing Borrega Arroyo on the east side of the projected Karrol Road right of way (Borrega Detention Dam).

2) A tinted concrete lined channel from the end of the existing Borrega Diversion Channel to the future Unser Blvd alignment Borrega Arroyo (Reach 1).

3) A tinted concrete lined channel from Unser to the confluence with the north Branch of the Borrega Arroyo (Reach 2).

4) Extension and backfill of the principal spillway pipe across the extension of the Karrol Road right of way. Completion of Karrol Road paving within the current AMAFCA Borrega Channel right of way to match the existing Karrol Road section will be the addressed via a separate agreement between AMAFCA and Bernalillo County.

5)

5) Upgrade, at a time AMAFCA deems to be appropriate, the existing Borrega Diversion Channel above the detention dam (Reach 0).

6) AMAFCA has the option to allow the disposal of excess material from the Dam construction on lands currently owned by TVI along Reach 0 or Reach 1. AMAFCA and WESTLAND shall coordinate such disposal site. The excess material will be placed with moisture suitable for dust control and with no other compaction requirements.

7) Document financial and right of way dedications by PAAKWEREE and WESTLAND, and provide such to Bernalillo County for PAAKWEREE and WESTLAND's use in applying for impact fee credits for such contributions.

b. Review, and if appropriate, approve all of the facilities as shown on Facilities Sketch Map at Exhibit A. All drainage facilities will be designed to accommodate fully developed conditions flows from the Borrega watershed.

c. Advertise for construction bids for the Borrega Detention Dam, Borrega Arroyo Reach 1 and Borrega Arroyo Reach 2, collectively the (PROJECT), upon:

1) Receipt of project rights of way from WESTLAND,
2) Receipt of contract documents approved by AMAFCA, the State Engineer Office and Bernalillo County for the PROJECT from PAAKWEREE.

3) Construct, provide construction inspection and geotechnical engineering testing services, at its expense and in accordance with the contract documents; and subject to AMAFCA and Bernalillo County (with regard to issuance of a Certificate of Occupancy) inspection and acceptance of the completed facility; the following facilities:
   a) Borrega Arroyo Reach 3
   b) South Branch of Borrega Arroyo Reach 4

4. Subject to reconveyance of Tract A by TVI to WESTLAND, WESTLAND agrees to:

a. Provide to AMAFCA the following rights of way (except that right of way previously dedicated by WESTLAND with the PAAKWEREE Plat) by Warranty Deed conveying merchantable title to AMAFCA free and clear of all liens and encumbrances, except those set out herein, ad valorem taxes for the current year, and restrictions, reservations and easements shown of record, prior to October 1, 1999: the following:
   1) Borrega Detention Dam (approximately 14.5 acres)
   2) Borrega Arroyo Reach 1 (approximately 3.3 acres)
   3) Borrega Arroyo Reach 2 (approximately 3.3 acres)
   4) Borrega Arroyo Reach 3 (approximately 3.4 acres)
   5) Borrega Arroyo Reach 4, if open channel construction (approximately 1.2 acres)
   6) Temporary construction easements as may be necessary for construction of the PROJECT.

   Provided that if AMAFCA requires less than 14.5 acres for the Borrega Detention Dam it shall be deeded back to WESTLAND.

b. Provide a commitment of title insurance to AMAFCA, issued by Albuquerque Title Company, as soon as practical after the execution of this agreement for the rights of way described in Paragraph 3.a.1-5 above.

   1) The title commitment shall be used for the purpose of insuring title to said right of way in AMAFCA's name through an owners policy of title insurance in the face amount of $642,500 (25.7 +/- acres at $25,000/acre). If AMAFCA chooses to buy title insurance, said title insurance premium will be paid by AMAFCA.

f. Provide to AMAFCA any environmental site assessments previously prepared for the right of way being dedicated to AMAFCA. AMAFCA shall have the right to obtain further site assessments at AMAFCA's expense, and should any such investigations show contamination of the site, the Parties will negotiate in good faith for cleanup of the site, an alternate site, other action as negotiated at that time, or may elect to terminate this Agreement.

4. PAAKWEREE, WESTLAND and AMAFCA all agree as follows:

a. AMAFCA's commitment to provide funding and construct the facilities identified in this Agreement is contingent upon the timely receipt of rights of way, designs, and construction funding from PAAKWEREE and WESTLAND.

b. All cost estimates herein are approximate. The PAAKWEREE cash contributions are fixed and are not adjustable for any reason. AMAFCA shall bear any increased costs in the construction of the PROJECT and likewise, shall benefit from any cost savings identified during the design and construction of the PROJECT.

c. The facilities and right of way described herein have the primary purpose of conveying and managing storm flows, and all other interest granted by any party shall be subservient to that purpose, and shall be mutually agreed to, in advance of the granting.

d. This Agreement does not relieve PAAKWEREE of the requirement to construct or financially guarantee the construction of such related drainage facilities that Bernalillo County may deem necessary.

e. Disputes under the Agreement will be referred to binding arbitration under the provisions of the New Mexico Uniform Arbitration Act.

f. This Agreement may not be assigned by any party without the written consent of the other parties, which consent shall not be unreasonably withheld.

g. Except as otherwise specifically provided herein, the Agreement shall be governed by, construed and enforced in accordance with the laws of the State of New Mexico.

h. All notices with respect to this Agreement shall be in writing and shall be delivered personally, sent via confirmed telefax, or sent postage prepaid by United States Mail, certified mail, return receipt requested, to the addresses set forth below or other such addresses as hereafter specified in writing by one party to the others:

o. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, and said counterparts shall constitute but one and the same instrument which may sufficiently be evidenced by one counterpart.

Executed the day and year first set out above.

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY, a political subdivision of the State of New Mexico

Ronald D. Brown, Chair
Board of Directors

ATTEST:

Clifford E. Anderson
Secretary Treasurer

PAAKWEREE DEVELOPMENT CORP, a New Mexico Corporation

Boleslo Romero, President

WESTLAND DEVELOPMENT CO. INC., a New Mexico Corporation

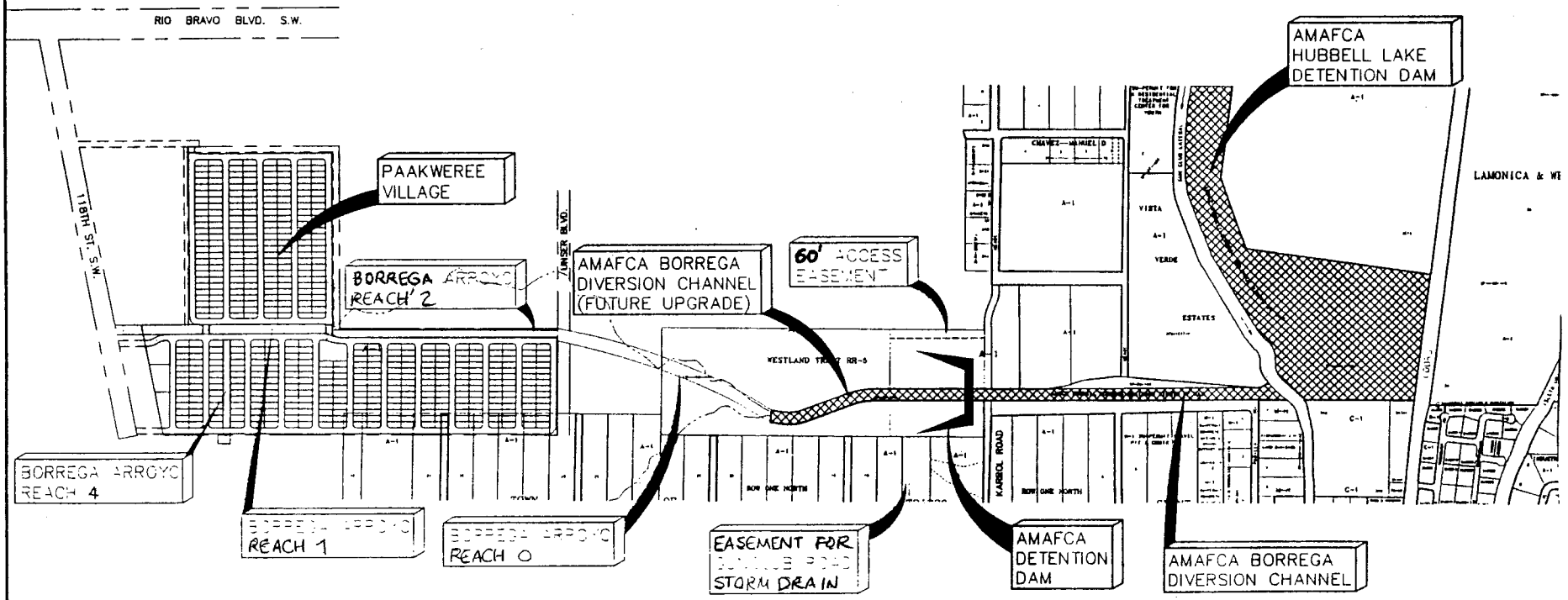
Barbara Page, President and CEO

AMAFCA

PAAKWEREE, CORPORATION

Westland Development Co., Inc.

11/11



WILSON & COMPANY

BORREGA DETENTION DAM AND CHANNELS

FIRST AMENDMENT TO AGREEMENT BORREGA DETENTION DAM AND UPSTREAM BORREGA ARROYO CHANNEL

This First Amendment to that Agreement dated August 10, 1999, by and among the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), a political subdivision of the State of New Mexico, Paakweree Development Corporation (PAAKWEREE), a New Mexico Corporation and Westland Development Corporation (WESTLAND), a New Mexico Corporation, ("Original Agreement") is entered into this 10th day of December, 1999, by and among the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), a political subdivision of the State of New Mexico, Paakweree Development Corporation (PAAKWEREE), a New Mexico Corporation, Westland Development Corporation (WESTLAND), a New Mexico Corporation, and American Southwest Homes, Ltd. Co. (SOUTHWEST HOMES), a Nevada LLC registered in New Mexico ("First Amendment").

RECITALS:

1. Whereas, AMAFCA, PAAKWEREE and WESTLAND have entered into the Original Agreement on August 10, 1999 to cost share the construction of flood control facilities to include a detention dam and upstream channels; and

2. Whereas, the recommended solution in the AMAFCA adopted Amole Hubbell Drainage Management Plan is to construct a storm water detention facility just upstream of Karrol Road (Borrega Detention Dam); and

3. Whereas, certain properties north of the Borrega Detention Dam site were intended to drain east to the South Rio Bravo Arroyo; and

4. Whereas, SOUTHWEST HOMES, the owner of certain property north of the Borrega Detention Dam site, desires to direct drainage emanating from these properties south to the facility and is willing to provide additional lands and to provide financial contribution for the design and construction of the Borrega Detention Dam facility; and

5. Whereas, the AMAFCA Board of Directors has determined that construction of an expanded Borrega Detention Dam to accept these storm flows is appropriate for AMAFCA, in that:

   a. It is consistent with AMAFCA's mission; and

   b. Reduces future cost associated with improvements to the South Rio Bravo Arroyo and inlet to the Hubbell Lake Detention Dam; and

Sum of Twenty Thousand Dollars ($20,000) as the total cost of modifications to the existing design.

3. The following paragraph is added to section 3 of the Original Agreement, "WESTLAND Agrees to":

g. Accept the relocation of the reserved 60' wide access and utility easement along the northern boundary of the Borrega Dam parcel to the north of and west of the northern and western boundaries of the parcel to be conveyed from SOUTHWEST HOMES to AMAFCA for the benefit of properties west of the Borrega Detention Dam parcel, AMAFCA, WESTLAND, and their successors and assigns. SOUTHWEST HOMES agrees to dedicate said 60' as right of way if required by any Governmental entity.

4. Section 4 of the Original Agreement is deleted and replaced in its entirety with the following:

4. PAAKWEREE, WESTLAND, AMAFCA, and SOUTHWEST HOMES all agree as follows:

a. AMAFCA's commitment to provide funding and construct the facilities identified in this First Amendment is contingent upon the timely receipt of rights of way, designs, and construction funding from PAAKWEREE, WESTLAND and SOUTHWEST HOMES.

b. All cost estimates herein are approximate. The PAAKWEREE and SOUTHWEST HOMES cash contributions are fixed and are not adjustable for any reason. AMAFCA shall bear any increased costs in the construction of the PROJECT and likewise, shall benefit from any cost savings identified during the design and construction of the PROJECT.

c. The facilities and right of way described herein have the primary purpose of conveying and managing storm flows, and all other interest granted by any party shall be subservient to that purpose, and shall be mutually agreed to, in advance of the granting.

d. This First Amendment does not relieve PAAKWEREE or SOUTHWEST HOMES of the requirement to construct or financially guarantee the construction of such related drainage facilities that Bernalillo County or the City of Albuquerque may deem necessary.

e. Disputes under this First Amendment will be referred to binding arbitration under the provisions of the New Mexico Uniform Arbitration Act.

such party. All of the terms and conditions of the Original Agreement shall remain in full force and effect except as amended herein.

j. If any provision of this First Amendment, or the application thereof to a person or circumstance, shall be determined to be invalid or unenforceable to any extent, the remainder of this First Amendment and the application of such provisions to other persons or circumstances shall not be affected thereby and such provisions shall be enforced to the greatest extent permitted by law.

k. In the event any action is instituted by any party for the purpose of enforcing or interpreting any provision of this First Amendment, the prevailing party in such action shall be entitled to its reasonable attorney's fees and costs.

l. This First Amendment shall inure to the benefit of and shall be binding upon the undersigned parties and their respective successor and assigns. Whenever in this First Amendment a reference to PAAKWEREE, WESTLAND or SOUTHWEST HOMES is made, such reference shall be deemed to include a reference to successors of each party.

m. Each individual signing for each of the parties hereunder, warrants and represents that he/she is an authorized agent of such party, on whose benefit he/she is executing this First Amendment, and is authorized to execute the same.

n. Each party agrees to execute such other and further instruments and documents as may be necessary or proper in order to complete the transactions contemplated by this Agreement.

o. This First Amendment may be executed in one or more counterparts, each of which shall be deemed an original, and said counterparts shall constitute but one and the same instrument which may sufficiently be evidenced by one counterpart.

The following Section 5 is added to the Original Agreement:

5. SOUTHWEST HOMES agrees to:

a. Provide to AMAFCA an approximately 5.75 acre parcel adjacent to the existing Borrega Detention Dam Parcel measuring approximately 340 feet' from north to south and 740 feet from east to west, as shown on Exhibit A attached hereto. Conveyance shall be by Warranty Deed conveying merchantable title to AMAFCA free and clear of all liens and encumbrances, except those set out herein, ad valorem

which would be disclosed by an accurate survey and inspections of the premises; and (iv) any lien, claim or right to a lien, for services, labor or material heretofore or hereafter furnished, imposed by law and not shown by the public records.

f. Reserve a 60' wide access and utility easement to north of and west of the northern and western boundaries of the SOUTHWEST HOMES' parcel to be conveyed to to AMAFCA for the benefit of properties west of the Borrega Detention Dam parcel, AMAFCA, WESTLAND, and their successors and assigns. SOUTHWEST HOMES agrees to dedicate said 60' as right of way if required by any Governmental entity.

g. Provide to AMAFCA any environmental site assessments previously prepared for the right of way being dedicated to AMAFCA. AMAFCA shall have the right to obtain further site assessments at AMAFCA's expense, and should any such investigations show contamination of the site, the Parties will negotiate in good faith for cleanup of the site, an alternate site, other action as negotiated at that time, or may elect to terminate this Amendment to the Original Agreement and proceed with the Original Agreement without SOUTHWEST HOMES participation. Should this First Amendment be terminated, SOUTHWEST HOMES' financial contribution to AMAFCA and the SOUTHWEST HOMES parcel, if already deeded to AMAFCA, shall be returned to SOUTHWEST HOMES.

h. Provide a grading and drainage plan for the site to meet the discharge restrictions in Paragraph 1.j. and provide that the terrain is not altered such that flows greater than the 100 year event are directed towards the dam, not including the 60 acres on the southern boundary of the site that are currently within the Borrega Detention Dam watershed. Should the volume or peak flow rate assumed in Paragraph 1.j. for the SOUTHWEST HOMES' site be exceed when SOUTHWEST HOMES' final grading and drainage plans are prepared, SOUTHWEST HOMES will be required to provide mitigation as necessary to demonstrate no adverse impact on either the 100 year water surface elevation or peak discharge rate at the Borrega Detention Dam.

i. Construct, at SOUTHWEST HOMES' expense, a storm sewer connection to the dam, including necessary manholes and energy dissipater, excavation of approximately 12 acre feet of material to obtain the required storage volume in the detention dam, revegetation of disturbed areas, and all other on site drainage improvements necessary for the planned development.

j. By executing this Amendment SOUTHWEST HOMES agrees to and shall be bound by all of the terms and conditions of the Original Agreement which shall remain in full force and effect except as amended herein.

ACKNOWLEDGMENTS

STATE OF NEW MEXICO)
)s.s..
COUNTY OF BERNALILLO)

This instrument was acknowledged before me on Dec. 16, 1999, by Ronald Brown, as Chair of the Albuquerque Metropolitan Arroyo Flood Control Authority, a political subdivision of the State of New Mexico, on behalf of said political subdivision.

My Commission Expires:
March 29, 2003
(SEAL)

OFFICIAL SEAL
Gwendolyn A. Vigil
NOTARY PUBLIC
STATE OF NEW MEXICO
3-29-03

Gwendolyn a. Vigil
Notary Public

STATE OF NEW MEXICO)
)s.s.
COUNTY OF BERNALILLO)

This instrument was acknowledged before me on December 13, 1999, by Boleslo Romero, as President of the Paakweree Development Corporation, a New Mexico Corporation, on behalf of said corporation.

My Commission Expires:
3-29-03
(SEAL)

Gwendolyn A. Vigil
NOTARY PUBLIC
STATE OF NEW MEXICO
3-29-03

Gwendolyn a. Vigil
Notary Public

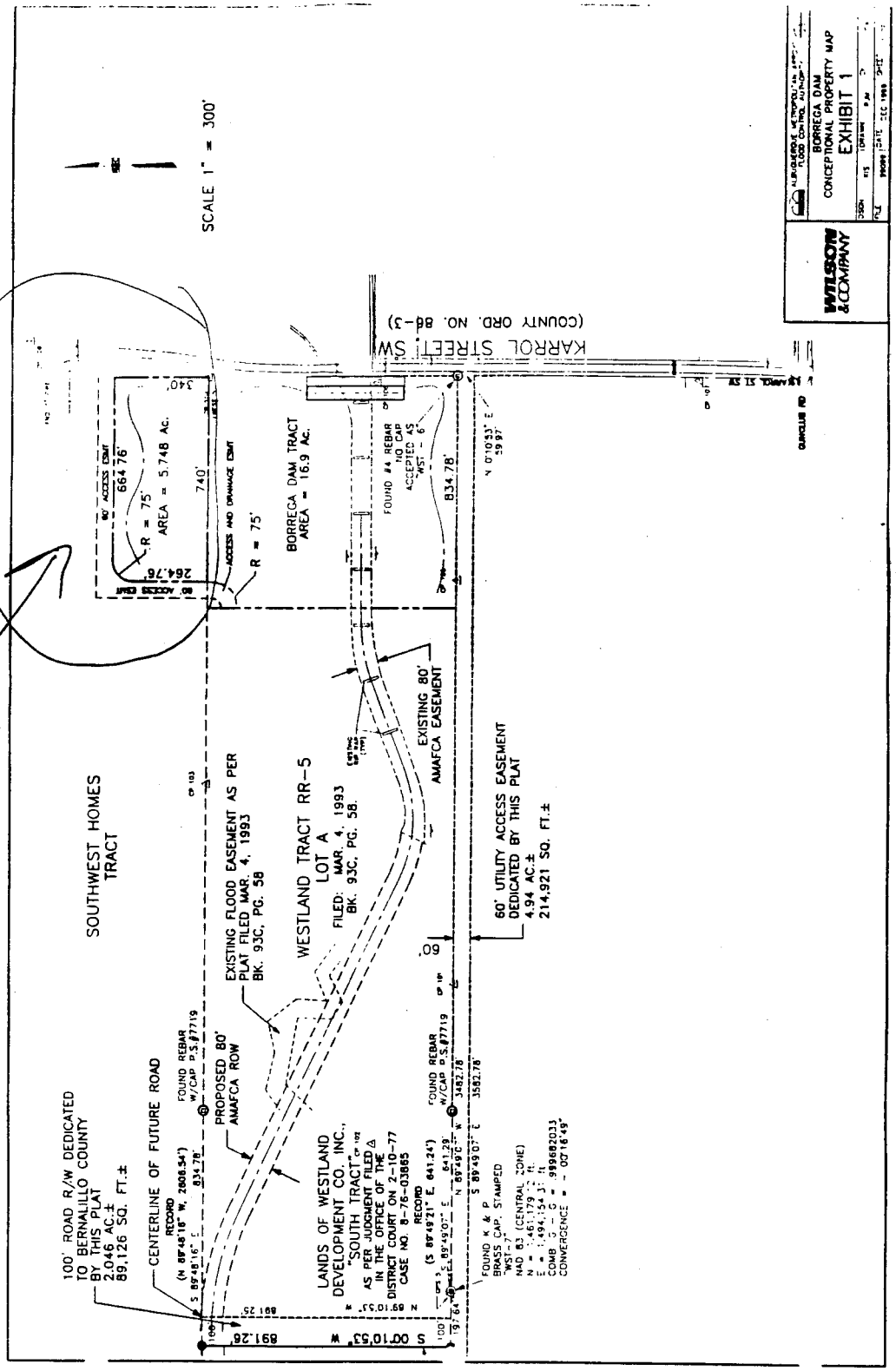
STATE OF NEW MEXICO)
)s.s.
COUNTY OF BERNALILLO)

This instrument was acknowledged before me on December 16, 1999, by ~~Barbara Page~~ Fred Amburgi, Jr, as President and CEO of the Westland Development Co. Inc., a New Mexico Corporation, on behalf of said corporation.

My Commission Expires:
March 29, 2003
(SEAL)

Gwendolyn a. Vigil
Notary Public

3-29-03



From American Southwest Homes

1/11 Exhibit A

SOUTH POWERLINE CHANNEL BASIN

ZONE A

ZONE AO

ZONE X

ZONE AE

RIO BRAVO CORRIDOR

RB2

BR2

BR3

BR4

BR1

(7A) 50101

(7B) 50104

(7C) 50102

(7D) 50106

(7E) 50105

(7F) 50107

(7G) 50109

(7H) 50108

(7I)

(7K) 50103

(6B) 50201

E1

E2

E3

E4

118th CORRIDOR

BORREGA ARROYO

KARROL RD

PROPOSED LOCATION BORREGA DAM

50111

EXISTING HUBBELL LAKE DETENTION AREA

POWERLINES

W&C

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)

1 inch = 500 ft.

BASIN SUMMARY

BASIN	AREA (sq mi)	AREA (ac)	%A	%B	%C	%D	Q100 24 hr (cfs)	VOL100 24 hr (ac-ft)
50101	0.1540	98.6	74.4	25.6	0	0	170	4.6
50102	0.1953	125.0	84.4	15.6	0	0	155	5.6
50103	0.0540	34.6	25.9	74.1	0	0	72	2.0
50104	0.0393	25.2	0	100	0	0	58	1.6
50105	0.1787	114.4	85.5	14.5	0	0	139	5.1
50106	0.0970	62.1	79.7	20.3	0	0	85	2.8
50107	0.0115	7.3	100	0	0	0	11	0.3
50108	0.2146	137.3	100	0	0	0	124	5.8
50109	0.1914	122.5	97.8	0	2.2	0	112	5.3
50111	0.1050	33.6	94	0	6	0	57	3.0
6B*	0.1473	94.3	76.9	0	22.2	0.9	100	4.9

NOTE: 15% SEDIMENT BULKING IN ALL BASINS FOR EXISTING CONDITIONS.
* BASIN 6B RUNOFF DOES NOT DISCHARGE TO AP E4

ANALYSIS POINT SUMMARY

AP NO.	DESCRIPTION	DRAINAGE AREA (sq mi)	DRAINAGE AREA (ac)	AHYMO HYD NO.	Q100 24 hr (cfs)	VOL100 24 hr (ac-ft)
E1	Total 50103, 50104, 50105	0.2719	174.0	105.3	185	8.7
E2	Total 50101 through 50107	0.7297	467.0	107.4	521	22.1
E3	Total 50101 through 50109 ("AP51")	1.1357	726.9	109.3	619	33.1
E4	Inflow into 60" pipe ("AP52")	1.2406	794.0	BR100E1B.HYD	591	36.1

LEGEND

5070	EXISTING INTERMEDIATE CONTOUR
5071	EXISTING INDEX CONTOUR
	DRAINAGE STUDY AREA BOUNDARY
	BASIN BOUNDARY
	PAAKWEREE DEVELOPMENT BOUNDARY
E2	ANALYSIS POINT
BR1	ARROYO CHANNEL NUMBER FROM FIGURE SH-4 AMOLE-HUBBELL DMP
50106	BASIN ID
	FEMA FLOODPLAIN

PAAKWEREE VILLAGE DRAINAGE REPORT

EXHIBIT 3
OVERALL BASIN BOUNDARY MAP
EXISTING CONDITIONS

DESIGN:	DRAWN:	DATE
NM	PJM	FEB 2000

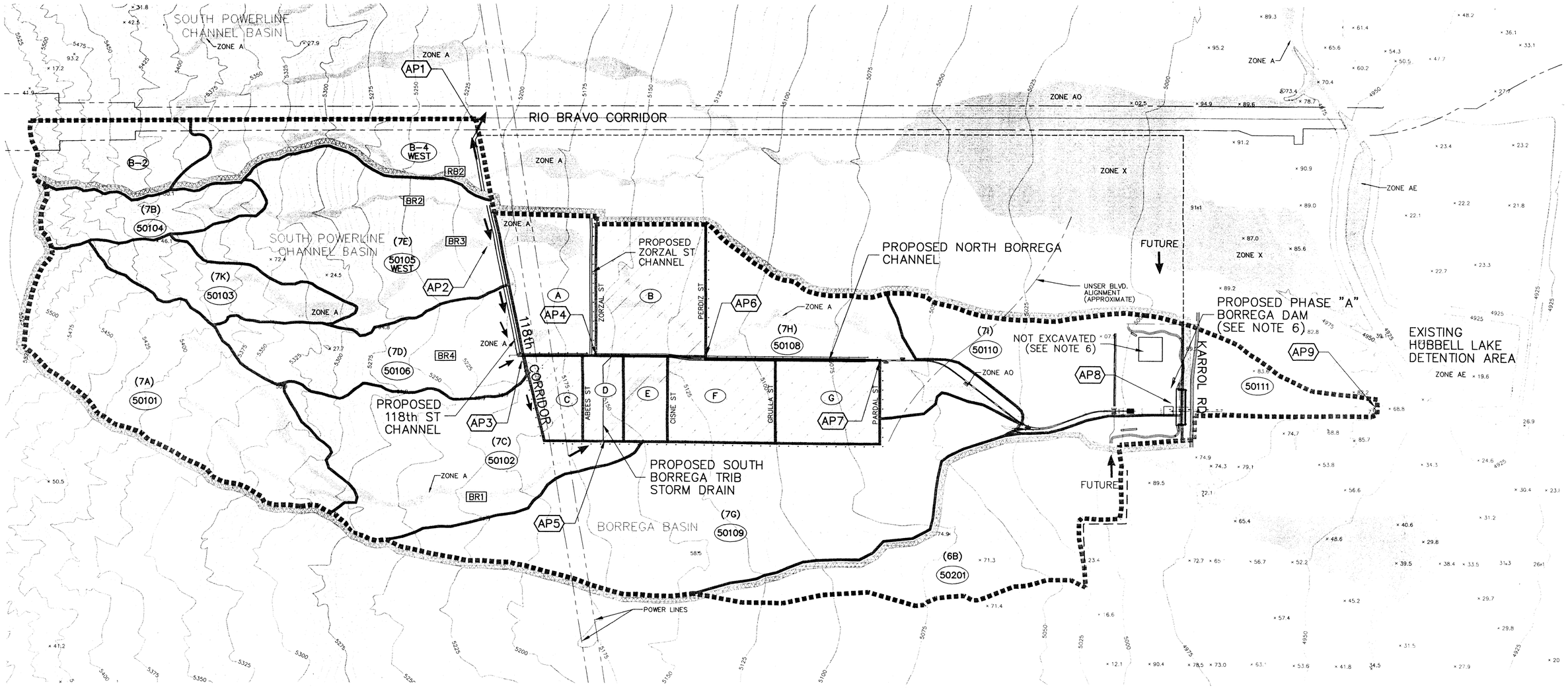
NANCY MUSINSKI NEW MEXICO 14246 REGISTERED PROFESSIONAL ENGINEER 02/08/00

WILSON & COMPANY
4900 LANG AVE NE
ALBUQUERQUE NM 87109
(505) 348-4000

FILE NO. 98088

SHEET NO. 1 OF 5

x-ref: 98088\W\C\DWG\98088SX.DWG
98088\W\C\DWG\SHEETS\98088E1.DWG\01-07-00\PJM



REVISED (POST-PROJECT) CONDITIONS:

1. PAAKWEREE BASINS (B THROUGH G) ARE ANALYZED AS DEVELOPED WITH NO BULKING. THESE ARE THE ONLY FULLY DEVELOPED BASINS IN THE WATERSHED.
2. BASINS 50103, 50104, & 50105 WEST ARE ANALYZED AS EXISTING WITH 15% BULKING, AND ARE ROUTED SOUTH VIA 118TH ST CHANNEL TO BE DISCHARGED TO THE NORTH BORREGA CHANNEL.
3. BASINS B-2 AND B-4 WEST ARE ANALYZED AS EXISTING WITH 15% BULKING, ARE ROUTED TO THE SW COR OF 118TH ST AND RIO BRAVO, AND THEN DISCHARGED THROUGH A CULVERT TO A CHANNEL ON THE NORTH SIDE OF RIO BRAVO BLVD.
4. BASIN 50201 (6B) RUNOFF DOES NOT DISCHARGE TO BORREGA DAM UNTIL THE BORREGA DIVERSION STORM DRAIN IS BUILT IN THE FUTURE CONDITIONS.
5. THE BASIN BETWEEN RIO BRAVO BLVD AND THE BORREGA WATERSHED BOUNDARY DOES NOT DISCHARGE TO BORREGA DAM UNTIL FUTURE CONDITIONS.
6. THE BORREGA DAM IS TO BE BUILT IN 2 PHASES: PHASE "A" AND PHASE "B". THE FIRST PHASE (NOT-FULLY EXCAVATED) IS CALLED PHASE "A". WHEN THE BASINS DISCUSSED IN NOTES 4 AND 5 ARE DEVELOPED, THEY WILL BE DIVERTED TO THE BORREGA DAM. THE DAM WILL THEN BE FULLY EXCAVATED. THE FULLY EXCAVATED BORREGA DAM IS CALLED PHASE "B".

LEGEND

- 5070 — EXISTING INTERMEDIATE CONTOUR
- 5071 — EXISTING INDEX CONTOUR
- DRAINAGE STUDY AREA BOUNDARY
- BASIN BOUNDARY
- AREA DISCHARGING TO DAM
- PAAKWEREE DEVELOPMENT BOUNDARY
- E2 — ANALYSIS POINT
- BR1 — ARROYO CHANNEL NUMBER FROM FIGURE SH-4 AMOLE-HUBBELL DMP
- 50106 — BASIN ID
- FEMA FLOOD PLAIN
- FULLY DEVELOPED BASINS
- DIRECTION OF FLOW

ANALYSIS POINT SUMMARY

AP NO.	DESCRIPTION	REVISED (POST-PROJECT) AHYMO HYD NO.	DRAINAGE AREA (sq mi)	Q100 24 hr (cfs)	VOL100 24 hr (ac-ft)
1	Culvert to north under Rio Bravo Blvd @ 118th St.	RB_CULV	0.1086	65	2.9
2	118th St Channel @ Arroyo "BR3"	105.10	0.2346	213	7.6
3	118th St Channel @ North Borrega Channel	106.20	0.3202	264	10.1
4	N. Borrega Chan @ Avestruz St	105E.1	0.3853	316	13.6
5	Intake of culvert @ South property line of Paakweree	S_CULV	0.2814	161	8.3
6	N. Borrega Chan @ Perdiz St	107.10	0.7599	593	29.8
7	N. Borrega Chan @ Pardal St	107.50	0.8287	716	35.6
8	Borrega Dam	110.20	1.2462	967	45.9
9	Borrega Arroyo @ Outfall	BR_DMP1.HYD	1.2841	52	40.5

BASIN SUMMARY

BASIN	AREA (sq mi)	AREA (ac)	%A	%B	%C	%D	%SED BULK	REVISED (POST-PROJECT) Q100 24 hr (cfs)	REVISED (POST-PROJECT) VOL100 24 hr (ac-ft)
B-2	0.0445	28.5	100	0	0	0	15	42	1.2
B-4 West	0.0641	41.0	100	0	0	0	15	41	1.7
50101	0.1540	98.6	74.4	25.6	0	0	15	142	4.6
50102	0.1277	81.7	84.4	15.6	0	0	15	134	3.7
50103	0.0540	34.6	25.9	74.1	0	0	15	72	2.0
50104	0.0393	25.2	0	100	0	0	15	58	1.6
50105West	0.1413	90.4	85.5	14.5	0	0	15	131	4.0
50106	0.0856	54.8	79.7	20.3	0	0	15	82	2.5
50108	0.0813	70.7	100	0	0	0	0	42	1.9
50109	0.2344	150.0	97.8	0	2.2	0	0	151	5.6
50110	0.1018	65.2	94	0	6	0	0	97	6.9
50111	0.0379	24.3	94	0	6	0	0	33	0.9
50201	0.1473	94.3	76	0	23	0	0	98	4.3
A	0.0513	32.8	0	40	55	5	0	85	2.5
B	0.0641	41.0	0	28	23	49	0	137	5.5
C	0.0138	8.8	0	30	42	28	0	27	0.9
D	0.0144	9.2	0	28	23	49	0	31	1.2
E	0.0144	9.2	0	28	23	49	0	31	1.2
F	0.0336	21.5	0	28	23	49	0	72	2.9
G	0.0352	22.5	0	28	23	49	0	75	3.0

GRAPHIC SCALE
500 0 250 500 1000 2000
(IN FEET)
1 inch = 500 ft.

PAAKWEREE VILLAGE DRAINAGE REPORT

EXHIBIT 4
OVERALL BASIN BOUNDARY MAP
REVISED (POST-PROJECT) CONDITION

DESIGN	DRAWN	DATE
NM	PJM	MARCH 2000

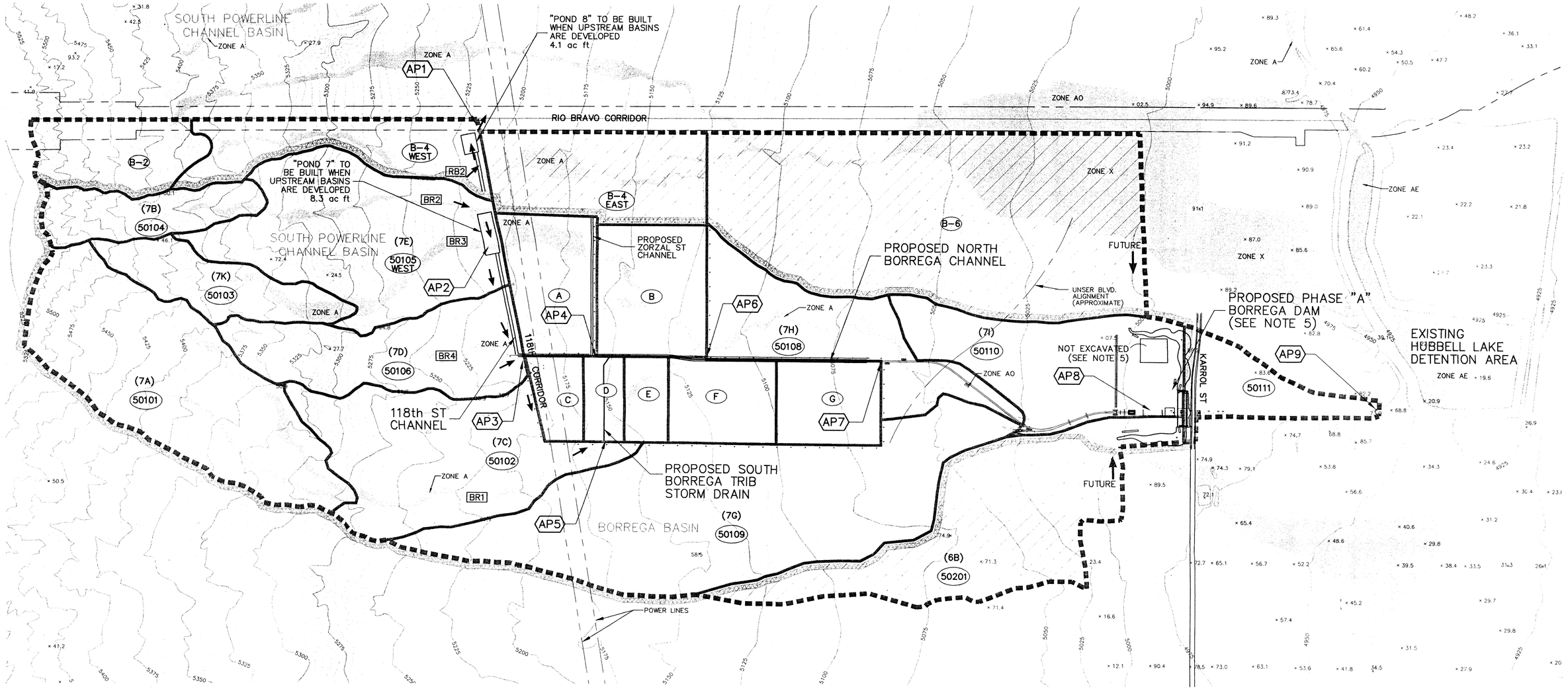
NANCY MUSINSKI NEW MEXICO 14248 03/22/00 REGISTERED PROFESSIONAL ENGINEER

WILSON & COMPANY
4900 LANC... NE
ALBUQUERQU... 09
(505) 34... 00

FILE NO. 98088

SHEET NO. 2 OF 5

XREF: 98099 MVCLOMV\DWG\M9998ASR.DWG
98099 MVCLOMV\DWG\SHEETS\M9995X4.DWG\03-22-00\PJM



ANALYSIS POINT SUMMARY

AP NO.	DESCRIPTION	INTERIM AHYMO HYD NO.	INTERIM DRAINAGE AREA (sq mi)	INTERIM Q100 24 hr (cfs)	INTERIM VOL100 24 hr (ac-ft)
1	Culvert to north under Rio Bravo Blvd @ 118th St.	RB_CULV	0.1086	43	7.9
2	Inflow to "Pond 7"	POND7.IN	0.2346	428	18.5
3	118th St Channel @ North Borrega Channel	106.20	0.3202	198	25.7
4	N. Borrega Chan @ Avestruz St	105E.1	0.3853	275	29.1
5	Intake of culvert @ South property line of Paakweree	S_CULV	0.2814	344	22.8
6	N. Borrega Chan @ Perdiz St	107.10	0.7599	728	59.9
7	N. Borrega Chan @ Pardal St	107.50	0.8287	854	65.7
8	Borrega Dam	110.20	1.2462	1473	99.1
9	Borrega Inlet to Hubbell Lake	BR_DMP1.HYD	1.2841	192	98.9

BASIN SUMMARY

BASIN	AREA (sq mi)	AREA (ac)	%A	%B	%C	%D	INTERIM Q100 24 hr (cfs)	INTERIM VOL100 24 hr (ac-ft)
B-2	0.0445	28.5	0	33	33	34	87	3.2
B-4 West	0.0641	41.0	0	33	33	34	126	4.7
50101	0.1540	98.6	0	38	20	42	271	12.0
50102	0.1277	81.7	0	28	23	49	272	10.9
50103	0.0540	34.5	0	48	17	35	102	3.8
50104	0.0393	25.2	0	53	15	32	72	2.7
50105West	0.1413	90.4	0	28	23	49	271	12.0
50106	0.0856	54.8	0	28	23	49	171	7.3
50108	0.0813	52.0	0	60	15	25	100	5.0
50109	0.2344	150.0	0	28	23	49	391	20.0
50110	0.1018	65.2	4	26	22	48	212	8.5
50111	0.0379	24.3	0	45	10	45	76	3.0
A	0.0513	32.8	0	40	55	5	85	2.5
B	0.0641	41.0	0	28	23	49	137	5.5
C	0.0138	8.8	0	30	42	28	27	0.9
D	0.0144	9.2	0	28	23	49	31	1.2
E	0.0144	9.2	0	28	23	49	31	1.2
F	0.0336	21.5	0	28	23	49	72	2.9
G	0.0352	22.5	0	28	23	49	75	3.0

INTERIM CONDITIONS – PHASE "A" DAM:

1. ALL BASINS DISCHARGING TO THE DAM ARE ANALYZED AS DEVELOPED WITH NO BULKING.
2. BASINS 50103, 50104, & 50105 WEST ARE ANALYZED AS DEVELOPED WITH NO BULKING, AND ARE ROUTED THROUGH "POND 7" PER THE AMOLE–HUBBELL DMP (A–H DMP). DISCHARGE FROM "POND 7" IS ROUTED SOUTH TO THE CULVERT UNDER 118TH ST (AP3).
3. BASINS B–2 AND B–4 WEST ARE ANALYZED AS DEVELOPED WITH NO BULKING, ROUTED TO "POND 8" PER THE A–H DMP, THEN DISCHARGED THROUGH A CULVERT TO THE CHANNEL ON THE NORTH SIDE OF RIO BRAVO BLVD.
4. PONDS ALONG WEST SIDE OF 118TH ST PER THE A–H DMP.
   POND 7 IS TO BE LOCATED IN BASIN 50105 WEST.
   STORAGE VOLUME = 8.3 AC–FT.
   POND 8 IS TO BE LOCATED IN BASIN B–4 WEST.
   STORAGE VOLUME = 4.1 AC–FT.
5. THE BORREGA DAM IS TO BE BUILT IN 2 PHASES: PHASE "A" & PHASE "B". THE FIRST PHASE (NOT–FULLY EXCAVATED) IS CALLED "PHASE "A". WHEN BASINS B–4 EAST AND B–6 ARE DEVELOPED, THEY WILL BE DIVERTED TO THE BORREGA DAM. WHEN BASIN 50201 IS DEVELOPED, IT WILL BE DIVERTED TO THE BORREGA DAM. THE DAM WILL THEN BE FULLY EXCAVATED. THE FULLY EXCAVATED BORREGA DAM IS CALLED PHASE "B".

LEGEND

- 5070 — EXISTING INTERMEDIATE CONTOUR
- 5071 — EXISTING INDEX CONTOUR
- DRAINAGE STUDY AREA BOUNDARY
- BASIN BOUNDARY
- AREA DISCHARGING TO DAM
- PAAKWEREE DEVELOPMENT BOUNDARY
- E2 — ANALYSIS POINT
- BR1 — ARROYO CHANNEL NUMBER FROM FIGURE SH–4 AMOLE–HUBBELL DMP
- 50106 — BASIN ID
- FEMA FLOOD PLAIN
- BASINS TO BE DIVERTED TO THE DAM IN THE FUTURE. THE DAM WILL BE THEN BE FULLY EXCAVATED PER PHASE "B" DAM
- DIRECTION OF FLOW

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft.

PAAKWEREE VILLAGE DRAINAGE REPORT

EXHIBIT 4a
OVERALL BASIN BOUNDARY MAP
INTERIM CONDITION – PHASE "A" DAM

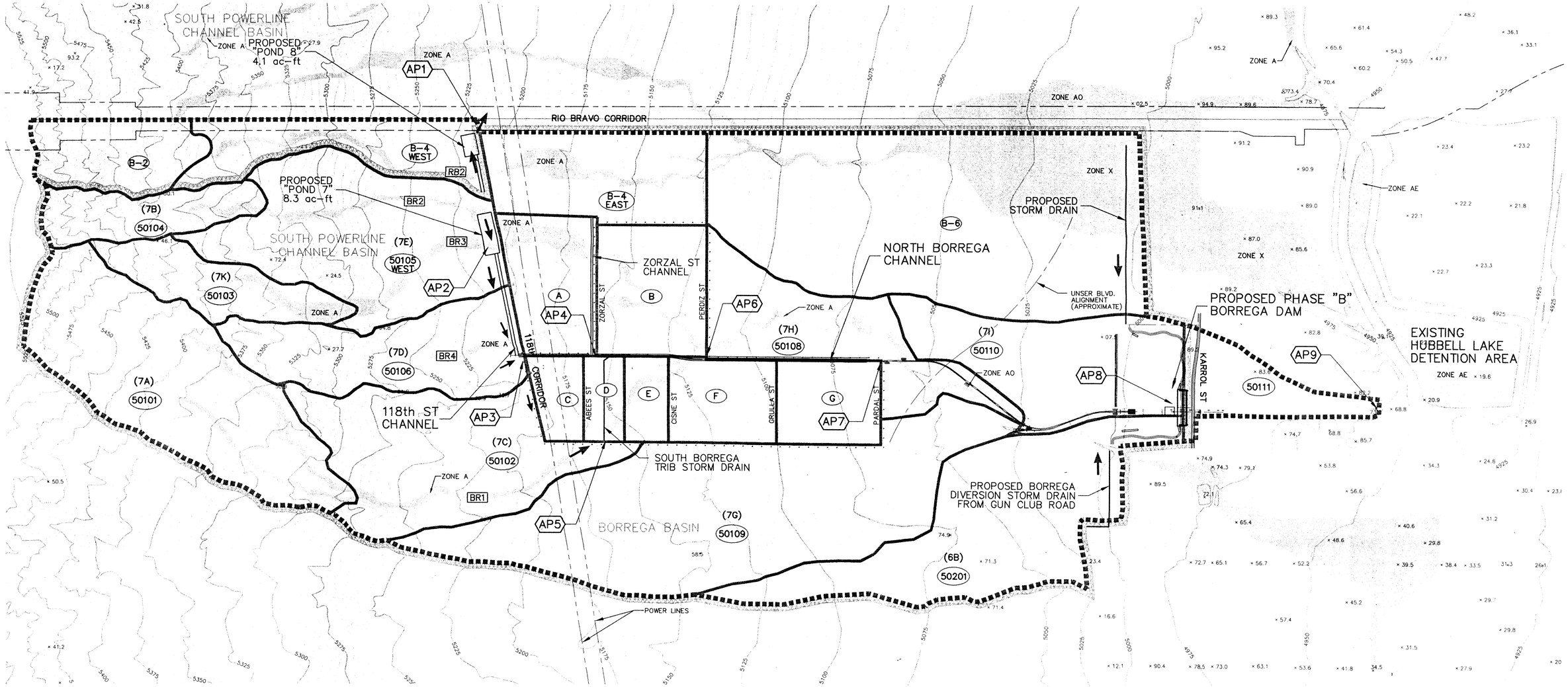
DESIGN	DRAWN
NM	PJM

NANCY M. MUSTAFA NEW MEXICO 14248 REGISTERED PROFESSIONAL ENGINEER 03/22/00

WILSON & COMPANY
4900 LANG AVENUE NE
ALBUQUERQUE, NM 87109
(505) 348-4000

DATE: MARCH 2000
FILE NO.: 98088
SHEET NO.: 3 OF 5

98088\M\C\DWG\SHEETS\98088X4A.DWG\3-22-00\PJM



ANALYSIS POINT SUMMARY

AP NO.	DESCRIPTION	FUTURE AHYMO HYD NO.	FUTURE DRAINAGE AREA (sq mi)	FUTURE Q100 24 hr (cfs)	FUTURE VOL100 24 hr (ac-ft)
1	Culvert to north under Rio Bravo Blvd @ 118th St.	RB_CULV	0.3432	53	26.4
2	118th St Channel @ Arroyo "BR3"	POND7.IN	0.2346	428	18.5
3	118th St Channel @ North Borrega Channel	106.10	0.3202	198	25.7
4	N. Borrega Chan @ Avestruz St	105E.1	0.3853	275	29.1
5	Intake of culvert @ South property line of Paakweree	S_CULV	0.2814	344	22.8
6	N. Borrega Chan @ Perdiz St	107.10	0.7599	728	59.9
7	N. Borrega Chan @ Pardal St	107.5	0.8287	854	65.7
8	Borrega Dam	110.20	1.7481	2066	133.5
9	Borrega Inlet to Hubbell Lake	BR_DMP1.HYD	1.7860	213	136.5

BASIN SUMMARY

BASIN	AREA (sq mi)	AREA (ac)	%A	%B	%C	%D	FUTURE Q100 24 hr (cfs)	FUTURE VOL100 24 hr (ac-ft)
B-2	0.0445	28.5	0	33	33	34	87	3.2
B-4 West	0.0641	41.0	0	33	33	34	126	4.7
B-4 East	0.0677	43.3	0	9	75	16	110	4.3
B-6	0.2869	183.6	0	60	15	25	358	17.6
50101	0.1540	98.6	0	38	20	42	271	12.0
50102	0.1277	81.7	0	28	23	49	272	10.9
50103	0.0540	34.5	0	48	17	35	102	3.8
50104	0.0393	25.2	0	53	15	32	72	2.7
50105West	0.1413	90.4	0	28	23	49	271	12.0
50106	0.0856	54.8	0	28	23	49	171	7.3
50108	0.0813	52.0	0	60	15	25	100	5.0
50109	0.2344	150.0	0	28	23	49	391	20.0
50110	0.1018	65.2	4	26	22	48	212	8.5
50111	0.0379	24.3	0	45	10	45	76	3.0
50201	0.1473	94.3	0	28	23	49	230	12.5
A	0.0513	32.8	0	40	55	5	85	2.5
B	0.0641	41.0	0	28	23	49	137	5.5
C	0.0138	8.8	0	30	42	28	27	0.9
D	0.0144	9.2	0	28	23	49	31	1.2
E	0.0144	9.2	0	28	23	49	31	1.2
F	0.0336	21.5	0	28	23	49	72	2.9
G	0.0352	22.5	0	28	23	49	75	3.0

FUTURE CONDITIONS:

1. ALL BASINS DISCHARGING TO THE DAM ARE ANALYZED AS DEVELOPED WITH NO BULKING.
2. DISCHARGE FROM BASINS B-4 EAST AND B-6 IS DIVERTED AND CONVEYED VIA STORM DRAIN TO THE BORREGA DAM.
3. DISCHARGE FROM BASIN 50201 IS DIVERTED AND CONVEYED VIA STORM DRAIN TO THE BORREGA DAM.
3. TO ACCOMMODATE THE ADDITIONAL DISCHARGE FROM BASINS B-4 EAST, B-6, AND 50201 (SEE NOTES 2 & 3). THE BORREGA DAM IS FULLY EXCAVATED PER PHASE "B".

LEGEND

- 5070 — EXISTING INTERMEDIATE CONTOUR
- 5071 — EXISTING INDEX CONTOUR
- DRAINAGE STUDY AREA BOUNDARY
- BASIN BOUNDARY
- AREA DISCHARGED TO DAM
- PAAKWEREE DEVELOPMENT BOUNDARY
- E2 — ANALYSIS POINT
- BR1 — ARROYO CHANNEL NUMBER FROM FIGURE SH-4 AMOLE-HUBBELL DMP
- 50106 — BASIN ID
- FEMA FLOOD PLAIN
- DIRECTION OF FLOW

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft.

W&C

PAAKWEREE VILLAGE DRAINAGE REPORT

EXHIBIT 5
OVERALL BASIN BOUNDARY MAP
FUTURE CONDITIONS – PHASE "B" DAM

DESIGN	DRAWN
NM	PJM

JAMES P. MURSINNA NEW MEXICO 12641 REGISTERED PROFESSIONAL ENGINEER 03/22/00

WILSON & COMPANY
4900 LANG AVENUE NE
ALBUQUERQUE, NM 87109
(505) 348-4000

DATE: MARCH 2000

FILE NO.: 98088

SHEET NO.: 4 OF 5

XREFs: 98099\M\CLOMR\DWG\M98099BASE.DWG
98099\M\CLOMR\DWG\SHEETS\M98BEX5.DWG\J=-22-00\PJM