INDIVIDUAL HYDROLOGIC & HYDRAULIC ASSESSMENT (IHHA) REPORT FOR ALVARADO CHANNEL (LOWER PORTION) MAP NUMBERS 59 & 60

> Job Number 15541-A September 13, 2010

RICK ENGINEERING COMPANY ENGINEERING COMPANY RICK ENGINEERING CC



#### INDIVIDUAL HYDROLOGIC & HYDRAULIC ASSESSMENT (IHHA) REPORT

Site Name/Facility:	Alvarado Channel (Lower Portion)	
	Map Numbers 59 & 60	DPROFESSION A
Date:	September 13, 2010	E S CALVIN BY GU
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• Instructions: This form must be completed for each target facility following the completion of the Individual Maintenance Plan (IMP) report form and prior to any work being conducted in the facility. Attach additional sheets if needed.

Description of creek/channel (limits of reach, surrounding land use and area, creek/channel geometry and vegetative condition):

The area of study extends from the location where the channel transitions from an underground culvert, and flows in an easterly direction for approximately 3,420 feet to a point where the channel confluences with San Diego River (see workmap located in the Attachments). The lower portion of the channel is aligned north of Camino Del Rio North Road, which becomes Alvarado Canyon Road, just east of Fairmount Avenue. The central and upper portions of the channel are bounded by Mission Gorge Road to the north and Alvarado Canyon Road to the south. The upper portion of the channel, within the area of study, is concrete-lined (approximately 550 feet) and transitions into an earthen channel (approximately 700 feet). The central portion of the channel is concrete-lined (approximately 1,120 feet). The downstream portion of the channel, within the area of study consists of a concrete lined portion (approximately 280 feet), an earthen portion with rock lined slope on the left bank (approximately 330 feet), and a naturally lined portion (approximately 440 feet), that confluences with San Diego River. The channel geometry is trapezoidal in shape throughout the area of study.

For the purposes of this assessment, the area of study has been divided into four reaches: Reach 1 (HEC-RAS Cross Sections 13.60 to 1041.78), Reach 2 (HEC-RAS Cross Sections 1041.78 to 2168.69), Reach 3 (HEC-RAS Cross Sections 2168.69 to 2926.63), and Reach 4 (HEC-RAS Cross Sections 2926.63 to 3415.77). Reach 1 is the most downstream reach. Reach 1 extends from the downstream limits of the area of study (at the confluence with the San Diego River), and continues upstream for approximately 1,050 feet. Reach 1 consists of light to moderate vegetation and is bounded by parking lots to the north and south, or more specifically by the Camino Del Rio North Road to the south and Fairmont Avenue to the east. At the upstream limits of Reach 2 begin at the culvert crossing under Fairmount Avenue, and extend upstream approximately 1,120 feet. Reach 2 has light vegetation and is bounded by commercial buildings and parking lots to the north and south, which are bounded by Mission George Road to the north and Alvarado Canyon Road to the south. Reach 3 is located upstream of Reach 2 and is approximately 700 feet in length. Reach 3 has light vegetation Reach 4 is the most upstream reach with moderate vegetation and extends for approximately 550 feet in length. Reach 3 and Reach 4 are bounded by the commercial buildings and parking lot to the north and south, Mission George to the north, and Alvarado Canyon Road to the south.

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Note: See attached pictures

## Hydrologic information (source of hydrologic information, summary of flow rates and return frequencies):

There are two (2) sources of hydrologic information. The first source of hydrologic information is based on the Federal Emergency Management Agency's (FEMA's) DRAFT (no date) Flood Insurance Study (FIS) for San Diego County. The second source of hydrologic information is based on FEMA's 2006 FIS for San Diego County. The difference between these two sources is that the DRAFT FIS has not been officially adopted at the authoring of this assessment. While the hydrologic information utilized for this project is based on the 2006 FIS, hydrologic information from the DRAFT FIS was compared for any discrepancies of information. For this project reach, no discrepancies were noted. The FIS provided the 10-, 50-, and 100-year flow rate information for Alvarado Creek. This flow rate information was then plotted on log-probability paper to determine a flow rate distribution. From this distribution, flow rates were determined and equated to a return frequency storm event.

The following flow rates were provided in the FIS:

100-Year =5,100 cubic feet per second (cfs) 50-Year = 4,500 cfs 10-Year = 2,700 cfs

The following flow rates were determined from log-probability paper:

25-Year = 3,800 cfs 5-Year = 2,050 cfs 2-Year = 1,180 cfs

## Hydraulic analyses (description of hydraulic models created for project):

The US Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) Version 4.0 was used to analyze the hydraulic characteristics of Alvarado Channel. HEC-RAS has the ability to perform one-dimensional hydraulic calculations for natural and engineered channels, by utilizing the energy equation and the momentum equation. For the purposes of this project, all HEC-RAS modeling was performed using a sub-critical flow regime.

The hydraulic modeling prepared for the Current Vegetated Condition, Ultimate Vegetated Condition, Maintained Condition (no sediment removed) and Maintained Condition (sediment removed) analyses are based on the 1999 City of San Diego 2-foot contour topographic information. The topography and the hydraulic modeling performed for Alvarado Channel are all on the National Geodetic Vertical Datum of 1929 (NGVD 29).

The following provides general descriptions of hydraulic analyses/models that were prepared for this area of study:

Current Vegetated Condition:

The hydraulic analysis for Current Vegetated Condition was created to reflect the current vegetated condition of the channel and determine the actual channel capacity. A field visit was performed on October 13, 2009 to determine and confirm the Manning's Roughness Coefficients within Alvarado Channel for the Current Vegetated Condition.

Based on the site visit, it was determined that Manning's Roughness Coefficients ranged from a n-value of 0.016 for the concrete portion to a n-value of 0.06, reflecting light to moderate vegetation in the earthen or sedimented portions.

Note: See Hydraulic Profiles for Current Vegetated Condition Model

Ultimate Vegetated Condition:

The Ultimate Vegetated Condition reflects dense vegetation in the channel, which assumes no maintenance is being performed. The existing vegetation that currently exists in the channel will become more dense. This dense vegetation will reduce velocities. The slower velocities will cause sediment to drop out and ultimately cause deposition in the upstream areas where the channel is fully lined. The vegetation will migrate upstream and thus further decrease the capacity of the channel and potentially cause flooding to occur more frequently.

To establish this ultimate vegetated condition in the hydraulic model, a Manning's Roughness Coefficients of 0.17 was assumed throughout the area of study for earthen portions and 0.17 for the bottom of the channel only for the concrete-lined portions.

Note: See Hydraulic Profiles for Ultimate Vegetated Condition Model

Maintained Condition (No sediment removed): 2 models were prepared.

1. Maintained Condition (bank to bank):

This Maintained Condition (Bank to Bank) assumes vegetation-only maintenance of the channel. With this model, maintenance was proposed for the bottom and the sides of the channel for earthen portions of the channel and for the bottom of the channel only for concrete-lined portions of the channel. The limits of maintenance, for modeling purposes, begin at 280 feet downstream of the downstream side of the culvert crossing at Fairmount Avenue and extend upstream for approximately 2650 feet.

For the above-described limits of maintenance, to establish the maintained condition (bank to bank) in this hydraulic model, the Manning's Roughness Coefficient of 0.035 was utilized for the bottom and the sides of the earthen portions of the channel. For the portions of the channel that is concrete-lined, for the side slopes, the Manning's Roughness Coefficient of 0.016 was utilized.

2. Maintained Condition (bottom of the channel only):

This Maintained Condition (bottom of the channel only) assumes vegetation-only maintenance of the channel bottom. The limits of maintenance, for modeling purposes, begin 280 feet downstream of the downstream side of the culvert crossing at Fairmount Avenue and extend upstream for approximately 2650 feet.

For the above-described limits of maintenance, to establish the maintained condition (bottom of the channel only) in this hydraulic model, the Manning's Roughness Coefficient of 0.035 was utilized for the bottom of the channel.

It is important to note that maintenance for the lower portions of Reach 1, the earthen portion with a rock lined left bank and the naturally lined portion, were not modeled in the 2 models (maintained condition, no sediment removed), located approximately 280 feet downstream of the downstream side of the culvert crossing at Fairmount Avenue, due to the Arundo Donax removal project that is currently in process. The Manning's Roughness Coefficients for the above-described portions of Reach 1 were kept the same as the current vegetated condition.

## Additional Notes:

For the two models prepared for the Maintained Condition (No sediment removed), it is important to note that the Manning's Roughness Coefficients for the remaining portions of the channel, outside of the limits of maintenance, were kept the same as the current vegetated condition model.

Note: See Hydraulic Profiles for Maintained Condition Model (No sediment removed)

Maintained Condition (Sediment and vegetation removed):

1. Maintained Condition (bottom of the channel only):

In addition to the vegetation-only maintenance (2 models), a Maintained Condition was also prepared that modeled the removal of sediment and vegetation from the bottom of the channel, that has deposited over the years. The limits of maintenance, for modeling purposes, begin 280 feet downstream of the downstream side of the culvert crossing at Fairmount Avenue and extend approximately 1220 feet upstream of the beginning limits of maintenance. Sediment removal was also assumed within the entire Reach 4. The removal of sediment, to the historic flowline from the bottom of the channel, will increase the capacity of the channel compared to the current vegetated condition, and thus reduce the flooding potential.

For modeling purposes, the sediment and vegetation removal was assumed to be limited to a portion of Reach 1, Reach 2 and Reach 4. The depth of sediment removed ranged from 0.3 feet to 0.8 feet.

In the hydraulic analysis, the channel bottom was adjusted to reflect the historic flowline based on 1999 City of San Diego 2-foot contour topographic information and as-built information.

Note: See Hydraulic Profiles for Maintained Condition Model (Sediment and vegetation removed)

## Hydraulics Results (Describe capacity of channel for each condition):

Based on the hydrologic and hydraulic assessment, maintenance is recommended in the entire limits of study area, except for the downstream portion of the channel for approximately 770 feet. However, the proposed maintenance is for the bottom of the channel only and consists of vegetation removal in the upper portion of Reach 2 and entire Reach 3, and sediment and vegetation removal in the upper portion of Reach 1, the remaining portion of Reach 2, and entire Reach 4. Additionally, based on the site visit, 1999 City of San Diego 2-foot contour topographic information, and the hydraulic results it was determined that the culvert crossing under Fairmount Avenue and the channel downstream of Reach 4 is severely undersized. In order to bring the channel to the current design standards, improvements would be required for Reaches 2 and 3. These improvements would consist of, but would not be limited to, re-grading of the channel and upsizing the culvert crossing under Fairmount Avenue. The re-grading would consist of widening the channel and/or removing the abandoned road crossing. Also, it is important to note that portions of the channel (located in a portion of Reach 2 and Reach 3) that needs improvements are not owned by the City of San Diego and additional coordination would be required for the future improvements mentioned above.

The results of the hydraulic analyses describe these benefits in more detail (see below).

Current Vegetated Condition:

Capacity:

Reach 1 ranges from 3,800 to 4,500 cfs (25- to 50-year storm event and a 6-hour precipitation of 2.1" to 2.2"). Reach 2 ranges from 1,180 to 2,050 cfs (2- to 5-year storm event and a 6-hour precipitation of 1.25 to 1.62"). Reach 3 is less than 1,180 cfs (less than 2-year storm event and a 6-hour precipitation of less than 1.25"). Reach 4 ranges from 3,800 to 4,500 cfs (25- to 50-year storm event and a 6-hour precipitation of 2.1" to 2.2").

The hydraulic model determined that the current channel, based on the vegetated condition observed during the site visit, does not have capacity to convey the design storm (100-year).

Note: Reference Detailed Hydraulic Results for Current Vegetated Condition Model

Ultimate Vegetated Condition:

Capacity:

Reach 1 ranges from 1,180 to 2,050 cfs (2- to 5-year storm event and a 6-hour precipitation of 1.25" to 1.62"). Reach 2 is less than 1,180 cfs (less than 2-year storm event and a 6-hour precipitation of less than 1.25"). Reach 3 is less than 1,180 cfs (less than 2-year storm event and a 6-hour precipitation of less than 1.25"). Reach 4 is approximately 2,700 cfs (10-year storm event and a 6-hour precipitation of 1.8"). Due to the light to moderate vegetation that currently exists today in the lower and upper portion of the channel, there is a significant change in the capacity in Reach 1 and Reach 4 when comparing the Ultimate Vegetated Condition model to the Current Vegetated Condition model. Additionally, due to the undersized channel and crossing at Fairmount Avenue, there is not a significant change in the capacity in Reach 2 and Reach 3 when comparing the Ultimate Vegetated Condition model to the Current Vegetated Condition model to the Current Vegetated Condition model.

Note: Reference Detailed Hydraulic Results for Ultimate Vegetated Condition Model

Maintained Condition (No sediment removed):Based on the 2 models prepared (maintained condition, bank to bank and channel bottom only), it was determined that the maintenance method of vegetation removal only along the channel bottom is the most beneficial model and least impactive. The following are the results for the determined maintenance model:

## Capacity:

Reach 1 ranges 3,800 cfs to 4,500 cfs (25- to 50-year storm event and a 6-hour precipitation of 2.1" to 2.2"). Reach 2 ranges from 1,180 to 2,050 cfs (2- to 5-year storm event and a 6-hour precipitation of 1.25" to 1.62"). Reach 3 is less than 1,180 cfs (less than 2-year storm event and a 6-hour precipitation of less than 1.25"). Reach 4 is approximately 5,100 cfs (100-year storm event and a 6-hour precipitation of 2.6").

In Reach 3, at cross section 2231.64, where the abandoned road is located, the channel has capacity of less than a 2-year storm event. At that location, the water overtops the channel banks and inundates the neighboring properties. Upstream and downstream of the abandoned road the channel in Reach 3 has capacity of 1,180 to 2,050 cfs (2- to 5-year storm event and 6-hour precipitation of 1.25 to 1.62"). It should be noted that increased capacities identified above would only be realized if non-City portions of the Reaches are maintained as assumed.

Based on the result of the hydraulic analyses, it was determined that the channel bottom only method would be a beneficial approach because it would increase the channel capacity while allowing retention of vegetation along the channel banks.

Note: Reference Detailed Hydraulic Results for Maintained Condition Model (No sediment removed)

Maintained Condition (Sediment and vegetation removed): Based on the profiles, there was evidence of deposition in portion of Reach 1, Reach 2 and Reach 4. This hydraulic analysis modeled the removal of sediment and vegetation for a length of approximately 280 feet in Reach 1, 940 feet in Reach 2, and 550 feet in Reach 4 from the channel bottom and removal of vegetation only from the channel bottom in upper portion of Reach 2 and entire Reach 3.

Capacity:

Reach 1 is 3,800 cfs to 4,500 cfs (25- to 50-year storm event and a 6-hour precipitation of 2.1 to 2.2"). Reach 2 ranges from 1,180 to 2,050 cfs (2- to 5-year storm event and a 6-hour precipitation of 1.25 to 1.62"). Reach 3 is less than 1,180 cfs (less than 2-year storm event and a 6-hour precipitation of less than 1.25"). Reach 4 is approximately 5,100 cfs (100-year storm event and a 6-hour precipitation of 2.6").

In Reach 3, at cross section 2231.64 where the abandoned road is located, the channel has capacity of less than 2-year storm event. At that location, the water overtops the channel banks and inundates the neighboring properties. Upstream and downstream of the abandoned road, the channel in Reach 3 has a capacity of 1,180 to 2,050 cfs (2- to 5-year storm event and 6-hour precipitation of 1.25 to 1.62"). By the sediment and vegetation removed maintenance method in a portion of Reach 1, Reach 2 and Reach 4, the capacity of the channel in these Reaches would not change compared to the maintained condition (no sediment removed), due to the undersized channel and crossing at Fairmount Avenue, but will bring the channel back to the original (historic) design, lower the area of flooding in Reach 3 and Reach 4, and prevent siltation of the underground culvert located upstream of Reach 4. Therefore, this is the recommended approach. It should be noted that increased capacities identified above would only be realized if non-City portions of the Reaches are maintained as assumed.

Note: Reference Detailed Hydraulic Results for Maintained Condition Model (Sediment and vegetation removed)

# Are there areas of native vegetation identified in the IBA that can be retained during maintenance? If so, identify location and any thinning or other modifications, which must be made in the retained area.

This portion of Alvarado channel is subject to frequent flooding. Based on the hydraulic results it was determined that the culvert crossing under Fairmount Avenue and the channel downstream of Reach 4 (Reach 2 and Reach 3) is severely undersized and has capacity for less than a 2-year storm event in it's current condition. The proposed maintenance will mitigate the frequency of flooding but it will not increase the channel capacity in the deficient areas. However, in order to preserve additional vegetation in the portion of the channel where maintenance of vegetation removal only in the channel bottom is proposed, if there are individual mature trees such as Sycamores or Cottonwoods along the channel bottom, and the trees are located no closer than 50 feet apart, maintenance should be performed around the trees. It is recommended that the trees be trimmed to remove branches below the top of bank elevation where possible, to improve the channel capacity, while retaining the mature trees.

# Is a downstream check dam or comparable mechanism required pursuant to Water Quality Protocol # 24? If not, explain why. If so, describe what mechanism should be included in the IMP?

As stated previously, the channel reach has very little capacity. This channel is subject to frequent flooding and failures. The lower portion of Reach 1 may experience erosive velocities in the portion of the earthen channel with rock lined left bank side, and a part of the naturally lined portion of the channel where maintenance is not proposed. However, these velocities are consistent with the current condition. Due to the channel configuration and lack of capacity in its current condition, it would be counter productive to install check dams or some other comparable mechanism that would further reduce the capacity of the channel and increase the frequency of flooding.

# Conclusion/Recommendations (Describe the limits of recommended maintenance, degree to which native vegetation within the facility can be retained, and capacity of maintained channel):

Several hydraulic models were created to determine the limits of maintenance. Throughout the limit of study there are two kinds of maintenance proposed: "vegetation removal" and "sediment and vegetation removal" from the channel bottom. The following summarizes the recommended limits of maintenance:

Upper portion of Reach 1 – sediment and vegetation removal for a length of 280 feet Lower portion of Reach 2 – sediment and vegetation removal for a length of 800 feet Central portion of Reach 2 – sediment and vegetation removal for a length of 140 feet Upper portion of Reach 2 - vegetation removal for a length of 180 feet. Reach 3 – vegetation removal for a length of 700 feet. Reach 4 – sediment and vegetation removal for a length of 550 feet

Throughout this limit of study there are portions that are not owned by the City. These extents are the lower portion of Reach 1, the central and upper portion of Reach 2, and the entire extents of Reach 3. Please refer to the maintenance plan for limits of maintenance and notes. It should be noted that increased capacities identified above would only be realized if non-City portions of the Reaches are maintained as assumed.

It is important to note that maintenance for the lower portions of Reach 1, the earthen portion with a rock lined left bank and the naturally lined portion, should not be performed in the first year maintenance plan for a distance of approximately 470 feet (280 feet downstream of the downstream side of Fairmount Avenue culvert crossing) due to the Arundo Donax removal project that is currently in process. But as vegetation re-establishes, maintenance should be performed.

## **Additional Comments:**

It is important to note that the frequency of flooding will be increased and the capacity of the channel will be reduced should maintenance be neglected within 1,020 feet of the property owned by the "San Diego Metropolitan Transit Development Board" (see Note 1, Map Number 59 & 60 on the IMP exhibit) for the first year maintenance plan. Also, it is important to note that maintenance should be performed in a portion of Reach

1 for approximately 470 feet, from which 300 feet are owned by the private property "Willis Enterprises Incorporation" in the next cycle of maintenance when vegetation re-establishes. The City is not responsible for maintenance on properties owned by others. If the City maintains its portion, flooding frequency will be reduced, however, significant benefits with respect to increasing the capacity and further reducing the frequency of flooding would be achieved when this additional offsite area is maintained. It would be beneficial for the City to notify and request the responsible parties to maintain these offsite areas to minimize the backwater effect that could contribute to the frequency of flooding of adjacent properties.

Additionally, due to the low capacity of this channel, future improvements should be considered. However these future improvements are not a part of the scope of this individual permit. These improvements can be, but not limited to widening and re-alignment of portion of the channel downstream of Reach 4 and/or upsizing the culvert crossing under Fairmount Avenue.

- $\blacksquare$  Site Photos
- ☑ Hydraulic Workmap
- ☑ Hydraulic Profiles for Current Vegetated Condition Model
- ☑ Hydraulic Profiles for Ultimate Vegetated Condition Model
- ☑ Hydraulic Profiles for Maintained Condition Model (No Sediment Removed)
- ☑ Hydraulic Profiles for Maintained Condition Model (Sediment Removed)
- ☑ Detailed Hydraulic Results for Current Vegetated Condition Model
- Detailed Hydraulic Results for Ultimate Vegetated Condition Model
- Detailed Hydraulic Results for Maintained Condition Model (No Sediment Removed)
- Detailed Hydraulic Results for Maintained Condition Model (Sediment Removed)

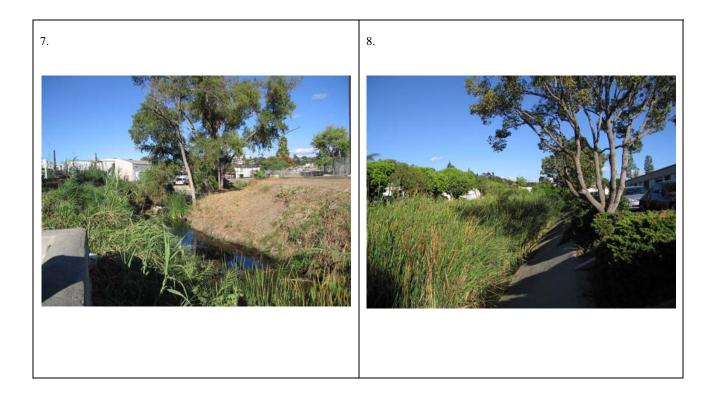
## SITE PHOTOS:

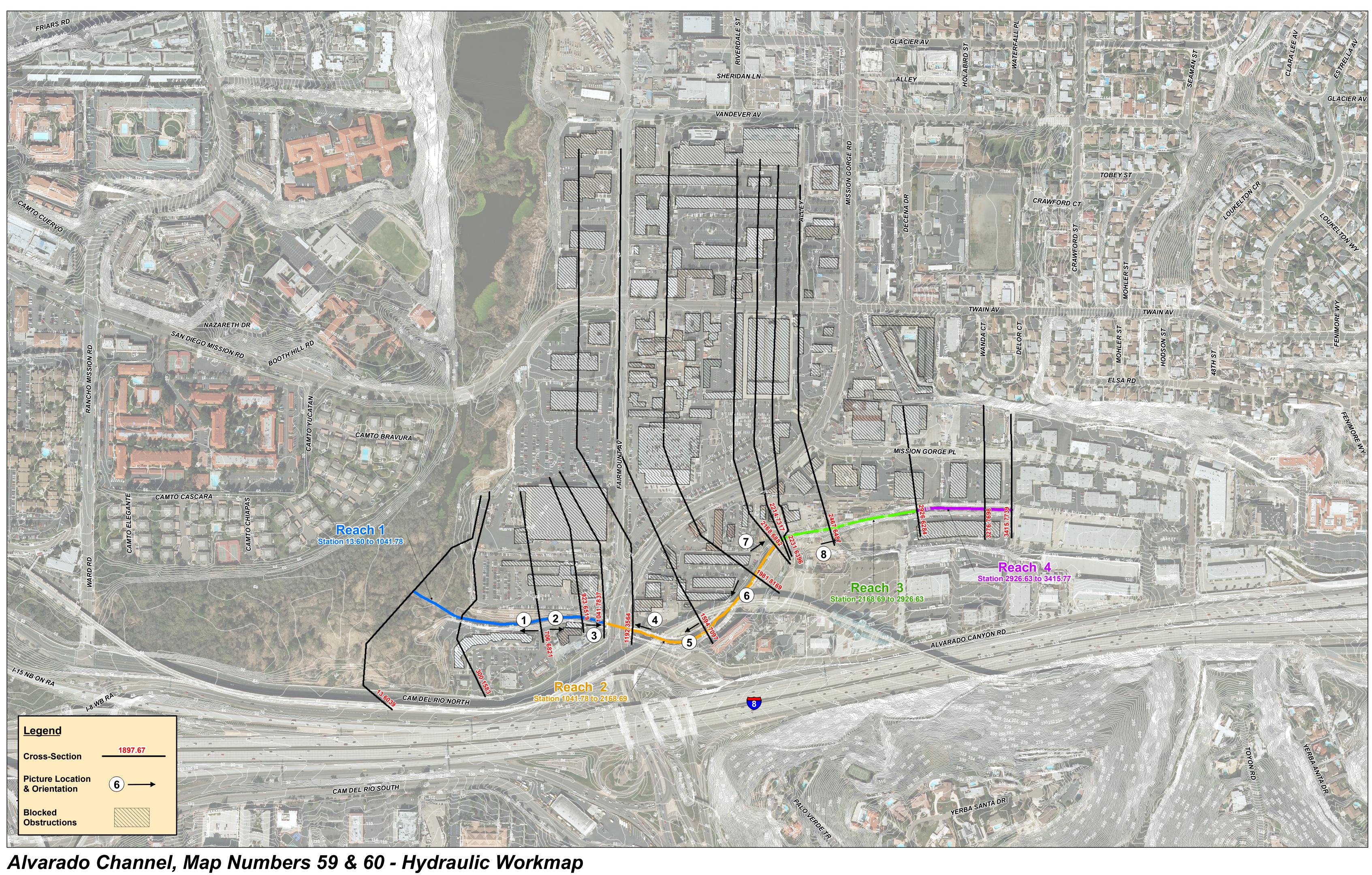
A site visit was conducted on October 13, 2009. See Hydraulic Workmap for picture locations and orientation.











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Exhibit Date: August 25, 2010

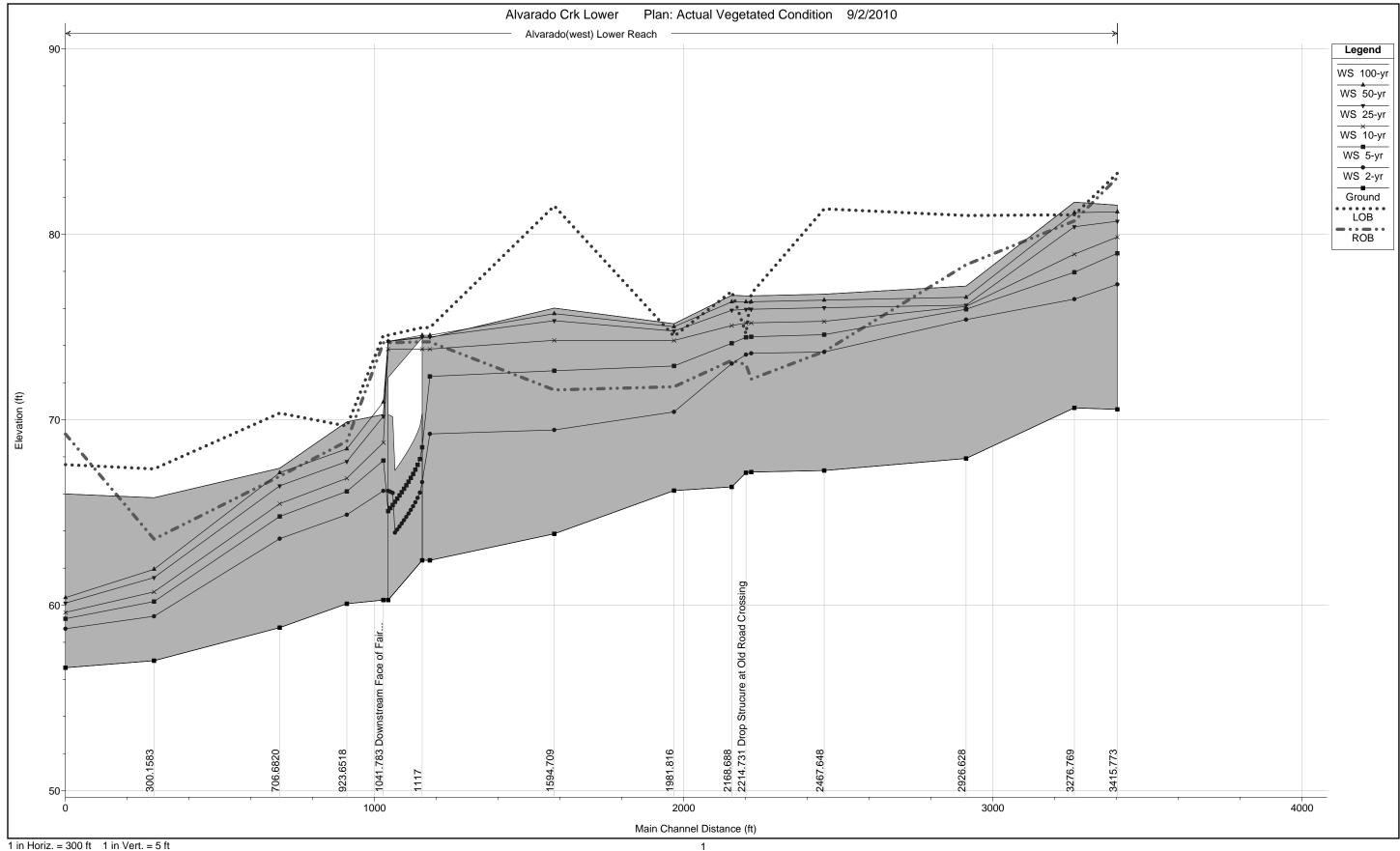
REC JN: 15541A



Data Sources: SanGIS Topo 2' Contours: 1999 SanGIS Roads - March 2010 Eagle Aerial Photo: March 2009

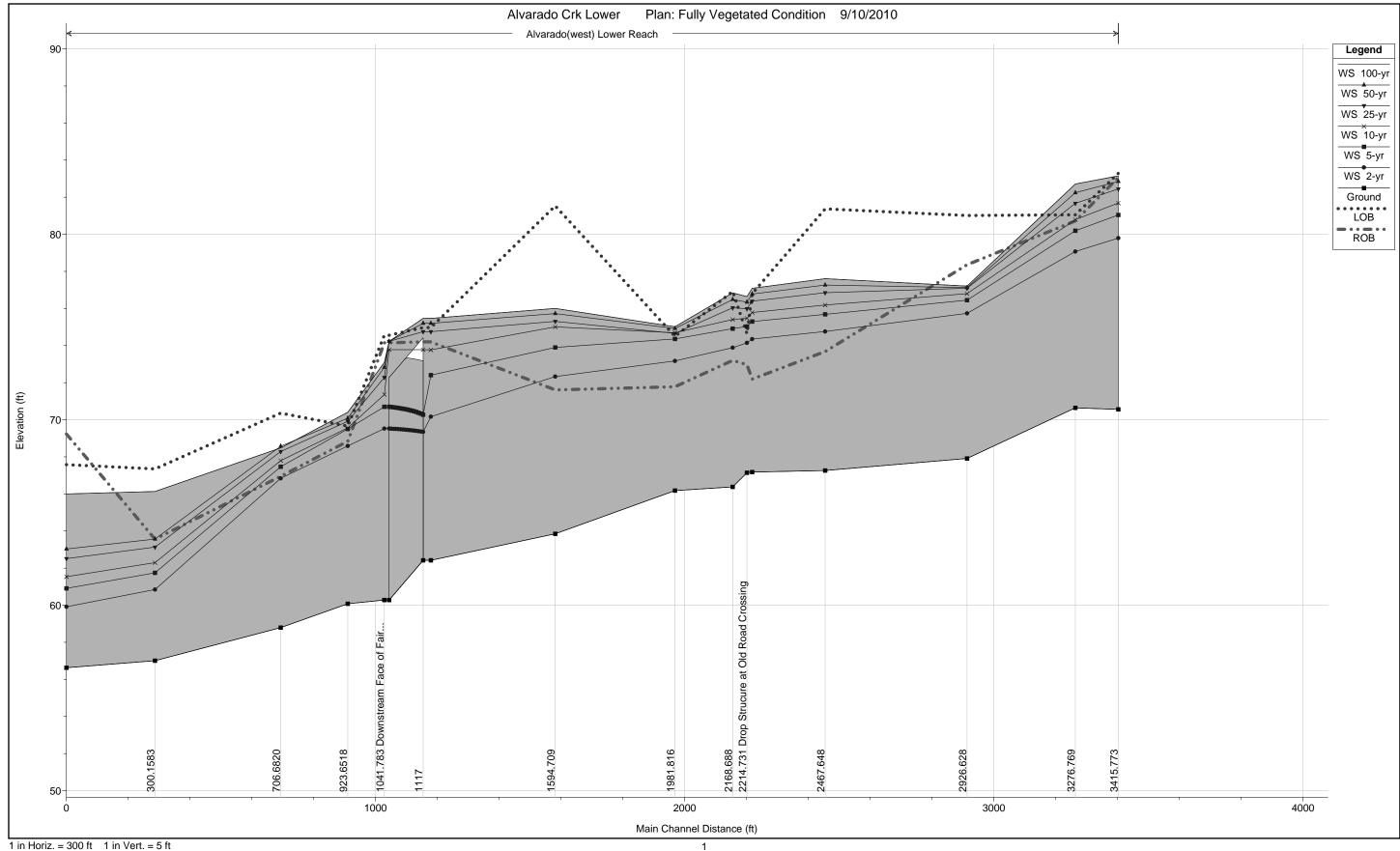


## HYDRAULIC PROFILE FOR CURRENT VEGETATED CONDITION MODEL

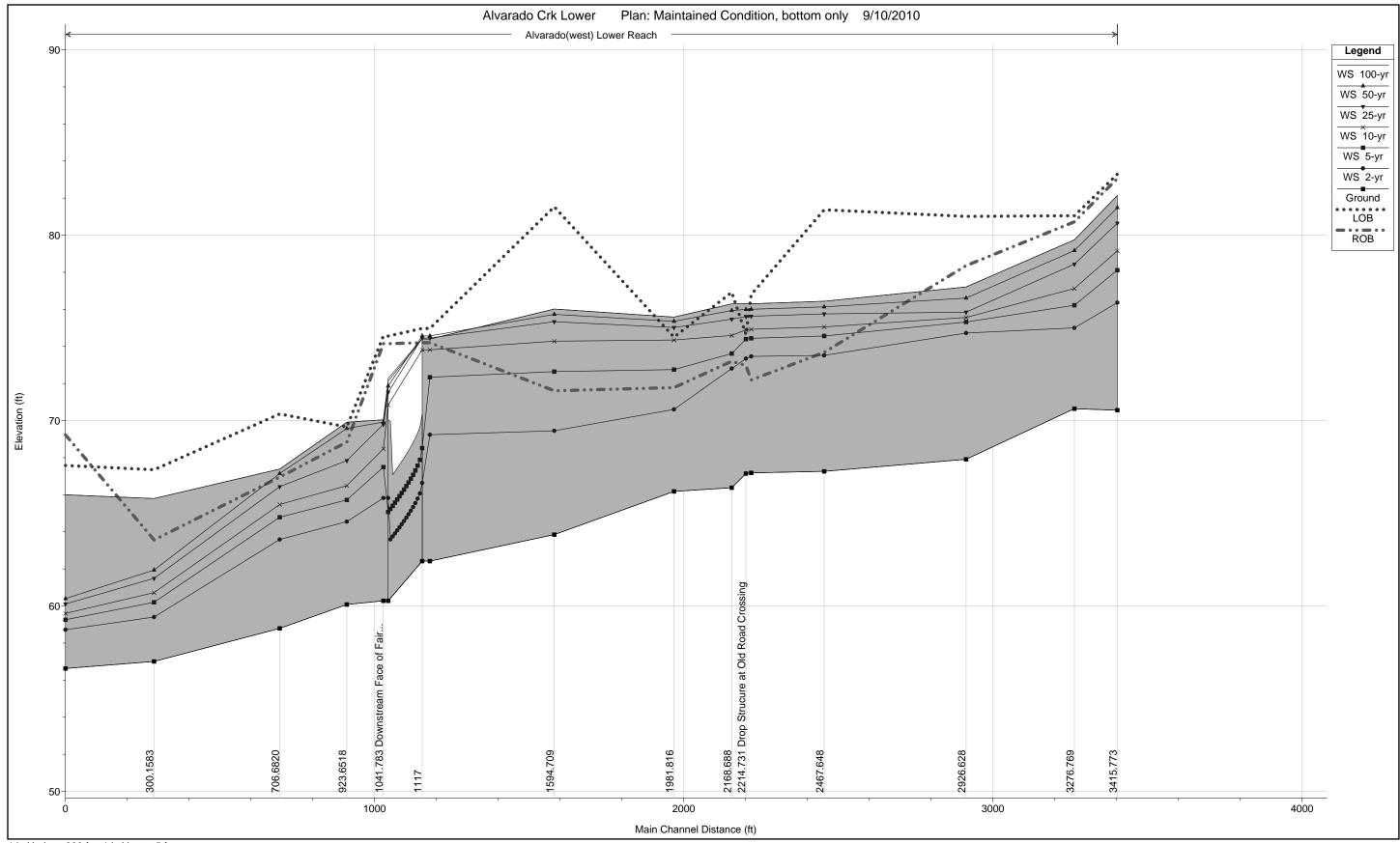


1 in Horiz. = 300 ft 1 in Vert. = 5 ft

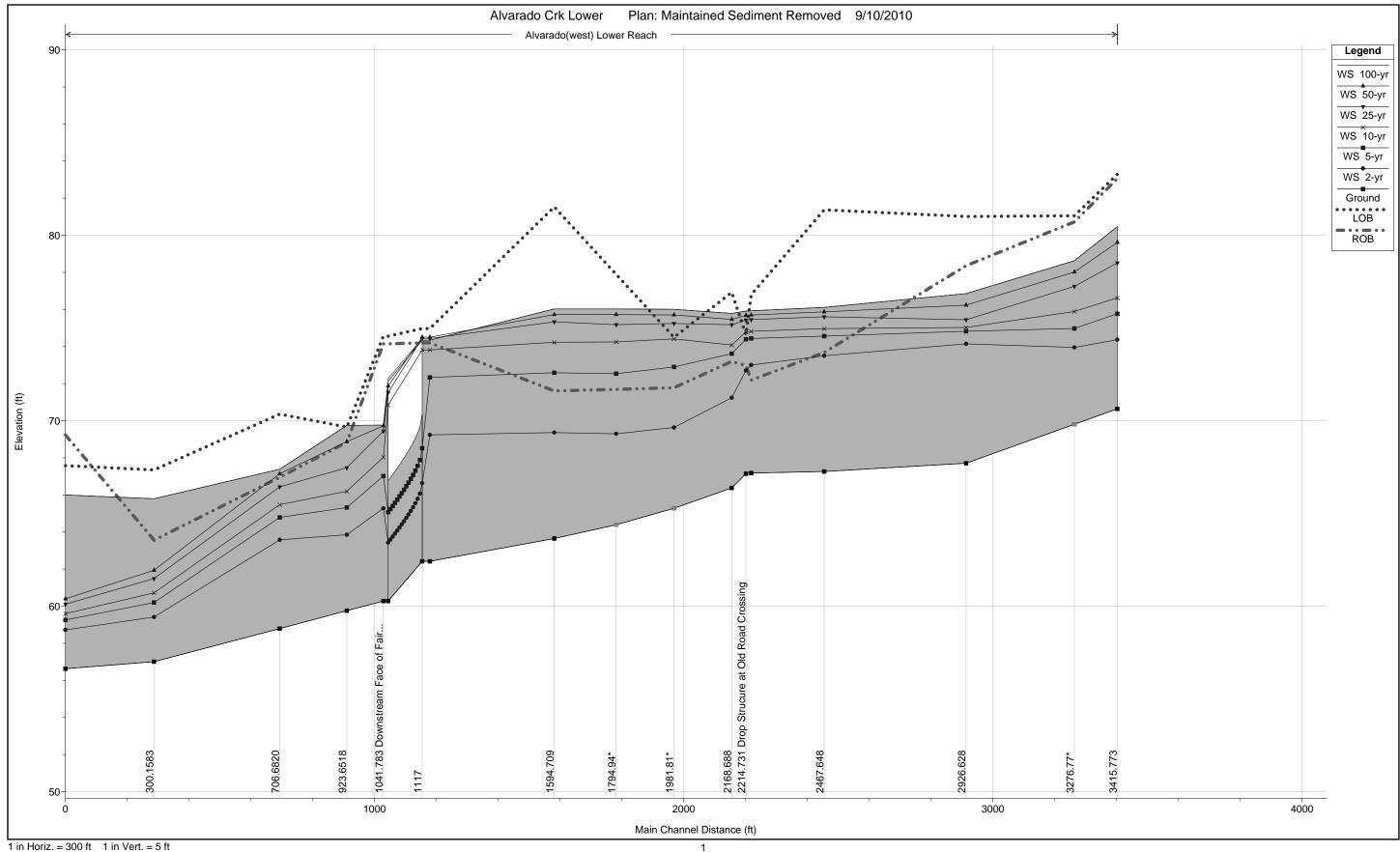
## HYDRAULIC PROFILE FOR ULTIMATE VEGETATED CONDITION MODEL



1 in Horiz. = 300 ft 1 in Vert. = 5 ft



1 in Horiz. = 300 ft 1 in Vert. = 5 ft



1 in Horiz. = 300 ft 1 in Vert. = 5 ft

Reach River Sta Profile O Total Min	River Sta	Profile	Q Total	Ch El	W.S. Elev	Crit W.S.	E.G. Flev	E.G. Slope	Vel Chul	Flow Area	Top Width	Froude # Chi
							(ft)	(ft/ft)	2 2000	(sq ft)	12 12 12 12 12	
Lower Reach	13.60388	100-yr	5100.00	56.63	66.00	58.46	66.01	0.000048	0.68	7538.81	968.59	0.04
Lower Reach	13.60388	50-yr	4500.00	56.63	60.41	58.38	60.46	0.001301	1.83	2454.26	834.32	0.19
Lower Reach	13.60388	25-yr	3800.00	56.63	60.12	58.27	60.16	0.001300	1.72	2212.26	829.02	0.19
Lower Reach	13.60388	10-yr	2700.00	56.63	59.61	58.08	59.65	0.001301	1.51	1793.83	819.76	0.18
Lower Reach	13.60388	S-yr	2050.00	56.63	59.27	57.96	59.30	0.001301	1.35	1515.80	813.55	0.17
Lower Reach	13.60388	2-yr	1180.00	56.63	58.73	57.77	58.75	0.001300	1.09	1083.20	803.84	0.17
Lower Reach	300.1583	100-yr	5100.00	57.01	65.80	62.30	66.15	0.001822	5.19	1253.34	404.93	0.34
Lower Reach	300.1583	50-yr	4500.00	57.01	61.94	61.94	63.90	0.019204	11.24	400.32	101.94	1.00
Lower Reach	300.1583	25-yr	3800.00	57.01	61.49	61.49	63.27	0.019749	10.69	355.52	99.88	1.00
Lower Reach	300.1583	10-yr	2700.00	57.01	60.72	60.72	62.17	0.021043	9.65	279.66	96.30	1.00
Lower Reach	300.1583	S-yr	2050.00	57.01	60.20	60.20	61.43	0.022332	8.90	230.31	93.89	1.00
Lower Reach	300.1583	2-yr	1180.00	57.01	59.40	59.40	60.28	0.024988	7.51	157.09	90.22	1.00
								-				
Lower Reach	706.6820	100-yr	5100.00	58.79	67.39	67.39	68.43	0.005167	8.70	663.72	298.55	0.66
Lower Reach	706.6820	S0-yr	4500.00	58.79	67.14	67.14	68.17	0.005234	8.53	592.15	289.40	0.66
Lower Reach	706.6820	25-yr	3800.00	58.79	66.44	65.45	67.73	0.006871	9.22	428.33	155.90	0.74
Lower Reach	706.6820	10-yr	2700.00	58.79	65.48	64.42	66.54	0.006432	8.29	325.67	76.87	0.71
Lower Reach	706.6820	.5-yr	2050.00	58.79	64.79	63.69	65.65	0.005879	7.47	274.57	71.26	0.67
Lower Reach	706.6820	2-yr	1180.00	58.79	63.59	62.47	64.16	0.004929	6.05	195.06	61.53	0.60
Lower Reach	923.6518	100-yr	5100.00	60.08	69.89	69.89	71.08	0.005823	9.30	614.47	239.79	0.69
Lower Reach	923.6518	50-yr	4500.00	60.08	68.43	68.43	71.10	0.013178	13.12	343.00	90.36	1.00
Lower Reach	923.6518	25-yr	3800.00	60.08	67.75	67.75	70.23	0.014012	12.63	300.81	66.83	1.00
Lower Reach	923.6518	10-yr	2700.00	60.08	66.84	66.52	68.68	0.012750	10.88	248.11	55.64	0.91
Lower Reach	923.6518	5-yr	2050.00	60.08	66.14	65.66	67.62	0.012251	9.76	210.14	51.81	0.85
Lower Reach	923.6518	2-yr	1180.00	60.08	64.88	64.24	65.85	0.011718	7.90	149.29	45.00	0.76
Lower Reach	1041.783	100-yr	5100.00	60.28	70.28	68.38	71.90	0.005861	10.21	499.54	103.10	0.68
Lower Reach	1041.783	50-yr	4500.00	60.28	70.96	67.84	72.00	0.003624	8.20	548.92	250.77	0.54
Lower Reach	1041.783	25-yr	3800.00	60.28	70.18	67.14	71.11	0.003403	7.72	492.38	92.29	0.51
Lower Reach	1041.783	10-yr	2700.00	60.28	68.77	65.90	69.49	0.003363	6.80	397.11	65.07	0.48
Lower Reach	1041.783	5-yr	2050.00	60.28	67.80	65.04	68.38	0.003278	6.11	335.54	61.29	0.46
Lower Reach	1041.783	2-yr	1180.00	60.28	66.16	63.64	66.53	0.002991	4.88	241.73	53.54	0.40
					2							
Lower Reach	1117		Culvert					19	8			
Lower Reach	1192.356	100-yr	5100.00	62.42	74.42	71.17	75.87	0.001377	9.83	597.28	1050.32	0.61
Lower Reach	1192.356	50-yr	4500.00	62.42	74.55	70.50	75.61	0.000996	8.44	629.40	1122.90	0.52
Lower Reach 1192.356 25-yr	1192.356	25-yr	3800.00	62.42	74.47	69.68	75.25	0.000745	7.25	608.15	1083.29	0.45

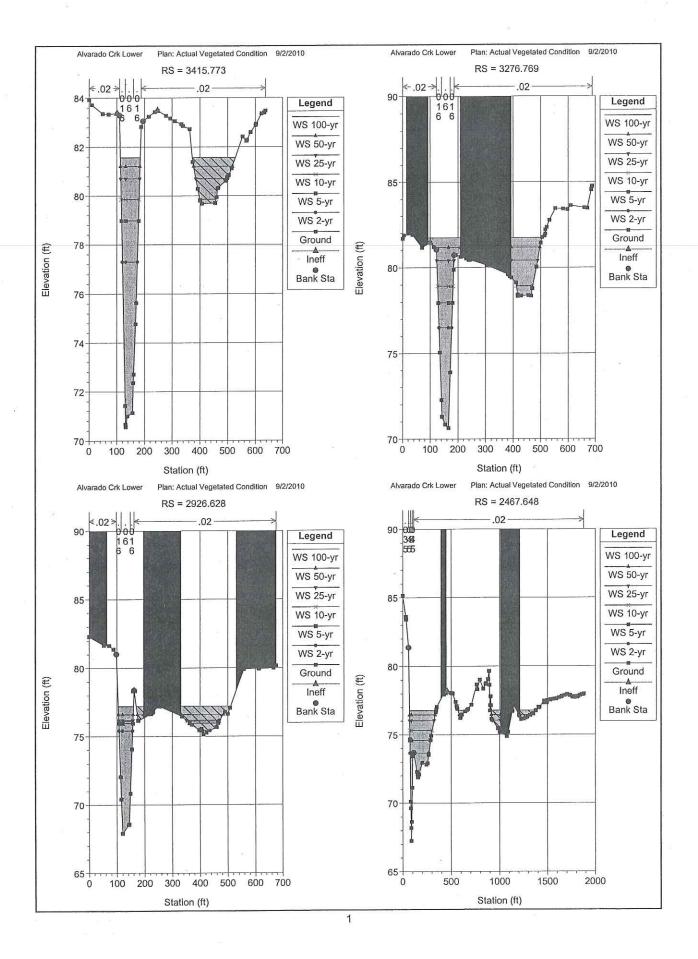
HEC-RAS Plan: Actual River: Alvarado(west) Reach: Lower Reach

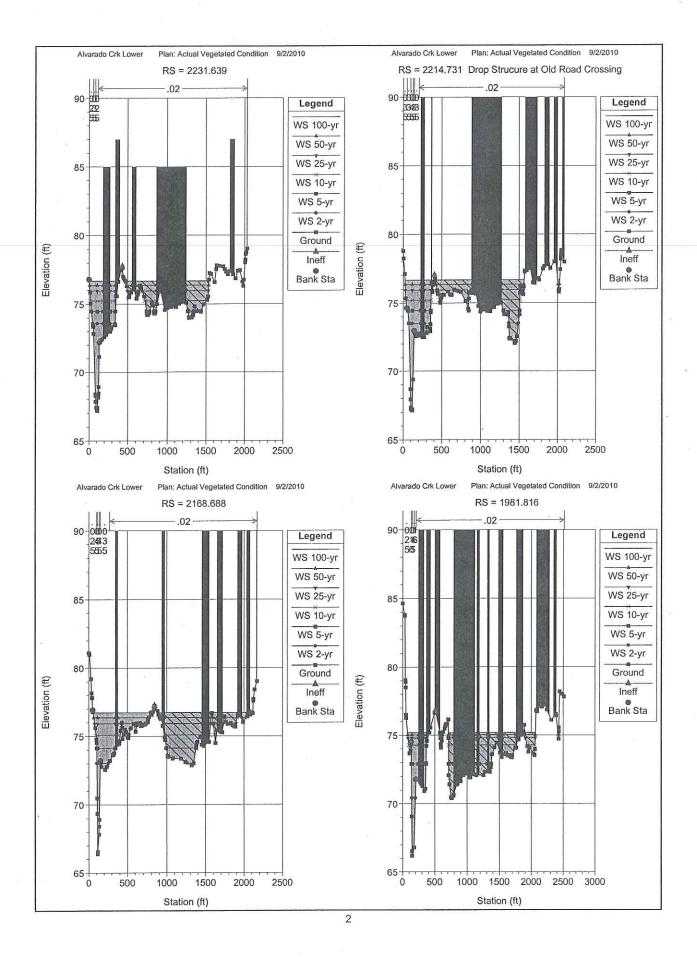
\*

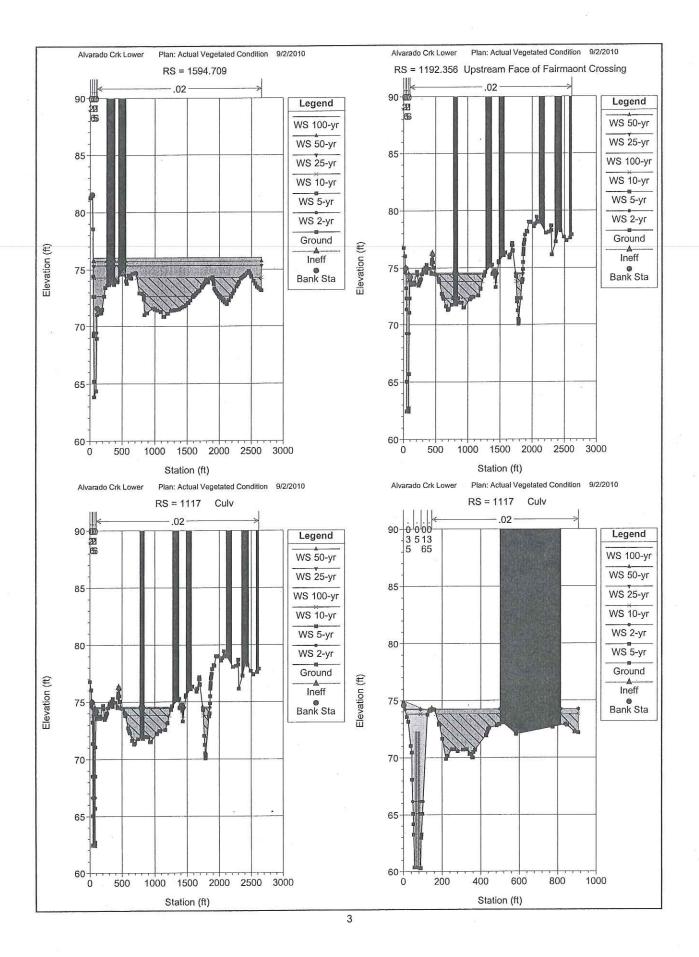
HEC-RAS Plan: Actual River: Alvarado(west) River Sta Profile	Actual River:		Reach: Lower Reach (Continued)	ach (Continued Min Ch Fl	S Flev	Crit W S	F G Flev	F G Slone	Vel Chul	Flow Area	Ton Width	Froude # Ghi
						(ft)	(¥)	(ft/ft)		(sa ft)	(tt)	
Lower Reach	1192.356	10-yr	2700.00	62.42	73.81	68.27	74.34	0.000510	5.82	478.72	861.72	0.37
Lower Reach	1192.356	5-yr	2050.00	62.42	72.34	67.32	72.78	0.000488	5.37	381.86	464.72	0.34
Lower Reach	1192.356	2-yr	1180.00	62.42	69.24	65.86	69.59	0.000577	4.79	246.33	40.69	0.34
Lower Reach	1594.709	100-yr	5100.00	63.85	76.02	72.92	76.03	0.000013	1.13	8056.92	2353.25	0.06
Lower Reach	1594.709	50-yr	4500.00	63.85	75.72	72.51	75:73	0.000014	1.13	7355.12	2352.92	0.07
Lower Reach	1594.709	25-yr	3800.00	63.85	75.34	70.94	75.35	0.000015	1.14	6454.02	2352.49	0.07
Lower Reach	1594.709	10-yr	2700.00	63.85	74.28	69.69	74.50	0.000229	4.19	832.92	2068.73	0.26
Lower Reach	1594.709	5-yr	2050.00	63.85	72.64	68.85	72.97	0.000390	4.80	507.37	1122.38	0.33
Lower Reach	1594.709	2-yr	1180.00	63.85	69.45	67.49	69.93	0.000984	5.54	212.96	49.69	0.47
Lower Reach	1981.816	100-yr	5100.00	66.18	75.18	73.37	76.41	0.004782	3.77	820.38	1020.78	0.25
Lower Reach	1981.816	50-yr	4500.00	66.18	75.02	72.67	76.06	0.004260	3.50	787.67	1000.44	0.24
Lower Reach	1981.816	25-yr	3800.00	66.18	74.78	72.23	75.62	0.003716	3.20	741.40	964.82	0.22
Lower Reach	1981.816	10-yr	2700.00	66.18	74.27	71.92	74.81	0.002997	2.72	644.69	868.92	0.20
Lower Reach	1981.816	5-yr	2050.00	66.18	72.90	71.28	73.43	0.007873	3.72	433.57	403.06	0.30
Lower Reach	1981.816	2-yr	1180.00	66.18	70.42	69.72	71.16	0.046012	6.91	170.79	65.17	0.71
		15										
Lower Reach	2168.688	100-yr	5100.00	66.38	76.71	74.86	76.87	0.000936	3.13	1597.61	1647.21	0.26
Lower Reach	2168.688	50-yr	4500.00	66.38	76.36	74.68	76.53	0.001150	3.39	1350.86	1503.50	0.28
Lower Reach	2168.688	25-yr	3800.00	66.38	75.90	74.44	76.11	0.001462	3.73	1054.85	1223.56	0.31
Lower Reach	2168.688	10-yr	2700.00	66.38	75.08	74.04	75.31	0.002021	4.19	706.64	829.21	0.33
Lower Reach	2168.688	5-yr	2050.00	66.38	74.12	73.61	74.50	0.004100	5.53	451.38	626.98	0.44
Lower Reach	2168.688	. 2-yr	1180.00	66.38	73.03	71.24	73.53	0.005738	5.81	225.76	228.27	0.50
Lower Reach	2214.731	100-yr	5100.00	67.14	76.68	74.53	76.95	0.000988	3.87	1235.58	1102.73	0.28
Lower Reach	2214.731	50-yr	4500.00	67.14	76.36	74.29	76.61	0.000996	3.74	1135.76	1070.93	0.28
Lower Reach	2214.731	25-yr	3800.00	67.14	75.95	74.07	76.17	0.001011	3.57	1013.73	998.79	0.28
Lower Reach	2214.731	10-yr	2700.00	67.14	75.21	73.67	75.39	0.001067	3.30	804.89	580.18	0.28
Lower Reach	2214.731	5-yr	2050.00	67.14	74.44	72.36	74.63	0.001409	3.66	602.09	455.69	0.32
Lower Reach	2214.731	2-yr	1180.00	67.14	73.51	71.08	73.69	0.001506	3.62	380.87	351.26	0.32
Lower Reach	2231.639	100-yr	5100.00	67.18	76.68	74.33	76.99	0.000690	4.44	1142.23	902.61	0.34
Lower Reach	2231.639	50-yr	4500.00	67.18	76.36	74.09	76.64	0.000660	4.26	1064.31	853.45	0.33
Lower Reach	2231.639	25-yr	3800.00	67.18	75.96	73.76	76.20	0.000621	4.02	967.45	783.30	0.32
Lower Reach	2231.639	10-yr	2700.00	67.18	75.23	72.24	75.41	0.000567	3.57	795.45	636.18	0.30
Lower Reach	2231.639	5-yr	2050.00	67.18	74.48	71.56	74.65	0.000625	3.57	624.76	402.29	0.30
Lower Reach	2231.639	2-yr	1180.00	67.18	73.58	70.45	73.71	0.000455	2.96	436.50	200.68	0.25
Lower Reach	2467.648	100-yr	5100.00	67.26	76.77	75.33	77.26	0.001346	3.24	961.62	627.14	0.26

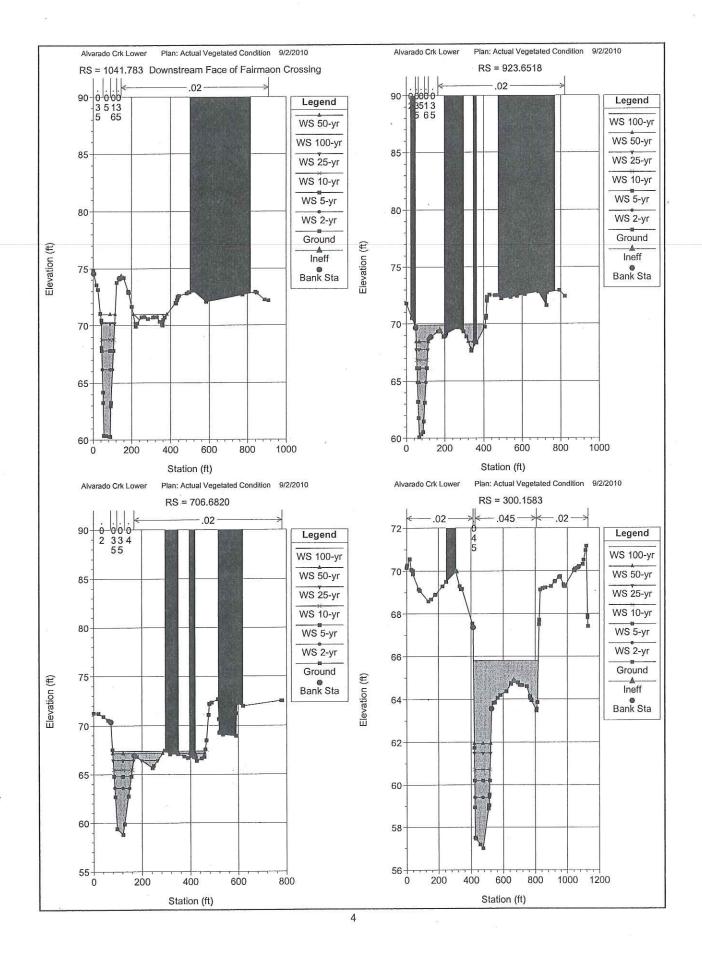
HEC-RAS Plan: Actual	Actual River.	River: Alvarado(west)	Reach: Lower	Reach: Lower Reach (Continued)	(p							
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chul	Flow Area	Top Width	Froude # Chi
			(cfs)	( <del>t</del> )	(ff)	(¥)	(H)	(th/ft)	(ft/s)	(sq ft)	(μ)	
Lower Reach	2467,648	50-yr	4500.00	67.26	76.45	75.09	76.91	0.001391	3.18	874.18	497.49	0.26
Lower Reach	2467.648	25-yr	3800.00	67.26	76.04	74.80	76.47	0.001459	3.11	768.07	335.95	0.26
Lower Reach	2467.648	10-yr	2700.00	67.26	75.31	74.30	75.67	0.001641	3.01	589.61	242.52	0.27
Lower Reach	2467.648	5-yr	2050.00	67.26	74.59	73.97	74.98	0.002585	3.38	428.59	214.91	0.33
Lower Reach	2467,648	2-yr	1180.00	67.26	73.66	73.44	74.05	0.005974	4.32	237.12	194.24	0.48
Lower Reach	2926.628	100-yr	5100.00	67.91	77.21	77.21	80.42	0.016674	14.38	354.62	259.42	1.00
Lower Reach	2926.628	50-yr	4500.00	67.91	76.61	76.61	79.64	0.017705	13.98	321.93	227.81	1.00
Lower Reach	2926.628	25-yr	3800.00	67.91	76.18	75.85	78.68	0.015926	12.69	299.48	175.38	0.93
Lower Reach	2926.628	10-yr	2700.00	67.91	76.11	74.50	77.40	0.008327	9.11	296.23	166.57	0.67
Lower Reach	2926.628	5-yr	2050.00	67.91	75.96	73.58	76.74	0.005240	7.11	288.28	154.30	0.53
Lower Reach	2926.628	2-yr	1180.00	67.91	75.40	72.07	75.72	0.002405	4.53	260.52	77.14	0.35
Lower Reach	3276.769	100-yr	5100.00	70.64	81.73	80.17	82.36	0.002231	6.42	810.63	228.65	0.41
Lower Reach	3276.769	50-yr	4500.00	70.64	81.17	79.89	81.83	0.002693	6.70	688.14	197.23	0.44
Lower Reach	3276.769	25-yr	3800.00	70.64	80.41	79.55	81.15	0.003553	. 7.18	554.14	156.77	0.49
Lower Reach	3276.769	10-yr	2700.00	70.64	78.93	77.13	79.94	0.006215	8.21	345.28	114.55	0.61
Lower Reach	3276.769	5-yr	2050.00	70.64	77.95	76.22	78.90	0.006970	7.80	262.97	51.47	0.61
Lower Reach	3276.769	2-yr	1180.00	70.64	76.51	74.74	77.09	0.006295	6.12	192.67	45.57	0.52
Lower Reach	3415.773	100-yr	5100.00	70.56	81.57	79.31	83.05	0.004626	9.75	523.16	227.99	0.64
Lower Reach	3415.773	50-yr	4500.00	70.56	81.21	78.76	82.48	0.004234	9.05	497.11	211.13	0.60
Lower Reach	3415.773	25-yr	3800.00	70.56	80.70	78.06	81.75	0.003809	8.23	462.00	180.21	0.56
Lower Reach	3415.773	10-yr	2700.00	70.56	79.85	76.84	80.54	0.002921	6.67	405.09	123.61	0.47
Lower Reach	3415.773	5-уг	2050.00	70.56	78.97	75.99	79.51	0.002699	5.87	349.44	61.38	0.43
Lower Reach	3415.773	2-yr	1180.00	70.56	77.30	74.63	77.64	0.002530	4.67	252.65	54.24	0.38

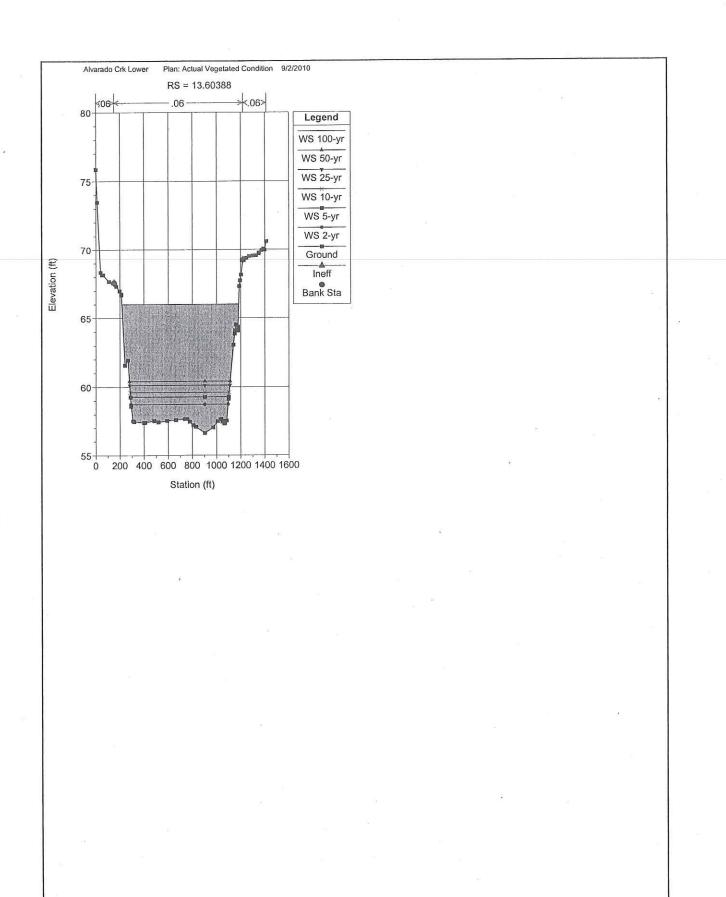
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HEC-RAS Version 4.0.0 March 2008 U.S. Army Corps of Engineers Hydrologic Engineering Center 609 Second Street Davis, California

Х	Х	XXXXXX	XX	XX		XX	XX	Х	Х	XXXX
Х	х	Х	х	Х		Х	Х	Х	Х	Х
Х	Х	Х	Х			Х	Х	Х	Х	X
XXXX	XXXX	XXXX	Х		XXX	XX	XX	XXX	XXX	XXXX
Х	х	Х	Х			Х	Х	Х	Х	Х
·X	Х	Х	Х	Х		Х	Х	Х	Х	X
х	Х	XXXXXX	XX	XX		х	Х	Х	Х	XXXXX

PROJECT DATA Project Title: Alvarado Crk Lower Project File : AlvaradoCrkLower.prj Run Date and Time: 9/2/2010 3:57:42 PM

Project in English units

Project Description: City of San Diego - 1st Year Maintenance J-15541A October 13, 2009 Utilized 1999 City 2-foot Contour Topo (NGVD 29) Alvarado Creek (Lower/Westerly Portion) Helix Map Number 59 and 60 - Phase A Priority

PLAN DATA

Plan Summary Information: Number of: Cross Sections = 15 Multiple Openings = 0

## 1 of 25

	Culverts	=			Structures		0	
	Bridges	=	0	Lateral	Structures	=	0	
Water s Critica Maximum Maximum	al Information urface calculat l depth calculat number of iter difference tolo lerance factor	tion t ations	olera	ance = =				<b>.</b> 
Conveya	l depth computed nce Calculation	Metho	d: At	breaks	s in n values	s only	7	
Frictio Computa	n Slope Method: tional Flow Reg	ime:	Av Su	verage ( ubcritic	Conveyance cal Flow			
FLOW DATA								

Flow Title: Actual Vegetated Condition
Flow File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.f02

Flow Data (cfs)

River	Reach	RS	100-yr	50-yr
25-yr	10-yr	5-yr	2-yr	
Alvarado(v	west) Lower Reach	3415.773	5100	4500
3800	2700	2050	1180	

Boundary Conditions

River	Reach		Profile	Upstream
Downstream				
Alvarado(west)	Lower	Reach	100-yr	
Known WS = $66$				
Alvarado(west)	Lower	Reach	50-yr	
Normal $S = 0.0013$				
Alvarado(west)	Lower	Reach	25-yr	
Normal $S = 0.0013$				
Alvarado(west)	Lower	Reach	10-yr	
Normal $S = 0.0013$				
Alvarado(west)	Lower	Reach	5-yr	
Normal $S = 0.0013$				
Alvarado(west)	Lower	Reach	2-yr	
Normal $S = 0.0013$				e.

#### GEOMETRY DATA

Geometry Title: Actual Vegetated Condition

Geometry File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.g01

CROSS SECTION

RIVER: Alvarado(west) REACH: Lower Reach RS: 3415.773

INPUT

Description:

Station Elevation	Data	num=	53					
Sta Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev								
0 83.93	10.52	83.72	49.34	83.36	70.68	83.34	100.85	
83.38								
109.41 83.29	130.02	71.42	131.31	70.67	131.95	70.56	137.65	
71								
157.14 71.13	159.47	72.36	160.66	72.71	167.65	74.77	169.83	
75.63		3.15						
188.02 82.83	194.79	83.06	215.5	83.25	236.72	83.43	246.85	
83.49								
277.39 83.28	293.32	83.17	309.77	83.06	333.91	82.93	338.78	
82.86	8		40					
362.9 82.73	374.16	81.39	392.18	80.28	400.42	79.82	401.41	
79.79								
407.16 79.67	455.28	79.7	459.96	79.94	464.45	80.31	465.99	
80.33								
492.85 80.61	494.47	80.65	497.4	80.72	499.2	80.77	503.06	
80.83					0.00 12020			
504.06 80.86	514.76	81.12	553.49	82.42	566.92	82.25	568.15	
82.26								
569.27 82.29	582.64	82.6	600.74	82.89	602.56	82.94	622.5	
83.36			2 5 5 50					
631.58 83.4	632.75	83.39	637.02	83.47				
			_					
Manning's n Values			5		<b></b>		0.5.5	
	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n
Val			100.00	00	100.00	010	100 00	
	109.41	.016	130.02	.06	160.66	.016	188.02	
.02								
		- (1	T - E - O		Diabt	Cooff	Contr	
Bank Sta: Left R	light	Lengths	: Lert C	nannei	RIGHT	COELL	CONCI.	
Expan.			100 55	120	139.44		.1	
	4.79		138.55	139	139.44		• L	
.3		0						
Ineffective Flow								
		Permane	nt					
	83.38	F						
246.85 637.02	83.49	F						
CRACE CHEMICAL								
CROSS SECTION	- 24							
RIVER: Alvarado(we	(at)							
RIVER: Alvarado (we		DC. 277	6 769					

REACH: Lower Reach RS: 3276.769

INPUT									
Descripti		- -							
Station E					77]			Sta	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	SLd	
Elev					01 00		01 17	100 0	
0	81.69	4.45	81.89	35.41	81.92	70.17	81.17	100.3	
81.46							70.00	140.05	
112.67	81.2	122.62	81.05	134.98	75.05	140.38	72.26	142.25	
71.29									
154.18	70.84	165.75	70.64	172.28	73.88	184.34	79.88	186.01	
80.72					1000 C 1000 C				
191.45	80.73	210.25	80.63	229.99	80.52	238.65	80.44	245.22	
80.45					secondar data data				
304.34	80.13	380.38	79.61	384.55	79.58	387.47	79.49	393.73	
79.41						wert is a constant of second set		0	
410.54	79.12	416.31	78.42	416.91	78.34	422.24	78.35	429.59	
78.36				8					
455.88	78.38	465.27	78.36	469.47	78.78	484.52	80.04	500.14	
81.43									
505.85	81.76	514.04	81.84	516.55	82.2	516.86	81.95	522.35	
82.35									
531.72	82.76	552.96	83.45	582.28	83.42	597.3	83.4	609.57	
83.62									
660.02	83.49	670.66	83.47	684.79	84.54	685.45	84.57	687.4	
84.72									
688.83	84.77								
Manning's			1 The second	5	1000 D		Santo a		
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n
Val									
0	.02	122.62	.016	140.38	.06	172.28	.016	186.01	
.02									
Bank Sta:	Left	Right	Lengths	: Left C	hannel	Right	Coeff	Contr.	
Expan.									
	22.62 1	86.01		345.32	350.14	353.92		.1	
.3									
Ineffectiv	ve Flow	num=							
Sta L	Sta R	Elev	Permane	nt					
0	100.3		F					20	
Blocked O			num=	2	5 1.1 201 <u>0</u>				
Sta L	Sta R	Elev		Sta R	Elev				
13.62	92.64	90	208.28	393.34	90				
CROSS SEC	FION								
RIVER: Al									
REACH: LO	wer Reac	h	RS: 292	6.628					
INPUT									
Descripti									
Station E	levation			42	57.4528 ····	852574	10.000-11	10000000	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev									
				121103733 * 30 Junit	STREET, ALCOHOL & STREET, STRE				
0	82.29	53.38	81.66	72.39	81.64	87.76	81.37	97.81	
0 81.01	82.29	53.38	81.66	72.39	81.64	87.76	81.37	97.81	

72.05 115.78 70.41 120.03 67.91 141.42 68.53 144.01 113 68.59 76.17 177.43 78.36 175.86 148.04 70.84 153.8 74.06 161.57 76.16 77.21 249.49 76.79 247.52 76.64 227.21 76.74 229.11 223.02 77.2 77.19 335.23 76.46 335.65 76.45 362.99 75.94 370.4 254.91 75.85 75.53 407.82 75.41 412.56 75.13 423.65 397.23 75.43 404.82 75.26 75.66 460.33 75.67 467.47 76.07 490.09 76.78 499.97 459.1 76.64 77.08 557.44 79.91 610.52 79.96 613.3 79.92 666.44 507.82 79.99 80.17 676.28 80.14 674.48 Manning's n Values num= 5 Sta n Val .02 97.81 .016 115.78 .06 148.04 .016 161.57 0 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 455.11 458.98 464.26 .1 97.81 161.57 .3 num= 1 Ineffective Flow Sta L Sta R Elev Permanent 161.54 676.28 78.35 F Blocked Obstructions num= 3 Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev 90 195.38 332.19 90 0 65.03 90 530.39 676.28 CROSS SECTION RIVER: Alvarado(west) REACH: Lower Reach RS: 2467.648 INPUT Description: Station Elevation Data num= 131 Elev Sta Elev Sta Sta Elev Sta Elev Sta Elev 85.14 31.71 83.6 33.83 83.49 34.64 83.42 35.08 0 83.41 70.11 83.15 69.63 86.73 59.99 81.37 73.72 74.68 82.27 68.19 71.13 103.24 73.43 113.31 67.26 92.06 68.64 97.86 89.02 73.68 72.07 166.17 71.89 165.93 72.29 153.08 72.07 156.92 146.6 72.08 72.82 258.71 72.9 268.41 72.94 245.26 167.48 72.11 202.5 73.53 269.48 73.55 294.79 74.91 342.16 76.66 346.46 76.82 346.9 76.83

352.33	77.04	420.61	77.94	422.58	77.93	442.68	78.03	457.77	
78.17 493.61	78.06	507.21	78.02	507.95	78.05	514.77	78	545.03	
77.39		F F Q Q		F ( ) 0	76 00	F02 82	76 22	E96 07	
554.65 76.24	77.1	558.3	77	562.9	76.89	592.83	76.22	596.07	
609.78	76.47	643.62	76.71	645.17	76.7	665.46	76.81	673.24	
76.88 708	77.18	763.5	78.67	770.56	78.32	794.79	79.02	831.94	
78.37	//.10	/03.5	/0.0/	110.50		·~ ; · · · · ,			10
855.73 78.63	78.71	859.72	78.76	881.44	79.06	892.44	79.65	895.56	
902.16	76.75	903.47	77.15	906.73	77.79	909.69	77.14	916.27	
76.15									
924.71 75.47	76.06	982.71	75.44	989.78	75.49	992.3	75.48	994.07	
994.82	75.46	1002.08	75.17	1075.12	74.87	1081.44	75.17	1087.78	
75.18								1001 00	
1134.03 76.41	76.7	1136.68	76.76	1149.13	77.15	1153.32	77.09	1201.92	
1209.82	76.35	1225.56	76.12	1254.7	76.16	1273.65	76.22	1290.4	
76.3									
1316.22	76.41	1319.91	76.43	1349.5	76.55	1350.69	76.52	1377.48	
76.74 1378.49	76.78	1405.71	77.02	1408.81	76.97	1416.98	77.03	1463.22	
77.46	, , .								
1464.35	77.47	1465.26	77.38	1465.46	77.33	1492.9	77.32	1495.06	
77.49	00 51	1526 26		1500 61	77 57	1557.48	77 59	1560.29	
1497.02 77.6	77.51	1526.26	//.54	1528.61	//.5/	1557.40	11.59	1900.29	
1588.83	77.63	1592.01	77.64	1617.89	77.71	1643.35	77.77	1650.27	
77.81									
1675.79	77.87	1677.17	77.88	1702.31	77.94	1703.75	77.95	1727.8	
77.87 1732.13	77.89	1735.39	77.86	1758.02	77.78	1761.23	77.75	1763.95	
77.79	11.05	1100.00							
1784.6	77.72	1787.59	77.76	1790.47	77.8	1810.66	77.74	1813.79	
77.78 1820.99	77.81	1838.1	77 88	1855.62	77 95	1868.06	77.94	1868.49	
77.93	77.01	1000.1	//.00	1055.02	11125	1000.00	,,,,,,,		
1878.22	77.98								
Manning's		20	num=	5					
Manning Sta	n Valu				n Val	Sta	n Val	Sta	n
Val									
0	.035	59.99	.045	82.27	.05	97.86	.045	113.31	
.02							÷.		
Bank Sta:	Left	Right	Length	s: Left	Channel,	Right	Coeff	Contr.	
Expan.					000 01	004 07		-	
	59.99	113.31		232.89	236.01	234.37		.1	
.3 Ineffecti	ve Flow	num=		1					
Sta L	Sta R		Permane						
457.77			F	800					
Blocked O			num=	2 Sta P					
Sta L	Sta R	Elev	Sta L	Sta R	Elev				

CROSS SECTION

RIVER: Alvarado(west) REACH: Lower Reach RS: 2231.639

INPUT

INPUI	- 100							
Description		Deter		100				
Station Ele			num=	120	Elev	Sta	Elev	Sta
Sta	Elev	Sta	Elev	Sta	FIEA	SLa	PIEA	BLA
Elev		10 55		17 04	75 04	51.03	73.41	51.81
0	76.8	12.75	75.85	17.94	75.04	51.03	73.41	51.01
73.4				56.04	70.04	00.00	C0 20	81.55
52.64	73.35	54.8	73.36	56.84	72.84	80.96	68.39	01.00
68.28					< <b>7 7 7 7</b>	105 50	67 10	107.28
83.35	67.85	92.65	67.42	102.28	67.26	105.78	67.18	107.28
67.35		8 N 8 18			<b>CO 00</b>	104 05	CO 47	105 11
108.73	67.41	119.2	68.15	120.35	68.23	124.25	68.47	125.11
68.93						115 55	80.00	154 00
130.5	71.14	132.75	72.19	144.53	72.32	146.66	72.33	154.89
72.34						000 6		220.04
163.13	72.39	172.13	72.44	200.97	72.59	222.6	72.75	229.84
72.92						0.54 0.4	<b>TO</b> 00	0.07 0.0
250.17	73.03	264.5	73.1	267.34	73.09	274.94	72.99	287.98
73.17								200 11
291.98	73.34	338.77	73.46	352.25	75.59	358.58	75.57	378.11
76.64								
409.95	77.45	424.63	77.62	428.34	77.74	429.8	77.64	437.38
77.02					201 BOX 5245	107023027 UB642		
448.59	76.88	465.55	76.73	477.09	76.63	488.11	76.31	513.25
75.49								
517.54	75.56	518.31	75.58	536.09	75.88	541.8	75.85	581.1
76.06								60 C 1 F
611.82	75.41	615.4	75.4	627.3	75.69	630.96	75.78	636.47
75.92						- 		
653.45	76.35	658.88	76.34	668.58	76.19	707.85	75.57	742.43
74.25								
749.35	74.2	763.74	74.34	800.8	75.09	816.48	74.89	829.18
74.42								
829.93	74.37	830.73	74.44	833.71	74.31	838.94	74.34	865.2
75								
909.05	76.09	917.31	75.9	966.88	74.57	1003.02	74.72	1049.97
74.77							- 4 - 6 -	1001 85
1113.38	74.78	1153.48	75.02	1242.96	75.08	1279.83	74.03	1281.75
73.98			1977 av 1878-	ana a sa na 2				1200 5
1314.45	74.01	1329.84	74.17	1334.15	74.24	1350.52	74.82	1379.5
74.47			5 107 8 (193 100)					1 - 0 - 0
1430.9	74.43	1469.75	74.96	1516.6	75.29	1527.23	75.55	1539.52
76.78								1 5 4 9 9 5
1545.51	77.26	1565.11	77.18	1611.43	76.59	1631.79	77.54	1640.26
77.82			1000 Carlos Carlos Socio			1000 00	<b>HH A F</b>	1000 00
1672.84	77.77	1719.97	77.73	1741.31	77.53	1760.68	77.35	1780.39
77.16						1010 10	00 44	1010 10
1802.24	77.4	1849.81	77.16	1880.35	76.86	1910.12	//.41	1912.12
77.42								

76.62 1982.33 76.31 1990.43 76.76 2006.08 77.47 1970.04 1936.96 78.02 78.23 2014.93 78.64 2020.55 78.77 2034.15 2008.62 78.15 2009.51 79.03 Manning's n Values num= 4 n Val n Val Sta Sta n Val Sta Sta n Val .02 .025 119.2 54.8 .035 81.55 0 .025 Right Coeff Contr. Bank Sta: Left Right Lengths: Left Channel Expan. 16.91 37.54 .1 0 132.75 16.13 .3 num= 1 Ineffective Flow Elev Permanent Sta L Sta R 77.74 F 428.34 2034.15 num= 6 Blocked Obstructions Sta R Elev Sta R 🛛 Elev Sta L Sta R Elev Sta L Sta L 87 85 85 340.74 396.32 552.57 607.29 184.32 275.65 90 87 2031.7 2034.15 85 1807.53 1866.52 856.96 1244.13 CROSS SECTION RIVER: Alvarado(west) REACH: Lower Reach RS: 2214.731 INPUT Description: Drop Strucure at Old Road Crossing 132 Station Elevation Data num= Elev Sta Elev Sta Elev Sta Sta Elev Sta Elev 77.13 31.38 75.35 32.65 78.26 19.99 4.69 78.8 0 75.36 95.88 68.7 98.81 75.72 73.53 60.75 74.49 47.05 74.64 67.95 104.5 67.22 105.37 103.51 67.24 102.3 67.29 102.07 67.35 67.21 143.1 119.21 67.22 128.26 69.4 67.15 118.92 67.14 117.4472.97 72.57 182.67 72.73 192.62 72.74 160.75 147.52 72.88 154.75 72.61 212.51 72.63 248.98 72.78 203.03 193.9 72.63 202.04 72.79 72.52 72.82 305.5 72.8 304.45 72.53 271.5 72.51 302.09 251.05 72.87 73.43 358.18 72.93 353.9 73.13 351.51 313.36 73.25 350.18 74.32 377.9 75.85 380.05 75.81 390.48 76.5 376.42 75.82 368.7 76.33 76.77 439.48 76.97 411.53 76.55 404.34 77.03 405.94 394.76 75.92 75.01 483.64 75.07 496.29 480.79 75.73 451.19 75.64 447.47 75.38 75.63 609.25 75.84 608.69 75.61 526.86 75.57 580.21 505.79 75.62

8 of 25

621.32	75.58	627.49	75.57	662.49	75.98	709.38	75.88	743.92	
75.81 808.08	75.14	842.46	74.58	847.52	74.44	850.1	75.33	851.67	
75.84 853.5	75.75	863.11	75.73	896.48	75.71	940.17	75.67	942.15	
75.68 970.19	74.78	995.12	74.37	1085.56	74.41	1125.08	74.38	1176.36	
74.69 1223.87	74.93	1267.55	75	1298.95	74.42	1308.02	74.18	1312.54	
74.17 1339.62	74.15	1356.07	74.13	1358.46	74.16	1362.15	74.33	1370.72	
73.27 1375.79	72.41	1381.3	72.4	1385.28	72.39	1386.68	72.37	1443.12	
72.05									
1450.89 74.16	72.15	1451.83	72.14	1458.42	72.22	1472.94	72.54	1505.43	
1512.29	75.72	1513.91	76.23	1530.37	75.83	1550.2	75.66	1553.68	
	76.2	1573.52	77.27	1574.42	77.36	1599.33	77.39	1640.48	
1644.68 76.81	77.62	1681.27	76.5	1698.12	76.47	1703.78	76.46	1749.14	
1764.78 77.53	76.68	1814.25	77.5	1830.66	77.69	1879.63	77.79	1905.43	
1957.8	78.01	1977.52	78.05	2014.28	75.94	2016.6	75.81	2020.51	
75.99 2035.53	77.45	2040.76	78.2	2042.13	78.4	2046.47	78.66	2048.95	
78.81 2049.4	78.84	2088.99	77.99						
				6					
Manning's Sta	n Value n Val		num= n Val	- Sta	n Val	Sta	n Val	Sta	n
Val 0	.035	47.05	.035	95.88	.045	128.26	.035	143.1	а 
.035 202.04	.02						ŝ		
202.01									
Bank Sta: Expan.	Left	Right	Length	s: Left (	Channel	Right	Coeff	Contr.	
	47.05	143.1		31.05	46.04	52.74		.1	
Ineffecti	ve Flow	num=		1					
•	Sta R		Perman	ent					
		77.03	F						
Blocked O					8				
	Sta R			Sta R	Elev	Sta L	Sta R	Elev	
		90							
		90		1893.63	90	1952.63	1999.56	90	
2059.58									
CROSS SEC	TION								
RIVER: Al			1000000000 and a second						
REACH: LO	wer Rea	ch	RS: 21	68.688					
INPUT									

Descriptio Station El		Data	num=	130		.9		
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
Elev 0	81.11	8.42	80.99	28.98	79.2	35.51	78.16	41.11
77.81 41.46	77.79	49.04	76.92	49.21	76.77	49.37	76.92	82.88
75.61 97.93	74.76	101.97	74.53	108.09	70.47	109.72	69.35	114.08
66.38 116.39	66.55	133.68	67.83	135.76	68.42	137.48	68.92	152.33
73.19 154.59	73.2	164.21	72.76	214.35	72.55	235.29	72.76	236.86
72.78 272.29 73.76	73.21	276.75	73.19	313.88	73.62	322.66	73.67	332.02
371.42 75.38	74.39	391.58	74.46	391.98	74.47	397.41	74.66	412.65
429.65 75.49	75.99	432.12	75.63	436.98	74.8	453.7	75.15	469.65
482.13	75.32	503.89	74.94	511.34	74.86	515.46	75.09	543.35
578.89	75.92	605.69	75.33	622.05	75.8	627.14	75.96	661.78
75.97 675.45	75.76	676.55	75.73	687.84	75.78	695.12	75.81	695.54
75.83 702.92	75.86	717.53	75.85	726.03	75.89	734.98	75.93	755.29
76.02 755.55	76.04	758.4	76.21	771.81	76.4	796.33	76.73	803.08
76.59 803.36	76.57	819.66	76.78	835.81	76.97	836.04	77	839.41
77.22 878.82	76.85	890.04	76.59	890.63	76.56	906.91	76.39	914.08
76.32 921.68	76.25	921.89	76.27	925.47	76.52	948.37	75.75	972.75
74.93 979.07	74.72	1009.42	73.57	1012.54	73.52	1023.73	73.49	1076.49
73.36 1078.47	73.37	1185.18	73.35	1241.16	73.1	1320.75	72.86	1323.48
72.88	73.01	1381.97	74.25	1386.87	74.49	1395.25	74.58	1434.3
74.94 1437.78	74.92	1450.87	74.37	1477.49	74.27	1545.68	74.56	1578.98
76.66 1580.24	76.68	1600.5	75.9	1628.93	74.48	1647.38	75.39	1693.93
75.3 1716.25	75.27	1717.43	75.26	1744.84	76.44	1761.11	76.02	1787.9
75.88 1828.77	75.93	1850.39	75.79	1872.58	75.7	1885.99	75.68	1916.24
76.57 1917.11	76.58	1943.96	76.56	1944.71	76.54	1949.43	76.48	1987.9
76.01 2041.55	76.43	2068.14	76.8	2081.25	76.55	2105.17	76.72	2114.6
76.66 2120.74	77.58	2121.39	77.68	2122.26	77.7	2137.68	78.4	2168.38
79.02								

Manning's n Values num= 6 Sta Sta n Val Sta n Val Sta n Sta n Val n Val Val .045 109.72 .05 137.48 .045 152.33 .025 101.97 0 .035 272.29 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 178.72 186.87 197.94 49.04 154.59 .1 .3 Ineffective Flow num= 1 Sta L Sta R Elev Permanent 839.41 2168.38 77.22 F Blocked Obstructions num= 7 Elev Sta L Sta R Elev Sta L Sta R Elev Sta R Sta L 90 1452.21 1548.05 90 934.55 972.18 345.94 374.87 90 90 1649.05 1720.79 90 1912.43 1972.34 90 2033.15 2077.5 2162.07 2168.38 90 CROSS SECTION RIVER: Alvarado(west) REACH: Lower Reach RS: 1981.816 INPUT Description: 127 Station Elevation Data num= Sta Sta Elev Sta Sta Elev Sta Elev Elev Elev 34.24 83.75 43.66 79.05 44.52 84.65 26.29 83.82 0 78.91 73.68 117.48 76.51 55.06 76.27 107.5 47.34 78.5 52.63 73.69 74.5 143.27 69.08 147.09 66.53 147.68 121.54 73.87 135.14 66.18 66.79 207.09 71.78 208.92 71.79 268.97 148.53 66.2 177.68 71.61 71.27 338.31 71.45 307.37 70.93 355.82 71.08 365.49 286.29 72.96 74.57 377.34 74.58 416.58 75.18 431.39 74.21 377.15 369.68 75.55 76.65 500.16 76.77 581.67 76.66 511.31 497.42 76.64 498.44 75.17 587.43 74.78 592.49 74.36 596.04 74.09 607.81 74.59 627.47 75.22 75.72 678.56 75.82 710.64 651.82 75.47 661.48 75.65 668.9 76.16 72.07 727.37 71.42 728.7 71.4 751.18 74.79 714.72 712.03 70.46 70.6 790.66 70.63 792.22 70.4 785.21 70.57 788.19 761.32 70.66 71.48 900.76 71.63 940.59 72.07 941.53 838.84 71.38 852.37 72.08 72.18 1004.87 72.17 1014.63 72.29 1037.68 964.43 72.28 1000.66 71.95

10	050.64	71.91	1122.41	72.15	1138.79	72.08	1253.51	72.09	1274.09	
	.32 333.33	72.34	1353.17	72.32	1367.11	72.64	1389.46	73.61	1424.82	
74	.08						1500.00	<b>5</b> 2 C1	1610 0	
	463.87 .66	74.44	1510.27	73.71	1539.64	73.38	1583.36	73.61	1610.2	
	635.67	73.51	1653.24	73.48	1676.18	73.43	1686.19	73.39	1690.32	
	.38 693.81	72 27	1694.24	72 28	1700.52	73 53	1747.46	74.04	1761.35	
	.09	13.37	1094.24	75.50	1700.52					
	779.25	74.63	1800.08	74.67	1844.83	75.01	1876.85	75.26	1886.5	2
	.75 890.08	75.08	1936.81	74.18	1955.42	73.79	1972.69	74.08	2032.6	
	.63								2001 20	
	053.07 .87	73.55	2055.82	73.53	2059.2	73.97	2077.89	/6./9	2091.39	
	094.31	76.74	2133.72	77.12	2149.21	77.14	2169.15	77.07	2182.51	
77	.2 183.81	77 21	2229.19	77 2	2233.11	77.34	2234.63	77.35	2247.8	
	.86	11.21	2222.22	77.2	2233.11					
	316.18	76.11	2379.09	76.54	2383.26	76.53	2386.26	76.42	2428.46	
	.73 429.38	75.25	2430.87	75.55	2441.79	78.2	2470.28	78.04	2481.28	
	.01	1	0540 55	<b>57</b> 01						
2	509.95	77.84	2513.55	77.81						
Mai	nning's :			num=	5	n Val	Sta	n Val	Sta	n
Va	Sta 1	n Val	Sta	n Val	Sta	II VAL	BLA	II VAL	bla	11
	0	.025	135.14	.016	147.68	.045	177.68	.16	207.09	
.0:	2									
	nk Sta:	Left	Right	Length	s: Left (	Channel	Right	Coeff	Contr.	
	pan. 13	5.14 2	207.09		397.08	387.11	367.43	*	.1	
.3					-			75		
In	effectiv Sta L	e Flow Sta R			l ent					
	511.31 2	513.55	76.77	F						
Bl	ocked Ob			num= Sta L	10 Sta R	Flow	Sta L	Sta R	Elev	
-	Sta L 245.39	Sta R			581.04		366.42		90	80
	789.77 1				1186.87		1312.75		90	
	486.06 1				1868.49		2082.76	2284.39	90	
2	346.39 2	390.73	90							
CR	OSS SECT	ION								
RT	VER: Alv	arado (v	west)							
	ACH: Low			RS: 15	94.709					
TN	PUT				14					÷
	scriptio	n:								
	ation El		n Data	num=	165	18	000000		100 A	
	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
ΕT	ev									

					*2				
0	81.24	3.6	81.26	4.29	81.27	32.08	81.53	38.54	
81.45 42.88	78.55	47.5	74.42	55.83	69.17	62.95	65.2	65.36	
63.85 92.75	64.35	95.54	64.37	104.12	68.94	108.05	71.03	109.14	
71.61 127.14 71.43	71.39	166.03	71.16	168.57	71.15	175.1	71.21	184.39	
	71.5	187.13	71.52	236.4	73.4	237.09	73.41	268.14	
294.5 73.66	73.66	295.95	73.67	324.02	73.93	345.93	73.81	371.75	
383.11	74.14	414.98	73.94	420.44	73.91	422.27	73.92	424.77	
73.97									
424.88 74.6	73.98	426.56	73.99	466.28	74.58	467.34	74.59	504.82	
522.99 73.76	74.76	558.3	74.01	559.94	73.99	560.54	73.97	569.14	
596.78 74.21	74.29	605.83	74.52	616.15	74.43	634.74		639.37	ξŦ.
641.16 72.93	74.26	656.72		703.85	74.71	713.76	74.66	763.8	
801.7	72.92	804.8	72.9	810.04	72.86	831.79	72.73	833.5	
72.38 843.33	71	882.51	71.16	968.58	71.6	971.8	71.61	973.87	
71.58 998.07	71.48	999.71	71.52	1037.78	71.4	1090.42	71.27	1130.12	
70.83 1142.01 71.39	70.84	1189.25	71.11	1199.17	71.12	1246.15	71.38	1294.17	×
1306.69 71.66	71.43	1330.64	71.44	1367.69	71.48	1392.75	71.57	1417.65	
1442.39	71.74	1455.9	71.75	1480.65	71.84	1507.67	72.05	1521.17	
1548.12 72.77	72.28	1583.8	72.57	1590.38	72.61	1610.57	72.72	1617.02	
1637.25 73.18	72.88	1643.58		1663.85	73.03	1684.25		1690.36	
1720.07 73.63		1721.93		1726.44	73.46			1746.66	
1762.3 74.16		1766.72				1798.11			
1808.47 74.32	74.09	1815.84	73.89	1823.63	73.85	1858.05	74.2	1893.05	
1899.49 73.3	74.13	1900.86	74.08	1909.1	73.77	1910.32	73.71	1919.01	
1934.76 72.64	73.16	1944.06	73.08	1959.83	72.94	1976.87	72.79	1993.96	
2002.86 72.12	72.56	2027.9	72.43	2053.18	72.29	2059.57	72.25	2084.9	÷
2091.1 72.29	72.08	2116.49	71.94	2119.83	71.98	2148.08	72.26	2151.19	
2179.8 73.14		2185.55	72.64			2232.84			
2267.86 73.87	73.48	2270.89	73.51	2286.9	73.68	2288.93	73.7	2304.91	

73.89 2334.55 74.18 2337.73 74.2 2352.04 74.27 2355.1 2306.98 74.28 74.51 2404.21 74.36 2383.86 74.43 2386.87 74.44 2401.32 2369.42 74.53 74.65 2494.14 74.65 2454.51 74.85 2475.72 74.78 2457.5 2429.19 74.45 74.36 2535.88 73.97 2559.62 73.72 2561.68 73.75 2585.58 2498.97 73.49 73.21 2656.25 73.45 2614.1 73.34 2640.94 73.22 2642.44 2587.3 73.15 5 num= Manning's n Values n Val Sta n Val Sta n n Val Sta n Val Sta Sta Val 92.75 .016 109.14 62.95 .025 .02 32.08 .016 0 .02 Coeff Contr. Bank Sta: Left Right Lengths: Left Channel Right Expan. 420.75 402.35 377.25 .1 32.08 109.14 . 3 Ineffective Flow num= 1 Elev Permanent Sta L Sta R 74.76 F 522.99 2656.25 2 Blocked Obstructions num= Sta L Sta R Elev Sta L Sta R Elev 436.7 558.37 90 251.93 387.55 90 CROSS SECTION RIVER: Alvarado(west) RS: 1192.356 REACH: Lower Reach INPUT Description: Upstream Face of Fairmaont Crossing Station Elevation Data num= 170 Elev Sta Elev Sta Sta Sta Elev Sta Elev Elev 35.1 74.92 76.77 18.93 76.04 21.89 74.65 25.29 0 74.97 62.46 44.03 71.37 46.29 65.04 47.46 73.23 40.34 47.6362.46033 82.17 62.43 79.09 62.42 79.39 62.72 62.7 62.47 52.57 65.7 74.2 101.43 74.1 101.8 73.93 99.47 71.07 98.3 87.2 74.06 73.54 123.79 73.6 125.51 73.52 114.14 73.53 111.8 110.38 73.72 73.59 167.25 73.67 157.07 73.54 161.04 73.58 162.42 156.53 73.63 74.56 213.36 74.41 228.38 74.68 210.42 73.75 208.44 168.05 73.59 73.92 269.63 73.63 251.87 73.77 260.77 73.45 243.72 233.28 74.02 74.89 319.79 74.83 339.44 74.46 305.4 74.69 313.68 283.97 75.04

342.79	75.01	350.26	74.65	353.09	74.63	353.6	74.6	354.11	
74.58 356.48	75.26	394.6	74.94	429.16	74.57	431.36	74.48	438.63	
75.37 440.77	75.59	442.53	75.76	448.54	76.25	448.64	76.24	454.45	
76.12 457.74	75.5	460.8	75.01	466.44	75.04	483.29	74.47	499.53	
74.43 514.59 73.81	74.39	538.86	74.05	548.88	73.89	553.46	73.78	554.01	
555.27 71.62	73.78	595.7	72.73	608.77	72.47	621.83	72.28	658.25	
687.91	71.3	700.08	71.38	751.01	71.76	813.92	71.82	821.41	
71.78 862.82	71.97	887.32	71.93	901.82	71.92	929.54	71.51	932.56	
71.5 934.69 72.24	71.49	937.68	71.51	938.79	71.52	1029	72.21	1033.02	
72.24 1069.62 73.15	72.48	1084.18	72.45	1159.78	72.56	1194.18	73.13	1194.99	
1196.07 75.17	73.18	1248.61	74.31	1249.84	74.3	1267.16	74.63	1356.36	
1374.72 74.61	75.27	1379.93	74.47	1383.42	74.45	1391.79	74.54	1398.41	
1419.11 75.52	74.79	1425.07	74.2	1432.86	73.3	1476.57	75.45	1478.13	
1480.72 75.89	75.56	1481.32	75.58	1556.48	76.09	1580.63	76.34	1644.38	
1653.98 76.96	76.15	1682.03	76.98	1687.06	77.16	1688.73	77.04	1692.49	
1696.11 71.24	76.55	1697.49	76.47	1747.83	74.25	1764.6	72.03	1774.73	
1781.54 70.38	70.5	1784.97	70.15	1786.06	70.06	1786.58		1790.93	
1840.62 75.48	73.72	1845.09	73.92	1850.6	73.99	1854.08		1856.38	à
1858.9 77.16	76.15	1861.82	76.42			1866.65		1871.47	
1881.03 79	77.44	1887.79		1911.88		1921.72		1946.47	
1969.69 78.85		1979.5		1980.5		2026.36			
2073.87 78.05	79.44	2086.71		2101.29		2121.21		2218.29	
2263.61 76.13	78.13	2297.66		2299.32		2300.66		2307.54	
2363.75 77.41	77.28	2409.66	78.45	2440.17		2492.2		2529.08	э.
2530.74 77.89	77.37	2531.9	77.4	2588.93	77.6	2610.61	77.88	2616.93	
Manning's	n Valu	es	num=	5					
Sta	n Val		1222 133		n Val	Sta	n Val	Sta	n
Val 0	.02	35.1	.016	47.63	.025	79.09	.016	99.47	
.02									

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 150.44 150.57 156.21 99.47 .1 35.1 . 3 2 Ineffective Flow num= Sta R Elev Permanent Sta L 35.1 74.97 F 0 76.25 F 448.54 2616.93 6 Blocked Obstructions num= Elev Sta L Sta R Elev Sta R Elev Sta L Sta R Sta L 90 1272.38 1373.24 90 1481.65 1571.21 90 771.98 844.79 90 2574.5 2616.93 90 90 2348.88 2459.84 2109.13 2197.69 CULVERT RIVER: Alvarado(west) INPUT Description: Distance from Upstream XS = 25 Deck/Roadway Width = 110 = 2.6 Weir Coefficient Upstream Deck/Roadway Coordinates 2 num= Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 74.97 99 74.1 35.1 Upstream Bridge Cross Section Data 170 Station Elevation Data num= Elev Sta Elev Sta Elev Sta Elev Sta Sta Elev 25.29 74.92 35.1 74.65 76.77 18.93 76.04 21.89 0 74.97 65.04 47.46 62.46 46.29 71.37 40.34 73.23 44.03 47.6362.46033 79.39 62.72 82.17 79.09 62.42 62.7 62.43 52.57 62.47 65.7 74.2 101.43 101.8 74.1 99.47 87.2 71.07 98.3 73.93 74.06 73.6 125.51 73.54 123.79 73.52 114.14 110.38 73.53 111.8 73.72 73.59 167.25 73.58 162.42 156.53 73.67 157.07 73.54 161.04 73.63 74.56 213.36 74.68 210.42 74.41 228.38 168.05 73.75 208.44 73.59 73.92 269.63 251.87 73.77 260.77 233.28 73.45 243.72 73.63 74.02 74.89 319.79 74.83 339.44 313.68 283.97 74.46 305.4 74.69 75.04 74.6 354.11 75.01 350.26 74.65 353.09 74.63 353.6 342.79 74.58 74.57 431.36 74.48 438.63 75.26 394.6 74.94 429.16 356.48 75.37 76.25 448.64 76.24 454.45 75.59 442.53 75.76 448.54 440.77 76.12

	75.5	460.8	75.01	466.44	75.04	483.29	74.47	499.53	
	74.39	538.86	74.05	548.88	73.89	553.46	73.78	554.01	
73.81 555.27	73.78	595.7	72.73	608.77	72.47	621.83	72.28	658.25	
71.62 687.91	71.3	700.08	71.38	751.01	71.76	813.92	71.82	821.41	
71.78 862.82	71.97	887.32	71.93	901.82	71.92	929.54	71.51	932.56	
71.5 934.69	71.49	937.68	71.51	938.79	71.52	1029	72.21	1033.02	
72.24 1069.62	72.48	1084.18	72.45	1159.78	72.56	1194.18	73.13	1194.99	
	73.18	1248.61	74.31	1249.84	74.3	1267.16	74.63	1356.36	
75.17 1374.72	75.27	1379.93	74.47	1383.42	74.45	1391.79	74.54	1398.41	
74.61 1419.11	74.79	1425.07	74.2	1432.86	73.3	1476.57	75.45	1478.13	
75.52 1480.72	75.56	1481.32	75.58	1556.48	76.09	1580.63	76.34	1644.38	
75.89 1653.98	76.15	1682.03	76.98	1687.06	77.16	1688.73	77.04	1692.49	
	76.55	1697.49	76.47	1747.83	74.25	1764.6	72.03	1774.73	
71.24 1781.54	70.5	1784.97	70.15	1786.06	70.06	1786.58	70.1	1790.93	
70.38 1840.62 75.48	73.72	1845.09	73.92	1850.6	73.99	1854.08	74.87	1856.38	
	76.15	1861.82	76.42	1864.2	76.64	1866.65	77.02	1871.47	
	77.44	1887.79	77.88	1911.88	78.22	1921.72	78.15	1946.47	2 42
1969.69 78.85	79.01	1979.5	78.97	1980.5	78.96	2026.36	78.6	2045.29	
2073.87 78.05	79.44	2086.71	79.09	2101.29	78.97	2121.21	78.98	2218.29	
2263.61 76.13	78.13	2297.66	78.65	2299.32	78.67	2300.66	78.26	2307.54	
	77.28	2409.66	78.45	2440.17	78.23	2492.2	77.69	2529.08	
2530.74 77.89	77.37	2531.9	77.4	2588.93	77.6	2610.61	77.88	2616.93	
				-					
Manning's Sta		es Sta			n Val	Sta	n Val	Sta	n
Val 0 .02	.02	35.1	.016	47.63	.025	79.09	.016	99.47	
Bank Sta:	Left	Right 99.47	Coeff (	Contr. .1					
Ineffecti				2.1	د.				
Sta L	Sta R	Elev	Perman						
0	35.1		F F						
448.54	2616.93	10.25	r						

Blocked Obstructions			num=	6				
Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
771.98	844.79	90	1272.38	1373.24	90	1481.65	1571.21	90
2109.13	2197.69	90	2348.88	2459.84	90	2574.5	2616.93	90

Downstream Deck/Roadway Coordinates

num=		2								
Sta	Нi	Cord	Lo	Cord		Sta	Hi	Cord	Lo	Cord
2.34	1	74.97			124	.06		74.1		

Downstream Bridge Cross Section Data Station Elevation Data num= 5

Downstream Bridge Cross Section Data									
Station El	evation	Data	num=	54					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev								504210/00- 4221-3821	
0	74.86	2.34	74.56	17.27	73.56	25.01	73.15	37.44	
71.04									
43.21	70.45	44.57	68.08	51.5	64.18	52.78	63.26	56.79	
60.37									
65.67	60.35	84.38	60.29	89.53	60.28	92.01	62.96	92.93	
63.27							0		
124.06	73.77	139.8	74.15	146.56	74.22	151.57	74.24	160.28	
74.18	S					a			
182.96	73	184.47	72.9	186.49	72.88	201.13	71.64	220.44	
69.91									
228.66	70.18	250.89	70.72	263.43	70.73	281.27	70.56	309.06	
70.69						250 26	7.0	261 04	
328.54	70.72	343.55	70.31	356.64	70.02	359.36	70	361.84	
70.48					=1 00	407 00		422 01	
370.24	70.68	426.34	71.99	426.54	71.92	427.93	71.93	433.01	
72.21			2		70 50	400.00	72 70	492.98	
436.83	72.42	437.72	72.49	443.44	72.59	482.93	72.79	492.98	
72.9			<b>FO</b> 01	F10 06		F04 22	72 06	774.58	
496.02	72.93	497.59	72.91	517.36	73.05	584.33	72.06	114.50	
72.67		040 FC	70.04	007 00	72.24	908.45	72.17		
841.08	72.92	848.56	72.84	887.98	12.24	908.45	12.11		
		-		5					
Manning's	n Value n Val	s Sta	num= n Val	Sta	n Val	Sta	n Val	Sta	n
Sta	n val	SLA	II VAL	bla	II VAL	bea	ii var	bea	11
Val 0	.035	52.78	05	92.01	.016	124.06	035	146.56	
	.035	52.70	.05	52.01	.010	121.00	1055	110.00	
.02									
Bank Sta:	Loft	Right	Coeff C	ontr	Expan.				
Dallk Sta.		139.8	COCII C	.1	. 3				
Ineffectiv		num=	1						
Sta L	Sta R	Elev							
146.56	908.45	74.22	F						
Blocked Ob			num=	1					
Sta L	Sta R	Elev					(h)		
499.89	817.02	90							
199.09									
Upstream H	Embankme	nt side	slope		=	0 hor	iz. to 1	.0 verti	cal
Downstream	n Embank	ment sid	e slope		=	0 hor	iz. to 1	.0 verti	cal
Maximum al				weir fl	ow =	.98			
Floration						74.1			

74.1 Elevation at which weir flow begins = Energy head used in spillway design Spillway height used in design = =

= Broad Crested Weir crest shape Number of Culverts = 1 Culvert Name Rise Span Shape 12 8 Culvert #1 Box FHWA Chart # 8 - flared wingwalls FHWA Scale # 1 - Wingwall flared 30 to 75 deg. Solution Criteria = Highest U.S. EG Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef 0 . 4 . 25 110 .018 .018 1 Number of Barrels = 3 Upstream Elevation = 62.42Centerline Stations Sta. Sta. Sta. 54.36 63.36 72.36 Downstream Elevation = 60.28 Centerline Stations Sta. Sta. Sta. 64.16 73.16 82.16 CROSS SECTION RIVER: Alvarado(west) RS: 1041.783 REACH: Lower Reach INPUT Description: Downstream Face of Fairmaon Crossing Station Elevation Data num= 54 Elev Sta Elev Sta Elev Sta Elev Sta Sta Elev 74.86 2.34 74.56 17.27 73.56 25.01 73.15 37.44 0 71.04 70.45 44.57 68.08 51.5 64.18 52.78 63.26 56.79 43.21 60.37 89.53 60.28 92.01 62.96 92.93 60.35 84.38 60.29 65.67 63.27 74.15 146.56 74.22 151.57 74.24 160.28 139.8 73.77 124.06 74.18 72.9 186.49 72.88 201.13 71.64 220.44 73 184.47 182.96 69.91 281.27 70.56 309.06 70.72 263.43 70.73 250.89 228.66 70.18 70.69 356.64 70.02 359.36 70 361.84 70.72 343.55 70.31 328.54 70.48 71.93 433.01 71.92 427.93 370.24 70.68 426.34 71.99 426.54 72.21 437.72 72.49 443.44 72.59 482.93 72.79 492.98 72.42 436.83 72.9 72.06 774.58 73.05 584.33 72.93 497.59 72.91 517.36 496.02 72.67 72.84 887.98 72.24 908.45 72.17 72.92 848.56 841.08 num= 5

Manning's n Values

n Val Sta n Val Sta n Val Sta n Val Sta n Sta Val .016 124.06 .035 146.56 92.01 .05 0 .035 52.78 .02 Lengths: Left Channel Right Coeff Contr. Bank Sta: Left Right Expan. 116.66 118.13 124.58 .1 139.8 2.34 . 3 Ineffective Flow num= 1 Sta L Sta R Elev Permanent 146.56 908.45 74.22 F Blocked Obstructions num= 1 Sta L Sta R Elev 499.89 817.02 90 CROSS SECTION RIVER: Alvarado(west) RS: 923.6518 REACH: Lower Reach INPUT Description: 41 num= Station Elevation Data Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 48.51 69.657 60.29 70.51 48.23 69.81 0 71.8 28.48 63.2 77.5 60.34 86.4 60.54 89.98 60.08 61.77 65.67 62.89 61.47 68.66 128.53 68.84 166.16 69.32 175.37 63.11 115.82 95.85 69.36 68.95 207.36 69.14 267.19 68.9 203.24 68.86 198.66 194.56 69.68 68.88 337.01 67.64 361.62 68.34 405.48 310.7 69.32 295.45 69.72 72.35 429.87 72.01 417.74 70.69 416.65 70.5 412.49 411.15 72.53 72.22 540.06 72.34 572.32 492.7 72.51 459.15 72.49 472.74 72.43 72.81 726.53 72.72 792.37 72.58 684.11 71.6 728.33 614.53 72.94 821.37 72.42 num= 6 Manning's n Values Sta n Val Sta n Val Sta n Val Sta n Sta n Val Val 95.85 62.89 .05 .016 115.82 48.23 .035 0 .02 .035 166.16 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 217.42 216.97 218.99 48.51 128.53 .1 . 3 Ineffective Flow num= 1

 Sta L
 Sta R
 Elev
 Permanent

 175.37
 821.37
 69.36
 F

 Blocked Obstructions
 num=
 4

 Sta L
 Sta R
 Elev
 Sta R
 Elev

 197.27
 297.6
 90
 346.43
 364.51
 90
 476.23
 770.33
 90

 21.29
 48.51
 90
 476.23
 770.33
 90

CROSS SECTION

TNPUT

RIVER: Alvarado(west) REACH: Lower Reach RS: 706.6820

INPUT									
Descripti									
Station E			num=	44				<u>a</u>	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev				1					
0	71.26	20.07	71.23	41.3	70.92	61.42	70.53	72.14	
70.36				121(75) 57(8)	1.1214.000				
78.67	67.53	90.76	62.68	98.97	59.38	122.39	58.79	129.2	
59.88					1000-000 0000000				
145.25	62.74	168.96	66.95	171.58	66.94	177.87	66.8	242.61	
65.66									
247.27	65.87	294.8	67.45	316.09	67.07	348.94	67.08	374.67	
66.83									
390.3	66.67	415.05	66.76	420.51	66.79	421.71	66.71	426.1	
66.38									
446.87	66.62	457.84	66.78	461.67	67.55	466.39	68.48	475.46	
71.07									
478.88	72.18	479.52	72.19	488.24	72.32	514.26	72.66	517.04	
70.64									
518.76	69.24	521.16	69.32	534.61	69.06	590.6	68.93	592.93	
71.22									
594.97	72.24	619.91	71.97	778.79	72.51	781.74	72.5		
Manning's	n Value	S	num=	5					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n
Val									
0	.02	72.14	.035	98.97	.035	129.2	.04	168.96	
.02									
Bank Sta:	Left	Right	Lengths	: Left (	Channel	Right	Coeff	Contr.	
Expan.									
	72.14 1	68.96		420.18	406.52	381.53		.1	
.3									
Blocked O	bstructi	ons	num=	3					
Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev	
295.09	350.86	90	395.63	420.97	90	514.53	619.15	90	
CROSS SEC	TION								
RIVER: Al	varado(w	est)							
				1 5 0 0					

REACH: Lower Reach RS: 300.1583

INPUT

Descriptio									
Station E			num=	86	_				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev							5 (T)	a a - 10 aa	
0	70.16	3.03	70.27	19.06	70.56	29.27	70.07	33.47	
70.03									
38.02	70.02	38.83	69.86	74.82	69.15	81.53	69.08	137.44	
68.59									
154.02	68.68	179.01	68.89	182.24	68.91	224.14	69.29	247.36	
69.5									
306.01	69.99	330.3	69.29	337.05	69.15	338.42	69.16	343.69	
69.17									
407.69	67.55	412.83	67.35	419.76	61.74	423.21	58.94	425.02	
57.51									
429.49	57.46	454.89	57.18	472.73	57.01	506.78	58.87	506.93	
58.88			10	10					
509.91	59.04	511.61	59.03	513.31	59.54	526.98	63.56	538.51	
63.83	52101								
548.13	63.84	564.83	64.05	565.8	64.06	583.1	64.19	620	
64.36	05.01	501.05	01.05	565.0		4 5 5 5 5 T			
648.17	64.71	649.27	64.73	664.53	64.84	691.37	64.77	691.92	
64.76	04.71	049.27	01.75	001.55	01.01	0,21,01			
	CA CC	716.85	64.64	746.66	64.59	765.91	64.14	767.74	
702.47	64.66	/10.05	04.04	/40.00	04.55	703.21	01.11	101.14	
64.05	~ ~ ~ ~ ~		<b>60</b> 00		62 04	007 20	C2 47	000 07	
768.78	64.08	775.03	63.98	777.44	63.94	807.38	63.47	808.97	
63.55					<b>6 • •</b>	005 00	68 80	020 0	
814.33	63.86	824.4	67.5	824.92	67.7	825.32	67.72	830.9	
69.13			PRO2010 1077224					~~~ ~~	
845.62	69.19	862.7	69.23	897.15	69.29	919.62	69.5	922.68	
69.54							2		
948.41	69.71	954.38	69.75	976.05	69.37	977.36	69.33	980.96	
69.28									
982.86	69.29	986.42	69.3	1042.11	70.04	1045.54	70.02	1047.77	
70.1									
1059.86	70.14	1067.83	70.17	1072.13	70.2	1073.11	70.22	1095.86	
70.31									
1101.11	70.51	1113.44	70.96	1118.04	71.16	1126.02	67.91	1126.29	
67.81									
1128.68	67.41								
Manning's	n Value	s	num=	4					
		Sta				Sta	n Val		
0	.02	412.83	.045	425.02	.045	807.38	.02		
				а.					
Bank Sta:	Left	Right	Length	s: Left	Channel	Right	Coeft	E Contr.	
Expan.									
	L2.83 5	26 98		309.26	286.55	277,96		.1	
.3	12.05 5	20.50							
Ineffectiv	TA FLOW	m11m-		2	×.				
		Elev		7)					
		69.99							
		64.84							
Blocked Ok			num	T					
		Elev							
247.08	307.3	12							

CROSS SECTION

RIVER: Alvarado(v REACH: Lower Read		RS: 13	.60388					
INPUT Description: Station Elevatior	Data	num=	68					
Sta Elev	Sta	Elev		Elev	Sta	Elev	Sta	
Elev								
0 75.85 68.15	10.33	73.48	38.53	68.34	51.12	68.16	60.44	
108.69 67.67	151.29	67.58	156.01	67.55	159.53	67.46	169.58	
67.33					ner en en en			
197.14 66.97	210.75	66.75	211.18	66.74	211.62	66.68	241.12	1.00
61.57			2.2.2. 0.1		210 10	<b>F7 1 7</b>	401 0	
266.65 61.95	293.8	58.59	309.91	57.51	318.19	57.47	401.8	
57.39	404 0		F1C 70	57.43	518.19	57.42	590.01	
	484.2	57.52	516.72	57.43	510.19	57.42	590.01	
	664.72	57.6	737.22	57.65	758.62	57.66	779	
57.47 808.53 57.2	810.66	57.19	829.99	57.08	903.54	56.63	971.56	
57.03								
972.65 57.04	1009.45	57.49	1032.22	57.63	1039.89	57.65	1048.28	
57.46								
1064.18 57.51	1065.22	57.32	1069.26	57.35	1084.27	57.52	1100.33	
59.12								
1140.26 63.05	1150.65	63.85	1153.2	64.07	1153.41	64.09	1160.7	
64.49		1000 BY 1000 BAD						
	1178.95	64.36	1188.24	67.3	1194.9	67.73	1202.1	
68.16								
	1222.37	69.26	1239.98	69.37	1248.73	69.39	1272.24	
69.51						<b>4</b> 0 <b>- -</b>		
	1326.83	69.57	1348.91	69.7	1352.15	69.77	1372.76	
69.94	1000 00	<b>CO</b> 00	1 4 1 0 0 0			0		
1388.62 70.06	1398.96	69.98	1412.03	70.6				
Manning's n Value			3					
Sta n Value				n Val				
	151.29			.06				
0 .06	151.29	.06	1218.05	.00				
Bank Sta: Left	Right	Lengths	s: Left C	hannel	Right	Coeff	Contr.	
Expan.	-							
151.29 12	218.05		23.58	13.6	15.76		.1	
.3								
Ineffective Flow	num=	2	2					
Sta L Sta R	Elev	Permane	ent					
0 151.29	67.58	F						
1218.05 1412.03		F						

SUMMARY OF MANNING'S N VALUES

River:Alvarado(west)

	Reach n6	River Sta.	nl	n2	n3	n4
Lower	Reach	3415.773	.02	.016	.06	.016
	Reach	3276.769	.02	.016	.06	.016
Lower	Reach	2926.628	.02	.016	.06	.016
Lower	Reach	2467.648	.035	.045	.05	.045
Lower	Reach	2231.639	.025	.035	.025	.02
Lower	Reach	2214.731	.035	.035	.045	.035
.035	.02					
	Reach .02	2168.688	.025	.045	.05	.045
Lower	Reach	1981.816	.025	.016	.045	.16
Lower	Reach	1594.709	.02	.016	.025	.016
Lower	Reach	1192.356	.02	.016	.025	.016
Lower	Reach	1117	Culvert			
Lower	Reach	1041.783	.035	.05	.016	.035
	Reach .02	923.6518	.02	.035	.05	.016
	Reach	706.6820	.02	.035	.035	.04
Lower	Reach Reach	300.1583 13.60388	.02 .06	.045	.045 .06	.02

## SUMMARY OF REACH LENGTHS

River: Alvarado(west)

Reach	River Sta.	Left	Channel	Right
Lower Reach	3415.773	138.55	139	139.44
Lower Reach	3276.769	345.32	350.14	353.92
Lower Reach	2926.628	455.11	458.98	464.26
Lower Reach	2467.648	232.89	236.01	234.37
Lower Reach	2231.639	16.13	16.91	37.54
Lower Reach	2214.731	31.05	46.04	52.74
Lower Reach	2168.688	178.72	186.87	197.94
Lower Reach	1981.816	397.08	387.11	367.43
Lower Reach	1594.709	420.75	402.35	377.25
Lower Reach	1192.356	150.44	150.57	156.21
Lower Reach	1117	Culvert		
Lower Reach	1041.783	116.66	118.13	124.58
Lower Reach	923.6518	217.42	216.97	218.99
Lower Reach	706.6820	420.18	406.52	381.53
Lower Reach	300.1583	309.26	286.55	277.96
Lower Reach	13.60388	23.58	13.6	15.76

## SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS River: Alvarado(west)

Reach	River Sta.	Contr.	Expan.	
Lower Reach	3415.773	.1	.3	
Lower Reach	3276.769	.1	.3	
Lower Reach	2926.628	.1	.3	a.
Lower Reach	2467.648	.1	. 3	•
Lower Reach	2231.639	.1	.3	
Lower Reach	2214.731	.1	.3	
Lower Reach	2168.688	.1	.3	
Lower Reach	1981.816	.1	.3	10
Lower Reach	1594.709	.1	.3	
Lower Reach	1192.356	.1	. 3	
Lower Reach	1117 Cul	vert		
Lower Reach	1041.783	.1	.3	
Lower Reach	923.6518	.1	.3	
Lower Reach	706.6820	.1	.3	
Lower Reach	300.1583	.1	.3	
Lower Reach	13.60388	.1	.3	

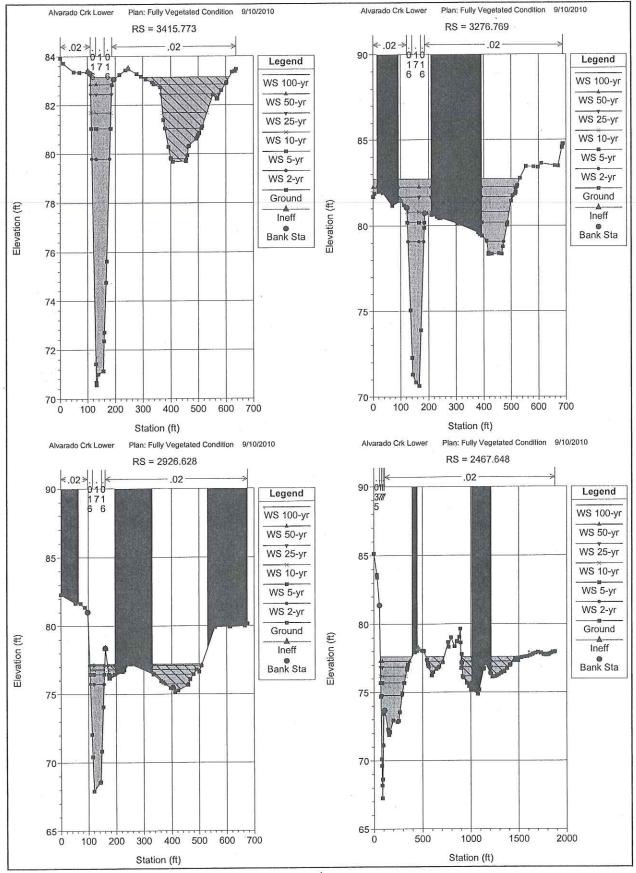
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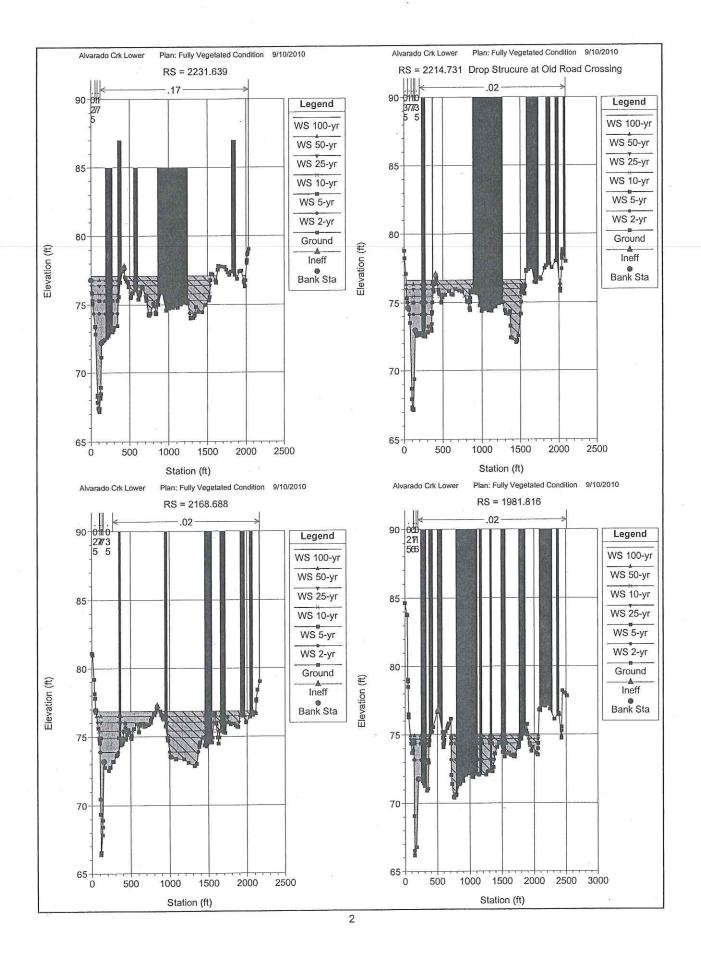
кеасп	RIVEL STA			Ū	VV. O. LICV	CIIC 4. C	Г. С. Г. С.	E.G. Jupe		50		
			(cfs)	Ð	(£)	(¥)	(£)	(ft/ft)	(f/s)	S	(£)	
Lower Reach	13.60388	100-yr	5100.00	56.63	66.00	58.46	66.01	0.000389	0.68	7538.81	968.59	0.04
Lower Reach	13.60388	50-yr	4500.00	56.63	63.03	58.38	63.05	0.001302	0.95	4741.55	907.43	0.07
Lower Reach	13.60388	25-yr	3800.00	56.63	62.51	58.27	62.52	0.001301	0.89	4269.00	899.10	0.07
Lower Reach	13.60388	10-yr	2700.00	56.63	61.54	58.08	61.55	0.001301	0.79	3407.97	854.92	0.07
Lower Reach	13.60388	5-yr	2050.00	56.63	60.91	57.96	60.92	0.001301	0.71	2872.96	843.43	0.07
Lower Reach	13.60388	2-yr	1180.00	56.63	59.92	57.77	59.92	0.001301	0.58	2044.45	825.32	0.06
			2			1						
Lower Reach	300,1583	100-yr	5100.00	57.01	66.13	62.30	66.38	0.008282	3.01	1390.91	406.29	0.19
Lower Reach	300.1583	50-yr	4500.00	57.01	63.56	61.94	64.52	0.092174	7.86	572.54	117.57	0.61
Lower Reach	300.1583	25-yr	3800.00	57.01	63.13	61.49	63.94	0.085108	7.23	525.65	107.49	0.58
Lower Reach	300.1583	10-yr	2700.00	57.01	62.30	60.72	62.89	0.075275	6.18	437.24	103.60	0.53
Lower Reach	300.1583	5-yr	2050.00	57.01	61.75	60.20	62.20	0.066174	5.38	381.12	101.06	0.49
Lower Reach	300.1583	2-yr	1180.00	57.01	60.85	59.42	61.10	0.050054	4.04	292.11	96.90	0.41
Lower Reach	706.6820	100-yr	5100.00	58.79	68.48		69.43	0.006434	2.36	997.59	308.82	0.17
Lower Reach	706.6820	50-yr	4500.00	58.79	68.58	66.14	69.28	0.004416	1.97	1026.46	309.36	0.14
Lower Reach	706.6820	25-yr	3800.00	58.79	68.29	65.44	68.88	0.004720	1.99	937.08	307.37	0.14
Lower Reach	706.6820	10-yr ·	2700.00	58.79	67.80	64.40	68.19	0.005302	2.01	787.19	303.75	0.15
Lower Reach	706.6820	5-yr	2050.00	58.79	67.47	63.67	67.73	0.005790	2.03	687.24	301.31	0.15
Lower Reach	706.6820	2-yr	1180.00	58.79	66.84		66.95	0.006739	. 2.06	508.86	247.35	0.16
Lower Reach	923.6518	100-yr	5100.00	60.08	70.40	69.47	71.58	0.015600	4.86		243.52	0.34
Lower Reach	923.6518	50-yr	4500.00	60.08	70.08	68.43	71.13	0.018930	5.19	661.36	241.20	0.38
Lower Reach	923,6518	25-yr	3800.00	60.08	69.92				4.88			0.36
Lower Reach	923.6518	10-yr	2700.00	60.08	69.56	66.52	70.04	0.015118	4.40	537.05	233.40	0.33
Lower Reach	923.6518	5-yr	2050.00	60.08	69.51	65.66	69.79	0.009515	3.47	523.78	231.48	0.27
Lower Reach	923.6518	2-Yr	1180.00	60.08	68.59	64.24	68.76	0.010351	3.34	353.33	99.57	0.25
		•										
Lower Reach	1041.783	100-yr	5100.00	60.28	73.09				6.94			
Lower Reach	1041.783	50-yr	4500.00	60.28	72.83	67.83	73.45	0.017775	6.34			0.41
Lower Reach	1041.783	25-yr	3800.00	60.28	72.28	67.14	72.80		5.76		353.54	0.37
Lower Reach	1041.783	10-yr	2700.00	60.28	71.36		71.69	0.012224	4.65			0.31
Lower Reach	1041.783	5-yr	2050.00	60.28	70.70		70.93	0.009465	3.87	529.57	204.47	0.26
Lower Reach	1041.783	2-yr	1180.00	60.28	69.52	63.64	69.63	0.005326	2.64	447.07	67.73	0.18
Lower Reach	1117		Culvert									
Lower Reach	1192.356	100-yr	5100.00	62.42	75.47	71.17	75.94	0.006283	4.64	957.78		0.28
Lower Reach	1192.356	50-yr	4500.00	62.42	75.20			0.007170	4.85			
I ower Reach	1192 356	25-vr	3800.00	62.42	74.75	69.68	75.23	0.009548	5.40	684.35	1222.73	0.33

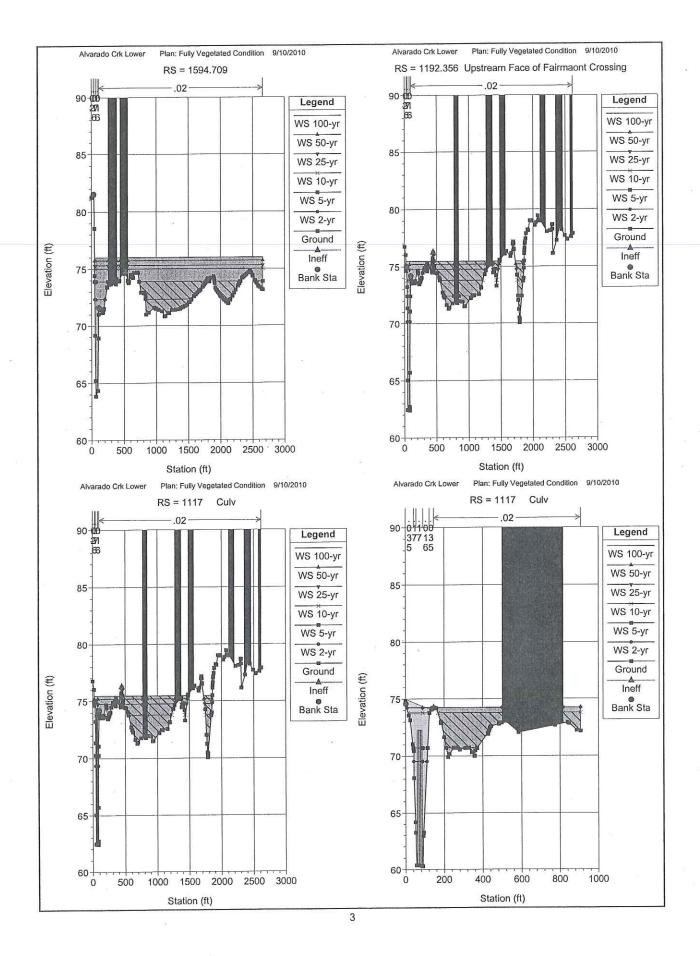
Reach River Sta Profile	River Sta	Profile	Q Total	Min Ch El 🔰 V	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width F	Froude # Chl
			(cfs)	(ft)	(£)	( <b>1</b> )	£	(ft/ft)	(ft/s)	(sq ft)	(tt)	
Lower Reach	1192.356	10-yr	2700.00	62.42	73.77	68.27	74.29	0.012939	5.81	472.40	847.78	0.37
Lower Reach	1192.356	5-yr	2050.00	62.42	72.41	67.32	72.84	0.013596	5.32	385.31	481.85	0.34
Lower Reach	1192.356	2-yr	1180.00	62.42	70.17	65.86	70.43	0.012182	4.14	284.84	44.73	0.28
Lower Reach	1594.709	100-yr	5100.00	63.85	· 76.01	72.19	76.01	0.000017	0.25	8020.92	2353.23	0.01
Lower Reach	1594.709	50-yr	4500.00	63.85	75.72	72.05	75.73	0.000017	0.26	7358.78	2352.92	0.01
Lower Reach	1594.709	25-yr	3800.00	63.85	75.30	70.94	75.31	0.000020	0.27	6370.98	2352.45	0.02
Lower Reach	1594.709	10-yr	2700.00	63.85	75.01	69.69	75.01	0.000015	0.23	5670.73	2352.12	0.01
Lower Reach	1594.709	5-yr	2050.00	63.85	73.90	68.85	74.08	0.001309	1.91	741.54	1786.13	0.12
Lower Reach	1594.709	2-yr	1180.00	63.85	72.33	67.49	72.44	0.002698	2.37	456.38	985.92	0.17
Lower Reach	1981.816	100-yr	5100.00	66.18	75.02	74.20	76.47	0.005856	3.75	787.47	1000.29	0.25
Lower Reach	1981.816	50-yr	4500.00	66.18	74.92	72.96	76.11	0.004953	3.41	768.33	985.65	0.23
Lower Reach	1981.816	25-yr	3800.00	66.18	74.66	72.15	75.62	0.004463	3.16	717.03	947.96	0.22
Lower Reach	1981.816	10-yr	2700.00	66.18	74.69	71.45	75.17	0.002183	2.21	723.76	952.24	0.15
Lower Reach	1981.816	5-yr	2050.00	66.18	74.36	71.24	74.68	0.001723	1.90	659.85	894.88	0.14
Lower Reach	1981.816	2-yr	1180.00	66.18	73.17	69.72	73.35	0.002050	1.80	472.37	411.01	0.14
Lower Reach	2168.688	100-yr	5100.00	66.38	76.84	75.34	77.03	0.001169	1.18	1693.71	1672.12	0.10
Lower Reach	2168.688	50-yr	4500.00	66.38	76.48	74.93	76.69	0.001502	1.28	1436.00	1547.83	0.11
Lower Reach	2168.688	25-yr	3800.00	66.38	76.04	74.33	76.28	0.002174	1.45	1138.91	1366.64	0.12
Lower Reach	2168.688	10-yr	2700.00	66.38	75.41	73.58	75.67	0.002712	1.49	823.84	925.29	0.12
Lower Reach	2168.688	5-yr	2050.00	66.38	74.91	73.28	75.15	0.003436	1.58	655.49	782.55	0.13
Lower Reach	2168.688	2-yr	1180.00	66.38	73.89	71.24	74.07	0.008784	2.25	394.31	607.83	0.18
Lower Reach	2214.731	100-yr	5100.00	67.14	76.64	75.24	77.24	0.002245	1.31	1223.60	1098.95	0.10
Lower Reach	2214.731	50-yr	4500.00	67.14	76.34	74.98	76.89	0.002298	1.28	1130.84	1069.34	0.10
Lower Reach	2214.731	25-yr	3800.00	67.14	75.99	73.26	76.47	0.002318	1.23	1025.22	1022.54	0.10
Lower Reach	2214.731	10-yr	2700.00	67.14	75.47	73.04	75.81	0.002074	1.09	878.60	636.32	0.09
Lower Reach	2214.731	5-yr	2050.00	67.14	75.03	72.96	75.29	0.002124	1.03	755.06	544.47	0.09
Lower Reach	2214.731	2-yr	1180.00	67.14	74.14	71.08	74.30	0.002846	1.19	529.09	395.00	0.10
Lower Reach	2231.639	100-yr	5100.00	67.18	77.09	74.39	77.40	0.016692	4.95	1244.76	1033.15	0.37
Lower Reach	2231.639	50-yr	4500.00	67.18	76.78	74.10	77.05	0.015909	4.66	1167.05	931.94	0.35
Lower Reach	2231.639	25-yr	3800.00	67.18	76.40	73.69	76.63	0.014687	4.28	1073.24	857.68	0.33
Lower Reach	2231.639	10-yr	2700.00	67.18	75.78	72.24	75.94	0.011601	3.52	926.03	734.15	0.28
Lower Reach	2231.639	5-yr	2050.00	67.18	75.30	71.56	75.42	0.009911	3.04	811.73	647.76	0.25
Lower Reach	2231.639	2-yr	1180.00	67.18	74.35	70.45	74.43	0.007772	2.35	597.29	317.02	0.20
									*			
Lower Reach 2467.648	2467.648	100-yr	5100.00	67.26	77.61	75.72	78.00	0.000936	0.81	1209.90	976.14	0.06

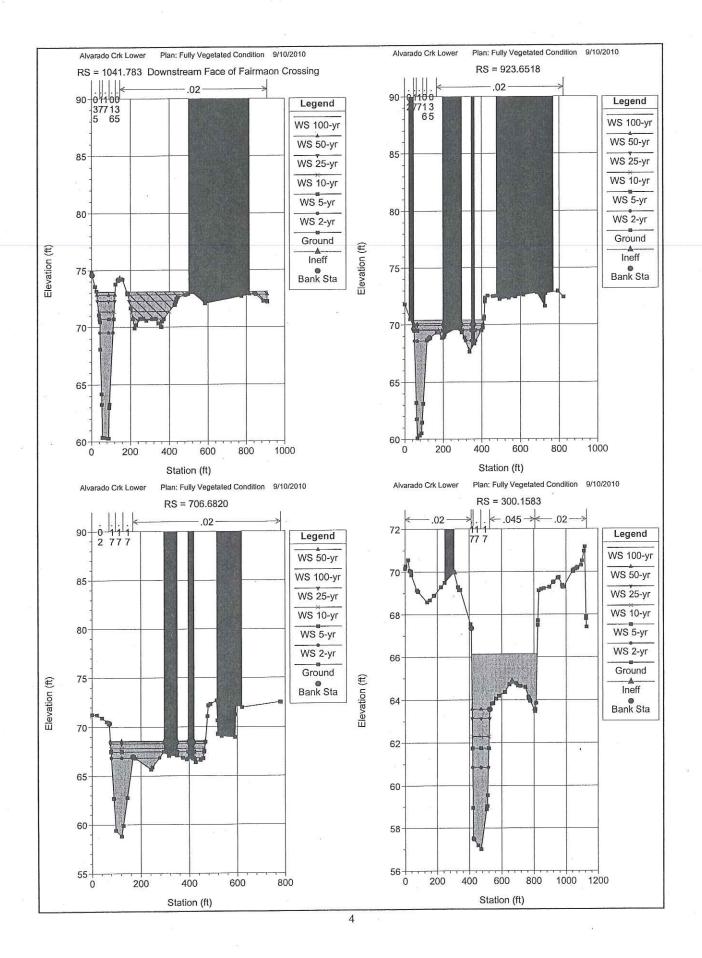
HEC-RAS Plan:	Fully_Veg Riv	HEC-RAS Plan: Fully_Veg River: Alvarado(west)	t) Reach: Lower	ver Reach (Continued)	inued)							
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(¥)	(#)	(Ħ)	(¥)	(tt/ft)	(ft/s)	(sq ft)	(Ψ)	
Lower Reach	2467.648	50-yr	4500.00	67.26	77.26	75.48	77.64	0.000907	0.77	1101.95	794.32	0.06
Lower Reach	2467.648	25-yr	3800.00	67.26	76.85	75.18	77.19	0.000866	0.72	983.08	653.50	0.06
Lower Reach	2467.648	10-yr	2700.00	67.26	76.19	74.66	76.45	0.000806	0.65	805.50	392.92	0.05
Lower Reach	2467.648	5-yr	2050.00	67.26	75.68	74.31	75.90	0.000794	0.61	678.80	292.02	0.05
Lower Reach	2467.648	2-yr	1180.00	67.26	74.76	73.75	74.92	0.000898	0.57	465.57	218.42	0.05
Lower Reach	2926.628	100-yr	5100.00	67.91	77.21	77.21	80.42	0.120201	14.38	354.62	259.42	1.00
Lower Reach	2926.628	50-yr	4500.00	67.91	77.12	76.61	79.69	0.097738	12.86	349.99	257.10	0.90
Lower Reach	2926.628	25-yr	3800.00	67.91	77.09	75.85	78.94	0.070989	10.92	348.05	256.13	0.76
Lower Reach	2926.628	10-yr	2700.00	67.91	76.80	74.50	77.83	0.041723	8.12	332.40	248.10	0.58
Lower Reach	2926.628	5-yr	2050.00	67.91	76.45	73.58	77.11	0.029101	6.53	313.78	217.95	0.47
Lower Reach	2926.628	2-yr	1180.00	67.91	75.74	72.07	76.02	0.014527	4.26	277.21	134.13	0.32
Lower Reach	3276.769	100-yr	5100.00	70.64	82.71	79.41	83.31	0.002447	2.76	1059.89	266.58	0.17
Lower Reach	3276.769	50-yr	4500.00	70.64	82.24	79.42	82.85	0.002893	2.89	936.42	256.77	0.18
Lower Reach	3276.769	25-yr	3800.00	70.64	81.67	78.92	82.29	0.003410	2.99	796.25	226.59	0.19
Lower Reach	3276.769	10-yr	2700.00	70.64	80.79	77.13	81.29	0.004214	3.06	617.53	184.76	0.21
Lower Reach	3276.769	5-yr	2050.00	70.64	80.19	76.22	80.55	0.004792	3.08	520.48	153.45	0.21
Lower Reach	3276.769	2-yr	1180.00	70.64	79.07	74.74	79.24	0.006295	3.13	362.07	118.05	0.23
Lower Reach	3415.773	100-yr	5100.00	70.56	83.15	79.31	84.12	0.015629	7.92	644.48	410.82	0.51
Lower Reach	3415.773	50-yr	4500.00	70.56	82.85	78.76	83.67	0.013728	7.27	619.15	335.42	0.46
Lower Reach	3415.773	25-yr	3800.00	70.56	82.45	78.06	83.09	0.011579	6.46	588.20	286.89	0.41
Lower Reach	3415.773	10-yr	2700.00	70.56	81.69	76.84	82.09	0.008148	5.08	531.76	233.01	0.33
Lower Reach	3415.773	-5-yr	2050.00	70.56	81.04	75.99	81.32	0.006342	4.22	485.43	201.91	0.28
Lower Reach	3415.773	2-yr	1180.00	70.56	79.80	74.63	79.93	0.003934	2.94	401.33	120.84	0.21

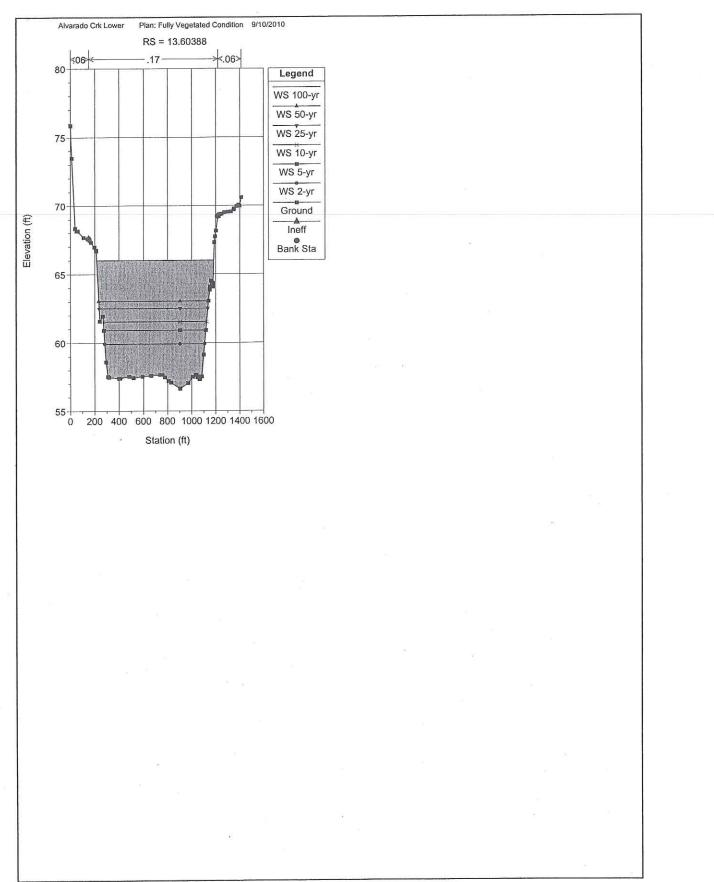
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HEC-RAS Version 4.0.0 March 2008 U.S. Army Corps of Engineers Hydrologic Engineering Center 609 Second Street Davis, California

х	Х	XXXXXX	XX	XX		XX	XX	Х	Х	XXXX
x	х	х	Х	X		Х	Х	Х	Х	X
x	x	x	х			Х	Х	Х	Х	X
XXXX	XXXX	XXXX	х		XXX	XX	XX	XXX	XXX	XXXX
X	х	X	х	8		Х	Х	Х	Х	Х
X	x	х	Х	Х		Х	Х	Х	Х	Х
X	х	XXXXXX	XX	XX		х	Х	Х	Х	XXXXX

PROJECT DATA Project Title: Alvarado Crk Lower Project File : AlvaradoCrkLower.prj Run Date and Time: 9/10/2010 9:23:37 AM

Project in English units

Project Description: City of San Diego - 1st Year Maintenance J-15541A October 13, 2009 Utilized 1999 City 2-foot Contour Topo (NGVD 29) Alvarado Creek (Lower/Westerly Portion) Helix Map Number 59 and 60 - Phase A Priority

PLAN DATA

Plan Title: Fully Vegetated Condition Plan File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.p04 Geometry Title: Fully Vegetated Condition Geometry File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.g04 : Fully Vegetated Condition Flow Title Flow File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.f03 Plan Summary Information: Number of: Cross Sections = Multiple Openings = 0 15 Culverts = Inline Structures = 0 1 Lateral Structures = 0 0 Bridges =

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculation tolerance	=	0.01
Maximum number of iterations		20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computation Options

Critical depth computed only wh	
Conveyance Calculation Method:	At breaks in n values only
Friction Slope Method:	Average Conveyance
Computational Flow Regime:	Subcritical Flow

## FLOW DATA

Flow Title: Fully Vegetated Condition
Flow File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.f03

Flow Data (cfs)

River	Reach	RS	100-yr	50-yr
25-yr	10-yr	5-yr	2-yr	
Alvarado(v	west) Lower Reach	3415.773	- 5100	4500
3800	2700	2050	1180 .	

Upstream

Boundary Conditions

River	Reach	Profile
Downstream		
Alvarado(west) Known WS = 66	Lower Reach	100-yr
Alvarado(west)	Lower Reach	50-yr
Normal S = 0.0013 Alvarado(west) Normal S = 0.0013	Lower Reach	25-yr
Alvarado(west)	Lower Reach	10-yr
Normal S = 0.0013 Alvarado(west) Normal S = 0.0013	Lower Reach	5-yr
Alvarado(west)	Lower Reach	2-yr
Normal $S = 0.0013$		

GEOMETRY DATA

Geometry Title: Fully Vegetated Condition Geometry File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.g04

CROSS SECTION

RIVER: Alvarado(west) REACH: Lower Reach		RS: 3415.773		<u>a</u>	8		
INPUT Description: Station Elevation Dat Sta Elev	ta num= Sta Elev	53 Sta	Elev	Sta	Elev	Sta	
	0.52 83.72	49.34	83.36	70.68	83.34	100.85	
83.38 109.41 83.29 130 71	0.02 71.42	131.31	70.67	131.95	70.56	137.65	
157.14 71.13 159	9.47 72.36	160.66	72.71	167.65	74.77	169.83	
75.63 188.02 82.83 194 83.49	4.79 83.06	215.5	83.25	236.72	83.43	246.85	
	3.32 83.17	309.77	83.06	333.91	82.93	338.78	
	4.16 81.39	392.18	80.28	400.42	79.82	401.41	
407.16 79.67 45	5.28 79.7	459.96	79.94	464.45	80.31	465.99	
	4.47 80.65	497.4	80.72	499.2	80.77	503.06	
	4.76 81.12	553.49	82.42	566.92	82.25	568.15	
	2.64 82.6	600.74	82.89	602.56	82.94	622.5	
83.36 631.58 83.4 63	2.75 83.39	637.02	83.47				
Manning's n Values Sta n Val	num= Sta n Val	5 Sta	n Val	Sta	n Val	Sta	n
Val 0 .02 10	9.41 .016	130.02	.17	160.66	.016	188.02	
Bank Sta: Left Rig	ht Lengths	: Left Ch	annel	Right	Coeff	Contr.	
Expan. 109.41 194.	79	138.55	139	139.44		.1	
0 100.85 8	num= 2 Elev Permane 3.38 F 3.49 F						
CROSS SECTION	2			×			
RIVER: Alvarado(west REACH: Lower Reach	.) RS: 327	76.769					
INPUT Description: Station Elevation Da Sta Elev Elev	ta num= Sta Elev	51 Sta	Elev	Sta	Elev	Sta	

81.69 4.45 81.89 35.41 81.92 70.17 81.17 100.3 0 81.46 81.05 134.98 75.05 140.38 72.26 142.25 81.2 122.62 112.67 71.29 79.88 186.01 70.64 172.28 73.88 184.34 70.84 165.75 154.18 80.72 80.52 238.65 80.44 245.22 80.73 210.25 80.63 229.99 191.45 80.45 79.58 387.47 79.61 384.55 79.49 393.73 304.34 80.13 380.38 79.41 78.35 429.59 78.34 422.24 78.42 416.91 79.12 416.31 410.54 78.36 80.04 500.14 78.78 484.52 455.88 78.38 465.27 78.36 469.47 81.43 81.76 514.04 81.84 516.55 82.2 516.86 81.95 522.35 505.85 82.35 531.72 82.76 552.96 83.45 582.28 83.42 597.3 83.4 609.57 83.62 83.49 670.66 83.47 684.79 84.54 685.45 84.57 687.4 660.02 84.72 84.77 688.83 num= 5 Manning's n Values Sta n Val .02 122.62 .016 140.38 .17 172.28 .016 186.01 0 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 345.32 350.14 353.92 .1 122.62 186.01 .3 num= 1 Ineffective Flow Sta L Sta R Elev Permanent 81.46 F 0 100.3 2 Blocked Obstructions num= Sta L Sta R Elev Sta L Sta R Elev 92.64 90 208.28 393.34 90 13.62 CROSS SECTION RIVER: Alvarado(west) RS: 2926.628 REACH: Lower Reach INPUT Description: 42 num= Station Elevation Data Elev Sta Elev Sta Elev Sta Elev Sta Sta Elev 81.64 87.76 81.37 97.81 72.39 53.38 81.66 0 82.29 81.01 68.53 144.01 70.41 120.03 67.91 141.42 72.05 115.78 113 68.59 78.36 175.86 76.17 177.43 148.04 70.84 153.8 74.06 161.57 76.16

76.74 229.11 76.79 247.52 77.21 249.49 223.02 76.64 227.21 77.2 75.94 370.4 76.45 362.99 76.46 335.65 254.91 77.19 335.23 75.85 75.13 423.65 75.53 407.82 75.41 412.56 75.43 404.82 397.23 75.26 76.78 499.97 75.66 460.33 75.67 467.47 76.07 490.09 459.1 76.64 79.92 666.44 79.91 610.52 79.96 613.3 507.82 77.08 557.44 79.99 80.17 676.28 80.14 674.48 num= 5 Manning's n Values Sta n Val Sta n Val Sta n Val Sta n n Val Sta Val .17 148.04 .016 161.57 .016 115.78 0 .02 97.81 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 97.81 161.57 455.11 458.98 464.26 .1 . 3 Ineffective Flow num= 1 Sta L Sta R Elev Permanent 161.54 676.28 78.35 F 3 Blocked Obstructions num= Elev Sta L Sta R Elev Sta L Sta R Elev Sta R Sta L 90 195.38 332.19 90 0 65.03 90 530.39 676.28 CROSS SECTION RIVER: Alvarado(west) RS: 2467.648 REACH: Lower Reach INPUT Description: 131 Station Elevation Data num= Sta Elev Sta Sta Elev Elev Sta Elev Sta Elev 35.08 34.64 83.42 83.6 33.83 83.49 0 85.14 31.71 83.41 83.15 69.63 86.73 70.11 59.99 81.37 73.72 74.68 82.27 68.19 92.06 68.64 97.86 71.13 103.24 73.43 113.31 67.26 89.02 73.68 71.89 165.93 72.07 166.17 72.07 156.92 146.6 72.29 153.08 72.08 72.94 245.26 72.82 258.71 72.9 268.41 72.11 202.5 167.48 73.53 76.82 346.9 76.66 346.46 74.91 342.16 269.48 73.55 294.79 76.83 77.93 442.68 78.03 457.77 77.04 420.61 77.94 422.58 352.33 78.17 78.02 507.95 78.05 514.77 78 545.03 78.06 507.21 493.61 77.39

554.65	77.1	558.3	77	562.9	76.89	592.83	76.22	596.07	
76.24 609.78	76.47	643.62	76.71	645.17	76.7	665.46	76.81	673.24	
76.88 708	77.18	763.5	78.67	770.56	78.32	794.79	79.02	831.94	
78.37 855.73	78.71	859.72	78.76	881.44	79.06	892.44	79.65	895.56	
78.63 902.16 76.15	76.75	903.47	77.15	906.73	77.79	909.69	77.14	916.27	
924.71 75.47	76.06	982.71	75.44	989.78	75.49	992.3	75.48	994.07	
994.82	75.46	1002.08	75.17	1075.12	74.87	1081.44	75.17	1087.78	
75.18	76 7	1136.68	76 76	1149.13	77.15	1153.32	77.09	1201.92	
1134.03 76.41	/0./	1150.00						1000 1	
1209.82 76.3	76.35	1225.56	76.12	1254.7		1273.65	76.22	1290.4	
1316.22 76.74	76.41	1319.91	76.43	1349.5	76.55	1350.69	76.52	1377.48	
1378.49	76.78	1405.71	77.02	1408.81	76.97	1416.98	77.03	1463.22	
77.46 1464.35	77.47	1465.26	77.38	1465.46	77.33	1492.9	77.32	1495.06	
77.49 1497.02	77.51	1526.26	77.54	1528.61	77.57	1557.48	77.59	1560.29	
77.6 1588.83	77.63	1592.01	77.64	1617.89	77.71	1643.35	77.77	1650.27	e.
77.81 1675.79	77.87	1677.17	77.88	1702.31	77.94	1703.75	77.95	1727.8	
77.87 1732.13	77.89	1735.39	77.86	1758.02	77.78	1761.23	77.75	1763.95	
77.79		1787.59			77.8	1810.66	77.74	1813.79	
1784.6 77.78						1868.06		1868.49	
1820.99 77.93	77.81		77.88	1855.62	11.95	1888.00	11.94	1000.49	
1878.22	77.98								
Manning's		es	num=	5	n Val	Sta	n Val	Sta	n
Sta Val	n Val								
0	.035	59.99	.17	82.27	.17	97.86	.17	113.31	
Bank Sta:	Left	Right	Length	s: Left	Channel	Right	Coeft	E Contr.	
Expan.	59.99	113.31		232.89	236.01	234.37		.1	
.3 Ineffecti	ve Flow	num=	=	1					
Sta L	Sta R	Elev	Perman F						
457.77 Blocked O			num=	2					
Sta L	Sta R				a Elev				
393.47				1212.91					
CROSS SEC	TION								

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RIVER:	Alvarado(west)			
REACH:	Lower Reach	RS:	2231.639	

INPUT Description:

Descriptio									
Station E Sta	levation Elev	Data Sta	num= Elev	120 Sta	Elev	Sta	Elev	Sta	
Elev 0	76.8	12.75	75.85	17.94	75.04	51.03	73.41	51.81	
73.4 52.64	73.35	54.8	73.36	56.84	72.84	80.96	68.39	81.55	
68.28	67 05	92.65	67.42	102.28	67.26	105.78	67.18	107.28	
83.35	67.85	92.05	07.42	102.20	07120				
67.35 108.73	67.41	119.2	68.15	120.35	68.23	124.25	68.47	125.11	
68.93 130.5	71.14	132.75	72.19	144.53	72.32	146.66	72.33	154.89	
72.34 163.13	72.39	172.13	72.44	200.97	72.59	222.6	72.75	229.84	
72.92 250.17	73.03	264.5	73.1	267.34	73.09	274.94	72.99	287.98	
73.17 291.98	73.34	338.77	73.46	352.25	75.59	358.58	75.57	378.11	
76.64						400 0	77 64	437.38	
409.95	77.45	424.63	77.62	428.34	77.74	429.8	77.64	437.30	
77.02				2010/03/000 8		100 11	RC 21	<b>F13 OF</b>	
448.59	76.88	465.55	76.73	477.09	76.63	488.11	76.31	513.25	
75.49 517.54	75.56	518.31	75.58	536.09	75.88	541.8	75.85	581.1	
76.06 611.82	75.41	615.4	75.4	627.3	75.69	630.96	75.78	636.47	
75.92 653.45	76.35	658.88	76.34	668.58	76.19	707.85	75.57	742.43	
74.25 749.35	74.2	763.74	74.34	800.8	75.09	816.48	74.89	829.18	
74.42 829.93	74.37	830.73	74.44	833.71	74.31	838.94	74.34	865.2	
75									
909.05	76.09	917.31	75.9	966.88	74.57	1003.02	74.72	1049.97	
74.77							V 3.2		
1113.38	74.78	1153.48	75.02	1242.96	75.08	1279.83	74.03	1281.75	
73.98							100 1 1 202		
1314.45 74.47	74.01	1329.84	74.17	1334.15	74.24	1350.52	74.82	1379.5	
1430.9	74.43	1469.75	74.96	1516.6	75.29	1527.23	75.55	1539.52	
76.78			10	1 ( 1 1 1 1 2	76 50	1631.79	77 54	1640.26	
1545.51	77.26	1565.11	77.18	1611.43	70.59	1031.75	11.54	1040.20	
77.82				1041 01	77 53	1760.68	77 35	1780.39	
1672.84	77.77	1719.97	11.13	1741.31	//.53	1/00.00	11.55	1100.35	
77.16		1040 01	<b>DD 1</b> C	1880.35	76 96	1910.12	77 41	1912.12	
1802.24	77.4	1849.81	//.10	T000.33	70.00	1910.12		1710.11	
77.42 1936.96	77.47	1970.04	76.62	1982.33	76.31	1990.43	76.76	2006.08	
78.02 2008.62	78.15	2009.51	78.23	2014.93	78.64	2020.55	78.77	2034.15	
79.03									

Manning's n Values num= 4 Sta n Val Sta n Val Sta n Val n Val Sta 81.55 .17 119.2 .17 54.8 .17 0 .025 Lengths: Left Channel Right Coeff Contr. Bank Sta: Left Right Expan. 16.13 16.91 37.54 .1 132.75 0 .3 1 Ineffective Flow num= Elev Permanent Sta R Sta L 428.34 2034.15 77.74 F 6 Blocked Obstructions num= Elev Sta L Sta R Elev Sta L Sta R Sta R Elev Sta L 552.57 607.29 85 87 184.32 275.65 85 340.74 396.32 2031.7 2034.15 90 85 1807.53 1866.52 87 856.96 1244.13 CROSS SECTION RIVER: Alvarado(west) RS: 2214.731 REACH: Lower Reach INPUT Description: Drop Strucure at Old Road Crossing 132 Station Elevation Data num= Elev Sta Elev Sta Elev Sta Sta Elev Sta Elev 32.65 77.13 31.38 75.35 4.69 78.26 19.99 0 78.8 75.36 68.7 98.81 73.53 95.88 74.49 75.72 47.05 74.64 60.75 67.95 67.22 105.37 104.5 67.29 103.51 67.24 102.07 67.35 102.3 67.21 143.1 128.26 69.4 67.22 117.44 67.15 118.92 67.14 119.21 72.97 160.75 72.57 182.67 72.73 192.62 154.75 72.74 147.52 72.88 72.61 248.98 72.63 193.9 72.63 202.04 72.79 203.03 72.78 212.51 72.52 304.45 72.82 305.5 271.5 72.51 302.09 72.8 251.05 72.53 72.87 353.9 358.18 73.25 350.18 73.13 351.51 72.93 73.43 313.36 74.32 75.85 380.05 75.81 390.48 376.42 75.82 377.9 368.7 76.5 76.33 76.77 439.48 404.34 77.03 405.94 76.97 411.53 394.76 76.55 75.92 75.07 496.29 480.79 . 75.01 483.64 75.73 451.19 75.64 447.47 75.38 75.57 580.21 75.84 608.69 75.63 609.25 526.86 505.79 75.61 75.62 75.88 743.92 75.98 709.38 627.49 75.57 662.49 75.58 621.32 75.81 74.58 847.52 74.44 850.1 75.33 851.67 808.08 75.14 842.46 75.84

853.5	75.75	863.11	75.73	896.48	75.71	940.17	75.67	942.15	
75.68 970.19	74.78	995.12	74.37	1085.56	74.41	1125.08	74.38	1176.36	
74.69 1223.87	74.93	1267.55	75	1298.95	74.42	1308.02	74.18	1312.54	
74.17 1339.62	74.15	1356.07	74.13	1358.46	74.16	1362.15	74.33	1370.72	
73.27 1375.79	72.41	1381.3	72.4	1385.28	72.39	1386.68	72.37	1443.12	
72.05		1451.83		1458.42		1472.94	72.54	1505.43	
74.16					75.83	1550.2		1553.68	
1512.29	75.72	1513.91	/6.23	1530.37	75.85	1330.2	75.00	1999.00	
	76.2	1573.52	77.27	1574.42	77.36	1599.33	77.39	1640.48	
1644.68 76.81	77.62	1681.27	76.5	1698.12	76.47	1703.78	76.46	1749.14	
1764.78	76.68	1814.25	77.5	1830.66	77.69	1879.63	77.79	1905.43	
77.53 1957.8	78.01	1977.52	78.05	2014.28	75.94	2016.6	75.81	2020.51	
75.99 2035.53	77.45	2040.76	78.2	2042.13	78.4	2046.47	78.66	2048.95	
78.81 2049.4	78.84	2088.99	77.99						
		0 1212	201100	6					
Manning's Sta	n Value n Val		num= n Val		n Val	Sta	n Val	Sta	n
Val 0	.035	47.05	.17	95.88	.17	128.26	.17	143.1	
.035 202.04	.02								
Bank Sta:	Left	Right	Length	s: Left (	Channel	Right	Coeff	Contr.	
Expan.	47.05	143.1		31.05	46.04	52.74		.1	
.3	1000 <b>–</b> 10			-					
Ineffecti Sta L	ve Flow Sta R		Perman	1 ent					
	2088.99	77.03	F						
Blocked O	bstruct	ions	num=	7				):	
Sta L				Sta R		Sta L		Elev	
	275.77			373.41		883.42		90 90	
1579.78			1834.2	1893.63	90	1952.63	1999.30	. 90	
2059.58	2088.99	90							
CROSS SEC	TION								
		(and the second s							
RIVER: Al REACH: LO			RS: 21	68.688					
INPUT									
Descripti Station E		n Data	num=	130					
Sta	Elev		Elev		Elev	Sta	Elev	Sta	
Elev									

	0	81.11	8.42	80.99	28.98	79.2	35.51	78.16	41.11	
	77.81 41.46	77.79	49.04	76.92	49.21	76.77	49.37	76.92	82.88	
		74.76	101.97	74.53	108.09	70.47	109.72	69.35	114.08	
e	56.38 116.39	66.55	133.68	67.83	135.76	68.42	137.48	68.92	152.33	
	73.19 154.59	73.2	164.21	72.76	214.35	72.55	235.29	72.76	236.86	
5	72.78 272.29	73.21	276.75	73.19	313.88	73.62	322.66	73.67	332.02	
1	73.76 371.42	74.39	391.58	74.46	391.98	74.47	397.41	74.66	412.65	
5	75.38									
,	429.65 75.49	75.99	432.12	75.63	436.98	74.8	453.7	75.15	469.65	
	482.13 75.57	75.32	503.89	. 74.94	511.34	74.86	515.46	75.09	543.35	
	578.89 75.97	75.92	605.69	75.33	622.05	75.8	627.14	75.96	661.78	
	675.45 75.83	75.76	676.55	75:73	687.84	75.78	695.12	75.81	695.54	
3		75.86	717.53	75.85	726.03	75.89	734.98	75.93	755.29	
1	702.92		/1/.55		720.05	75.05	751.50	10100	,	
	76.02 755.55	76.04	758.4	76.21	771.81	76.4	796.33	76.73	803.08	
	76.59 803.36	76.57	819.66	76.78	835.81	76.97	836.04	77	839.41	
	77.22 878.82	76.85	890.04	76.59	890.63	76.56	906.91	76.39	914.08	
	76.32 921.68	76.25	921.89	76.27	925.47	76.52	948.37	75.75	972.75	
	74.93 979.07	74.72	1009.42	73.57	1012.54	73.52	1023.73	73.49	1076.49	
	73.36 1078.47	73.37	1185.18	73.35	1241.16	73.1	1320.75	72.86	1323.48	
	72.88 1346.75	73.01	1381.97	74.25	1386.87	74.49	1395.25	74.58	1434.3	
	74.94 1437.78	74.92	1450.87	74.37	1477.49	74.27	1545.68	74.56	1578.98	
	76.66	76.68	1600.5	75.9	1628.93	74.48	1647.38	75.39	1693.93	
	75.3 1716.25	75.27	1717.43	75.26	1744.84	76.44	1761.11	76.02	1787.9	
	75.88 1828.77	75.93	1850.39	75.79	1872.58	75.7	1885.99	75.68	1916.24	
	76.57 1917.11	76.58	1943.96	76.56	1944.71	76.54	1949.43	76.48	1987.9	
	76.01 2041.55	76.43	2068.14	76.8	2081.25	76.55	2105.17	76.72	2114.6	
	76.66 2120.74	77.58	2121.39	77.68	2122.26	77.7	2137.68	78.4	2168.38	
8	79.02	*				22		8		
	, <sup>1</sup>				c					
]	Manning's					··· · · · · · · · · · · · · · · · · ·	0+-	n 17-1	0+-	~
	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	п
	Val						27			

.025 101.97 .17 109.72 .17 137.48 .17 152.33 0 .035 272.29 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 178.72 186.87 197.94 .1 49.04 154.59 . 3 1 Ineffective Flow num= Elev Permanent Sta L Sta R F 839.41 2168.38 77.22 7 Blocked Obstructions num= Elev Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R 90 90 1452.21 1548.05 90 934.55 972.18 345.94 374.87 90 90 2033.15 2077.5 90 1912.43 1972.34 1649.05 1720.79 90 2162.07 2168.38 CROSS SECTION RIVER: Alvarado(west) RS: 1981.816 REACH: Lower Reach INPUT Description: num= 127 Station Elevation Data Elev Sta Sta Elev Sta Elev Elev Sta Sta Elev 79.05 44.52 43.66 83.75 83.82 34.24 26.29 0 84.65 78.91 73.68 117.48 107.5 76.27 55.06 52.63 76.51 78.5 47.34 73.69 69.08 147.09 66.53 147.68 74.5 143.27 73.87 135.14 121.54 66.18 71.79 268.97 71.78 208.92 207.09 66.2 177.68 66.79 148.53 71.61 71.08 365.49 70.93 355.82 338.31 71.27 71.45 307.37 286.29 72.96 416.58 75.18 431.39 74.58 74.21 377.15 74.57 377.34 369.68 75.55 76.77 581.67 500.16 76.66 511.31 76.64 498.44 76.65 497.42 75.17 74.09 607.81 74.59 627.47 74.36 596.04 74.78 592.49 587.43 75.22 75.82 710.64 75.72 678.56 668.9 75.47 661.48 75.65 651.82 76.16 71.4 751.18 728.7 727.37 71.42 72.07 74.79 714.72 712.03 70.46 70.6 790.66 70.63 792.22 788.19 70.4 785.21 70.57 761.32 70.66 72.07 941.53 71.63 940.59 71.48 900.76 71.38 852.37 838.84 72.08 72.17 1014.63 72.29 1037.68 72.28 1000.66 72.18 1004.87 964.43 71.95 71.91 1122.41 72.15 1138.79 72.08 1253.51 72.09 1274.09 1050.64 72.32

73.61 1424.82 72.32 1367.11 72.64 1389.46 72.34 1353.17 1333.33 74.08 73.61 1610.2 73.38 1583.36 74.44 1510.27 73.71 1539.64 1463.87 73.66 73.39 1690.32 73.43 1686.19 73.48 1676.18 73.51 1653.24 1635.67 73.38 74.04 1761.35 73.38 1700.52 73.53 1747.46 73.37 1694.24 1693.81 74.09 75.01 1876.85 75.26 1886.5 74.67 1844.83 1779.25 74.63 1800.08 75.75 74.08 2032.6 75.08 1936.81 74.18 1955.42 73.79 1972.69 1890.08 73.63 76.79 2091.39 73.55 2055.82 73.53 2059.2 73.97 2077.89 2053.07 76.87 77.12 2149.21 77.14 2169.15 77.07 2182.51 76.74 2133.72 2094.31 77.2 77.35 2247.8 77.21 2229.19 77.2 2233.11 77.34 2234.63 2183.81 76.86 76.54 2383.26 76.53 2386.26 76.42 2428.46 76.11 2379.09 2316.18 74.73 75.55 2441.79 78.2 2470.28 78.04 2481.28 75.25 2430.87 2429.38 78.01 77.84 2513.55 77.81 2509.95 5 Manning's n Values num= Sta n Val Sta n Val Sta n Sta n Val Sta n Val Val .016 143.27 .17 177.68 .016 207.09 .025 135.14 0 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 397.08 387.11 367.43 .1 135.14 207.09 .3 1 Ineffective Flow num= Elev Permanent Sta L Sta R 511.31 2513.55 76.77 F 10 Blocked Obstructions num= Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev 90 505.65 581.04 90 366.42 431.68 90 245.39 330.92 90 90 1146.29 1186.87 90 1312.75 1341.97 789.77 1118.24 90 1762.96 1868.49 90 2082.76 2284.39 . 90 1486.06 1556.66 2346.39 2390.73 90 CROSS SECTION RIVER: Alvarado(west) RS: 1594.709 REACH: Lower Reach INPUT Description: 165 Station Elevation Data num= Sta Elev Sta Sta Elev Elev Elev Sta Sta Elev 38.54 81.27 32.08 81.53 81.26 4.29 3.6 0 81.24 81.45

42.88	78.55	47.5	74.42	55.83	69.17	62.95	65.2	65.36	
63.85 92.75	64.35	95.54	64.37	104.12	68.94	108.05	71.03	109.14	
71.61	71.39	166.03	71.16	168.57	71.15	175.1	71.21	184.39	
127.14 71.43	/1.39	100.03	11.10	100.57	/1.10	1/0.1	/2102		
	71.5	187.13	71.52	236.4	73.4	237.09	73.41	268.14	
73.62	77 66	295.95	73.67	324.02	73.93	345.93	73.81	371.75	
294.5 73.66	73.66	295.95	/5.0/	524.02	15.25	515.55			
383.11	74.14	414.98	73.94	420.44	73.91	422.27	73.92	424.77	
73.97	72 00	426.56	73.99	466.28	74.58	467.34	74.59	504.82	
424.88	73.98	420.50	15.99	400.20	74.50	107.51	,		
74.6 522.99	74.76	558.3	74.01	559.94	73.99	560.54	73.97	569.14	
73.76	/4./0	550.5	/1101						
596.78	74.29	605.83	74.52	616.15	74.43	634.74	74.26	639.37	
74.21					74 71	713.76	74.66	763.8	
641.16 72.93	.74.26	656.72	74.65	703.85	74.71	/13./0	/4.00	705.0	
801.7	72.92	804.8	72.9	810.04	72.86	831.79	72.73	833.5	
72.38						071 0	<b>D1</b> C1	072 07	
843.33	71	882.51	71.16	968.58	71.6	971.8	71.61	973.87	
71.58 998.07	71 48	999.71	71.52	1037.78	71.4	1090.42	71.27	1130.12	
70.83	/1.40	<i>JJJ</i> .1±	71.52	100					
1142.01	70.84	1189.25	71.11	1199.17	71.12	1246.15	71.38	1294.17	
71.39				1068 60	71 40	1202 75	71 67	1417.65	
1306.69	71.43	1330.64	71.44	1367.69	/1.48	1392.75	/1.5/	1417.05	
71.66 1442.39	71.74	1455.9	71.75	1480.65	71.84	1507.67	72.05	1521.17	
72.07									
1548.12	72.28	1583.8	72.57	1590.38	72.61	1610.57	72.72	1617.02	
72.77	70.00	1642 50	72 02	1663.85	73 03	1684.25	73.14	1690.36	
1637.25 73.18	12.88	1643.58	12.94	1002.02	75.05	1001.20			
1720.07	73.4	1721.93	73.42	1726.44	73.46	1742.1	73.58	1746.66	
73.63								1000 00	
1762.3	73.74	1766.72	73.79	1782.34	73.95	1798.11	74.11	1802.33	
74.16 1808.47	74 09	1815.84	73.89	1823.63	73.85	1858.05	74.2	1893.05	
74.32	72.02							28 53	
1899.49	74.13	1900.86	74.08	1909.1	73.77	1910.32	73.71	1919.01	
73.3	<b>70 1</b> 0	1044 06	72 00	1959.83	72 94	1976.87	72.79	1993.96	
1934.76 72.64	/3.16	1944.06	73.00	1939.03	12.94	1970.07			
2002.86	72.56	2027.9	72.43	2053.18	72.29	2059.57	72.25	2084.9	
72.12					<b>F1</b> 00	0140 00	72 26	2151.19	
2091.1	72.08	2116.49	71.94	2119.83	71.98	2148.08	12.20	2121.19	
72.29 2179.8	72.58	2185.55	72.64	2209	72.88	2232.84	73.12	2235.73	
73.14							1 Statistics 1		
2267.86	73.48	2270.89	73.51	2286.9	73.68	2288.93	73.7	2304.91	
73.87	72 00	2334.55	74 19	2227 72	74.2	2352.04	74.27	2355.1	
2306.98 74.28	13.09	4004.00	/1.10	2337.73	, 1 . 4		a sasta		
11.20									

74.43 2386.87 74.44 2401.32 74.51 2404.21 74.36 2383.86 2369.42 74.53 74.65 2494.14 2429.19 74.65 2454.51 74.78 2457.5 74.85 2475.72 74.45 73.72 2561.68 73.75 2585.58 73.97 2559.62 74.36 2535.88 2498.97 73.49 73.34 2640.94 73.22 2642.44 73.21 2656.25 2587.3 73.45 2614.1 73.15 Manning's n Values num= 5 n Val Sta n Val Sta n Val Sta n n Val Sta Sta Val 62.95 .17 92.75 .016 109.14 .02 32.08 .016 0 .02 Lengths: Left Channel Right Coeff Contr. Right Bank Sta: Left Expan. 420.75 402.35 377.25 .1 32.08 109.14 . 3 num= Ineffective Flow 1 Elev Permanent Sta L Sta R 522.99 2656.25 74.76 F 2 Blocked Obstructions num= Sta R Elev Sta L Sta R Elev Sta L 436.7 558.37 90 251.93 387.55 90 CROSS SECTION RIVER: Alvarado(west) RS: 1192.356 REACH: Lower Reach INPUT Description: Upstream Face of Fairmaont Crossing 170 Station Elevation Data ກນm= Elev Sta Elev Sta Sta Sta Elev Sta Elev Elev 74.65 25.29 74.92 35.1 76.04 21.89 76.77 18.93 0 74.97 47.46 62.46 40.34 73.23 44.03 71.37 46.29 65.04 47.6362.46033 79.39 62.72 82.17 52.57 62.47 62.7 62.43 79.09 62.42 65.7 74.1 101.8 87.2 71.07 98.3 73.93 99.47 74.2 101.43 74.06 73.54 123.79 73.6 125.51 73.53 111.8 73.52 114.14 110.38 73.72 73.58 162.42 73.59 167.25 73.67 157.07 73.54 161.04 156.53 73.63 74.41 228.38 73.75 208.44 74.68 210.42 74.56 213.36 168.05 73.59 73.63 251.87 73.77 260.77 73.92 269.63 73.45 243.72 233.28 74.02 305.4 74.69 313.68 74.89 319.79 74.83 339.44 283.97 74.46 75.04 74.6 354.11 74.65 353.09 74.63 353.6 75.01 350.26 342.79 74.58

							2		
356.48	75.26	394.6	74.94	429.16	74.57	431.36	74.48	438.63	
75.37 440.77	75.59	442.53	75.76	448.54	76.25	448.64	76.24	454.45	
76.12 457.74	75.5	460.8	75.01	466.44	75.04	483.29	74.47	499.53	
74.43 514.59	74.39	538.86	74.05	548.88	73.89	553.46	73.78	554.01	
73.81 555.27	73.78	595.7	72.73	608.77	72.47	621.83	72.28	658.25	
71.62 687.91			71 38	751.01	71.76	813.92	71.82	821.41	
71.78								932.56	
862.82	71.97	887.32	/1.93	901.82	11.94	929.54	71.51	552.50	
71.5 934.69 72.24	71.49	937.68	71.51	938.79	71.52	1029	72.21	1033.02	
1069.62	72.48	1084.18	72.45	1159.78	72.56	1194.18	73.13	1194.99	
73.15 1196.07	73.18	1248.61	74.31	1249.84	74.3	1267.16	74.63	1356.36	
75.17 1374.72	75.27	1379.93	74.47	1383.42	74.45	1391.79	74.54	1398.41	
74.61 1419.11	74.79	1425.07	74.2	1432.86	73.3	1476.57	75.45	1478.13	
75.52 1480.72	75.56	1481.32	75.58	1556.48	76.09	1580.63	76.34	1644.38	
75.89 1653.98	76.15	1682.03	76.98	1687.06	77.16	1688.73	77.04	1692.49	
76.96 1696.11	76.55	1697.49	76.47	1747.83	74.25	1764.6	72.03	1774.73	
71.24 1781.54						1786.58		1790.93	
70.38		1845.09		1850.6		1854.08		1856.38	
75.48				1864.2		1866.65		1871.47	
1858.9 77.16						1921.72		1946.47	
1881.03 79		1887.79							
1969.69 78.85	79.01	1979.5		1980.5		2026.36			
2073.87 78.05	79.44	2086.71	79.09	2101.29	78.97	2121.21	78.98	2218.29	
2263.61 76.13	78.13	2297.66	78.65	2299.32	78.67	2300.66	78.26	2307.54	
2363.75	77.28	2409.66	78.45	2440.17	78.23	2492.2	77.69	2529.08	
77.41 2530.74 77.89	77.37	2531.9	77.4	2588.93	77.6	2610.61	77.88	2616.93	
Manning's Sta	n Valu n Val		num= n Val	5 Sta	n Val	Sta	n Val	Sta	n
Val O	.02	35.1	.016	47.63	.17	79.09	.016	99.47	
.02	.02	55.1							3
Bank Sta: Expan.	Left	Right	Length	s: Left	Channel	Right	Coef	f Contr.	

15 of 25

150.44 150.57 156.21 . 3 35.1 99.47 .5 Ineffective Flow 2 num= Sta R Elev Permanent Sta L 35.1 74.97 F 0 F 76.25 448.54 2616.93 6 Blocked Obstructions num= Sta R Elev Elev Sta L Sta R Elev Sta L Sta R Sta L 90 90 1481.65 1571.21 90 1272.38 1373.24 771.98 844.79 90 2574.5 2616.93 90 90 2348.88 2459.84 2109.13 2197.69 CULVERT RIVER: Alvarado(west) RS: 1117 REACH: Lower Reach INPUT Description: Distance from Upstream XS = 25 Deck/Roadway Width = 110 Weir Coefficient = 2.6 Upstream Deck/Roadway Coordinates 2 num= Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 74.1 99 74.97 35.1 Upstream Bridge Cross Section Data 170 Station Elevation Data num= Sta Elev Sta Elev Elev Sta Sta Sta Elev Elev 74.92 35.1 25.29 74.65 76.77 18.93 76.04 21.89 0 74.97 62.46 65.04 47.46 71.37 46.29 40.34 73.23 44.03 47.6362.46033 62.72 82.17 79.39 62.43 79.09 62.42 62.7 52.57 62.47 65.7 74.1 101.8 74.2 101.43 99.47 87.2 71.07 98.3 73.93 74.06 125.51 73.6 73.52 114.14 73.54 123.79 111.8 110.38 73.53 73.72 73.59 167.25 157.07 73.54 161.04 73.58 162.42 73.67 156.53 73.63 74.68 210.42 74.56 213.36 74.41 228.38 73.75 208.44 168.05 73.59 73.92 269.63 251.87 73.77 260.77 243.72 73.63 73.45 233.28 74.02 74.83 339.44 74.89 319.79 74.69 313.68 305.4 283.97 74.46 75.04 74.6 354.11 353.09 74.63 353.6 350.26 74.65 75.01 342.79 74.58 438.63 74.57 431.36 74.48 429.16 394.6 74.94 356.48 75.26 75.37 75.76 76.25 448.64 76.24 454.45 448.54 440.77 75.59 442.53 76.12 75.04 483.29 74.47 499.53 75.5 460.8 75.01 466.44 457.74 74.43

514.59	74.39	538.86	74.05	548.88	73.89	553.46	73.78	554.01	
73.81 555.27	73.78	595.7	72.73	608.77	72.47	621.83	72.28	658.25	
71.62 687.91	71.3	700.08	71.38	751.01	71.76	813.92	71.82	821.41	
71.78 862.82	71.97	887.32	71.93	901.82	71.92	929.54	71.51	932.56	
71.5				938.79	71.52	1029	72.21	1033.02	
934.69 72.24	71.49	937.68							
1069.62 73.15	72.48	1084.18	72.45	1159.78	72.56	1194.18	73.13	1194.99	
1196.07	73.18	1248.61	74.31	1249.84	74.3	1267.16	74.63	1356.36	
75.17 1374.72 74.61	75.27	1379.93	74.47	1383.42	74.45	1391.79	74.54	1398.41	
1419.11 75.52	74.79	1425.07	74.2	1432.86	73.3	1476.57	75.45	1478.13	
1480.72	75.56	1481.32	75.58	1556.48	76.09	1580.63	76.34	1644.38	æ
75.89 1653.98	76.15	1682.03	76.98	1687.06	77.16	1688.73	77.04	1692.49	
76.96 1696.11	76.55	1697.49	76.47	1747.83	74.25	1764.6	72.03	1774.73	
71.24 1781.54	70.5	1784.97	70.15	1786.06	70.06	1786.58	70.1	1790.93	
70.38 1840.62	73.72	1845.09	73.92	1850.6	73.99	1854.08	74.87	1856.38	
75.48 1858.9	76.15	1861.82	76.42	1864.2	76.64	1866.65	77.02	1871.47	
77.16 1881.03	77.44	1887.79	77.88	1911.88	78.22	1921.72	78.15	1946.47	
79 1969.69				1980.5	78.96	2026.36	78.6	2045.29	
78.85				2101.29	78 97	2121.21	78.98	2218.29	
2073.87 78.05	2							2307.54	
2263.61 76.13	78.13	2297.66	78.65	2299.32		2300.66			
2363.75 77.41		2409.66		2440.17		2492.2	1. O 10 AL 14 0.5	2529.08	
2530.74 77.89	77.37	2531.9	77.4	2588.93	77.6	2610.61	77.88	2616.93	a.
Manning's	n Valu	es Sta	num= n Val	5 Sta	n Val	Sta	n Val	Sta	n
Val						•			
.02	.02	35.1	.016	47.63	.17	79.09	.016	99.47	
Bank Sta:	Left	Right 99.47	Coeff	Contr. .3	Expan. .5				
Ineffectiv	ve Flow	num=		2					
Sta L		Elev							
0		74.97	F						
		10.25	F						
Blocked O	bstruct Sta R			6 Sta R	Elev	Sta L	Sta R	Elev	
sta L	BLA R		рец П	Jun n					

771.98	844.79	90	1272.38	1373.24	90	1481.65	1571.21	90
2109.13	2197.69	90	2348.88	2459.84	90	2574.5	2616.93	. 90

Downstream Deck/Roadway Coordinates

 num=
 2

 Sta Hi Cord Lo Cord
 Sta Hi Cord Lo Cord

 2.34
 74.97
 124.06
 74.1

Downstream Bridge Cross Section Data

DOWIISCICAL	I DI IUGC	CTOPP D	CCCTOIL D	aca					
Station El	levation			54		*	1000 (marked 2	N02447 1	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev		a					1000/4000 U-14-10-000		
0	74.86	2.34	74.56	17.27	73.56	25.01	73.15	37.44	
71.04			-	1000-07 1014			<i></i>	56 50	
43.21	70.45	44.57	68.08	51.5	64.18	52.78	63.26	56.79	
60.37	24-5 0000-000				<b>60 00</b>	00 01	62.06	92.93	
65.67	60.35	84.38	60.29	89.53	60.28	. 92.01	62.96	92.93	
63.27		120.0	<b>54 15</b>	146 56	74 22	151.57	74.24	160.28	
124.06	73.77	139.8	74.15	146.56	14.22	151.57	/4.24	100.20	
74.18	73	101 17	72.9	186.49	72.88	201 13	71.64	220 44	
182.96 69.91	/3	104.4/	12.5	100.49	72.00	201.13	/1.01	220.11	
228.66	70.18	250.89	70.72	263.43	70.73	281.27	70.56	309.06	
70.69	70.10	200.00	/01/2						
328.54	70.72	343.55	70.31	356.64	70.02	359.36	70	361.84	
70.48									
370.24	70.68	426.34	71.99	426.54	71.92	427.93	71.93	433.01	
72.21									
436.83	72.42	437.72	72.49	443.44	72.59	482.93	72.79	492.98	
72.9									
496.02	72.93	497.59	72.91	517.36	73.05	584.33	72.06	774.58	
72.67									
841.08	72.92	848.56	72.84	887.98	72.24	908.45	72.17		
2000-200 - Marks - Marks	1999 - <b>1</b> 99			-				(*)	
Manning's	n Value		12152 (1250) 2011 (1250)	6	** 7	0+-		04.0	~

Sta n Val Sta n Val Sta n Val Sta n n Val Sta Val .016 124.06 .17 92.01 43.21 .17 56.79 0 .035 .035 146.56 .02

Bank Sta:	Left	Right	Coeff	Contr.	Expan.	
	2.34	139.8		.3	.5	
Ineffectiv	ve Flow	num=		1		
Sta L	Sta R	Elev	Permar	nent		
146.56			F	7		
Blocked Ob	ostruct	ions	num=	1		
Sta L	Sta R	Elev				
499.89	817.02	90				

0 horiz. to 1.0 vertical Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = Maximum allowable submergence for weir flow = .98 Elevation at which weir flow begins 74.1 = Energy head used in spillway design = Spillway height used in design = = Broad Crested Weir crest shape

```
Number of Culverts = 1
Culvert Name
                 Shape
                            Rise
                                     Span
                     Box
                                        8
                              12
Culvert #1
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
                              Top n Bottom n Depth Blocked Entrance Loss
Culvert Upstrm Dist Length
      Exit Loss Coef
Coef
                                          .018
                                                      0
                                                                           . 4
                             .018
                 25
                        110
1
Number of Barrels = 3
Upstream
           Elevation =
                        62.42
Centerline Stations
   Sta.
           Sta.
                  Sta.
   54.36
           63.36
                   72.36
Downstream Elevation = 60.28
Centerline Stations
    Sta.
           Sta.
                    Sta.
   64.16
           73.16
                   82.16
CROSS SECTION
RIVER: Alvarado(west)
                          RS: 1041.783
REACH: Lower Reach
INPUT
Description: Downstream Face of Fairmaon Crossing
                                     54
Station Elevation Data
                          num=
                                                             Elev
                                                                       Sta
                                                      Sta
                                             Elev
                                     Sta
            Elev
                     Sta
                            Elev
     Sta
Elev
                                                            73.15
                                                                     37.44
                                            73.56
                                                    25.01
                           74.56
                                   17.27
                    2.34
       0
           74.86
71.04
                                                            63.26
                                                                     56.79
                                                    52.78
                                            64.18
                   44.57
                           68.08
                                     51.5
   43.21
           70.45
60.37
                                                            62.96
                                                                     92.93
                                            60.28
                                                    92.01
           60.35
                           60.29
                                    89.53
   65.67
                   84.38
63.27
                                                                   160.28
                                                            74.24
                   139.8
                           74.15
                                   146.56
                                            74.22
                                                   151.57
           73.77
  124.06
74.18
                                                   201.13
                                                                   220.44
                                            72.88
                                                            71.64
                  184.47
                            72.9
                                   186.49
              73
  182.96
69.91
                                                            70.56
                                                                  309.06
                  250.89
                           70.72
                                   263.43
                                            70.73
                                                   281.27
           70.18
  228.66
70.69
                                                   359.36
                                                                70
                                                                   361.84
                           70.31
                                   356.64
                                            70.02
           70.72
                  343.55
  328.54
70.48
                                                   427.93
                                                            71.93
                                                                   433.01
                           71.99
                                   426.54
                                            71.92
  370.24
           70.68
                  426.34
72.21
                                                   482.93
                                                            72.79 492.98
                            72.49
                                   443.44
                                            72.59
                  437.72
           72.42
  436.83
72.9
                                                            72.06 774.58
                                   517.36
                                            73.05
                                                   584.33
                            72.91
                  497.59
  496.02
           72.93
72.67
                                   887.98
                                            72.24
                                                   908.45
                                                            72.17
           72.92 848.56
                            72.84
  841.08
Manning's n Values
                           num=
                                      6
```

```
19 of 25
```

Sta n Val 43.21 .17 56.79 .17 92.01 .016 124.06 .035 0 .035 146.56 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 116.66 118.13 124.58 ..3 2.34 139.8 .5 Ineffective Flow num= 1 Sta R Elev Permanent Sta L 146.56 908.45 74.22 F Blocked Obstructions num= 1 Sta L Sta R Elev 499.89 817.02 90 CROSS SECTION RIVER: Alvarado(west) RS: 923.6518 REACH: Lower Reach INPUT Description: 41 Station Elevation Data num= Elev Sta Elev Sta Elev Sta Elev Sta Sta Elev 69.81 48.51 69.657 60.29 71.8 28.48 70.51 48.23 0 63.2 60.08 77.5 60.34 86.4 60.54 89.98 61.77 65.67 62.89 61.47 68.66 128.53 68.84 166.16 69.32 175.37 63.11 115.82 95.85 69.36 203.24 68.95 207.36 69.14 267.19 194.56 68.86 198.66 68.9 69.68 295.45 69.32 310.7 68.88 337.01 67.64 361.62 68.34 405.48 69.72 72.35 429.87 70.69 416.65 72.01 417.74 70.5 412.49 411.15 72.53 72.51 492.7 72.22 540.06 72.34 572.32 459.15 72.49 472.74 72.43 72.81 726.53 71.6 728.33 72.72 792.37 614.53 72.58 684.11 72.94 72.42 821.37 num= 6 Manning's n Values Sta n Val Sta n Val Sta n Sta n Val Sta n Val Val .02 48.51 .17 62.89 .17 95.85 .016 115.82 0 .035 166.16 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 48.51 128.53 217.42 216.97 218.99 .1 .3

Ineffective	e Flow	num=	1					
Sta L	Sta R	Elev	Permane	nt				
175.37 8	321.37	69.36	F					
Blocked Obs	structio	ns	num=	4				
Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
197.27	297.6	90	346.43	364.51	90	476.23	770.33	90
21.29	48.51	90						

CROSS SECTION

RIVER: Alvarado(west) REACH: Lower Reach RS: 706.6820

INPUT	2							
Description:	·		44					
Station Elevat	ev Sta		44 Sta	Elev	Sta	Elev	Sta	
	ev Sta	FIGA	bla	FIGA	bla	HICV	Dea	
Elev 0 71.	26 20.07	71.23	41.3	70.92	61.42	70.53	72.14	
70.36 78.67 67.	53 90.76	62.68	98.97	59.38	122.39	58.79	129.2	
59.88	55 50.70	01.00						
145.25 62.	74 168.96	66.95	171.58	66.94	177.87	66.8	242.61	
65.66 247.27 65.	87 294.8	67.45	316.09	67.07	348.94	67.08	374.67	
66.83							0.100.000.000.000.000.000.000.000.000	
390.3 66.	67 415.05	66.76	420.51	66.79	421.71	66.71	426.1	
66.38								
446.87 66.	62 457.84	66.78	461.67	67.55	466.39	68.48	475.46	
71.07			the more street, instruction					
478.88 72.	18 479.52	72.19	488.24	72.32	514.26	72.66	517.04	
70.64								
518.76 69.	24 521.16	69.32	534.61	69.06	590.6	68.93	592.93	
71.22								
594.97 72.	24 619.91	71.97	778.79	72.51	781.74	72.5		
Manning's n Va	lues	num=	5		12			
Sta n V		n Val	Sta	n Val	Sta	n Val	Sta	n
0.	02 72.14	.17	98.97	.17	129.2	.17	168.96	
.02								
Bank Sta: Left	Right	Lengths	: Left (	Channel	Right	Coeff	Contr.	
Expan.								
.3	168.96		420.18	406.52	381.53		.1	
Blocked Obstru	ations	num=	3				56	
Sta L Sta				Elev	Sta L	Sta R	Elev	
295.09 350.						619.15	90	
200.00 000.	00 90	525.55	/					
CROSS SECTION				÷				

RIVER: Alvarado(west) REACH: Lower Reach RS: 300.1583

INPUT									
Descripti	ion ·					*			
Station H		Data	num=	86					2
Station I	Elev		Elev	Sta	Elev	Sta	Elev	Sta	
	FIGA	bla	DIC V	Deu	1101	<b>D</b> C A		11751551888	
Elev		2 02	70 07	19.06	70.56	29.27	70.07	33,47	
0	70.16	3.03	70.27	19.00	70.50	22.21	10.07	55.17	
70.03						01 50	CO 00	107 44	
38.02	70.02	38.83	69.86	74.82	69.15	81.53	69.08	137.44	
68.59							Ξ.		
154.02	68.68	179.01	68.89	182.24	68.91	224.14	69.29	247.36	
69.5						÷			•
306.01	69.99	330.3	69.29	337.05	69.15	338.42	69.16	343.69	
69.17									
407.69	67.55	412.83	67.35	419.76	61.74	423.21	58.94	425.02	
57.51									
429.49	57.46	454.89	57.18	472.73	57.01	506.78	58.87	506.93	
	57.40	454.05	57.10	172.75					
58.88	50.04	F11 61	F0 02	513.31	59.54	526.98	63.56	538.51	
509.91	59.04	511.61	59.03	212.21	59.54	520.90	05.50	550.51	
63.83					<b>C1</b> 0C	<b>E00 1</b>	C4 10	620	
548.13	63.84	564.83	64.05	565.8	64.06	583.1	64.19	620	
64.36									
648.17	64.71	649.27	64.73	664.53	64.84	691.37	64.77	691.92	
64.76									
702.47	64.66	716.85	64.64	746.66	64.59	765.91	64.14	767.74	
64.05	8.0								
768.78	64.08	775.03	63.98	777.44	63.94	807.38	63.47	808.97	
63.55	01.00								
814.33	63.86	824.4	67.5	824.92	67.7	825.32	67.72	830.9	
	03.00	024.4	07.5	021.95					
69.13	60 10	060 7	60.22	897.15	69.29	919.62	69.5	922.68	
845.62	69.19	862.7	69.23	097.15	09.49	919.02	02.5	522.00	
69.54					60.00	077 26	<b>CO 22</b>	000 06	
948.41	69.71	954.38	69.75	976.05	69.37	977.36	69.33	980.96	
69.28									
982.86	69.29	986.42	69.3	1042.11	70.04	1045.54	70.02	1047.77	
70.1									
1059.86	70.14	1067.83	70.17	1072.13	70.2	1073.11	70.22	1095.86	
70.31									
1101.11	70.51	1113.44	70.96	1118.04	71.16	1126.02	67.91	1126.29	
67.81									
	67.41								
1120.00	07.11								
Manning'		20	mum-	6					
Maining		Cb	n Val	Sta	n Val	Sta	n Val	Sta	n
	II VAL	bla	II VAL	beu	n var	bou			
Val			1.0	405 00	. 17	170 70	17	526.98	
0	.02	412.83	.17	425.02	.17	472.73	• 1 /	520.90	
.045									
807.38	.02	15							
		52 ( <b>*</b> )				1000 - 200 M		-	
Bank Sta	: Left	Right	Length	s: Left	Channel	Right	Coeff	c Contr.	
Expan.									
	412.83	526.98		309.26	286.55	277.96	3	.1	
.3									
	ive Flow	num=	- 3	2					
Cta T.	Sta P	Elev	Perman						
		69.99							
		64.84							
Blocked			num=	1	12				
BIOCKED	UDSLIUCL.	TOUP	indin-	÷.					

Sta L	Sta R	Elev
247.08	307.3	72

CROSS SECTION

RIVER:	Alvarado(wes	st)	
REACH:	Lower Reach	RS:	13.60388

INPUT

Description:

Descriptio									
Station E			num=	68		<b>G b c</b>	77]	<b>6</b> + -	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev	75 85	10.33	73.48	38.53	68.34	51.12	68.16	60.44	
68.15	13.05	10.55	10110						
	67.67	151.29	67.58	156.01	67.55	159.53	67.46	169.58	
67.33									
197.14	66.97	210.75	66.75	211.18	66.74	211.62	66.68	241.12	
61.57								401 0	
	61.95	293.8	58.59	309.91	57.51	318.19	57.47	401.8	
57.39	FR 44	404 0		516.72	57.43	518.19	57.42	590.01	
	57.41	484.2	57.52	510.72	57.45	510.15	57.14	JJ0.01	
57.52	57 59	664.72	57.6	737.22	57.65	758.62	57.66	779	
57.47	57.55	001.72	57.0	/0//24					
	57.2	810.66	57.19	829.99	57.08	903.54	56.63	971.56	
57.03									
972.65	57.04	1009.45	57.49	1032.22	57.63	1039.89	57.65	1048.28	
57.46								1100 00	
1064.18	57.51	1065.22	57.32	1069.26	57.35	1084.27	57.52	1100.33	
59.12	62.05	1150.65		1152 0	64 07	1153 41	64 09	1160.7	
1140.26 64.49	63.05	1150.65	63.65	1155.4	04.07	TT33.4T	01.05	1100.1	
1178.04	64 07	1178.95	64.36	1188.24	67.3	1194.9	67.73	1202.1	
68.16	01.07	11,0,00							
1218.05	69.23	1222.37	69.26	1239.98	69.37	1248.73	69.39	1272.24	
69.51							5. 10 (MORA)	5 F 1855 - 55 12	
1302.61	69.55	1326.83	69.57	1348.91	69.7	1352.15	69.77	1372.76	
69.94	22722 22724		<b>60</b> 00	1 4 1 0 0 0	70 6				
1388.62	70.06	1398.96	69.98	1412.03	70.6				
Manning's	n Value		num=	3					
Sta	n Val		n Val		n Val				
0	.06			1218.05	.06				
Bank Sta:	Left	Right	Lengths	s: Left	Channel	Right	Coeff	Contr.	
Expan.	1.1 22			00 50	10 6	15 76		1	
	51.29 12	218.05		23.58	13.6	15.76		.1	
.3 Ineffectiv	TO FLOW			2					
Sta L	Sta R	Elev	Permane	ent					
	151.29		F	1997-9999999			e		
1218.05		69.23	F						

#### SUMMARY OF MANNING'S N VALUES

## River:Alvarado(west)

	Reach	1	River Sta		nl	n	12	n3		n4	
n5	n6										
Lower	Reach		3415.773		.02		.016		.17		.016
	Reach		3276.769		.02		.016		.17		.016
Lower	Reach		2926.628		.02		.016		.17		.016
Lower	Reach		2467.648		.035		.17		.17		.17
Lower	Reach		2231.639		.025		.17		.17		.17
	Reach		2214.731		.035		.17		.17		.17
3 3 5 S	.02				005		-1 -7		1 77		1 7
	Reach .02		2168.688		.025		.17		.17		.17
	Reach		1981.816		.025		.016		.17		.016
Lower	Reach		1594.709		.02		.016		.17		.016
Lower	Reach		1192.356		.02		.016		.17		.016
Lower	Reach		1117	(	Culvert						
	Reach		1041.783		.035		.17		.17		.016
Lower	Reach .02	×	923.6518		.02		.17		.17		.016
	Reach		706.6820		.02		.17	z. 12.	.17		.17
Lower	Reach .02		300.1583		.02		.17		.17		.17
	Reach		13.60388		.06		.17		.06		

### SUMMARY OF REACH LENGTHS

River: Alvarado(west)

Reach	River Sta.	Left	Channel	Right
Lower Reach Lower Reach	3415.773 3276.769	138.55 345.32	139 350.14	139.44 353.92
Lower Reach	2926.628	455.11	458.98	464.26
Lower Reach	2467.648	232.89	236.01	234.37
Lower Reach	2231.639	16.13	16.91	37.54
Lower Reach	2214.731	31.05	46.04	52.74
Lower Reach	2168.688	178.72	186.87	197.94
Lower Reach	1981.816	397.08	387.11	367.43
Lower Reach	1594.709	420.75	402.35	377.25
Lower Reach	1192.356	150.44	150.57	156.21
Lower Reach	1117	Culvert		

Lower Reach	1041.783	116.66	118.13	124.58
Lower Reach	923.6518	217.42	216.97	218.99
Lower Reach	706.6820	420.18	406.52	381.53
Lower Reach	300.1583	309.26	286.55	277.96
Lower Reach	13.60388	23.58	13.6	15.76

# SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS River: Alvarado(west)

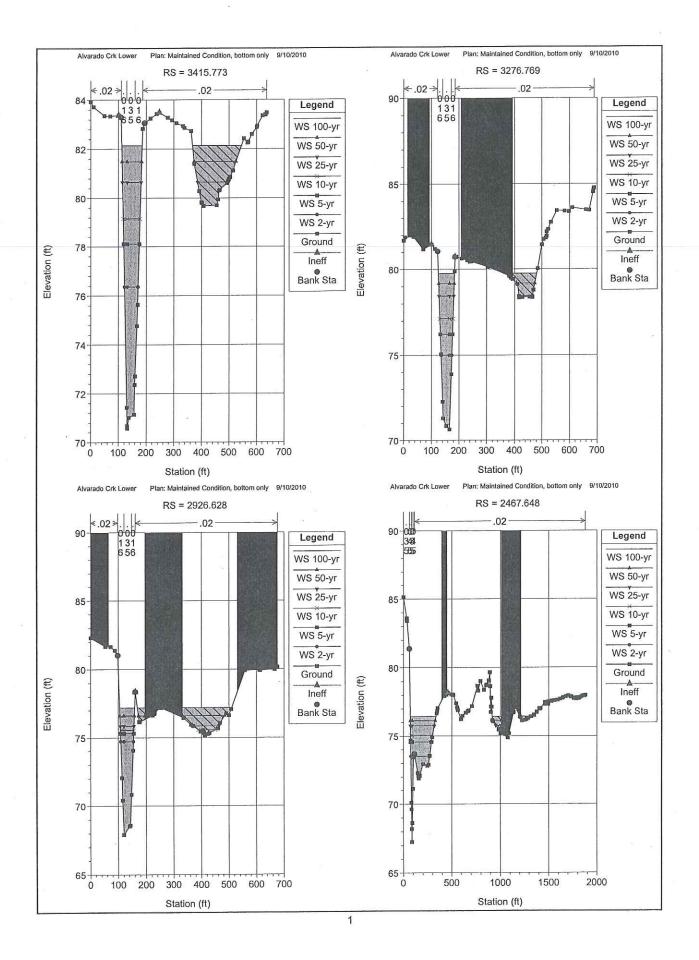
	Reach I	River Sta.	Contr.	Expan.	
	Lower Reach	3415.773	.1	.3	
	Lower Reach	3276.769	.1	.3	
	Lower Reach	2926.628	.1	.3	
	Lower Reach	2467.648	.1	.3	
	Lower Reach	2231.639	.1	.3	
	Lower Reach	2214.731	.1	.3	
	Lower Reach	2168.688	.1	.3	
	Lower Reach	1981.816	.1	. 3	
1st	Lower Reach	1594.709	.1	. 3	
	Lower Reach	1192.356	.3	.5	
	Lower Reach	1117 Culv	vert		
	Lower Reach	1041.783	.3	.5	
	Lower Reach	923.6518	.1	.3	
	Lower Reach	706.6820	.1	.3	
	Lower Reach	300.1583	.1	.3	
	Lower Reach	13.60388	.1	.3	
				14 C	

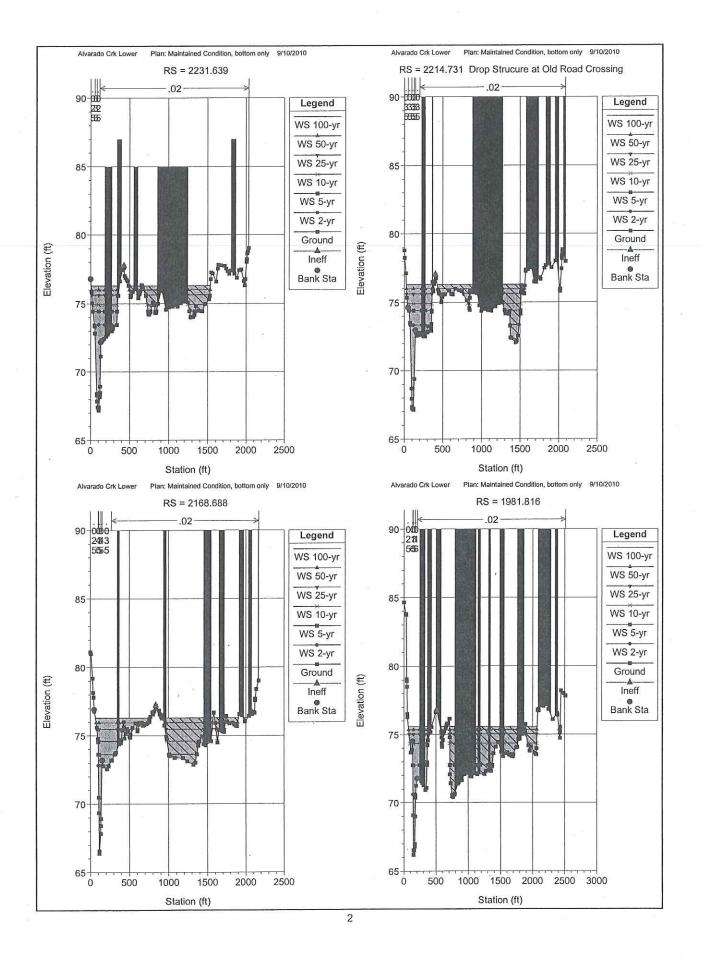
Reach	River Sta	Profile	Q Total N		VV. S. Elev		L.C. LICY	E.G. Slope		5);;;;);;		
			(cfs)	(ff)	(tt)	(¥)	(Ħ)	(fh/ft)	(ft/s)	(sq ft)	(tt)	
Lower Reach	13.60388	100-yr	5100.00	56.63	66.00	58.46	66.01	0.000048	0.68	7538.81	968.59	0.04
Lower Reach	13.60388	50-yr	4500.00	56.63	60.40	58.38	60.45	0.001301	1.84	2446.06	834.14	0.19
Lower Reach	13.60388	25-yr	3800.00	56.63	60.11	58.27	60.15	0.001300	1.72	2204.03	828.83	0.19
Lower Reach	13.60388	10-yr	2700.00	56.63	59.60	58.08	59.64	0.001301	1.51	1784.96	819.56	0.18
Lower Reach	13.60388	5-yr	2050.00	56.63	59.26	57.96	59.29	0.001301	1.36	1506.06	813.33	0.18
Lower Reach	13.60388	2-yr	1180.00	56.63	58.72	57.77	58.74	0.001300	1.10	1070.73	803.56	0.17
Lower Reach	300.1583	100-yr	5100.00	57.01	65.79	62.30	66.15	0.001823	5.20	1253.12	404.93	0.34
Lower Reach	300.1583	50-yr	4500.00	57.01	61.94	61.94	63.90	0.019204	11.24	400.32	101.94	1.00
Lower Reach	300.1583	25-yr	3800.00	57.01	61.49	61.49	63.27	0.019749	10.69	355.52	99.88	1.00
Lower Reach	300.1583	10-yr	2700.00	57.01	60.72	60.72	62.17	0.021043	9.65	279.66	96.30	1.00
Lower Reach	300.1583	5-yr	2050.00	57.01	60.20	60.20	61.43	0.022332	8.90	230.31	93.89	1.00
Lower Reach	300.1583	2-yr	1180.00	57.01	59.40	59.40	60.28	0.024988	7.51	157.09	90.22	1.00
Lower Reach	706.6820	100-yr	5100.00	58.79	67.39	67.39	68.43	0.005167	8.70	663.72	298.55	0.66
Lower Reach	706,6820	50-yr	4500.00	58.79	67.14	67.14	68.17	0.005234	8.53	592.15	289.40	0.66
Lower Reach	706.6820	25-yr	3800.00	58.79	66.44	65.45	67.73	0.006871	9.22	428.33	155.90	0.74
Lower Reach	706.6820	10-yr	2700.00	58.79	65.48	64.42	66.54	0.006432	8.29	325.67	76.87	0.71
Lower Reach	706,6820	5-yr	2050.00	58.79	64.79	63.69	65.65	0.005879	7.47	274.57	71.26	0.67
Lower Reach	706.6820	2-yr	1180.00	58.79	63.59	62.47	64.16	0.004929	6.05	195.06	61.53	0.60
Lower Reach	923.6518	100-yr	5100.00	60.08	69.91	69.91	71.16	0.004097	9.52	619.67	239.94	0.70
Lower Reach	923.6518	50-yr	4500.00	60.08	69.57	69.57	70.85	0.004341	9.45	539.34	233.73	0.72
Lower Reach	923.6518	25-yr	3800.00	60.08	67.84	67.84	70.23	0.007991	12.40	307.47	72.43	0.98
Lower Reach	923.6518	10-yr	2700.00	60.08	66.49	66.49	68.65	0.009487	11.80	228.88	53.74	1.01
Lower Reach	923.6518	S-yr	2050.00	60.08	65.72	65.64	67.55	0.009625	10.84	189.06	49.56	0.98
Lower Reach	923.6518	2-yr	1180.00	60.08	64.55	64.22	65.74	0.008777	8.76	134.71	43.20	0.87
						11						
Lower Reach	1041.783	100-yr	5100.00	60.28	70.04		71.77	0.003843	10.57	482.99	78.82	0.71
Lower Reach	1041.783	50-yr	4500.00	60.28	69.92		71.32	0.003152	9.49	474.30	69.61	0.64
Lower Reach	1041.783	25-yr	3800.00	60.28	69.80		70.83	0.002371	8.16	465.95	68.71	0.55
Lower Reach	1041.783	10-yr	2700.00	60.28	68.48		69.27	0.002248	7.14	378.32	64.04	0.52
Lower Reach	1041.783	5-yr	2050.00	60.28	67.49		68.14	0.002196	6.47	316.88	59.82	0.50
Lower Reach	1041.783	2-yr	1180.00	60.28	65.82		66.26	0.002038	5.27	223.79	51.92	0.45
Lower Reach	1117		Culvert									
Lower Reach	1192.356	100-yr	5100.00	62.42	74.40	71.17	75.86	0.001392	9.87	592.81	1038.91	0.62
Lower Reach	1192.356	50-yr	4500.00	62.42	74.57	70.50	75.61	0.000989	8.41	632.69	1128.52	0.52
Lower Reach	Lower Reach 1192.356	25-yr	3800.00	62.42	74.46	69.68	75.25	0.000749	7.27	605.97	1074.74	0.45

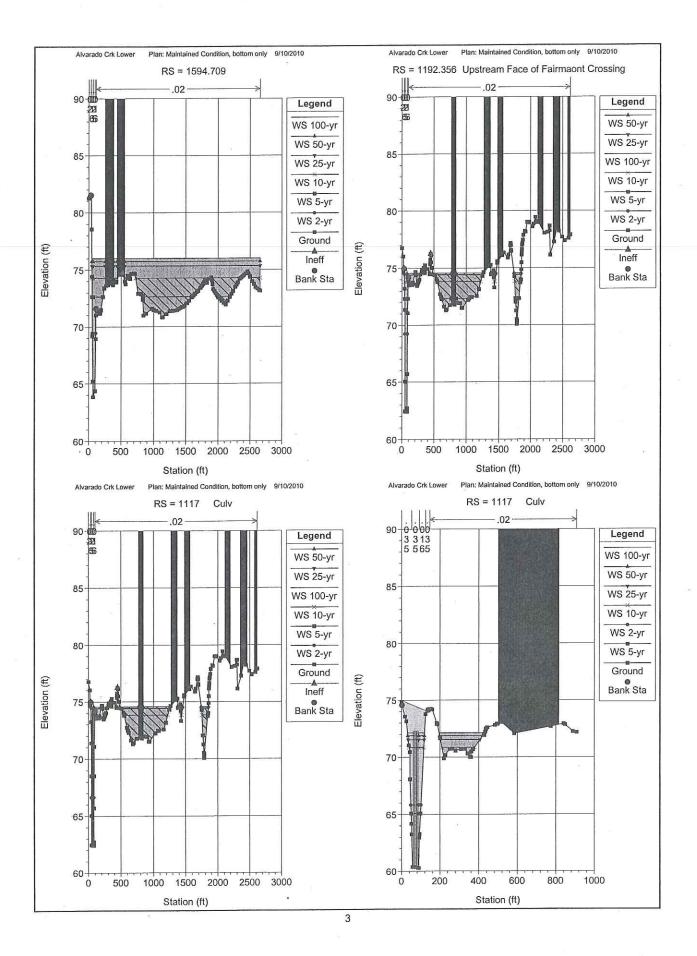
HEC-RAS Plan: M bottom only Reach River Sta	M bottom only River Sta	River: Alvarado(west) Reach: Lower Reach (Continued)	west) Reach:	Lower Reach (I	Continued) W S Flev	Crit W.S	E.G. Elev	E.G. Slope	Vel Chal	Flow Area	Top Width	Froude # Chl
			(cfs)	(#)	(ft)	(#)	(£)	(ft/ft)	(ft/s)	(sq ft)	(tj.)	
Lower Reach	1192.356	10-yr	2700.00	62.42	73.82	68.27	74.34	0.000510	5.82	479.10	862.44	0.37
Lower Reach	1192.356	5-yr	2050.00	62.42	72.34	67.32	72.78	0.000488	5.37	381.86	464.72	0.34
Lower Reach	1192.356	2-yr	1180.00	62.42	69.24	65.86	69.59	0.000577	4.79	246.33	40.69	0.34
Lower Reach	1594.709	100-yr	5100.00	63.85	76.02	72.92	76.02	0.000013	1.13	8047.80	2353.25	0.06
Lower Reach	1594.709	50-yr	4500.00	63.85	75.73	72.51	75.73		1.12	7367.58	2352.92	0.07
Lower Reach	1594.709	25-yr	3800.00	63.85	75.33	70.94	75.34	0.000015	1.14	6441.59	2352.48	0.07
Lower Reach	1594.709	10-yr	2700.00	63.85	74.28	69.69	74.50	0.000229	4.18	833.45	2070.46	0.26
Lower Reach	1594.709	5-yr	2050.00	63.85	72.64	68.85	72.97	0.000390	4.80	507.35	1122.32	0.33
Lower Reach	1594.709	2-yr	1180.00	63.85	69.45	67.49	69.93	0.000984	5.54	212.93	49.69	0.47
Lower Reach	1981,816	100-yr	5100.00	66.18	75.58	73.93	76.23	0.001249	6.87	830.10	1094.48	0.48
Lower Reach	1981.816	50-yr	4500.00	66.18	75.35	73.64	75.92	0.001144	6.41	781.60	1056.05	0.46
Lower Reach	1981.816	25-yr	3800.00	66.18	75.02	73.31	75.50	0.001041	5.89	714.04	1001.00	0.44
Lower Reach	1981.816	10-yr	2700.00	66.18	74.34	72.71	74.70		5.05	583.39	891.29	0.40
Lower Reach	1981.816	S-yr	2050.00	66.18	72.75	72.28	73.37	0.002548	6.70	337.91	398.45	0.62
Lower Reach	1981.816	2-yr	1180.00	66.18	70.60	70.60	72.07	0.010407	9.73	121.25	. 81.82	1.00
Lower Reach	2168.688	100-yr	5100.00	66.38	76.29	74.98		0.001473	4.39	1307.66	1470.73	0.37
Lower Reach	2168.688	50-yr	4500.00	66.38	75.94	74.78	76.22	0.001769	4.76	1075.26	1274.22	0.39
Lower Reach	2168.688	25-yr	3800.00	66.38	75.47	74.55	75.80	0.002172	5.20	848.14	947.46	0.42
Lower Reach	2168.688	10-yr	2700.00	66.38	74.59	74.08	75.00	0.003027	5.95	568.01		0.46
Lower Reach	2168.688	5-yr	2050.00	66.38	73.62	73.62	74.42	0.006281	7.71	332.74	566.07	0.65
Lower Reach	2168.688	2-yr	1180.00	66.38	72.81	71.24	73.42	0.004750	6.32	196.49	122.60	0.56
Lower Reach	2214.731	100-yr	5100.00	67.14	76.30	74.61			4.54	1118.36		0.34
Lower Reach	2214.731	50-yr	4500.00	67.14	76.00	74.34			4.39	1027.49		0.34
Lower Reach	2214.731	25-yr	3800.00	67.14	75.61	74.12			4.20	918.10		0.34
Lower Reach	2214.731	10-yr	2700.00	67.14	74.90	73.69	75.12	0.001372	3.92	720.47	530.05	0.35
Lower Reach	2214.731	5-yr	2050.00	67.14	74.40	72.36		0.001293	3.91	590.44		0.34
Lower Reach	2214.731	2-yr	1180.00	67.14	73.35	71.08	73.58	0.001505	4.04	343.66	345.17	0.36
									1			
Lower Reach	2231.639	100-yr	5100.00	67.18	76.30	74.33	76.67	0.000882	4.90	1049.98	837.31	0.38
Lower Reach	2231.639	50-yr	4500.00	67.18	76.00	74.09	76.33	0.000843	4.70	978.44	790.54	0.37
Lower Reach	2231.639	25-yr	3800.00	67.18	75.63	73.76	75.91	0.000798	4.42	889.81	701.82	0.35
Lower Reach	2231.639	10-yr	2700.00	67.18	74.92	72.24	75.14	0.000738	3.96	725.65	558.91	0.33
Lower Reach	2231.639	5-yr	2050.00	67.18	74.44	71.56	74.62	0.000647	3.63	616.33	347.69	0.31
Lower Reach	2231.639	2-yr	1180.00	67.18	73.46	70.45	73.60	0.000502	3.10	412.68	197.49	0.27
				0						0		4
Lower Reach	2467.648	100-yr	5100.00	67.26	76.44	75.28	77.01	0.001740	4.02	870.89	492.72	0.32

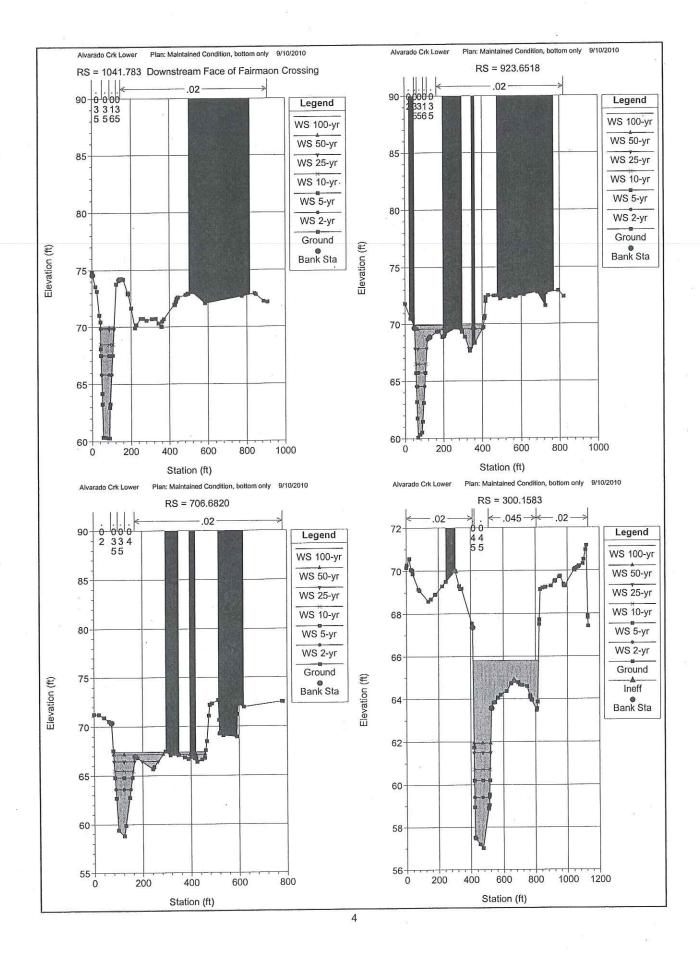
Reach	River Sta	Profile	Reach River Sta Profile Q Total I	Min Ch El W.S. Elev	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chul	Flow Area	Top Width	Froude # Chl
			(cfs)	(Ħ)	(tt)	(tt)	(tj)	(tt/tt)	(ft/s)	(sq ft)	(ft)	
Lower Reach	2467.648	50-yr	4500.00	67.26	76.13	75.05	76.68	0.001797	3.95	791.58	357.67	0.33
Lower Reach	2467.648	25-yr	3800.00	67.26	75.75	74.76	76.25	0.001878	3.87	696.27	300.77	0.33
Lower Reach	2467.648	10-yr	2700.00	67.26	75.05	74.27	75.48	0.002151	3.78	530.91	225.72	0.35
Lower Reach	2467.648	5-yr	2050.00	67.26	74.56	73.95	. 74.95	0.002535	3.81	423.21	214.39	0.37
Lower Reach	2467,648	2-yr	1180.00	67.26	73.52	73.50	74.01	0.006948	5.91	210.72	181.71	0.61
										01 110		
Lower Reach	2926.628	100-yr	5100.00	67.91	77.21	77.21	80.42		14.39	354.53		
Lower Reach	2926.628	50-yr	4500.00	67.91	76.61	76.61	79.64	0.006176	13.97	322.01	227.88	1.00
Lower Reach	2926.628	25-yr	3800.00	67.91	75.85	75.85	78.65	0.006562	13.44	282.81	143.64	1.00
Lower Reach	2926.628	10-yr	2700.00	67.91	75.56	74.51	77.13	0.003896	10.06	268.32	110.80	0.76
Lower Reach	2926.628	5-yr	2050.00	67.91	75.32	73.58	76.31	0.002583	7.99	256.43	67.98	0.61
Lower Reach	2926.628	2-yr	1180.00	67.91	74.72	72.08	75.14	0.001231	5.17	228.02	46.52	0.41
							×					
Lower Reach	3276.769	100-yr	5100.00	70.64	79.75	79.75	82.83	0.006268	14.09	362.00	146.50	1.00
Lower Reach	3276.769	50-yr	4500.00	70.64	79.17	79.17	82.08	0.006568	13.70	328.56	122.90	1.00
Lower Reach	3276.769	25-yr	3800.00	70.64	78.44	78.44	81.13	0.006996	13.18	288.39	103.34	1.00
Lower Reach	3276.769	10-yr	2700.00	70.64	77.13	77.13	79.43	0.007970	12.18	221.73	48.10	1.00
Lower Reach	3276.769	5-yr	2050.00	70.64	76.22	76.22	78.24	0.008837	11.40	179.80	44.41	1.00
Lower Reach	3276.769	2-yr	1180.00	70.64	75.00	74.74	76.31	0.008398	9.17	128.63	39.45	06.0
Lower Reach	3415.773	100-yr	5100.00	70.56	82.14	79.31	83.41	0.001607	9.02	565.22	252.23	0.58
Lower Reach	3415.773	50-yr	4500.00	70.56	81.48	78.76	82.66	0.001640	8.71	516.83	224.27	0.57
Lower Reach	3415.773	25-yr	3800.00	70.56	80.65	78.06	81.72	0.001684	8.29	458.30	176.85	0.56
Lower Reach	3415.773	10-yr	2700.00	70.56	79.15	76.84	80.03	0.001767	7.49	360.55	62.14	0.55
Lower Reach	3415.773	5-yr	2050.00	70.56	78.11	75.99	78.85	0.001829	6.88	298.09	57.70	0.53
I outor Dopoh	3/15 773	2.55	110000	TO EC	20 22	C3 17	76 00	0,001070	A RO	203 60	50 24	0.51

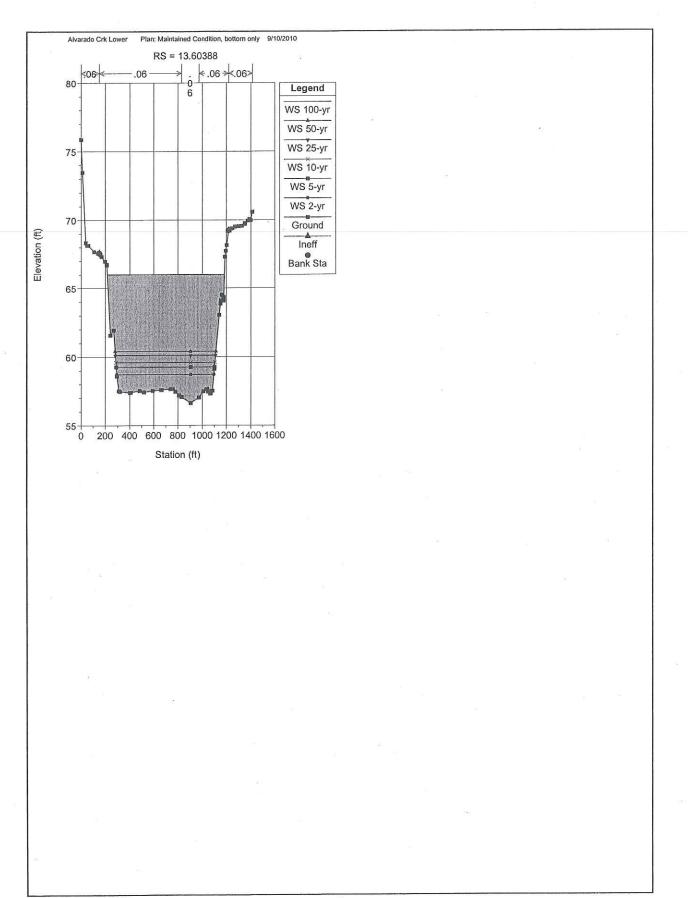
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HEC-RAS Version 4.0.0 March 2008 U.S. Army Corps of Engineers Hydrologic Engineering Center 609 Second Street Davis, California

	Х	х	XXXXXX	XX	XX		XX	XX	Х	Х	XXXX
	х	х	Х	Х	Х		Х	Х	Х	Х	X
	х	х	х	х			Х	Х	Х	Х	X
	XXXX	XXXX	XXXX	Х		XXX	XX	XX	XXX	XXX	XXXX
	х	х	х	Х			Х	Х	Х	Х	Х
	х	Х	Х	Х	Х		Х	Х	Х	Х	Х
2	Х	Х	XXXXXX	XX	XX		Х	Х	Х	Х	XXXXX

PROJECT DATA Project Title: Alvarado Crk Lower Project File : AlvaradoCrkLower.prj Run Date and Time: 9/10/2010 9:25:31 AM

Project in English units

Project Description: City of San Diego - 1st Year Maintenance J-15541A October 13, 2009 Utilized 1999 City 2-foot Contour Topo (NGVD 29) Alvarado Creek (Lower/Westerly Portion) Helix Map Number 59 and 60 - Phase A Priority

PLAN DATA

Plan Title: Maintained Condition, bottom only Plan File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.p09

Geometry Title: Maintained Condition bottom only Geometry File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.g09

Flow Title : Maintained Condition Flow File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.f04

Plan Description: Model output

Plan Summary Information: Number of: Cross Sections = 15 Multiple Openings = 0

Bridg	erts = jes =		Structures = 0 Structures = 0	
Critical dept Maximum numbe	calculation the calculation the calculation the calculation of iteration the calculation of iteration to be calculated as a constraint of the calculation of the calc	tolerance = ( ns = 2 ce = (	0.01 0.01 20 0.3 0.001	
Computation Optic Critical dept Conveyance Ca Friction Slop	h computed on lculation Meth	ly where necess hod: At breaks Average Co	in n values only	
	Flow Regime:	Subcritica		
FLOW DATA				
Flow Title: Maint Flow File : w:\15	ained Conditio	on oCreek\HECRAS\1	LowerReach\Alvarad	loCrkLower.f04
Flow Data (cfs)		10 T		
River	Reach	RS	100-yr	50-yr
Alvarado(west)	0-yr	5-yr 3415.773 2050	2-yr 5100 1180	4500
Alvarado(west)	.0-yr Lower Reach 700	5-yr 3415.773	2-yr 5100	*
Alvarado(west) 3800 2	.0-yr Lower Reach 700	5-yr 3415.773	2-yr 5100	*
Alvarado(west) 3800 2 Boundary Conditio River Downstream Alvarado(west)	.0-yr Lower Reach 700	5-yr 3415.773 2050	2-yr 5100	4500
Alvarado(west) 3800 2 Boundary Condition River Downstream Alvarado(west) Known WS = 66 Alvarado(west)	.0-yr Lower Reach 700 ms Reach Lower Reach	5-yr 3415.773 2050 Profile	2-yr 5100	4500
Alvarado(west) 3800 2 Boundary Condition River Downstream Alvarado(west) Known WS = 66 Alvarado(west) Normal S = 0.0013 Alvarado(west)	.0-yr Lower Reach 700 Reach Lower Reach Lower Reach Lower Reach	5-yr 3415.773 2050 Profile 100-yr	2-yr 5100	4500
Alvarado(west) 3800 2 Boundary Condition River Downstream Alvarado(west) Known WS = 66 Alvarado(west) Normal S = 0.0013	0-yr Lower Reach 700 Reach Lower Reach Lower Reach Lower Reach Lower Reach	5-yr 3415.773 2050 Profile 100-yr 50-yr	2-yr 5100	4500
Alvarado(west) 3800 2 Boundary Condition River Downstream Alvarado(west) Known WS = 66 Alvarado(west) Normal S = 0.0013 Alvarado(west) Normal S = 0.0013 Alvarado(west)	0-yr Lower Reach 700 Reach Lower Reach Lower Reach Lower Reach Lower Reach Lower Reach Lower Reach	5-yr 3415.773 2050 Profile 100-yr 50-yr 25-yr	2-yr 5100	4500

### GEOMETRY DATA

Geometry Title: Maintained Condition bottom only

Geometry File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.g09

CROSS SECTION

RIVER: Alvarado(west) REACH: Lower Reach RS: 3415.773

INPUT

Descriptio	on:								
Station E		Data	num=	53					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev									
0	83.93	10.52	83.72	49.34	83.36	70.68	83.34	100.85	
83.38									
109.41	83.29	130.02	71.42	131.31	70.67	131.95	70.56	137.65	
71				- Î.				1 6 0 0 0	
157.14	71.13	159.47	72.36	160.66	72.71	167.65	74.77	169.83	
75.63	43 			015 5	02 25	226 72	83.43	246.85	
188.02	82.83	194.79	83.06	215.5	83.25	236.72	03.43	240.05	
83.49				220 11	02.00	222 01	82.93	338.78	
277.39	83.28	293.32	83.17	309.77	83.06	333.91	02.95	330.70	
82.86		201 10	01 20	202 10	00 20	400.42	79.82	401.41	
362.9	82.73	374.16	81.39	392.18	80.28	400.42	12.02	401.41	
79.79			70 7	459.96	79.94	464.45	80.31	465.99	
407.16	79.67	455.28	79.7	459.90	12.24	101.15	00.51	103122	
80.33	00 61	494.47	80.65	497.4	80.72	499.2	80.77	503.06	
492.85	80.61	494.47	80.85	497.4	00.72	199.2	00		
80.83	80.86	514.76	81.12	553.49	82.42	566.92	82.25	568.15	
504.06	80.00	514.70	01.12	333.19	0,2.12	000.72			
82.26 569.27	82.29	582.64	82.6	600.74	82.89	602.56	82.94	622.5	
83.36	02.25	502.01	01.0						
631.58	83.4	632.75	83.39	637.02	83.47				
051.50	03.1	002170	53 S S S S S						
Manning's	n Value	s	num=	5					
Sta	n Val		n Val	Sta	n Val	Sta	n Val	Sta	n
Val	-								
0	.02	109.41	.016	130.02	.035	160.66	.016	188.02	
.02									
								144	
Bank Sta:	Left	Right	Lengths	: Left C	hannel	Right	Coeff	Contr.	
Expan.									
- 1	09.41	L94.79		138.55	139	139.44		.1	
.3									
Ineffecti	ve Flow	num=	2	2					
Sta L	Sta R	Elev	Permane	ent					
0	100.85	83.38	F						
246.85	637.02	83.49	F	65					
CROSS SEC	TION								

RIVER: Alvarado(west) REACH: Lower Reach RS: 3276.769

INPUT									
Descriptio Station El		Data	num=	51					
Station El Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev	DICV	bca	HICV.	beu					
0	81.69	4.45	81.89	35.41	81.92	70.17	81.17	100.3	
81.46	01.05								
112.67	81.2	122.62	81.05	134.98	75.05	140.38	72.26	142.25	
71.29									
154.18	70.84	165.75	70.64	172.28	73.88	184.34	79.88	186.01	
80.72									
191.45	80.73	210.25	80.63	229.99	80.52	238.65	80.44	245.22	
80.45								202 82	
304.34	80.13	380.38	79.61	384.55	79.58	387.47	79.49	393.73	
79.41			<b>FO</b> 40	410 01	70 24	422.24	78.35	429.59	
410.54	79.12	416.31	78.42	416.91	78.34	422.24	10.33	429.39	
78.36	70 20	ACE 27	78.36	469.47	78.78	484.52	80.04	500.14	
455.88	78.38	465.27	78.30	402.47	/0./0	101.52	00.01	20000	
81.43 505.85	81.76	514.04	81.84	516.55	82.2	516.86	81.95	522.35	
82.35	01.70	211.01	01.01	510.00					
531.72	82.76	552.96	83.45	582.28	83.42	597.3	83.4	609.57	
83.62	02.70								
660.02	83.49	670.66	83.47	684.79	84.54	685.45	84.57	687.4	9
84.72							240		
688.83	84.77								
					2				
Manning's			num=	5	** 7	<b>0</b> h -		Cto	~
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n
Val	0.0	100 (0	010	140.38	035	172.28	.016	186.01	
0.	.02	122.62	.016	140.30	.055	172.20	.010	100.01	
.02									
Bank Sta:	Teft	Right	Lengths	: Left C	hannel	Right	Coeff	Contr.	
Expan.						-			
1077).	2.62 1	86.01		345.32	350.14	353.92		.1	
.3									
Ineffectiv	e Flow	num=	- 2						
Sta L	Sta R	Elev	Permane	nt					
0	100.3	81.46	F						
	688.83	80.72	F	2					
Blocked Ob			num=	2 Sta R	Elev	8			
Sta L	Sta R	Elev 90	Sta L 208.28	393.34	90				
13.62	92.64	90	200.20	525.54	50				
CROSS SECT	אסדי				a	64 A			
CRODD DHCI	101								
RIVER: Alv	arado(w	vest)							
REACH: LOW	e .		RS: 292	6.628					
INPUT		÷							
Descriptic									
Station El			num=	42	Flore	Sta	Elev	Sta	
Sta	Elev	Sta	Elev	Sta	Elev	old	DTC A	bla	
Elev									

81.66 72.39 81.64 87.76 81.37 97.81 82.29 53.38 0 81.01 72.05 115.78 70.41 120.03 67.91 141.42 68.53 144.01 113 68.59 78.36 175.86 76.17 177.43 148.04 70.84 153.8 74.06 161.57 76.16 76.79 247.52 76.74 229.11 77.21 249.49 223.02 76.64 227.21 77.2 254.91 76.45 362.99 75.94 370.4 77.19 335.23 76.46 335.65 75.85 75.53 407.82 75.41 412.56 75.13 423.65 75.43 404.82 397.23 75.26 76.07 490.09 76.78 499.97 75.66 460.33 75.67 467.47 459.1 76.64 79.96 79.92 666.44 79.91 610.52 613.3 507.82 77.08 557.44 79.99 80.17 676.28 80.14 674.48 Manning's n Values num= 5 Sta n Val Sta n Val Sta Sta n Val n Sta n Val Val .016 120.03 .035 148.04 .016 161.57 .02 97.81 0 .02 Coeff Contr. Bank Sta: Left Right Lengths: Left Channel Right Expan. 97.81 161.57 455.11 458.98 464.26 .1 .3 Ineffective Flow num= 1 Elev Permanent Sta R Sta L 161.57 676.28 78.36 F Blocked Obstructions num= 3 Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev 90 195.38 332.19 90 0 65.03 90 530.39 676.28 CROSS SECTION RIVER: Alvarado(west) RS: 2467.648 REACH: Lower Reach INPUT Description: Station Elevation Data num= 131 Sta Elev Sta Sta Elev Sta Elev Sta Elev Elev 35.08 85.14 31.71 83.6 33.83 83.49 34.64 83.42 0 83.41 86.73 74.68 82.27 70.11 83.15 69.63 59.99 81.37 73.72 68.19 92.06 68.64 97.86 71.13 103.24 73.43 113.31 67.26 89.02 73.68 71.89 165.93 72.07 156.92 72.07 166.17 72.29 153.08 146.6 72.08 72.11 202.5 72.94 245.26 72.82 258.71 72.9 268.41 167.48 73.53

		×.							
269.4	8 73.55	294.79	74.91	342.16	76.66	346.46	76.82	346.9	
76.83 352.3	3 77.04	420.61	77.94	422.58	77.93	442.68	78.03	457.77	
78.17 493.6	1 78.06	507.21	78.02	507.95	78.05	514.77	78	545.03	
77.39 554.6	5 77.1	558.3	77	562.9	76.89	592.83	76.22	596.07	
76.24 609.7	8 76.47	643.62	76.71	645.17	76.7	665.46	76.81	673.24	
76.88 70	8 77.18	763.5	78.67	770.56	78.32	794.79	79.02	831.94	
78.37 855.7	3 78.71	859.72	78.76	881.44	79.06	892.44	79.65	895.56	
78.63									
902.1 76.15	6 76.75	903.47	77.15	906.73	77.79	909.69	77.14	916.27	
924.7 75.47	1 76.06	982.71	75.44	989.78	75.49	992.3	75.48	994.07	
994.8 75.18	2 75.46	1002.08	75.17	1075.12	74.87	1081.44	75.17	1087.78	
1134.0	3 76.7	1136.68	76.76	1149.13	, 77.15	1153.32	77.09	1201.92	
76.41	2 76.35	1225.56	76.12	1254.7	76.16	1273.65	76.22	1290.4	
76.3	2 76.41	1319.91	76.43	1349.5	76.55	1350.69	76.52	1377.48	
76.74 1378.4	9 76.78	1405.71	77.02	1408.81	76.97	1416.98	77.03	1463.22	
1464.3	5 77.47	1465.26	77.38	1465.46	77.33	1492.9	77.32	1495.06	
77.49 1497.0	2 77.51	1526.26	77.54	1528.61	77.57	1557.48	77.59	1560.29	
77.6 1588.8	3 77.63	1592.01	77.64	1617.89	77.71	1643.35	77.77	1650.27	
77.81 1675.7	9 77.87	1677.17	77.88	1702.31	77.94	1703.75	77.95	1727.8	
77.87 1732.1	3 77.89	1735.39	77.86	1758.02	77.78	1761.23	77.75	1763.95	
77.79 1784.	6 77.72	1787.59	77.76	1790.47	77.8	1810.66	77.74	1813.79	
77.78 1820.9	9 77.81	1838.1	77.88	1855.62	77.95	1868.06	77.94	1868.49	
77.93 1878.2	2 77.98								
Manning St	's n Valu a n Val		num= n Val	. 5 Sta	n Val	Sta	n Val	Sta	n
Val	0.035	59.99	.045	82.27	.035	97.86	.045	113.31	
.02									
Bank St Expan.	a: Left	Right				Right	Coeff		
.3	59.99	113.31		232.89	236.01	234.37		.1	
Ineffec	tive Flow		Perman	1 ent					
Sta			Ferman						
457.7	7 1878.22	78.17	F					343	

2 Blocked Obstructions num= Elev Sta R Sta R Elev Sta L Sta L 90 393.47 449.7 90 1007.94 1212.91 CROSS SECTION RIVER: Alvarado(west) RS: 2231.639 REACH: Lower Reach INPUT Description: 120 Station Elevation Data num= Elev Sta Sta Elev Elev Sta Sta Elev Sta Elev 51.03 73.41 51.81 17.94 75.04 76.8 12.75 75.85 0 73.4 81.55 68.39 80.96 54.8 56.84 72.84 73.35 73.36 52.64 68.28 107.28 105.78 67.18 67.85 92.65 67.42 102.28 67.26 83.35 67.35 125.11 124.25 68.47 119.2 68.15 120.35 68.23 67.41 108.73 68.93 146.66 72.33 154.89 132.75 72.19 144.53 72.32 71.14 130.5 72.34 222.6 72.75 229.84 200.97 72.59 72.44 72.39 172.13 163.13 72.92 287.98 274.94 72.99 264.5 73.1 267.34 73.09 73.03 250.17 73.17 75.57 378.11 75.59 358.58 352.25 338.77 73.46 291.98 73.34 76.64 437.38 77.62 428.34 77.74 429.8 77.64 424.63 409.95 77.45 77.02 76.31 513.25 76.63 488.11 76.88 76.73 477.09 465.55 448.59 75.49 536.09 75.88 541.8 75.85 581.1 75.58 75.56 518.31 517.54 76.06 75.78 636.47 627.3 75.69 630.96 615.4 75.4 75.41 611.82 75.92 76.19 707.85 75.57 742.43 76.34 668.58 76.35 658.88 653.45 74.25 800.8 75.09 816.48 74.89 829.18 74.34 763.74 74.2 749.35 74.42 74.31 838.94 74.34 865.2 830.73 74.44 833.71 74.37 829.93 75 74.57 1003.02 74.72 1049.97 75.9 966.88 76.09 917.31 909.05 74.77 74.03 1281.75 75.08 1279.83 74.78 1153.48 75.02 1242.96 1113.38 73.98 74.24 1350.52 74.82 1379.5 74.17 1334.15 1314.45 74.01 1329.84 74.47 75.55 1539.52 74.43 1469.75 75.29 1527.23 74.96 1516.6 1430.9 76.78 77.54 1640.26 76.59 1631.79 77.26 1565.11 77.18 1611.43 1545.51 77.82 77.35 1780.39 77.73 1741.31 77.53 1760.68 77.77 1719.97 1672.84 77.16

77.41 1912.12 77.16 1880.35 76.86 1910.12 77.4 1849.81 1802.24 77.42 76.76 2006.08 76.31 1990.43 77.47 1970.04 76.62 1982.33 1936.96 78.02 78.23 2014.93 78.77 2034.15 78.64 2020.55 78.15 2009.51 2008.62 79.03 4 Manning's n Values num= n Val Sta n Val Sta Sta n Val Sta n Val .025 119.2 .02 81.55 54.8 .035 0 .025 Coeff Contr. Right Lengths: Left Channel Right Bank Sta: Left Expan. .1 37.54 16.13 16.91 0 132.75 .3 Ineffective Flow num= 1 Sta L Sta R Elev Permanent 428.34 2034.15 77.74 F Blocked Obstructions num= 6 Sta R Elev Sta L Elev Sta R Elev Sta L Sta R Sta L 87 552.57 607.29 85 85 340.74 396.32 184.32 275.65 90 87 2031.7 2034.15 85 1807.53 1866.52 856.96 1244.13 CROSS SECTION RIVER: Alvarado(west) RS: 2214.731 REACH: Lower Reach INPUT Description: Drop Strucure at Old Road Crossing 132 num= Station Elevation Data Sta Elev Sta Sta Elev Elev Sta Elev Sta Elev 75.35 32.65 31.38 4.69 78.26 19.99 77.1378.8 0 75.36 95.88 68.7 98.81 73.53 60.75 74.49 75.72 74.64 47.05 67.95 105.37 104.5 103.51 67.24 67.22 67.29 102.3 67.35 102.07 67.21 143.1 67.22 128.26 69.4 67.14 119.21 118.92 67.15 117.44 72.97 160.75 72.57 182.67 72.73 192.62 72.74 72.88 154.75 147.52 72.61 72.63 248.98 72.78 212.51 72.79 203.03 202.04 193.9 72.63 72.52 305.5 72.51 302.09 72.8 304.45 72.82 72.53 271.5 251.05 72.87 73.43 358.18 353.9 351.51 72.93 73.13 350.18 313.36 73.25 74.32 75.85 380.05 75.81 390.48 377.9 376.42 75.82 368.7 76.5 76.33 76.77 439.48 76.97 411.53 405.94 404.34 77.03 394.76 76.55 75.92 75.01 483.64 75.07 496.29 75.64 480.79 75.73 451.19 447.47 75.38

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505.79	75.61	526.86	75.57	580.21	75.84	608.69	75.63	609.25	
75.62 621.32	75.58	627.49	75.57	662.49	75.98	709.38	75.88	743.92	
75.81	75.50	027.45	/5.5/	002.19	/5.20	100100			
808.08	75.14	842.46	74.58	847.52	74.44	850.1	75.33	851.67	
75.84 853.5	75.75	863.11	75.73	896.48	75 71	940.17	75.67	942.15	
75.68	15.15	003.11	/5./5	090.10	/3./1	210127			
970.19	74.78	995.12	74.37	1085.56	74.41	1125.08	74.38	1176.36	
74.69 1223.87	71 02	1267.55	75	1298.95	74 42	1308.02	74.18	1312.54	
74.17	74.55	1207.55	75	1270.75	/ 1 / 12				
1339.62	74.15	1356.07	74.13	1358.46	74.16	1362.15	74.33	1370.72	
73.27 1375.79	72 /1	1291 3	72 4	1385 28	72.39	1386.68	72.37	1443.12	
72.05	12.41	1301.3	12.1	1909.20	/11.00	1000.00			
1450.89	72.15	1451.83	72.14	1458.42	72.22	1472.94	72.54	1505.43	
74.16 1512.29	75 72	1513.91	76 23	1530.37	75.83	1550.2	75.66	1553.68	
75.62									
	76.2	1573.52	77.27	1574.42	77.36	1599.33	77.39	1640.48	
77.53 1644.68	77 62	1681.27	76 5	1698 12	76.47	1703.78	76.46	1749.14	
76.81	11.02	1001.27	,0.5	1000.12	,				
1764.78	76.68	1814.25	77.5	1830.66	77.69	1879.63	77.79	1905.43	
77.53 1957.8	70 01	1977.52	78 05	2014 28	75 94	2016.6	75.81	2020.51	
75.99									
2035.53	77.45	2040.76	78.2	2042.13	78.4	2046.47	78.66	2048.95	
78.81	78 84	2088.99	77.99						
2049.4	/0.01	2000.99	11125	62					
Manning's						Sta	n Val	Sta	n
Sta Val	n Val	Sta	n val	SLd	II VAL	bla	II VAL	bca	11
	.035	47.05	.035	95.88	.035	128.26	.035	143.1	
.035	0.0								
202.04	.02								
Bank Sta:	Left	Right	Length	s: Left (	Channel	Right	Coeff	Contr.	
Expan.		140 1		21 05	46.04	52.74		.1	
.3	17.05	143.1		31.03	10.01	52.71		•	
Ineffectiv	ve Flow	num=		1					
Sta L 404.34 2	Sta R		Permane F	ent					ä
Blocked Ob			num=	7					
Sta L		Elev		Sta R	Elev	Sta L	Sta R	Elev	
224.9	275.77	90	363.14	373.41		883.42		90	
1579.78 1	1738.28	90	1834.2	1893.63	90	1952.63	1999.56	90	
2059.58 2	2088.99	90							
CROSS SEC	TION								
RIVER: Al	town do /	wort)							
RIVER · AIT	VALADO	WCSLI							

RIVER: Alvarado(west) REACH: Lower Reach RS: 2168.688

INPUT Description	<b>.</b>							2
Station Ele		Data	num=	130				
					Flor	Sta	Elev	Sta
Sta	Elev	Sta	Elev	Sta	FIEA	SLA	ETEA	Bla
Elev					2011/18/0, DA	1007-000 VILLI-02		
0	81.11	8.42	80.99	28.98	79.2	35.51	78.16	41.11
77.81								
41.46	77.79	49.04	76.92	49.21	76.77	49.37	76.92	82.88
75.61								
	74.76	101.97	74.53	108.09	70.47	109.72	69.35	114.08
	/4./0	101.07	71.55	100.05	, ,	202112		
66.38			10 1000 - 1000 - 1000		<i>c</i>	100 10	60.00	1 - 0 - 0 - 0
	66.55	133.68	67.83	135.76	68.42	137.48	68.92	152.33
73.19							*	
154.59	73.2	164.21	72.76	214.35	72.55	235.29	72.76	236.86
72.78				• n				
272.29	73.21	276.75	73.19	313.88	73.62	322.66	73.67	332.02
	13.21	270.75	75.15	510.00				× * *
73.76			<b>D</b> 4 46	201 00		207 41	74.66	412.65
371.42	74.39	391.58	74.46	391.98	74.47	397.41	/4.00	412.05
75.38								
429.65	75.99	432.12	75.63	436.98	74.8	453.7	75.15	469.65
75.49								
482.13	75.32	503.89	74.94	511.34	74.86	515.46	75.09	543.35
75.57	10.00							
NUSBER AND CONTRACT	<b>BE 00</b>		75.33	622 05	75.8	627.14	75.96	661.78
	75.92	605.69	15.33	622.05	12.0	027.14	75.50	001.70
75.97								
675.45	75.76	676.55	75.73	687.84	75.78	695.12	75.81	695.54
75.83								
702.92	75.86	717.53	75.85	726.03	75.89	734.98	75.93	755.29
76.02								
755.55	76.04	758.4	76.21	771.81	76.4	796.33	76.73	803.08
	10.04	750.4	10.21	//1.01	/011	120100		
76.59				005 01		000 04	77	839.41
803.36	76.57	819.66	76.78	835.81	76.97	836.04	77	039.41
77.22								
878.82	76.85	890.04	76.59	890.63	76.56	906.91	76.39	914.08
76.32								
921.68	76.25	921.89	76.27	925.47	76.52	948.37	75.75	972.75
74.93	,0.25		1993 F. 1913 - 1					
	74 70	1000 42	70 57	1012.54	73 50	1023.73	73 49	1076.49
	14.12	1009.42	13.57	1012.54	15.54	1023.13	13.12	1070.12
73.36					1010 10			1202 40
1078.47	73.37	1185.18	73.35	1241.16	73.1	1320.75	72.86	1323.48
72.88		25						
1346.75	73.01	1381.97	74.25	1386.87	74.49	1395.25	74.58	1434.3
74.94								
	74 92	1450.87	74.37	1477.49	74.27	1545.68	74.56	1578.98
	11.24	1100.07						
76.66	<b>FC CO</b>	1600 5	75 0	1 ( ) 0 )	74 40	1647 20	75 20	1693.93
	76.68	1600.5	15.9	1628.93	74.40	1047.30	15.59	1000.00
75.3								
1716.25	75.27	1717.43	75.26	1744.84	76.44	1761.11	76.02	1787.9
75.88								
	75.93	1850.39	75.79	1872.58	75.7	1885.99	75.68	1916.24
76.57		1.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5	100					
		1943.96	76 56	1944 71	76 54	1949.43	76.48	1987.9
1917.11	10.58	1943.90	70.50	1944./1	70.54	1949.43	,0.40	1201.2
76.01	(j. 16384	1960 B. 1997 B. 197	<u></u>			0105 15		0111 6
2041.55	76.43	2068.14	76.8	2081.25	76.55	2105.17	76.72	2114.6
76.66								

2120.74 77.58 2121.39 77.68 2122.26 77.7 2137.68 78.4 2168.38 79.02 6 Manning's n Values num= Sta n Val Sta n Val Sta n Val Sta n Sta n Val Val .025 101.97 .045 109.72 .035 137.48 .045 152.33 0 .035 272.29 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 49.04 154.59 178.72 186.87 197.94 .1 .3 num= 1 Ineffective Flow Sta L Sta R Elev Permanent 839.41 2168.38 77.22 F 345.94374.8790934.55972.18901452.211548.051649.051720.79901912.431972.34902033.1520772162.072168.3890 Blocked Obstructions num= Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev 90 90 1912.43 1972.34 90 2033.15 2077.5 90 CROSS SECTION RIVER: Alvarado(west) × 8 REACH: Lower Reach RS: 1981.816 INPUT Description: Station Elevation Data num= 132 Sta Elev Sta Elev Sta Sta Elev Sta Elev Elev 34.24 83.75 43.66 79.05 44.52 0 84.65 26.29 83.82 78.91 76.51 55.06 76.27 107.5 73.68 117.48 78.5 52.63 47.34 73.69 69.08 147.09 66.53 147.68 74.5 143.27 121.54 73.87 135.14 66.18 66.79 168.15 66.98 174.94 148.53 66.2 158.03 66.5 167.47 69 71.24 207.09 71.78 208.92 71.79 268.97 179.59 70.38 189.33 71.61 70.93 355.82 71.08 365.49 286.29 71.45 307.37 71.27 338.31 72.96 74.58 416.58 75.18 431.39 369.68 74.21 377.15 74.57 377.34 75.55 76.65 500.16 76.77 581.67 76.66 511.31 497.42 76.64 498.44 75.17 74.09 607.81 74.59 627.47 74.36 596.04 587.43 74.78 592.49 75.22 75.72 678.56 75.82 710.64 75.65 668.9 75.47 661.48 651.82 76.16 712.03 74.79 714.72 72.07 727.37 71.42 728.7 71.4 751.18 70.46

761.32	70.4	785.21	70.57	788.19	70.6	790.66	70.63	792.22	
70.66 838.84	71.38	852.37	71.48	900.76	71.63	940.59	72.07	941.53	
72.08 964.43	72.28	1000.66	72.18	1004.87	72.17	1014.63	72.29	1037.68	
71.95								1274.09	
1050.64 72.32	71.91	1122.41	72.15	1138.79	72.08	1253.51	72.09	1274.09	
1333.33	72.34	1353.17	72.32	1367.11	72.64	1389.46	73.61	1424.82	
74.08 1463.87	74.44	1510.27	73.71	1539.64	73.38	1583.36	73.61	1610.2	
73.66 1635.67	73.51	1653.24	73.48	1676.18	73.43	1686.19	73.39	1690.32	
73.38								a satesa awar	
1693.81 74.09	73.37	1694.24	73.38	1700.52	73.53	1747.46	74.04	1761.35	
1779.25	74.63	1800.08	74.67	1844.83	75.01	1876.85	75.26	1886.5	
75.75 1890.08	75.08	1936.81	74.18	1955.42	73.79	1972.69	74.08	2032.6	
73.63 2053.07	73.55	2055.82	73.53	2059.2	73.97	2077.89	76.79	2091.39	
76.87									843
2094.31 77.2	76.74	2133.72	77.12	2149.21	77.14	2169.15	77.07	2182.51	۲
2183.81	.77.21	2229.19	77.2	2233.11	77.34	2234.63	77.35	2247.8	
76.86 2316.18	76.11	2379.09	76.54	2383.26	76.53	2386.26	76.42	2428.46	
74.73 2429.38	75 25	2430.87	75.55	2441.79	78.2	2470.28	78.04	2481.28	
78.01			2						
2509.95	77.84	2513.55	77.81						
Manning's	n Valu	es	num=	5					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n
Val 0	.025	135.14	.016	143.27	.035	174.94	.016	207.09	
.02									
Bank Sta:	Left	Right	Length	s: Left (	Channel	Right	Coeff	Contr.	
Expan. 13	35.14	207.09		397.08	387.11	367.43		.1	
.3									
Ineffectiv	ve Flow	num	=)	1					
		Elev 76.77		ent					
Blocked Ob				10					
Sta L				Sta R	Elev	Sta L	Sta R	Elev	
245.39	330.92	90	505.65	581.04	90	366.42	431.68	90	
789.77 1	L118.24	90	1146.29	1186.87	90	1312.75	1341.97 2284.39	90	
1486.06 1		90	1762.96	1868.49	90	2082.76	2284.39	90	
2346.39 2	2390.73	90							
CROSS SECT	TION							<i>¥</i>	

RIVER: Alvarado(west) REACH: Lower Reach RS: 1594.709

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INPUT								
Descriptio		Dete		165	2			
Station El			num= Elev	Sta	Elev	Sta	Elev	Sta
Sta	Elev	Sta	FIEA	DLa	DIC.V	beu	110.	
Elev 0	81.24	3.6	81.26	4.29	81.27	32.08	81.53	38.54
81.45	01.24	5.0	01.20					
42.88	78.55	47.5	74.42	55.83	69.17	62.95	65.2	65.36
63.85	10.00						945 2	
92.75	64.35	95.54	64.37	104.12	68.94	108.05	71.03	109.14
71.61								
127.14	71.39	166.03	71.16	168.57	71.15	175.1	71.21	184.39
71.43							<b>TO</b> 11	000 14
186.57	71.5	187.13	71.52	236.4	73.4	237.09	73.41	268.14
73.62					72 02	345.93	73.81	371.75
294.5	73.66	295.95	73.67	324.02	73.93	345.95	12.01	571,75
73.66			72 04	420.44	73.91	422.27	73.92	424.77
383.11	74.14	414.98	73.94	420.44	13.91	422.27	75.72	111111
73.97	<b>72</b> 00	10C EC	73.99	466.28	74.58	467.34	74.59	504.82
424.88	73.98	426.56	13.99	400.20	/1.50	107.01	8 D.	
74.6 522.99	74.76	558.3	74.01	559.94	73.99	560.54	73.97	569.14
73.76	/4./0	550.5	/ 1.01	~~~~				
596.78	74.29	605.83	74.52	616.15	74.43	634.74	74.26	639.37
74.21								
641.16	74.26	656.72	74.65	703.85	74.71	713.76	74.66	763.8
72.93								
801.7	72.92	804.8	72.9	810.04	72.86	831.79	72.73	833.5
72.38								
843.33	71	882.51	71.16	968.58	71.6	971.8	71.61	973.87
71.58				8 800-80 V. 1928-	122121 2		<b>11 01</b>	1120 10
998.07	71.48	999.71	71.52	1037.78	71.4	1090.42	/1.2/	1130.12
70.83				1100 10	71 10	1246.15	71 38	1294.17
1142.01	70.84	1189.25	71.11	1199.17	11.12	1240.15	11.50	1294.17
71.39	71 42	1330.64	71 11	1367.69	71 48	1392.75	71.57	1417.65
1306.69	11.43	1220.04	/1.11	1307.05	/1.10		))	
71.66	71.74	1455.9	71 75	1480.65	71.84	1507.67	72.05	1521.17
1442.39 72.07			11.15	1100.00				
1548.12	72.28	1583.8	72.57	1590.38	72.61	1610.57	72.72	1617.02
72 77								
1637.25	72.88	1643.58	72.92	1663.85	73.03	1684.25	73.14	1690.36
73.18								
1720.07	73.4	1721.93	73.42	1726.44	73.46	1742.1	73.58	1746.66
73.63						-		1000 00
1762.3	73.74	1766.72	73.79	1782.34	73.95	1798.11	74.11	1802.33
74.16			1010 X X X		<b>50 05</b>	1050 05	74 0	1002 05
1808.47	74.09	1815.84	73.89	1823.63	73.85	1858.05	74.2	1093.05
74.32		1000 05	74 00	1000 1	72 77	1910.32	73 71	1919.01
1899.49	74.13	1900.86	/4.08	1909.1	13.11	10.52	13.11	1919.01
73.3	<b>DO 1</b> C	1044 06	72 08	1959.83	72 94	1976.87	72.79	1993.96
1934.76	/3.1b	1944.00	13.00	100.00	, 2, 21			
72.64 2002.86	72 56	2027.9	72.43	2053.18	72.29	2059.57	72.25	2084.9
72.12	12.50			2010100000000000 0000000000000000000000	+i i⊼ 10080 - 0			
10.24		÷						

71.94 2119.83 71.98 2148.08 72.26 2151.19 72.08 2116.49 2091.1 72.29 73.12 2235.73 72.88 2232.84 72.64 2209 72.58 2185.55 2179.8 73.14 73.7 2304.91 73.68 2288.93 73.48 2270.89 73.51 2286.9 2267.86 73.87 74.18 2337.73 74.27 2355.1 74.2 2352.04 73.89 2334.55 2306.98 74.28 74.51 2404.21 74.44 2401.32 74.36 2383.86 74.43 2386.87 2369.42 74.53 74.85 2475.72 74.78 2457.5 74.65 2494.14 74.65 2454.51 2429.19 74.45 74.36 2535.88 73.97 2559.62 73.72 2561.68 73.75 2585.58 2498.97 73.49 73.22 2642.44 73.21 2656.25 73.45 2614.1 73.34 2640.94 2587.3 73.15 Manning's n Values 5 num= n Val Sta n Sta n Val Sta n Val Sťa Sta n Val Val 92.75 .016 109.14 62.95 .025 .016 0 .02 32.08 .02 Coeff Contr. Right Lengths: Left Channel Right Bank Sta: Left Expan. 420.75 402.35 377.25 .1 32.08 109.14 .3 Ineffective Flow num= 1 Elev Permanent Sta L Sta R F 522.99 2656.25 74.76 2 Blocked Obstructions num= Elev Sta R Elev Sta L Sta R Sta L 436.7 558.37 90 251.93 387.55 90 CROSS SECTION RIVER: Alvarado(west) REACH: Lower Reach RS: 1192.356 INPUT Description: Upstream Face of Fairmaont Crossing Station Elevation Data num= 170 Sta Elev Elev Sta Elev Sta Sta Sta Elev Elev 74.92 35.1 74.65 25.29 18.93 76.04 21.89 76.77 0 74.97 65.04 47.46 62.46 71.37 46.29 73.23 44.03 40.34 47.6362.46033 62.72 82.17 79.39 62.43 79.09 62.42 62.7 52.57 62.47 65.7 101.43 74.1 101.8 99.47 74.2 73.93 71.07 98.3 87.2 74.06 73.6 125.51 123.79 114.14 73.54 111.8 73.52 110.38 73.53 73.72 73.59 167.25 73.58 162.42 73.54 161.04 156.53 73.67 157.07 73.63

168.05 73.59	73.75	208.44	74.68	210.42	74.56	213.36	74.41	228.38	
233.28 74.02	73.45	243.72	73.63	251.87	73.77	260.77	73.92	269.63	
283.97	74.46	305.4	74.69	313.68	74.89	319.79	74.83	339.44	
75.04 342.79	75.01	350.26	74.65	353.09	74.63	353.6	74.6	354.11	
74.58 356.48	75.26	394.6	74.94	429.16	74.57	431.36	74.48	438.63	
75.37 440.77	75.59	442.53	75.76	448.54	76.25	448.64	76.24	454.45	
Service of the second second	75.5	460.8	75.01	466.44	75.04	483.29	74.47	499.53	
74.43 514.59	74.39	538.86	74.05	548.88	73.89	553.46	73.78	554.01	
73.81 555.27	73.78	595.7	72.73	608.77	72.47	621.83	72.28	658.25	
71.62 687.91	71.3	700.08	71.38	751.01	71.76	813.92	71.82	821.41	
71.78 862.82	71.97	887.32	71.93	901.82	71.92	929.54	71.51	932.56	
71.5 934.69	71.49	937.68	71.51	938.79	71.52	1029	72.21	1033.02	
72.24 1069.62	72.48	1084.18	72.45	1159.78	72.56	1194.18	73.13	1194.99	
73.15 1196.07		1248.61	74.31	1249.84	74.3	1267.16	74.63	1356.36	
75.17 1374.72		1379.93	74.47	1383.42	74.45	1391.79	74.54	1398.41	
74.61 1419.11	74.79	1425.07	74.2	1432.86	73.3	1476.57	75.45	1478.13	
75.52 1480.72	75.56	1481.32	75.58	1556.48	76.09	1580.63	76.34	1644.38	
75.89 1653.98	76.15	1682.03	76.98	1687.06	77.16	1688.73	77.04	1692.49	
76.96 1696.11	76.55	1697.49	76.47	1747.83	74.25	1764.6	72.03	1774.73	
71.24 1781.54	70.5	1784.97	70.15	1786.06	70.06	1786.58	70.1	1790.93	
70.38 1840.62	73.72	1845.09	73.92	1850.6	73.99	1854.08	74.87	1856.38	
75.48 1858.9	76.15	1861.82	76.42	1864.2	76.64	1866.65	77.02	1871.47	
77.16 1881.03	77.44	1887.79	77.88	1911.88	78.22	1921.72	78.15	1946.47	
79 1969.69	79.01	1979.5	78.97	1980.5	78.96	2026.36	78.6	2045.29	
78.85 2073.87	79.44	2086.71	79.09	2101.29	78.97	2121.21	78.98	2218.29	
78.05 2263.61	78.13	2297.66	78.65	2299.32	78.67	2300.66	78.26	2307.54	
76.13 2363.75	77.28	2409.66	78.45	2440.17	78.23	2492.2	77.69	2529.08	
77.41 2530.74 77.89	77.37	2531.9	77.4	2588.93	77.6	2610.61	77.88	2616.93	

num= Manning's n Values 5 n Val Sta n Val Sta n n Val Sta Sta n Val Sta Val .025 79.09 99.47 .016 47.63 0 .02 35.1 .016 .02 Lengths: Left Channel Right Coeff Contr. Right Bank Sta: Left Expan. 150.44 150.57 156.21 .1 99.47 35.1 .3 2 Ineffective Flow num= Elev Permanent Sta L Sta R F 74.97 0 35.1 F 448.54 2616.93 76.25 num= 6 Blocked Obstructions Elev Sta R Elev Sta L Sta R Elev Sta L Sta R Sta L 90 1272.38 1373.24 90 1481.65 1571.21 90 771.98 844.79 90 2574.5 2616.93 90 90 2348.88 2459.84 2109.13 2197.69 CULVERT RIVER: Alvarado(west) REACH: Lower Reach RS: 1117 INPUT Description: Distance from Upstream XS = 25 Deck/Roadway Width = 110 2.6 = Weir Coefficient Upstream Deck/Roadway Coordinates 2 num= Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 99 74.1 35.1 74.97 Upstream Bridge Cross Section Data 170 Station Elevation Data num= Sta Elev Sta Sta Elev Sta Elev Sta Elev Elev 74.92 35.1 76.77 18.93 76.04 21.89 74.65 25.29 0 74.97 62.46 44.03 71.37 46.29 65.04 47.46 73.23 40.34 47.6362.46033 62.43 79.09 62.42 79.39 62.72 82.17 62.7 52.57 62.47 65.7 74.1 101.8 73.93 99.47 74.2 101.43 98.3 71.07 87.2 74.06 73.6 125.51 73.54 123.79 73.52 114.14 73.53 111.8 110.38 73.72 73.59 167.25 161.04 73.58 162.42 157.07 73.54 73.67 156.53 73.63 74.41 228.38 74.56 213.36 210.42 208.44 74.68 168.05 73.75 73.59 251.87 73.77 260.77 73.92 269.63 73.45 243.72 73.63 233.28 74.02 74.89 319.79 74.69 313.68 74.83 339.44 74.46 305.4 283.97 75.04

342.79	75.01	350.26	74.65	353.09	74.63	353.6	74.6	354.11	
74.58 356.48	75.26	394.6	74.94	429.16	74.57	431.36	74.48	438.63	
75.37						110 61	76 24	454 45	
440.77 76.12	75.59	442.53	75.76	448.54	76.25	448.64	76.24	454.45	
457.74	75.5	460.8	75.01	466.44	75.04	483.29	74.47	499.53	
74.43									
514.59	74.39	538.86	74.05	548.88	73.89	553.46	73.78	554.01	
73.81 555.27	73.78	595.7	72.73	608.77	72.47	621.83	72.28	658.25	
71.62									
687.91	71.3	700.08	71.38	751.01	71.76	813.92	71.82	821.41	
71.78 862.82	71 97	887 32	71.93	901.82	71.92	929.54	71.51	932.56	
71.5	11.51	007.52	11.25	201.01		5			
	71.49	937.68	71.51	938.79	71.52	1029	72.21	1033.02	
72.24	70 40	1084.18	72 45	1159 78	72 56	1194 18	73 13	1194.99	
1069.62 73.15	12.48	1084.10	72.45	1159.70	72.50	1194.10	75.15	1191.99	
	73.18	1248.61	74.31	1249.84	74.3	1267.16	74.63	1356.36	
75.17		1000 00		1202 42		1201 70	74 54	1398.41	
1374.72 74.61	75.27	1379.93	74.47	1383.42	/4.45	1391.79	/4.04	1390.41	
1419.11	74.79	1425.07	74.2	1432.86	73.3	1476.57	75.45	1478.13	
75.52									
1480.72	75.56	1481.32	75.58	1556.48	76.09	1580.63	76.34	1644.38	
75.89 1653.98	76.15	1682.03	76.98	1687.06	77.16	1688.73	77.04	1692.49	
76.96									
1696.11	76.55	1697.49	76.47	1747.83	74.25	1764.6	72.03	1774.73	
71.24 1781.54	70 5	1784.97	70.15	1786.06	70.06	1786.58	70.1	1790.93	
70.38	70.5	1/01.07	,,,,,						
1840.62	73.72	1845.09	73.92	1850.6	73.99	1854.08	74.87	1856.38	
75.48	76 15	1861.82	76 42	1864.2	76 64	1866.65	77.02	1871.47	
1858.9 77.16	70.15	1001.02	70.42	1001.2	/0.01				
1881.03	77.44	1887.79	77.88	1911.88	78.22	1921.72	78.15	1946.47	
79	70 01	1979.5	70 07	1980.5	78 96	2026.36	78 6	2045 29	
1969.69 78.85	79.01	19/9.5	10.91	1900.5	70.90	2020.50	,0.0	2013.25	
2073.87	79.44	2086.71	79.09	2101.29	78.97	2121.21	78.98	2218.29	
78.05						2200 66	70 00	2207 54	
2263.61 76.13	78.13	2297.66	78.65	2299.32	/8.6/	2300.66	/8.20	2307.54	
2363.75	77.28	2409.66	78.45	2440.17	78.23	2492.2	77.69	2529.08	
77.41									
2530.74	77.37	2531.9	77.4	2588.93	77.6	2610.61	77.88	2616.93	
77.89									
Manning's		es	num=	5					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n
Val 0	.02	35.1	.016	47.63	.025	79.09	.016	99.47	
.02									

# 17 of 25

Right Coeff Contr. Expan. Bank Sta: Left 99.47 .1 .3 35.1 2 Ineffective Flow num= Elev Permanent Sta L Sta R 74.97 F 0 35.1 76.25 F 448.54 2616.93 6 Blocked Obstructions num= Sta R Elev Sta L Elev Sta L Sta R Elev Sta L Sta R 90 90 1481.65 1571.21 771.98 844.79 90 1272.38 1373.24 90 2348.88 2459.84 90 2574.5 2616.93 90 2109.13 2197.69 Downstream Deck/Roadway Coordinates 2 num= Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 74.1 74.97 124.06 2.34 Downstream Bridge Cross Section Data 54 Station Elevation Data num= Elev Sta Sta Elev Sta Elev Elev Sta Sta Elev 73.15 37.44 73.56 25.01 17.27 2.34 74.56 0 74.86 71.04 63.26 56.79 51.5 64.18 52.78 70.45 44.57 68.08 43.21 60.37 62.96 92.93 60.28 92.01 60.35 84.38 60.29 89.53 65.67 63.27 160.28 139.8 74.15 146.56 74.22 151.57 74.24 73.77 124.06 74.18 201.13 71.64 220.44 72.88 184.47 72.9 186.49 182.96 73 69.91 70.56 309.06 263.43 70.73 281.27 70.72 228.66 70.18 250.89 70.69 361.84 359.36 70 70.31 356.64 70.02 328.54 70.72 343.55 70.48 427.93 71.93 433.01 71.92 370.24 70.68 426.34 71.99 426.54 72.21 72.79 492.98 72.59 482.93 436.83 437.72 72.49 443.44 72.42 72.9 72.06 774.58 584.33 496.02 72.93 497.59 72.91 517.36 73.05 72.67 72.92 848.56 72.84 887.98 72.24 908.45 72.17 841.08 Manning's n Values num= 5 n Val Sta n Val Sta n Val Sta n n Val Sta Sta Val .035 146.56 52.78 .035 92.01 .016 124.06 0 .035 .02 Coeff Contr. Expan. Bank Sta: Left Right 139.8 .1 :3 2.34 Blocked Obstructions 1 num= Sta R Elev Sta L 499.89 817.02 90 0 horiz. to 1.0 vertical Upstream Embankment side slope = Downstream Embankment side slope = 0 horiz. to 1.0 vertical

.98

Maximum allowable submergence for weir flow =

74.1 Elevation at which weir flow begins = Energy head used in spillway design = Spillway height used in design = = Broad Crested Weir crest shape Number of Culverts = 1 Shape Rise Span Culvert Name 12 8 Culvert #1 Box FHWA Chart # 8 - flared wingwalls FHWA Scale # 1 - Wingwall flared 30 to 75 deg. Solution Criteria = Highest U.S. EG Top n Bottom n Depth Blocked Entrance Loss Culvert Upstrm Dist Length Coef Exit Loss Coef 0 .4 .018 .018 25 110 1 Number of Barrels = 3 Elevation = 62.42 Upstream Centerline Stations Sta. Sta. Sta. 54.36 63.36 72.36 Downstream Elevation = 60.28 Centerline Stations Sta. Sta. Sta. 73.16 82.16 64.16 CROSS SECTION RIVER: Alvarado(west) RS: 1041.783 REACH: Lower Reach INPUT Description: Downstream Face of Fairmaon Crossing Station Elevation Data num= 54 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 25.01 73.15 37.44 17.27 73.56 2.34 74.56 0 74.86 71.04 63.26 56.79 70.45 44.57 68.08 51.5 64.18 52.78 43.21 60.37 92.93 60.35 84.38 60.29 89.53 60.28 92.01 62.96 65.67 63.27 139.8 74.15 146.56 74.22 151.57 74.24 160.28 73.77 124.06 74.18 71.64 220.44 184.47 72.9 186.49 72.88 201.13 182.96 73 69.91 263.43 70.56 309.06 70.72 70.73 281.27 250.89 228.66 70.18 70.69 70 361.84 70.31 356.64 70.02 359.36 328.54 70.72 343.55 70.48 71.93 433.01 426.54 71.92 427.93 71.99 370.24 70.68 426.34 72.21 72.59 482.93 72.79 492.98 437.72 72.49 443.44 436.83 72.42 72.9 73.05 584.33 72.06 774.58 496.02 72.93 497.59 72.91 517.36 72.67

841.08 72.92 848.56 72.84 887.98 72.24 908.45 72.17 5 Manning's n Values num= Sta n Val Sta n Val Sta n n Val Sta n Val Sta Val .035 52.78 .035 92.01 .016 124.06 .035 146.56 0 .02 Bank Sta: Left Right Lengths: Left Channel Coeff Contr. Right Expan. 116.66 118.13 124.58 . 1 139.8 2.34 .3 Blocked Obstructions num= 1 Elev Sta L Sta R 90 499.89 817.02 CROSS SECTION RIVER: Alvarado(west) RS: 923.6518 REACH: Lower Reach INPUT Description: Station Elevation Data 41 num= Elev Sta Elev Sta Elev Sta Elev Sta Sta Elev 48.51 69.657 69.81 60.29 48.23 0 71.8 28.48 70.51 63.2 86.4 60.54 89.98 77.5 60.34 61.77 65.67 60.08 62.89 61.47 69.32 175.37 68.84 166.16 63.11 115.82 68.66 128.53 95.85 69.36 68.95 207.36 69.14 267.19 68.9 203.24 68.86 198.66 194.56 69.68 68.88 337.01 68.34 405.48 67.64 361.62 69.32 310.7 295.45 69.72 72.01 417.74 72.35 429.87 70.5 412.49 70.69 416.65 411.15 72.53 72.51 492.7 72.22 540.06 72.34 572.32 472.74 459.15 72.49 72.43 72.72 792.37 72.81 726.53 71.6 728.33 614.53 72.58 684.11 72.94 821.37 72.42 num= 6 Manning's n Values Sta n Val Sta n Val Sta n Val Sta n Sta n Val Val .016 115.82 62.89 .035 95.85 48.23 .035 .02 0 .035 .02 166.16 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 217.42 216.97 218.99 .1 48.51 128.53 .3. Blocked Obstructions num= 4

197.27	Sta R 297.6 48.51	Elev 90 90		Sta R 364.51	Elev 90	Sta L 476.23	Sta R 770.33	Elev 90	
CROSS SECT	TION								
RIVER: Ala REACH: Lov			RS: 706	.6820					
INPUT Descriptic Station El		Data	num=	44					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev 0 70.36	71.26	20.07	71.23	41.3	70.92	61.42	70.53	72.14	
	67.53	90.76	62.68	98.97	59.38	122.39	58.79	129.2	
145.25 65.66	62.74	168.96	66.95	171.58	66.94	177.87	66.8	242.61	
247.27 66.83	65.87	294.8	67.45	316.09	67.07	348.94	67.08	374.67	
390.3 66.38	66.67	415.05	66.76	420.51	66.79	421.71	66.71	426.1	
446.87 71.07	66.62	457.84	66.78	461.67	67.55	466.39	68.48	475.46	
478.88 70.64	72.18	479.52	72.19	488.24	72.32	514.26	72.66	517.04	
518.76 71.22	69.24	521.16	69.32	534.61	69.06	590.6	68.93	592.93	
594.97	72.24	619.91	71.97	778.79	72.51	781.74	72.5		
Manning's Sta		s Sta	num= n Val	5 Sta	n Val	Sta	n Val	Sta	n
Val 0 .02	.02	72.14	.035	98.97	.035	129.2	.04	168.96	
Bank Sta:	Left	Right	Lengths	: Left C	hannel	Right	Coeff	Contr.	
	72.14 1	.68.96		420.18	406.52	381.53		.1	
.3 Blocked Ol Sta L 295.09	Sta R	ons. Elev 90		3 Sta R 420.97	Elev 90		Sta R 619.15	Elev 90	
CROSS SEC	FION								
RIVER: Alv REACH: Lov			RS: 300	.1583					
INPUT Descriptic Station E		n Data	num=	86					

Sta	a Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev (	0 70.16	3.03	70.27	19.06	70.56	29.27	70.07	33.47	
70.03 38.02	2 70.02	38.83	69.86	74.82	69.15	81.53	69.08	137.44	
68.59 154.02	2 68.68	179.01	68.89	182.24	68.91	224.14	69.29	247.36	
69.5 306.01	1 69.99	330.3	69.29	337.05	69.15	338.42	69.16	343.69	
69.17 407.69	9 67.55	412.83	67.35	419.76	61.74	423.21	58.94	425.02	
57.51 429.49 58.88	9 57.46	454.89	57.18	472.73	57.01	506.78	58.87	506.93	
509.91 63.83	1 59.04	511.61	59.03	513.31	59.54	526.98	63.56	538.51	
548.13 64.36	63.84	564.83	64.05	565.8	64.06	583.1	64.19	620	
648.1 <sup>°</sup> 64.76	64.71	649.27	64.73	664.53	64.84	691.37	64.77	691.92	
702.4 <sup>°</sup> 64.05	7 64.66	716.85	64.64	746.66	64.59	765.91	64.14	767.74	
768.78 63.55	64.08	775.03	63.98	777.44	63.94	807.38			
814.33 69.13	63.86	824.4	67.5		67.7			830.9	
845.62 69.54	2 69.19	862.7			69.29		69.5		
948.41 69.28				976.05		977.36		980.96	
982.80 70.1		986.42		1042.11		1045.54		1047.77	
1059.80 70.31		1067.83			70.2			1095.86	
1101.11 67.81		1113.44	70.96	1118.04	71.16	1126.02	67.91	1126.29	
1128.68				-					
Sta	's n Valu a n Val		num= n Val	5 Sta	n Val	Sta	n Val	Sta	n
Val .02	.02	412.83	.045	425.02	.045	509.91	.045	807.38	
	a: Left	Right	Length	s: Left	Channel	Right	Coef	E Contr.	
Expan.	72	526.98			286.55			.1	
Sta 1 664.53	tive Flow L Sta R 0 306.01 3 1128.68	num= Elev 69.99 64.84		2 ent					
Sta 1	Obstruct L Sta R 8 307.3	Elev	num=	1					

CROSS SECTION

RIVER: Alvarado(west) REACH: Lower Reach RS: 13.60388

INPUT

Description	n:								
Station El		n Data	num=	68					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev					8 <b>8</b> 9				
0	75.85	10.33	73.48	38.53	68.34	51.12	68.16	60.44	
68.15									
108.69	67.67	151.29	67.58	156.01	67.55	159.53	67.46	169.58	
67.33									
197.14	66.97	210.75	66.75	211.18	66.74	211.62	66.68	241.12	
61.57	1							×	
266.65	61.95	293.8	58.59	309.91	57.51	318.19	57.47	401.8	
57.39									
	57.41	484.2	57.52	516.72	57.43	518.19	57.42	590.01	
57.52	5								
	57.59	664.72	57.6	737.22	57.65	758.62	57.66	779	
57.47	57.05								
	57.2	810.66	57.19	829.99	57.08	903.54	56.63	971.56	
57.03	57.5	010.00							
972.65	57 04	1009.45	57.49	1032.22	57.63	1039.89	57.65	1048.28	
57.46	57.01		11						
1064.18	57.51	1065.22	57.32	1069.26	57.35	1084.27	57.52	1100.33	
59.12	37.31	2000.22							
1140.26	63 05	1150.65	63.85	1153.2	64.07	1153.41	64.09	1160.7	
64.49	00.00								
	64.07	1178.95	64.36	1188.24	67.3	1194.9	67.73	1202.1	
68.16	01.07								
1218.05	69 23	1222 37	69.26	1239.98	69.37	1248.73	69.39	1272.24	
69.51	02.25	1000.07							
	69 55	1326.83	69.57	1348.91	69.7	1352.15	69.77	1372.76	
69.94	02.33	1010100							
	70 06	1398.96	69.98	1412.03	70.6				
1500.02	10.00	1990.90							
Manning's	n Value	2g	num=	5					
Sta	n Val	Sta			n Val	Sta	n Val	Sta	n .
Val	II VOL								
0	.06	151.29	.06	829.99	.06	971.56	.06	1218.05	
.06	.00	101.00							
.00									
Bank Sta:	Toft	Right	Length	s. Left C	hannel	Right	Coeff	Contr.	
Expan.		Right	Dengen	5. <u>Hore</u> 6.		J			
	1.29 12	218 05		23.58	13.6	15.76		.1	
.3	1.27 14	210.05		23130	2010				
.3 Ineffectiv	e Flow	num=		2					
	Sta R		Perman						
	151.29	67.58	F						
1218.05 1		69.23	F						
T710.02 T	TI2.03	07.23	Ľ			4		-	

SUMMARY OF MANNING'S N VALUES

# River:Alvarado(west)

		River Sta.	nl	n2	n3	n4
n5	n6					
Lower	Reach	3415.773	.02	.016	.035	.016
Lower	Reach	3276.769	.02	.016	.035	.016
.02 Lower .02	Reach	2926.628	.02	.016	.035	.016
	Reach	2467.648	.035	.045	.035	.045
8 (9300)	Reach	2231.639	.025	.035	.025	.02
Lower	Reach	2214.731	.035	.035	.035	.035
Lower	Reach	2168.688	.025	.045	.035	.045
Lower	.02 Reach	1981.816	.025	.016	.035	.016
.02 Lower	Reach	1594.709	.02	.016	.025	.016
.02 Lower	Reach	1192.356	.02	.016	.025	.016
.02 Lower	Peach	1117	Culvert	2		
Lower		1041.783	.035	.035	.016	.035
Lower	Reach .02	923.6518	.02	.035	.035	.016
Lower		706.6820	.02	.035	.035	.04
.02 Lower	Reach	300.1583	.02	.045	.045	.045
.02 Lower .06	Reach	13.60388	.06	.06	.06	.06

### SUMMARY OF REACH LENGTHS

River: Alvarado(west)

Reach	River Sta.	Left	Channel	Right
Lower Reach	3415.773	138.55	139	139.44
Lower Reach	3276.769	345.32	350.14	353.92
Lower Reach	2926.628	455.11	458.98	464.26
Lower Reach	2467.648	232.89	236.01	234.37
Lower Reach	2231.639	16.13	16.91	37.54
Lower Reach	2214.731	31.05	46.04	52.74
Lower Reach	2168.688	178.72	186.87	197.94
Lower Reach	1981.816	397.08	387.11	367.43
Lower Reach	1594.709	420.75	402.35	377.25
Lower Reach	1192.356	150.44	150.57	156.21
Lower Reach	1117	Culvert		
Lower Reach	1041.783	116.66	118.13	124.58

Lower Reach	923.6518	217.42	216.97	218.99
Lower Reach	706.6820	420.18	406.52	381.53
Lower Reach	300.1583	309.26	286.55	277.96
Lower Reach	13.60388	23.58	13.6	15.76

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS River: Alvarado(west)

Reach	River Sta.	Contr.	Expan.
Lower Reach	3415.773	.1	.3
Lower Reach	3276.769	.1	.3
Lower Reach	2926.628	.1	.3
Lower Reach	2467.648	.1	.3
Lower Reach	2231.639	.1	.3
Lower Reach	2214.731	.1	.3
Lower Reach	2168.688	.1	.3
Lower Reach	1981.816	.1	.3
Lower Reach	1594.709	.1	.3
Lower Reach	1192.356	.1	.3
Lower Reach	1117 Cul	lvert	
Lower Reach	1041.783	.1	.3
Lower Reach	923.6518	.1	.3
Lower Reach	706.6820	.1	.3
Lower Reach	300.1583	.1	.3
Lower Reach	13.60388	.1	.3

25 of 25

HEC-RAS Plan: Sed Removed River: Alvarado(west) Reach: Lower Reach Reach River Sta Profile 0 Total Min Ch El	Sed Removed River Sta	River: Alvarado	(west) Keach: 0 Total	Min Ch Fl	W.S. Flev	Crit W S	F.G. Flev	E G Slope	Vel Chul	Flow Area	Too Width	Froude # Chl
•••				(¥)	(£)	(ų)	(Ħ)	(ft/ft)	(ft/s)	(sq ft)	1. 22. 10	
Lower Reach	13.60388	100-yr	5100.00	56.63	66.00	58.46	66.01		0.68	7538.81	968.59	0.04
Lower Reach	13.60388	50-yr	4500.00	56.63	60.40	58.38	60.45	0.001301	1.84	2446.95	834.16	0.19
Lower Reach	13.60388	25-yr	3800.00	56.63	60.11	58.27	60.16		1.72	2205.05	828.86	0.19
Lower Reach	13.60388	10-yr	2700.00	56.63	59.60	58.08	59.64	0.001301	1.51	1786.27	819.59	0.18
Lower Reach	13.60388	5-yr	2050.00	56.63	59.26	57.96		0.001301	1.36	1507.64	813.36	0.18
Lower Reach	13.60388	2-yr	1180.00	56.63	58.72	57.77	58.74	0.001300	1.10	1072.96	803.61	0.17
Lower Reach	300.1583	100-yr	5100.00	57.01	65.79	62.30	66.15	0.001823	5.20	1253.11	404.93	0.34
Lower Reach	300.1583	50-yr	4500.00	57.01	61.94	61.94	63.90	0.019207	11.24	400.31	101.94	1.00
Lower Reach	300.1583	25-yr	3800.00	57.01	61.49	61.49	63.27	0.019749	10.69	355.52	99.88	1.00
Lower Reach	300.1583	10-yr	2700.00	57.01	60.72	60.72	62.17	0.021040	9.65	279.67	96.30	1.00
Lower Reach	300.1583	5-yr	2050.00	57.01	60.20	60.20	61.43	0.022332	8.90	230.31	93.89	1.00
Lower Reach	300.1583	2-yr	1180.00	57.01	59.42	59.42	60.28	0.024369	7.45	158.32	90.28	0.99
					51							
Lower Reach	706.6820	100-yr	5100.00	58.79	67.39	67.39	68.43	0.005167	8.70	663.72	298.55	0.66
Lower Reach	706.6820	50-yr	4500.00	58.79	67.14	67.14	68.17	0.005234	8.53	592.15	289.40	0.66
Lower Reach	706.6820	25-yr	3800.00	58.79	66.44	65.45	67.73	0.006871	9.22	428.34	155.90	0.74
Lower Reach	706.6820	10-yr	2700.00	58.79	65.48	64.42	66.54	0.006433	8.29	325.66	76.87	0.71
Lower Reach	706.6820	5-yr	2050.00	58.79	64.79	63.69	65.65	0.005879	7.47	274.57	71.26	0.67
Lower Reach	706.6820	2-yr	1180.00	58.79	63.58	62.47	64.15	0.004975	6.07	194.39	61.44	0.60
Lower Reach	923.6518	100-yr	5100.00	59.76	69.75	69.75	71.26	0.002040	10.27	594.02	238.76	0.76
Lower Reach	923.6518	50-yr	4500.00	59.76	68.87	68.87	70.85	0.003071	11.39	416.49	132.61	0.90
Lower Reach	923.6518	25-yr	3800.00	59.76	67.47	67.47	70.01	0.002709	12.80	296.98	59.02	1.01
Lower Reach	923.6518	10-yr	2700.00	59.76	66.20	66.20	68.40	0.002896	11.91	226.66	52.16	1.01
Lower Reach	923.6518	5-yr	2050.00	59.76	65.32	65.32	67.27	0.003047	11.22	182.75	47.37	1.01
Lower Reach	923.6518	2-yr	1180.00	59.76	63.85	63.85	65.38	0.003382	9.91	119.10	39.42	1.00
											~	
Lower Reach	1041.783	100-yr	5100.00				71.64		11.01	463.32		0.75
Lower Reach	1041.783	50-yr	4500.00	60.28	69.73		71.21	0.001088	9.76	460.84	68.44	0.66
Lower Reach	1041.783	25-yr	3800.00	60.28	69.44		70.59	0.000877	8.61	441.54	67.44	0.59
Lower Reach	1041.783	10-yr	2700.00	60.28	68.03		68.96		7.71	350.17	14	0.57
Lower Reach	1041.783	5-yr	2050.00	60.28	67.02		67.80	0.000854	7.09	289.01	57.57	0.56
Lower Reach	1041.783	2-yr	1180.00	60.28	65.28		65.84	4 0.000853	6.01	196.22	49.34	0.53
						÷						
Lower Reach	1117		Culvert									
Lower Reach	1192.356	100-yr	5100.00	62.42	74.35	71.17	75.87	7 0.001019	10.03	581.10	1021.64	0.63
Lower Reach	1192.356	50-yr	4500.00	62.42	74.50	70.50	75.61	0.000733	8.58	617.42	1101.95	0.53
Lower Reach 1192.356	1192.356	25-yr	3800.00	62.42	74.44	69.68	75.25	0.000541	7.35	601.11	1060.21	0.46

Sed Removed River: Alvarado(west) Reach: Low

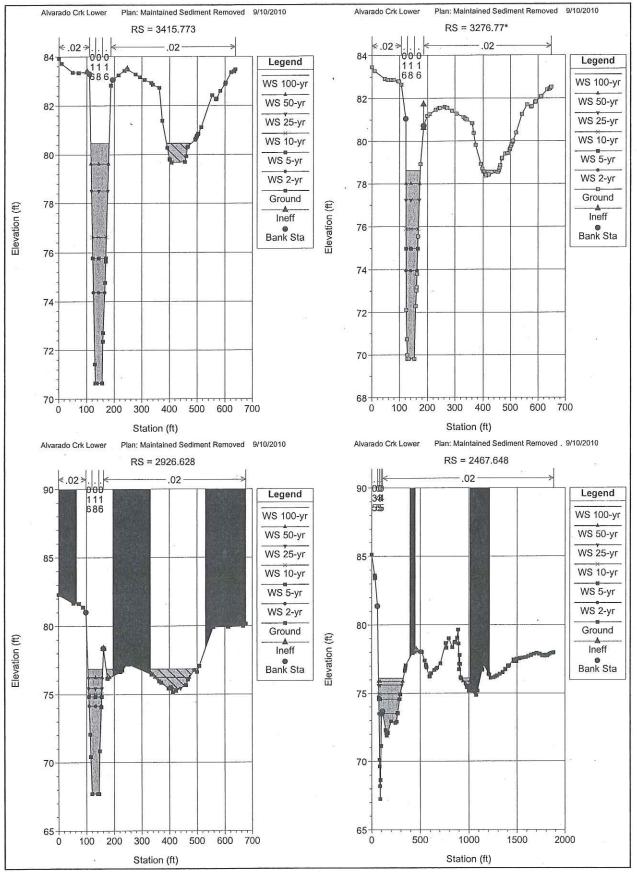
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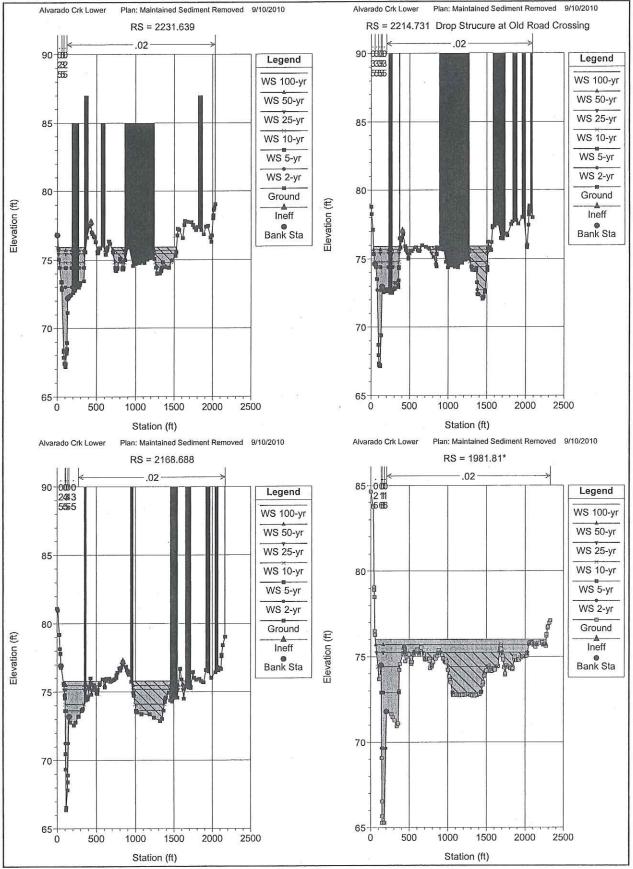
HEC-RAS Plan:	Sed Removed	HEC-PAS Plan: Sed Removed River: Alvarado(west) Reach: Lower Reach (Continued)	west) Reach: Lo	ower Reach (Co					VILI CHAI		TONING	
Keach		Liolle						E-U. Slupe				
			(cfs)	(ft)	(11)	(tt)	(1)	(11/11)	(fVS)	(sq ft)	ω	
Lower Reach	1192.356	10-yr	2700.00	62.42	73.82	68.27	74.34	0.000355	5.82	478.94	862.13	0.37
Lower Reach	1192.356	5-yr	2050.00	62.42	72.34	67.32	72.78	0.000324	5.37	381.86	464.72	0.34
Lower Reach	1192.356	2-yr	1180.00	62.42	69.24	65.86	69.59	0.000355	4.79	246.33	40.69	0.34
Lower Reach	1594.709	100-yr	5100.00	63.65	76.03	72.71	76.04	0.000012	1.29	8092.02	2353.26	0.07
Lower Reach	1594.709	50-yr	4500.00	63.65	75.72	72.19	75.73	0.000013	1.29	7376.14	2352.92	0.07
Lower Reach	1594.709	25-yr	3800.00	63.65	75.33	70.58	75.34	0.000014	1.31	6460.61	2352.48	0.08
Lower Reach	1594.709	10-yr	2700.00	63.65	74.23	69.31	74.47	0.000171	4.29	836.87	2023.71	0.26
Lower Reach	1594.709	5-yr	2050.00	63.65	72.59	68.45	72.91	0.000264	4.74	515.32	1099.25	0.32
Lower Reach	1594.709	2-yr	1180.00	63.65	69.36	67.06	66.79	0.000546	5.22	225.87	49.39	0.43
Lower Reach	1794.94*	100-yr	5100.00	64.39	76.03	73.95	76.04	0.000031	1.57	6181.99	2430.00	0.10
Lower Reach	1794.94*	50-yr	4500.00	64.39	75.72	73.26	75.74	0.000036	1.65	5441.20	2429.33	0.10
Lower Reach	1794.94*	25-yr	3800.00	64.39	75.18	72.69	75.42	0.000313	4.72	1208.62	2377.68	0.30
Lower Reach	1794.94*	10-yr	2700.00	64.39	74.25	70.46	74.52	0.000340	4.68	775.91	1685.20	0.32
Lower Reach	1794.94*	5-yr	2050.00	64.39	72.54	69.48	73.05	0.000661	5.86	397.04	555.52	0.44
Lower Reach	1794.94*	2-yr	1180.00	64.39	69.29	67.92	70.05	0.001285	6.96	169.64	41.93	0.61
Lower Reach	1981.81*	100-yr	5100.00	65.28	76.01	73.06	76.06	0.000065	2.88	4425.16	2212.83	0.17
Lower Reach	1981,81*	50-yr	4500.00	65.28	75.70	72.79	75.76	0.000071	2.94	3758.79	2064.28	0.18
Lower Reach	1981.81*	25-yr	3800.00	65.28	75.24	72.43	75.47	0.000176	4.45	1245.35	1776.77	0.28
Lower Reach	1981.81*	10-yr	2700.00	65.28	74.41	70.62	74.57	0.000144	3.73	987.38	1029.70	0.25
Lower Reach	1981.81*	5-yr	2050.00	65.28	72.90	69.84	73.15	0.000258	4.35	618.88	594.38	0.32
Lower Reach	1981.81*	2-yr	1180.00	65.28	69.64	68.58	70.28	0.001160	6.45	182.83	54.96	0.62
Lower Reach	2168.688	100-yr	5100.00	66.38	75.79	74.98	76.21	0.002710	5.87	991.32	1093.85	0.48
Lower Reach	2168.688	50-yr	4500.00	66.38	75.46	74.78	75.92	0.003078	6.19	844.32	944.04	0.50
Lower Reach	2168.688	25-yr	3800.00	66.38	75.18	74.55	75.62	0.003047	6.08	738.55	854.33	0.49
Lower Reach	2168.688	10-yr	2700.00	66.38	74.08	74.08	74.85	0.005861	7.87	441.26		0.63
Lower Reach	2168.688	5-yr	2050.00	66.38	73.62	73.62	74.42	0.006281	7.71	332.74	4,	0.65
Lower Reach	2168.688	2-yr	1180.00	66.38	71.24	71.24	72.78	0.015519	9.94	118.68	38.62	1.00
Lower Reach	2214.731	100-yr	5100.00	67.14	75.91	74.61	76.32	0.001722	5.11	1003.04	972.32	0.40
Lower Reach	2214.731	50-yr	4500.00	67.14	75.68	74.34	76.04	0.001663	4.86	936.93	758.88	0.39
Lower Reach	2214.731	25-yr	3800.00	67.14	75.43	74.12	75.73	0.001517	4.48	866.81	628.03	0.37
Lower Reach	2214.731	10-yr	2700.00	67.14	74.79	73.69	75.03	0.001567	4.11	691.04	513.77	0.37
Lower Reach	2214.731	5-yr	2050.00	67.14	74.40	72.36	74.60	0.001293	3.91	590.44	452.14	0.34
Lower Reach	2214.731	2-yr	1180.00	67.14	72.71	71.08	73.16	0.003056	5.34	225.78	239.20	0.50
Lower Reach	2231.639	100-yr	5100.00	67.18	75.93	74.33	76.37	0.001143	5.44	960.28	778.58	0.43

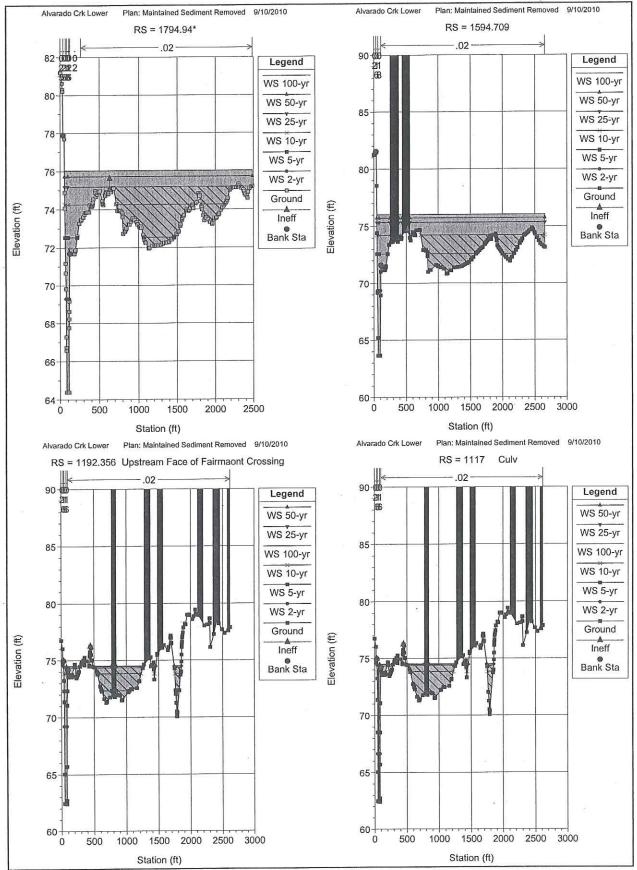
HEC-RAS Plan: Sed Removed	Sed Removed	River: Alvarado(west) Reach: Lower Reach (Continued)	o(west) Reach:	Lower Reach (	Continued)							
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(tt)	(Ħ)	(Ħ)	(t))	(tt/ft)	(f/s)	(t) (sq ft)	(Ħ)	
Lower Reach	2231.639	50-yr	4500.00	67.18	75.70	74.09	76.09	0.001058	5.13	906.45	716.71	0.41
Lower Reach	2231.639	25-yr	3800.00	67.18	75.45	73.76	75.77	0.000923	4.67	848.54	667.19	0.38
Lower Reach	2231.639	10-yr	2700.00	67.18	74.82	72.24	75.06	0.000806	4.12	701.84	532.98	0.35
Lower Reach	2231.639	5-yr	2050.00	67.18	74.44	71.56	74.62	0.000647	3.63	616.33	347.69	0.31
Lower Reach	2231.639	2-yr	1180.00	67.18	73.01	70.45	. 73.20	0.000718	3.63	344.91	128.53	0.32
Lower Reach	2467.648	100-yr	5100.00	67.26	76.11	75.28	76.82	0.002352	4.51	786.56	344.84	0.37
Lower Reach	2467.648	50-yr	4500.00	67.26	75.87	75.05	76.52	0.002329	4.37	725.55	315.26	· 0.37
Lower Reach	2467.648	25-yr	3800.00	67.26	75.60	74.76	76.16	0.002208	4.12	659.76	282.41	0.36
Lower Reach	2467.648	10-yr	2700.00	67.26	74.97	74.27	75.43	0.002414	3.95	511.26	223.17	0.37
Lower Reach	2467.648	5-yr	2050.00	67.26	74.56	73.95	74.95	0.002535	3.81	423.21	214.39	0.37
Lower Reach	2467.648	2-yr	1180.00	67.26	73.50	73.50	74.01	0.007108	6.04	208.30	180.62	0.62
			100									
Lower Reach	2926.628	100-yr	5100.00	67.71	76.85	76.85	80.11	0.002519	14.49	352.07	249.53	1.00
Lower Reach	2926.628	50-yr	4500.00	67.71	76.23	76.23	79.32	0.002577	14.10	319.25	. 185.93	1.00
Lower Reach	2926.628	25-yr	3800.00	67.71	75.45	75.45	78.31	0.002664	13.59	279.64	84.72	1.00
Lower Reach	2926.628	10-yr	2700.00	67.71	75.03	74.07	76.71	0.001660	10.41	259.48	47.60	0.79
Lower Reach	2926.628	5-yr	2050.00	67.71	74.82	73.12	75.87	0.001066	8.21	249.75	46.88	0.63
Lower Reach	2926.628	2-yr	1180.00	67.71	74.15	71.56	74.60	0.000514	5.39	218.79	44.51	0.43
Lower Reach	3276.77*	100-yr	5100.00	69.81	78.63	78.63	82.02	0.002657	14.77	345.30	109.69	1.00
Lower Reach	3276.77*	50-yr	4500.00	69.81	78.02	78.02	81.19	0.002696	14.31	314.51	49.43	1.00
Lower Reach	3276.77*	25-yr	3800.00	69.81	77.24	77.24	80.16	0.002759	13.71	277.12	47.49	1.00
Lower Reach	3276.77*	10-yr	2700.00	69.81	75.89	75.89	78.34	0.002888	12.54	215.23	44.10	1.00
Lower Reach	3276.77*	5-yr	2050.00	69.81	74.97	74.97	77.09	0.003006	11.66	175.84	41.79	1.00
Lower Reach	3276.77*	2-yr	1180.00	69.81	73.95	73.53	75.15	0.002207	8.78	134.45	39.22	0.84
Lower Reach	3415.773	100-yr	5100.00	70.64	80.47	79.14	t 82.42	0.001366	11.21	455.02	157.69	0.76
Lower Reach	3415.773	50-yr	4500.00	70.64	79.62	78.58	81.59	0.001535	11.28	398.95	64.11	0.80
Lower Reach	3415.773	25-yr	3800.00	70.64	78.51	77.88	80.56	0.001854	11.49	330.63	59.40	0.86
Lower Reach	3415.773	10-yr	2700.00	70.64	76.63	76.63	3 78.84	t 0.002740	11.92	226.50	51.38	1.00
Lower Reach	3415.773	S-yr	2050.00	70.64	75.77	75.77	77.70	0.002880	11.15	183.83	47.71	1.00
Lower Reach	3415.773	2-yr	1180.00	70.64	74.37	74.37	75.84	4 0.003181	9.72	121.37	41.40	. 1.00

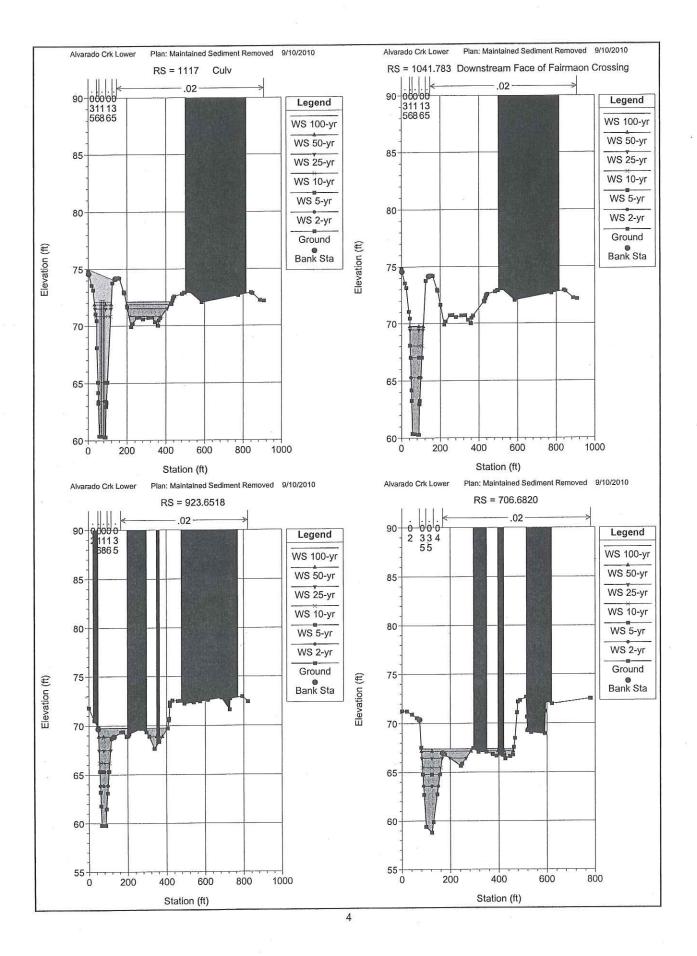
HFC-RAS Plan: Sed Removed River: Alvarado(west) Reach: Lower Reach (Continued)

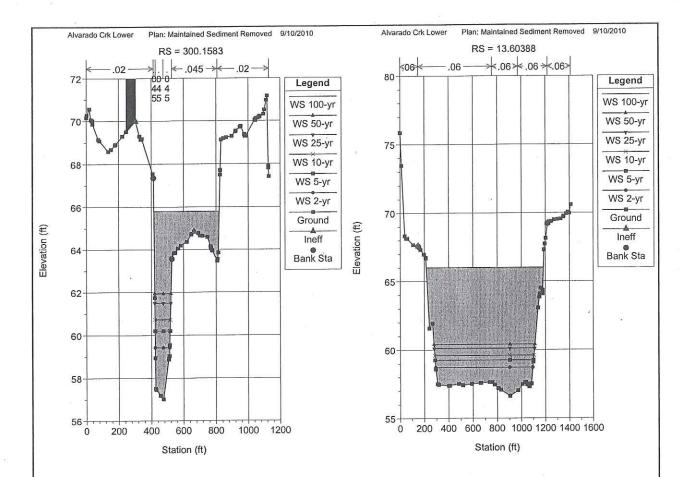
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HEC-RAS Version 4.0.0 March 2008 U.S. Army Corps of Engineers Hydrologic Engineering Center 609 Second Street Davis, California

Х	Х	XXXXXX	XX	XX		XX	XX	Х	X	XXXX
х	Х	Х	Х	Х		Х	Х	Х	Х	х
х	х	Х	Х			Х	Х	Х	Х	Х
XXXX	XXXX	XXXX	Х		XXX	XX	XX	XXX	XXX	XXXX
х	Х	Х	Х			Х	Х	Х	Х	Х
х	х	Х	Х	Х		Х	Х	х	Х	Х
Х	Х	XXXXXX	XX	XX		х	Х	Х	Х	XXXXX

PROJECT DATA Project Title: Alvarado Crk Lower Project File : AlvaradoCrkLower.prj Run Date and Time: 9/10/2010 9:27:45 AM

Project in English units

Project Description: City of San Diego - 1st Year Maintenance J-15541A October 13, 2009 Utilized 1999 City 2-foot Contour Topo (NGVD 29) Alvarado Creek (Lower/Westerly Portion) Helix Map Number 59 and 60 - Phase A Priority

PLAN DATA

Plan Title: Maintained Sediment Removed Plan File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.p08

Geometry Title: Maintained Condition Sediment Removed Geometry File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.g08

Flow Title : Maintained Condition Flow File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.f04

Plan Description: model output

Plan Summary Information: Number of: Cross Sections = 16 Multiple Openings = 0

Culve				0
Bridge	es =	0 Latera	al Structures =	0
Computational Info Water surface Critical dept Maximum numbe: Maximum diffe Flow tolerance	calculation h calculatior r of iteration rence tolerar	n tolerance =	0.01	
Computation Option Critical dept Conveyance Ca Friction Slop Computational	h computed or lculation Met e Method:	hod: At break Average	essary s in n values only Conveyance .cal Flow	2 2
	*			
FLOW DATA				
Flow Title: Maint Flow File : w:\15			S\LowerReach\Alvara	doCrkLower.f04
Flow Data (cfs)				
River	Reach	RS	100-yr	50-yr
25-yr 1 Alvarado(west)	0-yr	5-yr 3415.773	2-yr 5100	4500
	700	2050	1180	
100 C		<b>8</b> 9		
Boundary Condition	ns			
River	Reach	Profile		Upstream
Downstream		- -		
Alvarado(west) Known WS = 66	Lower Reach	100-yr		
Alvarado(west) Normal S = 0.0013	Lower Reach	50-yr		
Alvarado(west) Normal S = 0.0013	Lower Reach	25-yr		
Alvarado(west) Normal S = 0.0013	Lower Reach	10-yr		
Alvarado (west) Normal S = 0.0013	Lower Reach	5-yr		
Alvarado (west) Normal S = 0.0013	Lower Reach	2-yr		

## GEOMETRY DATA

Geometry Title: Maintained Condition Sediment Removed

Geometry File : w:\15541-A\AlvaradoCreek\HECRAS\LowerReach\AlvaradoCrkLower.g08

CROSS SECTION

RIVER: Alvarado(west) REACH: Lower Reach RS: 3415.773

INPUT

INFOR			
Description:	50		
Station Elevation Data			Cto
Sta Elev Sta	Elev Sta Ele	v Sta Elev	Sta
Elev			
0 83.93 10.52	83.72 49.34 83.3	6 70.68 83.34 10	0.85
83.38			
109.41 83.29 130.02	71.42 131.95 70.6	4 137.65 70.64 1	56.95
70.64	- <sup>1</sup> 21		
159.47 72.36 160.66	72.71 167.65 74.7	7 169.83 75.63 18	38.02
82.83			
194.79 83.06 215.5	83.25 236.72 83.4	3 246.85 83.49 2	77.39
83.28			
293.32 83.17 309.77	83.06 333.91 82.9	3 338.78 82.86 3	362.9
82.73			
374.16 81.39 392.18	80.28 400.42 79.8	2 401.41 79.79 40	07.16
79.67			
455.28 79.7 459.96	79.94 464.45 80.3	1 465.99 80.33 49	92.85
80.61			
494.47 80.65 497.4	80.72 499.2 80.7	7 503.06 80.83 50	04.06
80.86			
514.76 81.12 553.49	82.42 566.92 82.2	5 568.15 82.26 50	69.27
82.29			
582.64 82.6 600.74	82.89 602.56 82.9	4 622.5 83.36 63	31.58
83.4			
632.75 83.39 637.02	83.47		
Manning's n Values	num= 5		
Sta n Val Sta	n Val Sta n Va	l Sta nVal	Sta n
Val			
0 .02 109.41	.016 131.95 .01	8 156.95 .016 1	88.02
.02			
		2 20 22 20 20 20 20 20 20 20 20 20 20 20 2	
Bank Sta: Left Right	Lengths: Left Channel	Right Coeff Co	ontr.
Expan.			
109.41 194.79	137.5 139	140.2	.1
.3			14
Ineffective Flow num=			
Sta L Sta R Elev	Permanent		
0 100.85 83.38	F		
246.85 637.02 83.49	F		
CROSS SECTION			
RIVER: Alvarado(west)			
REACH: Lower Reach	RS: 3276.77*		

INPUT	<sup></sup>			*					
Descriptio		-		07					
Station E				87		<u></u>	77]	0.5.0	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev									
0	83.464	10.203	83.282	47.853	82.908	57.912	82.87	68.55	
82.86									
78.536	82.867	95.21	82.806	97.811	82.784	106.114	82.642	122.62	
81.05									
124.269	72 115	126.64	70 741	127 925	69 991	128.563	69.81	133.714	
10.002 00.00	12.113	120.04	/0./41	127.923	001001				
69.81	·		<b>FO</b> 000	1 60 004	77 011	161.344	72 176	162 794	
	69.81	157.804	12.292	160.824	/3.011	101.344	/3.1/0	102.794	
73.798							01 100	100 611	
166.854	75.542	174.728	78.926	186.01	80.72	198.199	81.183	199.611	
81.189									
207.024	81.26	229.233	81.463	239.834	81.541	240.606	81.54	244.373	
81.55									
246.082	81.557	262.636	81.598	264.407	81.587	269.281	81.561	271.797	
81.542	01.00								
288.469	01 116	305.685	81 287	330 949	81 122	336.046	81.057	341.505	
	01.410	505.005	01.207	550.515	01.105	550.010			
81.021		2 6 1 2 2 2	60 001	200 400	00 270	373.074	70 916	373 13	
341.882	81.017	361.289	80.831	366.466	80.379	373.074	19.010	212.12	
79.813					1				
391.933	78.928	397.255	78.699	400.557	78.586	401.593	78.569	404.08	
78.544									
406.778	78.471	407.611	78.444	411.04	78.381	421.012	78.423	452.889	
78.55									
453.995	78.553	457.972	78.625	460.415	78.754	462.87	78.865	467.569	
79.176									
469.181	79 206	480.755	79 404	489.639	79.427	496.698	79.603	497.292	
79.618	79.200	1001/35	12.101						
	70 677		70 702	EU3 038	79 852	507.977	79 968	509.024	
498.987	19.677	502.054	19.102	505.550	12.052	501.211	15.500	505.021	
80.008					01 01 0	FR4 010	01 505	576.099	
520.222	80.396	541.316	81.26	560.756	81.713	574.812	81.232	576.099	
81.603					1944-0110 - 1789-184				
577.271	81.624	589.045	81.815	591.264	81.84	591.545	81.841	610.207	
82.054									
612.112	82.09	632.98	82.4	639.329	82.421	642.483	82.453	643.708	
82.455									
646.558	82.511	648.177	82.524						
010.000	01.011								
Manning's	n Value	d	num=	6					
-		Sta			n Val	Sta	n Val	Sta	n
	II Val	SLA	II VAL	bta	n var	beu	n var	000	
Val	8			100 500	010	150 50	010	186.01	
0	.02	106.114	.016	128.563	.018	153.50	.016	100.01	
.02									
648.177	.02								
Bank Sta:	Left	Right	Length	s: Left (	Channel	Right	Coef	E Contr.	
Expan.									
	22,62 1	86.01		345.32	350.14	353.92		.1	
.3				5					
Ineffecti	VA FLOW	- תוות	2	1.					
	Sta R								
			Ferman						
105.35	048.⊥//	81.724	F						

CROSS SECTION

	8							
RIVER: Alvarado REACH: Lower Re		RS: 292	6.628					
INPUT								
Description: Station Elevati Sta Ele		num= Elev	42 Sta	Elev	Sta	Elev	Sta	
Elev 0 82.2	9 53.38	81.66	72.39	81.64	87.76	81.37	97.81	122
81.01 113 72.0	5 115.78	70.41	120.03	67.71	141.42	67.71	145.03	
67.71 148.04 70.8	34 153.8	74.06	161.57	78.36	175.86	76.17	177.43	
76.16 223.02 76.6	54 227.21	76.74	229.11	76.79	247.52	77.21	249.49	
77.2 254.91 77.1 75.85	9 335.23	76.46	335.65	76.45	362.99	75.94	370.4	
75.85 397.23 75.4 75.26	404.82	75.53	407.82	75.41	412.56	75.13	423.65	
459.1 75.6 76.64	56 460.33	75.67	467.47	76.07	490.09	76.78	499.97	
507.82 77.0 79.99	8 557.44	79.91	610.52	79.96	613.3	79.92	666.44	
674.48 80.1	7 676.28	80.14						
Manning's n Val Sta n Va		num= n Val	5 Sta	n Val	Sta	n Val	Sta	n
Val 0.0	97.81	.016	120.03	.018	145.03	.016	161.57	
.02								
Bank Sta: Left Expan.	Right	5		Channel		Coeff	Contr.	
97.81 .3	161.57		455.11	458.98	464.26		.1	
Ineffective Flo Sta L Sta 161.54 676.2	R Elev	= 1 Permane F						
Blocked Obstruc Sta L Sta	tions	num= Sta L	3 Sta R	Elev	Sta L	Sta R	Elev	
530.39 676.2			332.19	90	0	65.03	90	
CROSS SECTION				00 14				
RIVER: Alvarado REACH: Lower Re		RS: 246	7.648					
INPUT								
Description: Station Elevati Sta Ele		num= Elev	131 Sta	Elev	Sta	Elev	Sta	
Elev					2			<i>1</i> 4 - 3

0	85.14	31.71	83.6	33.83	83.49	34.64	83.42	35.08	
83.41 59.99	81.37	73.72	74.68	82.27	70.11	83.15	69.63	86.73	
68.19 89.02	67.26	92.06	68.64	97.86	71.13	103.24	73.43	113.31	
73.68 146.6	72.29	153.08	72.07	156.92	71.89	165.93	72.07	166.17	
72.08 167.48	72.11	202.5	72.94	245.26	72.82	258.71	72.9	268.41	
73.53 269.48	73.55	294.79	74.91	342.16	76.66	346.46	76.82	346.9	
76.83 352.33	77.04	420.61	77.94	422.58	77.93	442.68	78.03	457.77	
78.17 493.61	78.06	507.21	78.02	507.95	78.05	514.77	78	545.03	
77.39		558.3	77	562.9	76.89	592.83	76.22	596.07	
76.24 609.78	4	643.62	76.71	645.17	76.7	665.46	76.81	673.24	
76.88		763.5	78.67	770.56	78.32			831.94	
78.37		859.72	78.76	881.44				895.56	
78.63						909.69			
902.16 76.15	76.75		77.15			992.3			
924.71 75.47		982.71		989.78					
994.82 75.18				1075.12		1081.44			
1134.03 76.41	76.7	1136.68	76.76	1149.13		1153.32			
1209.82 76.3	76.35	1225.56	76.12	1254.7	76.16	1273.65	76.22	1290.4	
1316.22 76.74	76.41	1319.91	76.43	1349.5	76.55	1350.69	76.52	1377.48	
1378.49 77.46	76.78	1405.71	77.02	1408.81	76.97	1416.98	77.03	1463.22	
1464.35 77.49	77.47	1465.26	77.38	1465.46	77.33	1492.9	77.32	1495.06	
1497.02	77.51	1526.26	77.54	1528.61	77.57	1557.48	77.59	1560.29	
77.6 1588.83	77.63	1592.01	77.64	1617.89	77.71	1643.35	77.77	1650.27	
77.81 1675.79	77.87	1677.17	77.88	1702.31	77.94	1703.75	77.95	1727.8	
77.87 1732.13	77.89	1735.39	77.86	1758.02	77.78	1761.23	77.75	1763.95	
77.79 1784.6	77.72	1787.59	77.76	1790.47	77.8	1810.66	77.74	1813.79	
77.78 1820.99	77.81	1838.1	77.88	1855.62	77.95	1868.06	77.94	1868.49	
77.93 1878.22	77.98								
Manning's			num=	5		510	00 F		
Sta Val	n Val	Sta							

n

97.86 .045 113.31 82.27 .035 .035 59.99 .045 0 .02 Lengths: Left Channel Coeff Contr. Right Bank Sta: Left Right Expan. 232.89 236.01 234.37 .1 59.99 113.31 .3 1 num= Ineffective Flow Elev Permanent Sta R Sta L 78.17 F 457.77 1878.22 2 num= Blocked Obstructions Sta L Sta R Elev Elev Sta L Sta R 90 90 1007.94 1212.91 449.7 393.47 CROSS SECTION RIVER: Alvarado(west) REACH: Lower Reach RS: 2231.639 INPUT Description: 120 ກາງm= Station Elevation Data Sta Sta Elev Elev Elev Sta Sta Elev Sta Elev 73.41 51.81 51.03 75.85 17.94 75.04 76.8 12.75 0 73.4 68.39 81.55 72.84 80.96 73.36 56.84 52.64 73.35 54.8 68.28 67.18 107.28 102.28 67.26 105.78 67.42 67.85 92.65 83.35 67.35 125.11 124.25 68.47 68.23 67.41 119.2 68.15 120.35 108.73 68.93 154.89 72.32 146.66 72.33 144.53 132.75 72.19 130.5 71.14 72.34 72.75 229.84 222.6 72.59 72.39 172.13 72.44 200.97 163.13 72.92 274.94 72.99 287.98 267.34 73.09 73.1 250.17 73.03 264.5 73.17 378.11 75.57 358.58 338.77 73.46 352.25 75.59 73.34 291.98 76.64 437.38 429.8 77.64 424.63 77.62 428.34 77.74 77.45 409.95 77.02 76.31 513.25 465.55 76.73 477.09 76.63 488.11 448.59 76.88 75.49 541.8 75.85 581.1 518.31 75.58 536.09 75.88 75.56 517.54 76.06 630.96 75.78 636.47 75.4 627.3 75.69 615.4 611.82 75.41 75.92 707.85 75.57 742.43 658.88 76.34 668.58 76.19 76.35 653.45 74.25 75.09 816.48 74.89 829.18 800.8 74.34 74.2 763.74 749.35 74.42 865.2 833.71 74.31 838.94 74.34 74.44 830.73 829.93 74.37 75 74.57 1003.02 74.72 1049.97 966.88 76.09 917.31 75.9 909.05 74.77

75.08 1279.83 74.03 1281.75 75.02 1242.96 74.78 1153.48 1113.38 73.98 74.82 1379.5 74.24 1350.52 74.01 1329.84 74.17 1334.15 1314.45 74.47 75.29 1527.23 75.55 1539.52 74.96 1516.6 74.43 1469.75 1430.9 76.78 77.54 1640.26 77.18 1611.43 76.59 1631.79 77.26 1565.11 1545.51 77.82 77.35 1780.39 77.53 1760.68 1672.84 77.77 1719.97 77.73 1741.31 77.16 77.41 1912.12 77.16 1880.35 76.86 1910.12 77.4 1849.81 1802.24 77.42 76.31 1990.43 76.76 2006.08 76.62 1982.33 77.47 1970.04 1936.96 78.02 78.23 2014.93 78.64 2020.55 78.77 2034.15 2008.62 78.15 2009.51 79.03 4 Manning's n Values num= n Val Sta n Val Sta n Val Sta n Val Sta 119.2 .02 81.55 .025 .025 54.8 .035 0 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 16.13 16.91 37.54 .1 0 132.75 .3 num= 1 Ineffective Flow Sta R Elev Permanent Sta L 77:74 F 428.34 2034.15 6 Blocked Obstructions num= Sta L Sta R Elev Sta L Sta R Elev Sta R Elev Sta L 87 552.57 607.29 85 85 340.74 396.32 184.32 275.65 87 2031.7 2034.15 90 85 1807.53 1866.52 856.96 1244.13 CROSS SECTION RIVER: Alvarado(west) RS: 2214.731 REACH: Lower Reach INPUT Description: Drop Strucure at Old Road Crossing Station Elevation Data num= 132 Elev Sta Sta Sta Elev Sta Elev Sta Elev Elev 32.65 78.26 19.99 77.13 31.38 75.35 78.8 4.69 0 75.36 68.7 98.81 73.53 95.88 74.64 60.75 74.49 75.72 47.05 67.95 104.5 67.22 105.37 67.29 103.51 67.24 102.3 102.07 67.35 67.21 69.4 143.1 67.22 128.26 67.15 118.92 67.14 119.21 117.44 72.97 72.73 192.62 72.74 160.75 182.67 72.57 72.88 154.75 147.52 72.61 72.79 203.03 72.63 248.98 72.63 202.04 72.78 212.51 193.9 72.52

251.05	72.53	271.5	72.51	302.09	72.8	304.45	72.82	305.5	
72.87 313.36	73.25	350.18	73.13	351.51	72.93	353.9	73.43	358.18	
74.32 368.7	76.5	376.42	75.82	377.9	75.85	380.05	75.81	390.48	
76.33 394.76	76.55	404.34	77.03	405.94	76.97	411.53	76.77	439.48	
75.92	75.73				75.01	483.64	75.07	496.29	
75.38									
505.79 75.62	75.61	526.86		580.21		608.69	75.63		
621.32 75.81	75.58	627.49	75.57	662.49	75.98	709.38	75.88	743.92	
808.08 75.84	75.14	842.46	74.58	847.52	74.44	850.1	75.33	851.67	
853.5	75.75	863.11	75.73	896.48	75.71	940.17	75.67	942.15	
75.68 970.19	74.78	995.12	74.37	1085.56	74.41	1125.08	74.38	1176.36	
74.69 1223.87		1267.55	75	1298.95	74.42	1308.02	74.18	1312.54	
74.17 1339.62	74 15	1356.07	74 13	1358.46	74.16	1362.15	74.33	1370.72	
73.27				3		1386.68		1443.12	
1375.79 72.05		1381.3							
1450.89 74.16	72.15	1451.83	72.14	1458.42	72.22	1472.94	72.54	1505.43	
1512.29 75.62	75.72	1513.91	76.23	1530.37	75.83	1550.2	75.66	1553.68	
1560.85	76.2	1573.52	77.27	1574.42	77.36	1599.33	77.39	1640.48	
77.53 1644.68	77.62	1681.27	76.5	1698.12	76.47	1703.78	76.46	1749.14	
76.81 1764.78	76.68	1814.25	77.5	1830.66	77.69	1879.63	77.79	1905.43	
77.53 1957.8	78 01	1977.52	78.05	2014.28	75.94	2016.6	75.81	2020.51	
75.99						2046.47		2048.95	
2035.53 78.81		2040.76		2042.13	70.4	2040.47	78.00	2040.95	
2049.4	78.84	2088.99	77.99						
Manning's Sta	n Value n Val		num= n Val	6 Sta	n Val	Sta	n Val	Sta	n
Val									
0 .035	.035	47.05	.035	95.88	.035	128.26	.035	143.1	
202.04	.02				£				
Bank Sta:	Left	Right	Length	s: Left (	Channel	Right	Coef	f Contr.	
	47.05	143.1		31.05	46.04	52.74		.1	
.3 Ineffectiv	ve Flow	num=	-	1					8
Sta L 404 34	Sta R 2088,99	Elev 77.03	Permane	ent					
Blocked O			num=	7					

224.9 1579.78 2059.58		Elev 90 90 90	363.14	Sta R 373.41 1893.63	90		Sta R 1272.26 1999.56	Elev 90 90	
CROSS SEC	CTION								
RIVER: Al REACH: Lo			RS: 216	58.688				25	
INPUT Descripti Station E Sta		Data Sta	num= Elev	130 Sta	Elev	Sta	Elev	Sta	
Elev 0	81.11	8.42	80.99	28.98	79.2	35.51	78.16	41.11	
77.81 41.46	77.79	49.04	76.92	49.21	76.77	49.37	76.92	82.88	
75.61 97.93	74.76	101.97	74.53	108.09	70.47	109.72	69.35	114.08	
66.38 116.39	66.55	133.68	67.83	135.76	68.42	137.48	68.92	152.33	
73.19 154.59	73.2	164.21	72.76	214.35	72.55	235.29	72.76	236.86	
72.78 272.29	73.21	276.75	73.19	313.88	73.62	322.66	73.67	332.02	
73.76 371.42	74.39	391.58	74.46	391.98	74.47	397.41	74.66	412.65	
75.38 429.65	75.99	432.12	75.63	436.98	74.8	453.7	75.15	469.65	
75.49 482.13	75.32	503.89	74.94	511.34	74.86	515.46	75.09	543.35	
75.57 578.89	75.92	605.69	75.33	622.05	75.8	627.14	75.96	661.78	
75.97 675.45	75.76	676.55	75.73	687.84	75.78	695.12	75.81	695.54	
75.83 702.92	75.86	717.53	75.85	726.03	75.89	734.98	75.93	755.29	
76.02 755.55	76.04	758.4	76.21	771.81	76.4	796.33	76.73	803.08	
76.59 803.36	76.57	819.66	76.78	835.81	76.97	836.04	77	839.41	
77.22 878.82	76.85	890.04	76.59	890.63	76.56	906.91	76.39	914.08	
76.32 921.68	76.25	921.89	76.27	925.47	76.52	948.37	75.75	972.75	
74.93 979.07	74.72	1009.42	73.57	1012.54	73.52	1023.73	73.49	1076.49	
73.36 1078.47	73.37	1185.18	73.35	1241.16	73.1	1320.75	72.86	1323.48	
72.88 1346.75	73.01	1381.97	74.25	1386.87	74.49	1395.25	74.58	1434.3	
74.94 1437.78 76.66	74.92	1450.87	74.37	1477.49	74.27	1545.68	74.56	1578.98	

76.68 1600.5 75.9 1628.93 74.48 1647.38 75.39 1693.93 1580.24 75.3 75.27 1717.43 75.26 1744.84 76.44 1761.11 76.02 1787.9 1716.25 75.88 75.79 1872.58 75.7 1885.99 75.68 1916.24 75.93 1850.39 1828.77 76.57 76.56 1944.71 76.54 1949.43 76.48 1987.9 76.58 1943.96 1917.11 76.01 76.8 2081.25 76.72 2114.6 76.55 2105.17 76.43 2068.14 2041.55 76.66 78.4 2168.38 2120.74 77.58 2121.39 77.68 2122.26 77.7 2137.68 79.02 num= 6 Manning's n Values n Val Sta Sta n Val Sta n Val Sta n Val Sta n Val .025 101.97 .045 109.72 .035 137.48 .045 152.33 0 .035 272.29 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 187.46 186.87 184.07 .1 49.04 154.59 . 3 Ineffective Flow num= 1 Elev Permanent Sta L Sta R 77.22 839.41 2168.38 F 7 Blocked Obstructions num= Elev Sta R Elev<sup>.</sup> Sta L Sta R Elev StaL StaR Sta L 90 934.55 972.18 90 1452.21 1548.05 90 345.94 374.87 90 2033.15 2077.5 90 1649.05 1720.79 90 1912.43 1972.34 90 2162.07 2168.38 CROSS SECTION RIVER: Alvarado(west) REACH: Lower Reach RS: 1981.81\* INPUT Description: 251 num= Station Elevation Data Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 79.05 44.52 83.82 34.24 83.75 43.66 84.65 26.29 0 78.91 76.51 55.06 76.27 107.5 73.68 117.48 52.63 78.5 47.34 73.69 69.08 147.09 66.53 147.68 73.87 135.14 74.5 143.27 121.54 65.66 65.28 207.09 71.78 208.92 71.79 268.97 65.28 177.68 148.53 71.61 70.93 355.82 71.08 365.49 71.45 307.37 71.27 338.31 286.29 72.96 74.57 377.34 74.58 416.58 75.18 431.39 74.21 377.15 369.68 75.55

438.57	75.49	441.25	75.26	446.5	74.73	446.53	74.73	447.41	
74.74 464.69	74.97	479.6	75.17	482.02	75.21	495.2	75.14	495.57	
75.13 519.21	74.69	525.53	74.6	526.93	74.58	527.3	74.57	527.45	
74.58	74.05	525.55	/1.0	520.75					
531.78	74.69	534.83	74.69	558.57	75.12	562.07	75.19	566.34	
75.25 575.21	75.28	591.17	75.32	595.15	75.33	596.68	75.36	600.68	
75.42 610.05	75.38	629.79	75.12	647.56	75.44	650.52	75.5	653.09	
75.55 659.03	75.54	690.71	75.13	702.01	74.87	705.56	74.84	706.76	
74.82 719.02	74.85	726.93	74.87	727.38	74.88	734.55	74.9	735.4	
74.9 737.22	74.9	741.72	74.88	751.27	74.85	760.39	74.86	760.5	
74.85 761.86	74.75	770.23	74.33	770.31	74.33	792.29	74.42	792.57	
74.43		803.95	74.64	810.23	74.71	836.87	74.98	844.2	
74.9 844.5	74.89	862.21	75.06	877.87	75.21	879.75	75.22	880	
75.24 880.63	75.27	882.41	75.33	883.66	75.38	903.19	75.24	904.6	
75.24 926.47	75.09	937.3	74.92	938.66	74.9	939.3	74.88	956.98	
74.75 964.77	74.69	973.02	74.64	973.25	74.65	977.14	74.82	982.5	
74.7	-	1016 6	70.04	1000 01	72 62	1028.5	72 6	1035.36	
1002.01 73.48	74.21	1016.6	/3.84	1026.81	73.63	1020.0	75.0	1055.50	
1067.38 72.74	72.79	1068.33	72.77	1071.72	72.74	1075.9	72.73	1083.87	
1116.24 72.74	72.75	1141.18	72.72	1143.33	72.72	1157.48	72.72	1168.23	
1188.8	72.74	1220.62	72.75	1242.14	72.77	1259.24	72.79	1263.52	
72.79 1284.77	72.76	1296.37	72.73	1317.63	72.7	1320.05	72.7	1340.83	
	72.7	1375.57	72.73	1406.21	72.77	1406.5	72.77	1409.47	
	72.8	1429.2	72.9	1434.74	72.93	1452.11	73.35	1457.55	
73.48 1473	73.85	.1474.96	73.91	1478.32	74.02	1487.43	74.1	1492.48	
74.14 1497.72	74.18	1523.24	74.4	1524.84	74.42	1528.71	74.45	1529.84	
74.46 1533.62	74.46	1542.16	74.26	1546.07	74.18	1547.84	74.13	1559.5	
74.14 1563.3	74.15	1576.71	74.17	1576.76	74.17	1590.26	74.25	1593.88	
74.28 1599.15	74.27	1605.48	74.22	1612.17	74.23	1641.73	74.42	1650.83	
74.45 1671.79 75.68	75.3	1677.32	75.46	1678.5	75.49	1685.57	75.66	1686.62	
15.00									

12 of 29

				98					
	1687	75.69	1688.37	75.68	1694.08	75.44	1707.61	75.07 1710.37	7
7	5 1715.6	74.82	1729.14	74.35	1741.25	73.94	1743.77	74.01 1758.45	5
	4.41 1761.3	74.48	1766.09	74.46	1787.6	74.39	1809.31	74.32 1811.86	5
	4.31 1814.8	74.3	1836.1	74.25	1836.55	74.24	1837.39	74.24 1841.87	7
		74.88	1866.55	74.97	1867.16	74.99	1884.83	74.77 1890.81	Ľ
	4.78 1893.48 4.93	74.78	1913.93	74.79	1918.05	74.81	1922.99	74.83 1943.12	2
	1958.32 5.01	75	1963.6	74.99	1966.08	74.99	1981.81	74.99 1993.67	7
	1996.27	75,01	2005.91	75.03	2010.02			75.04 2020.48	
	2025.49	75.18	2027.27	75.22	2050.95	75.75	2053.34	75.8 2053.68	3
	2054.28 75.85	75.81	2065.97				2080.89		<del>1</del> )
7	2084.26 75.7	75.84			2093.29		2095.88		
7	2110.77 75.76	75.68	2131.18	75.57	2132.22		2153.97		
7	2172.18 75.9	75.77	2188		2189.45		2192.15		
	2223.84 75.7	75.81	2232.57		2244.23			75.7 2258.50	
7	2266.53 76.29				2268.8			76.22 2276.18	
	76.98			76.67	2293.87	76.75	2314.07	76.97 2315.30	D
	2327.22	77.11							
N	lanning's	n Valu	es	num=	6		•		
	Sta	n Val		n Val	Sta	n Val	Sta	n Val Sta	a n
	7al 0	.025	135.14	.016	147.68	.018	177.68	.016 207.09	Э.
	2327.22	.02							
	Bank Sta:	Left	Right	Length	s: Left	Channel	Right	Coeff Contr	•
		35.14	207.09		187.46	186.87	184.07	.1	
	.3 Ineffectiv Sta L 431.39 2	Sta R	Elev	Perman F	1 ent				
(	CROSS SECI	TION							
	RIVER: Alv REACH: Lov			RS: 17	94.94*				
	INPUT Descriptic	on:							
									-

Station E Sta	levation Elev	Data Sta	num= Elev	284 Sta	Elev	Sta	Elev	Sta	
Elev								50 	
0	81.19	4.26	81.18	5.08	81.18	6.52	81.18	22.45	
80.64 27.51 77.7	80.3	31.85	80.2	32.12	80.2	38	77.89	52.39	
58.55 69.83	74.89	61.08	74.06	69.65	71.17	71.34	70.66	74.1	
78.27 64.39	67.28	79.14	66.73	79.38	66.58	82.36	64.39	112.36	
113.07 71.69	67.76	114.26	68.23	115.24	68.63	116.58	69.17	123.17	
123.71 71.67	71.89	125	71.69	136.27	71.91	141.68	71.86	177.73	
180.08 71.87	71.66	186.14	71.69	194.75	71.82	195.06	71.83	196.77	
197.29 73.27	71.89	219.61	72.55	221.45	72.61	242.96	73.26	243.6	
262.99 73.61	73.43	268.22	73.45	272.38	73.48	296.82	73.59	298.16	
311.75 73.85	73.74	322.05	73.83	324.18	73.85	333.02	73.84	344.49	
368.42 74.15	73.86	378.95	74.23	379.22	74.23	402.85	74.15	403.32	
408.5 74.32	74.18	409.69	74.19	413.56	74.23	415.25	74.26	417.57	
417.67 74.89	74.33	419.23	74.36	427.56	74.56	447.49	74.98	450.38	
456.05 74.89	74.66	456.08	74.66	457.03	74.67	475.69	74.79	491.77	
494.39 74.31	74.93	508.62	74.96	509.02	74.95	534.53	74.44	541.35	
542.87 74.24	74.29	543.27	74.28	543.42	74.28	548.1	74.28	551.4	
577.02 74.81	74.72	580.8	74.8	585.41	74.9	594.97	74.87	612.2	
616.5 74.91	74.79	618.15	74.83	622.46	74.91		75.03	653.89	
673.07 74.29	75.09	676.27	75.12	679.03		685.45	75.11		
731.84 73.93	73.93	735.68	73.92	736.96		750.2		758.74	
759.23 73.91	73.94	766.97	73.94	767.88	73.94		73.93		
785.01 72.73	73.86	794.86	73.83	794.98	73.82		73.61		
805.56 72.96	72.72	829.28	72.82	829.59	72.83	832.93	72.9		
848.65 73.35	73.01	877.4	73.23	885.31	73.21				
921.66 73.52	73.47		73.48		73.49				
927.91 73.22	73.54			950.51		974.12		985.8	
987.27 73.03	13.21	90/.96		1007.05	/J.1	1013.40	/3.00	1024,3/	

1024.61	73.03 102	28.81	73.11	1034.6	73.04	1055.66	72.67	1071.4	
72.39 1082.42	72.29 108	34.24	72.27	1091.65	72.23	1126.21	71.98	1127.24	
71.97 1130.89	71.95 113	35.41	71.95	1144.01	71.98	1178.95	72.09	1205.87	
72.07 1208.19	72.08 122	23.47	72.08	1235.07	72.11	1257.27	72.11	1291.62	
72.13 1314.85	72.19 133	33.31	72.24	1337.93	72.24	1360.86	72.27	1373.38	
72.25 1396.32	72.28 139	98.94	72.29	1421.37	72.4	1433.88	72.4	1458.87	
72.51 1491.94	72.67 149	92.25	72.67	1495.45	72.69	1498.04	72.71	1516.75	
72.81 1522.73	72.85 154	41.49	73.12	1547.35	73.21	1564.03	73.45	1566.14	
73.49 1569.78	73.55 1	579.6	73.62	1585.05	73.66	1590.72	73.7	1618.26	
73.92 1619.98	73.94 162	24.16	73.97	1625.39	73.98	1629.47	74	1638.68	
73.93 1642.9	73.91 16	44.81	73.9	1657.4	73.95	1661.5	73.97	1675.98	
74.06 1676.02	74.06 1	690.6	74.18	1694.51	74.22	1700.2	74.18	1707.03	
74.06 1714.25	74.04 17	46.16	74.31	1755.97	74.35	1778.6	74.83	1784.57	
74.82 1785.84	74.81 17	93.48	74.75	1794.61	74.73	1795.01	74.73	1796.49	
74.68 1802.67	74.41 18	17.26	74.15	1820.25	74.1	1825.89	73.98	1840.5	
<ul> <li>Construction of the construction of the construction</li> </ul>	73.4 1	856.3	73.42	1872.14	73.55	1875.21	73.58	1880.39	
73.54 1903.6	73.45 19	27.03	73.34	1929.79	73.33	1932.96	73.31	1955.96	
73.22 1956.44	73.22 19	57.34	73.21	1962.18	73.25	1985.72	73.46	1988.82	
73.53 1989.48	73.54 20	08.55	73.53	2015	73.56	2017.89	73.58	2039.96	
73.7 2044.41	73.73 20	49.74	73.77	2071.47	73.94	2087.88	74.06	2093.57	
74.09 2096.25	74.1 21	13.23	74.19	2126.03	74.27	2128.84	74.29	2139.24	
74.35 2143.68	74.38 21	45.56	74.39	2154.97	74.46	2160.38	74.55	2162.3	
74.58 2187.85	74.99 21	90.43	75.03	2190.8	75.03	2191.45	75.03	2204.06	
75.07 2206.9	75.08 22	20.18	75.13	2222.93	75.14	2223.81	75.13	2229.35	
75.13 2233.56	75.13 22	36.35	75.13	2249.75	75.12	2252.42	75.13	2274.45	
	75.13 22	99.05	75.27	2301.82	75.32	2318.71	75.23	2335.78	
75.14 2337.35	75.12 23	40.26	75.09	2368.53	75	2374.48	74.92	2383.9	
74.8 2396.48 74.57	74.73 23	98.39	74.76	2411.94	74.68	2420.55	74.6	2422.14	

74.9 2431.98 74.9 2446.98 74.57 2430.2 74.87 2430.96 2423 75.06 75.1 2471.86 75.16 2473.25 75.16 2486.05 75.2 2450.06 9 Manning's n Values num= n Val Sta Sta n Val Sta n n Val n Val Sta Sta Val .018 112.36 69.65 .016 82.36 .025 38 .025 0 .016 .02 2486.05 .02 .02 262.99 125 113.07 .025 Coeff Contr. Bank Sta: Left Right Lengths: Left Channel Right Expan. 200.87 200.23 197.23 .1 38 125 . 3 num= 1 Ineffective Flow Sta L Sta R Elev Permanent 633.3748 2486.0575.61819 F CROSS SECTION RIVER: Alvarado(west) RS: 1594.709 REACH: Lower Reach INPUT Description: num= 164 Station Elevation Data Sta Sta Elev Sta Elev Elev Sta Sta Elev Elev 81.53 38.54 32.08 3.6 81.26 4.29 81.27 81.24 0 81.45 62.95 65.2 65.36 74.42 55.83 69.17 47.5 42.88 78.55 63.65 71.61 127.14 68.94 108.05 71.03 109.14 104.12 63.65 95.36 71.39 71.43 186.57 71.21 184.39 71.16 168.57 71.15 175.1 166.03 71.5 73.4 237.09 73.41 268.14 73.62 294.5 71.52 236.4 187.13 73.66 73.81 371.75 73.66 383.11 73.67 324.02 73.93 345.93 295.95 74.14 73.91 422.27 73.92 424.77 73.97 424.88 73.94 420.44 414.98 73.98 74.6 522.99 74.59 504.82 74.58 467.34 73.99 466.28 426.56 74.76 73.97 569.14 73.76 596.78 73.99 560.54 74.01 559.94 558.3 74.29 74.43 634.74 74.26 639.37 74.21 641.16 74.52 616.15 605.83 74.26 763.8 72.93 801.7 74.66 713.76 74.65 703.85 74.71 656.72 72.92 833.5 72.38 843.33 72.73 72.86 831.79 72.9 810.04 804.8 71 71.61 973.87 71.58 998.07 71.16 968.58 71.6 971.8 882.51 71.48

999.71	71.52	1037.78	71.4	1090.42	71.27	1130.12	70.83	1142.01	
70.84		1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			<b>F</b> 1 00	1004 17	71 20	1306.69	
1189.25	71.11	1199.17	71.12	1246.15	71.38	1294.17	/1.39	1200.09	
71.43 1330.64	71 44	1367.69	71.48	1392.75	71.57	1417.65	71.66	1442.39	
1330.84 71.74	17.44	1307.05	/1.10	1002.10	,				
1455.9	71.75	1480.65	71.84	1507.67	72.05	1521.17	72.07	1548.12	
72.28									
1583.8	72.57	1590.38	72.61	1610.57	72.72	1617.02	72.77	1637.25	
72.88		1.5.50 05	<b>H</b> O 00	1684.25	72 14	1690.36	73 18	1720.07	
1643.58 73.4	72.92	1663.85	73.03	1004.20	/3.14	1000.00	75.10	1,20.0,	
1721.93	73.42	1726.44	73.46	1742.1	73.58	1746.66	73.63	1762.3	
73.74	,,,,,,,								
1766.72	73.79	1782.34	73.95	1798.11	74.11	1802.33	74.16	1808.47	
74.09						1000 05	<b>T</b> 4 2 2 2 2	1000 40	
1815.84	73.89	1823.63	73.85	1858.05	74.2	1893.05	74.32	1899.49	
74.13	74 00	1909.1	72 77	1910.32	73.71	1919.01	73.3	1934.76	
1900.86 73.16	74.00	1909.1	, , , , , , , , , , , , , , , , , , , ,	1910.92	10112		10000-000000		
1944.06	73.08	1959.83	72.94	1976.87	72.79	1993.96	72.64	2002.86	
72.56									
2027.9	72.43	2053.18	72.29	2059.57	72.25	2084.9	72.12	2091.1	
72.08			71 00	0140 00	72 26	2151.19	72.29	2179.8	
2116.49	71.94	2119.83	71.98	2148.08	12.20	2121.19	12.29	21/2.0	
72.58 2185.55	72 64	2209	72.88	2232.84	73.12	2235.73	73.14	2267.86	
73.48	72.01							14	2
2270.89	73.51	2286.9	73.68	2288.93	73.7	2304.91	73.87	2306.98	
73.89	A		12.2 March 1 - De S			0055 1	74.00	2260 42	
2334.55	74.18	2337.73	74.2	2352.04	74.27	2355.1	74.20	2369.42	
74.36	71 13	2386.87	74 44	2401.32	74.51	2404.21	74.53	2429.19	
2383.86 74.65	/4.45	2500.07	/1.11	2101.52					
2454.51	74.78	2457.5	74.85	2475.72	74.65	2494.14	74.45	2498.97	
74.36							1407 S 1417-0		
2535.88	73.97	2559.62	73,72	2561.68	73.75	2585.58	73.49	2587.3	
73.45	<b>H2 24</b>	2640 04	72 22	2642.44	73 21	2656.25	73.15		
2614.1	/3.34	2640.94	13.22	2042.44		2050.25	75.125		
Manning's	n Valu	es	num=	4					
Sta	n Val	Sta	n Val	Sta	n Val	' Sta	n Val		
0	.02	Sta 32.08	.016	65.36	.018	109.14	.02		
Bank Sta:		<b>D</b> <sup>1</sup> -1-4	Tenahh	- Toft	Channel	Pight	Coef	Contr	
	Leit	Right	Lengens	S: Derc	Channer	Right	COCL	concr.	
Expan.	32.08	109.14		420.75	402.35	377.25		.1	
.3									
Ineffectiv	ve Flow	num=		1					
		Elev							
522.99 2	2656.25	74.76	F	1000					
Blocked Ok Sta L 251.93	ostruct	ions	num=	2					
Sta L	Sta R	Elev	Sta Ļ	Sta R	Elev				
251.93	387.55	90	436.7	558.37	90				
	TON								

CROSS SECTION

RIVER: Alv REACH: Low			RS: 119	02.356				
INPUT						2		
Descriptio	n: Upst	ream Fac	e of Fai	rmaont Ci	cossing			
Station El			num=	170	-			
Sta Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
Elev	2101							
0	76.77	18.93	76.04	21.89 -	74.65	25.29	74.92	35.1
74.97 40.34	73.23	44.03	71.37	46.29	65.04	47.46	62.46	
47.6362.46	033							
52.57	62.47	62.7	62.43	79.09	62.42	79.39	62.72	82.17
65.7					8			100 E.M.S. 127
87.2	71.07	98.3	73.93	99.47	74.2	101.43	74.1	101.8
74.06								
110.38	73.53	111.8	73.52	114.14	73.54	123.79	73.6	125.51
73.72								
156.53	73.67	157.07	73.54	161.04	73.58	162.42	73.59	167.25
73.63								
168.05	73.75	208.44	74.68	210.42	74.56	213.36	74.41	228.38
73.59	13.15	200111						
233.28	73.45	243.72	73.63	251.87	73.77	260.77	73.92	269.63
	/3.45	245.72	75.05	201.07				
74.02	<b>DA AC</b>		74.69	313.68	74.89	319.79	74.83	339.44
283.97	74.46	305.4	74.09	515.00	74.05	515.75	, 1100	
75.04				252 00	74.63	353.6	74.6	354.11
342.79	75.01	350.26	74.65	353.09	74.03	355.0	74.0	554.II
74.58				100 10		121 20	74 40	438.63
356.48	75.26	394.6	74.94	429.16	74.57	431.36	74.48	430.03
75.37			3					454 45
440.77	75.59	442.53	75.76	448.54	76.25	448.64	76.24	454.45
76.12								
457.74	75.5	460.8	75.01	466.44	75.04	483.29	74.47	499.53
74.43		3						
514.59	74.39	538.86	74.05	548.88	73.89	553.46	73.78	554.01
73.81								
555.27	73.78	595.7	72.73	608.77	72.47	621.83	72.28	658.25
71.62								
687.91	71.3	700.08	71.38	751.01	71.76	813.92	71.82	821.41
71.78					5			
862.82	71.97	887.32	71.93	901.82	71.92	929.54	71.51	932.56
71.5	/ =							
934.69	71 49	937.68	71.51	938.79	71.52	1029	72.21	1033.02
72.24	11.42	227.00						
1069.62	72 10	1084.18	72 45	1159.78	72.56	1194.18	73.13	1194.99
	/2.40	1004.10	72.15	1132110			50 - 54 F	
73.15	H2 10	1040 61	71 21	1249.84	74 3	1267 16	74 63	1356.36
1196.07	/3.10	1248.61	/4.JI	1240.04	/1.5	1207110		
75.17		1000 00	74 47	1383.42	74 45	1391 79	74 54	1398 41
1374.72	75.27	13/9.93	/4.4/	1303.42	/1.13	1001.10	/1.51	1990.11
74.61	ii 19 <u>11</u> - Standard		<b>B</b> / 2	1400 00	72 2	1476 57	75 15	1478 13
1419.11	74.79	1425.07	74.2	1432.86	13.3	14/0.5/	10.40	14/0.13
75.52				1911-1911 - 14 1911 - 14 1911			<b>BC D C</b>	1644 20
1480.72	75.56	1481.32	75.58	1556.48	76.09	1580.63	76.34	1644.38
75.89					Sector 42 March 1997	102 020203000		1 5 9 9 1 5
1653.98	76.15	1682.03	76.98	1687.06	77.16	1688.73	77.04	1692.49
76.96								

74.25 1764.6 72.03 1774.73 76.47 1747.83 76.55 1697.49 1696.11 71.24 70.1 1790.93 70.06 1786.58 70.15 1786.06 1781.54 70.5 1784.97 70.38 73.99 1854.08 74.87 1856.38 73.92 1850.6 73.72 1845.09 1840.62 75.48 77.02 1871.47 76.15 1861.82 76.64 1866.65 1858.9 76.42 1864.2 77.16 78.15 1946.47 77.88 1911.88 78.22 1921.72 77.44 1887.79 1881.03 79 78.6 2045.29 78.96 2026.36 1969.69 79.01 1979.5 78.97 1980.5 78.85 78.98 2218.29 78.97 2121.21 2073.87 79.44 2086.71 79.09 2101.29 78.05 78.67 2300.66 78.26 2307.54 78.13 2297.66 78.65 2299.32 2263.61 76.13 78.23 2492.2 77.69 2529.08 77.28 2409.66 78.45 2440.17 2363.75 77.41 77.37 2531.9 77.4 2588.93 77.6 2610.61 77.88 2616.93 2530.74 77.89 5 Manning's n Values num= Sta n Val Sta n Val Sta n Val Sta n n Val Sta Val 47.46 .018 79.09 .016 99.47 35.1 .016 .02 0 .02 Right Lengths: Left Channel Right Coeff Contr. Bank Sta: Left Expan. 150.44 150.57 156.21 . 3 35.1 99.47 .5 2 Ineffective Flow num= Sta L Sta R Elev Permanent 74.97 F 0 35.1 448.54 2616.93 76.25 F 6 Blocked Obstructions num= Elev Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R 90 1481.65 1571.21 90 1272.38 1373.24 90 771.98 844.79 90 2574.5 2616.93 90 90 2348.88 2459.84 2109.13 2197.69 CULVERT RIVER: Alvarado(west) RS: 1117 REACH: Lower Reach INPUT Description: 25 Distance from Upstream XS = Deck/Roadway Width = 110 Weir Coefficient Ξ 2.6 Upstream Deck/Roadway Coordinates num= 2 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 35.1 74.97 99 74.1 Upstream Bridge Cross Section Data

* (1)						.e
Station Elevation Data Sta Elev Sta	num= Elev	170 Sta	Elev	Sta	Elev	Sta
Elev 0 76.77 18.93	76.04	21.89	74.65	25.29	74.92	35.1
74.97 40.34 73.23 44.03	71.37	46.29	65.04	47.46	62.46	
47.6362.46033 52.57 62.47 62.7	62.43	79.09	62.42	79.39	62.72	82.17
65.7 87.2 71.07 98.3	73.93	99.47	74.2	101.43	74.1	101.8
74.06 110.38 73.53 111.8	73.52	114.14	73.54	123.79	73.6	125.51
73.72			73.58	162.42	73.59	167.25
156.53 73.67 157.07 73.63	73.54	161.04				
168.05 73.75 208.44 73.59	74.68	210.42	74.56	213.36	74.41	228.38
233.28 73.45 243.72 74.02	73.63	251.87	73.77	260.77	73.92	269.63
283.97 74.46 305.4 75.04	74.69	313.68	74.89	319.79	74.83	339.44
342.79 75.01 350.26 74.58	74.65	353.09	74.63	353.6	74.6	354.11
356.48 75.26 394.6 75.37	74.94	429.16	74.57	431.36	74.48	438.63
440.77 75.59 442.53	75.76	448.54	76.25	448.64	76.24	454.45
76.12 457.74 75.5 460.8	75.01	466.44	75.04	483.29	74.47	499.53
74.43 514.59 74.39 538.86	74.05	548.88	73.89	553.46	73.78	554.01
73.81 555.27 73.78 595.7	72.73	608.77	72.47	621.83	72.28	658.25
71.62 687.91 71.3 700.08	71.38	751.01	71.76	813.92	71.82	821.41
71.78 862.82 71.97 887.32	71.93	901.82	71.92	929.54	71.51	932.56
71.5 934.69 71.49 937.68	71.51	938.79	71.52	1029	72.21	1033.02
72.24 1069.62 72.48 1084.18	72.45	1159.78	72.56	1194.18	73.13	1194.99
73.15 1196.07 73.18 1248.61	74.31	1249.84	74.3	1267.16	74.63	1356.36
75.17 1374.72 75.27 1379.93	74.47	1383.42	74.45	1391.79	74.54	1398.41
74.61 1419.11 74.79 1425.07	74.2	1432.86	73.3	1476.57	75.45	1478.13
75.52 1480.72 75.56 1481.32	75.58	1556.48	76.09	1580.63	76.34	1644.38
75.89 1653.98 76.15 1682.03	76.98	1687.06	77.16	1688.73	77.04	1692.49
76.96 1696.11 76.55 1697.49	76.47	1747.83	74.25	1764.6	72.03	1774.73
71.24 1781.54 70.5 1784.97	70.15	1786.06	70.06	1786.58	70.1	1790.93
70.38 1840.62 73.72 1845.09	73.92	1850.6	73.99	1854.08	74.87	1856.38
75.48						

76.42 1864.2 76.64 1866.65 77.02 1871.47 76.15 1861.82 1858.9 77.16 78.22 1921.72 78.15 1946.47 1881.03 77.44 1887.79 77.88 1911.88 79 78.6 2045.29 78.96 2026.36 79.01 1979.5 78.97 1980.5 1969.69 78.85 78.98 2218.29 78.97 2121.21 79.09 2101.29 79.44 2086.71 2073.87 78.05 78.26 2307.54 78.65 2299.32 78.67 2300.66 78.13 2297.66 2263.61 76.13 78.23 2492.2 77.69 2529.08 2363.75 77.28 2409.66 78.45 2440.17 77.41 77.37 2531.9 77.4 2588.93 77.6 2610.61 77.88 2616.93 2530.74 77.89 Manning's n Values num= 5 Sta n Val Sta n Val Sta n Sta n Val Sta n Val Val .02 35.1 .016 47.46 .018 79.09 .016 99.47 0 .02 Bank Sta: Left Right Coeff Contr. Expan. .3 .5 35.1 99.47 Ineffective Flow num= 2 Elev Permanent Sta L Sta R 74.97 F 0 35.1 76.25 F 448.54 2616.93 Blocked Obstructions num= 6 Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev 90 1272.38 1373.24 90 1481.65 1571.21 90 771.98 844.79 90 90 2574.5 2616.93 90 2348.88 2459.84 2109.13 2197.69 Downstream Deck/Roadway Coordinates 2 num= Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2.34 74.97 124.06 74.1 Downstream Bridge Cross Section Data Station Elevation Data num= 54 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 17.27 73.56 25.01 73.15 37.44 2.34 74.56 74.86 0 71.04 51.5 64.18 52.78 63.26 56.79 68.08 44.57 70.45 43.21 60.37 60.28 92.01 62.96 92.93 60.29 89.53 84.38 65.67 60.35 63.27 74.22 151.57 74.24 160.28 74.15 146.56 139.8 124.06 73.77 74.18 72.9 186.49 72.88 201.13 71.64 220.44 182.96 73 184.47 69.91 70.56 309.06 70.18 250.89 70.72 263.43 70.73 281.27 228.66 70.69 70 361.84 70.31 356.64 70.02 359.36 70.72 343.55 328.54 70.48 71.92 427.93 71.93 433.01 70.68 426.34 71.99 426.54 370.24 72.21

72.49 443.44 72.59 482.93 72.79 492.98 72.42 437.72 436.83 72.9 774.58 72.06 584.33 72.93 497.59 72.91 517.36 73.05 496.02 72.67 72.24 908.45 72.17 72.84 887.98 841.08 72.92 848.56 Manning's n Values num= 6 Sta n Val Sta n n Val Sta n Val Sta n Val Sta Val .016 124.06 0 .035 43.21 .016 56.79 .018 92.01 .035 .02 146.56 Right Coeff Contr. Expan. Bank Sta: Left .5 139.8 .3 2.34 1 Blocked Obstructions num= Sta L Sta R Elev 499.89 817.02 90 0 horiz. to 1.0 vertical Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = .98 Maximum allowable submergence for weir flow = 74.1 Elevation at which weir flow begins = Energy head used in spillway design = Spillway height used in design -= Broad Crested Weir crest shape Number of Culverts = 1 Rise Span Culvert Name Shape 12 8 Box Culvert #1 FHWA Chart # 8 - flared wingwalls FHWA Scale # 1 - Wingwall flared 30 to 75 deg. Solution Criteria = Highest U.S. EG Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef . 4 0 110 .018 .018 25 1 Number of Barrels = 3 Upstream Elevation = 62.42Centerline Stations Sta. Sta. Sta. 54.36 63.36 72.36 Downstream Elevation = 60.28 Centerline Stations Sta. Sta. Sta. 64.16 73.16 82.16 CROSS SECTION RIVER: Alvarado(west) RS: 1041.783 REACH: Lower Reach INPUT Description: Downstream Face of Fairmaon Crossing Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
Elev 0	74.86	2.34	74.56	17.27	73.56	25.01	73.15	37.44	
71.04 43.21	70.45	44.57	68.08	51.5	64.18	52.78	63.26	56.79	
60.37 65.67	60.35	84.38	60.29	89.53	60.28	92.01	62.96	92.93	
63.27 124.06	73.77	139.8	74.15	146.56	74.22	151.57	74.24	160.28	
74.18 182.96	73	184.47	72.9	186.49	72.88	201.13	71.64	220.44	
69.91 228.66	70.18	250.89	70.72	263.43	70.73	281.27	70.56	309.06	
70.69 328.54 70.48	70.72	343.55	70.31	356.64	70.02	359.36	70	361.84	
370.24 72.21	70.68	426.34	71.99	426.54	71.92	427.93	71.93	433.01	
436.83 72.9	72.42	437.72	72.49	443.44	72.59	482.93	72.79	492.98	
496.02 72.67	72.93	497.59	72.91	517.36	73.05	584.33	72.06	774.58	
	72.92	848.56	72.84	887.98	72.24	908.45	72.17		
Manning' Sta	s n Value n Val	es Sta	num= n Val	6 Sta	n Val	Sta	n Val	Sta	n
Val 0	.035	43.21	.016	56.79	.018	92.01	.016	124.06	
.035 146.56	.02		¥:						
Bank Sta	: Left	Right	Lengths	s: Left (	Channel	Right	Coeff	Contr.	
Expan.	2.34	139.8		116.66	118.13	124.58		.3	
.5 Blocked				1				×	
Sta L 499.89	Sta R 817.02								
CROSS SE	CTION								
RIVER: A REACH: L			RS: 923	8.6518				*	
INPUT Descript	ion								
Station	Elevation		num=	41		Ch a	TI ort	0+->	
Sta Elev	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	
0 63.2	71.8	28.48	70.51	48.23	69.81	48.51	69.657	60.29	
62.89 61.47	61.77	65.67	59.76	77.5	59.76	86.4	59.76	89.98	
95.85 69.36	63.11	115.82	68.66	128.53	68.84	166.16	69.32	175.37	

194.56 68.86 198.66 68.9 203.24 68.95 207.36 69.14 267.19 69.68 295.45 69.32 310.7 68.88 337.01 67.64 361.62 68.34 405.48 69.72 411.15 70.5 412.49 70.69 416.65 72.01 417.74 72.35 429.87 72.53 459.15 72.49 472.74 72.51 492.7 72.22 540.06 72.34 572.32 72.43 614.53 72.58 684.11 72.81 726.53 71.6 728.33 72.72 792.37 72.94 821.37 72.42 6 Manning's n Values num= Sta n Val 48.51 .016 62.89 .018 95.85 .016 115.82 .02 0 .035 166.16 .02 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 48.51 128.53 217.42 216.97 218.99 .1 .3 4 Blocked Obstructions num= Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev 90 346.43 364.51 90 476.23 770.33 90 197.27 297.6 21.29 48.51 90 CROSS SECTION RIVER: Alvarado(west) RS: 706.6820 REACH: Lower Reach INPUT Description: 44 Station Elevation Data num= Sta Elev Sta Sta Elev Sta Elev Elev Sta Elev 71.23 41.3 70.92 61.42 70.53 72.14 0 71.26 20.07 70.36 62.68 98.97 59.38 122.39 58.79 129.2 78.67 67.53 90.76 59.88 66.8 242.61 145.25 62.74 168.96 66.95 171.58 66.94 177.87 65.66 67.07 348.94 67.08 374.67 247.27 65.87 294.8 67.45 316.09 66.83 66.67 415.05 66.79 421.71 66.71 426.1 66.76 420.51 390.3 66.38 68.48 475.46 67.55 466.39 66.62 457.84 66.78 461.67 446.87 71.07 72.32 514.26 72.66 517.04 478.88 72.18 479.52 72.19 488.24 70.64 518.76 69.24 521.16 69.32 534.61 69.06 590.6 68.93 592.93 71.22 594.97 72.24 619.91 71.97 778.79 72.51 781.74 72.5

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num= 5 Manning's n Values Sta n Val Sta n Val Sta n n Val Sta n Val Sta Val .035 98.97 .035 129.2 .04 168.96 .02 72.14 0 .02 Coeff Contr. Lengths: Left Channel Right Right Bank Sta: Left Expan. 420.18 406.52 381.53 .1 72.14 168.96 .3 3 num= Blocked Obstructions Sta R Elev Sta L Sta R Elev Sta L Sta R Elev Sta L 90 514.53 619.15 90 90 395.63 420.97 295.09 350.86 CROSS SECTION RIVER: Alvarado(west) RS: 300.1583 REACH: Lower Reach INPUT Description: 86 Station Elevation Data num= Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 70.07 33.47 29.27 3.03 70.27 19.06 70.56 70.16 0 70.03 69.08 137.44 74.82 69.15 81.53 69.86 38.02 70.02 38.83 68.59 69.29 247.36 68.68 179.01 182.24 68.91 224.14 68.89 154.02 69.5 69.15 338.42 69.16 343.69 337.05 306.01 69.99 330.3 69.29 69.17 58.94 425.02 61.74 423.21 67.55 412.83 67.35 419.76 407.69 57.51 57.01 506.78 58.87 506.93 57.46 454.89 57.18 472.73 429.49 58.88 59.54 526.98 63.56 538.51 59.03 513.31 511.61 509.91 59.04 63.83 620 64.19 63.84 564.83 583.1 64.05 565.8 64.06 548.13 64.36 64.84 691.37 691.92 64.77 64.71 649.27 64.73 664.53 648.17 64.76 767.74 716.85 64.64 746.66 64.59 765,91 64.14 64.66 702.47 64.05 63.94 807.38 63.47 808.97 775.03 63.98 777.44 64.08 768.78 63.55 67.5 824.92 67.7 825.32 67.72 830.9 824.4 814.33 63.86 69.13 69.5 922.68 69.29 919.62 69.23 897.15 862.7 69.19 845.62 69.54 69.75 976.05 69.37 977.36 69.33 980.96 69.71 954.38 948.41 69.28 70.02 1047.77 69.29 986.42 69.3 1042.11 70.04 1045.54 982.86 70.1 70.17 1072.13 70.2 1073.11 70.22 1095.86 1059.86 70.14 1067.83 70.31

1101.11 70.51 1113.44 70.96 1118.04 71.16 1126.02 67.91 1126.29 67.81 1128.68 67.41 Manning's n Values num= 6 Sta n Val Sta Sta n Val Sta n Val n n Val Sta Val .02 412.83 .045 425.02 .045 472.73 .045 526.98 0 .045 .02 807.38 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 412.83 526.98 309.26 286.55 277.96 .1 . 3 2 Ineffective Flow num= Elev Permanent Sta L Sta R 0 306.01 69.99 F 664.53 1128.68 64.84 F 1 Blocked Obstructions num= Sta L Sta R Elev 72 247.08 307.3 CROSS SECTION . RIVER: Alvarado(west) REACH: Lower Reach RS: 13.60388 INPUT Description: 68 Station Elevation Data num= Elev Sta Sta Elev Elev Sta Sta Elev Sta Elev 68.16 60.44 10.33 73.48 38.53 68.34 51.12 0 75.85 68.15 67.46 169.58 67.55 159.53 108.69 67.58 156.01 67.67 151.29 67.33 66.74 211.62 66.68 241.12 66.75 211.18 197.14 66.97 210.75 61.57 57.51 318.19 57.47 401.8 61.95 293.8 58.59 309.91 266.65 57.39 57.42 590.01 409.93 57.41 484.2 57.52 516.72 57.43 518.19 57.52 57.6 737.22 57.65 758.62 57.66 779 57.59 664.72 662.74 57.47 57.08 903.54 56.63 971.56 808.53 57.2 810.66 57.19 829.99 57.03 57.49 1032.22 57.65 1048.28 57.63 1039.89 57.04 1009.45 972.65 57.46 57.52 1100.33 1064.18 57.51 1065.22 57.32 1069.26 57.35 1084.27 59.12 64.09 1160.7 63.85 1153.2 64.07 1153.41 63.05 1150.65 1140.26 64.49 64.07 1178.95 64.36 1188.24 67.3 1194.9 67.73 1202.1 1178.04 68.16

1218.05 69.23 1222.37 69.26 1239.98 69.37 1248.73 69.39 1272.24 69.51 1302.61 69.55 1326.83 69.57 1348.91 69.7 1352.15 69.77 1372.76 69.94 1388.62 70.06 1398.96 69.98 1412.03 70.6 num= 5 Manning's n Values Sta n Val 0 .06 151.29 .06 758.62 .06 971.56 .06 1218.05 .06 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 151.29 1218.05 23.58 13.6 15.76 .1 .3 Ineffective Flow num= 2 Sta L Sta R Elev Permanent 0 151.29 67.58 F 1218.05 1412.03 69.23 F

## SUMMARY OF MANNING'S N VALUES

River:Alvarado(west)

Reach	River Sta.	nl	n2	n3	n4
n5 n6	n7 n	18 n9			
Lower Reach	3415.773	.02	.016	.018	.016
Lower Reach	3276.77*	.02	.016	.018	.016
.02 .02 Lower Reach	2926.628	.02	.016	.018	.016
.02 Lower Reach .02	2467.648	.035	.045	.035	.045
Lower Reach	2231.639	.025	.035	.025	.02
Lower Reach	CARGED OF CARGE OF	.035	.035	.035	.035
.035 .0	2				
Lower Reach	2168.688	.025	.045	.035	.045
.035 .0	2			12 St 943	9. 1919 - 1921
Lower Reach	1981.81*	.025	.016	.018	.016
.02 .02				0.7.6	01.0
Lower Reach			.025	.016	.018
.016 .02					0.0
Lower Reach	1594.709	.02	.016		
Lower Reach	1192.356	.02	.016	.018	.016
.02					
Lower Reach		Culvert			
Lower Reach		.035	.016	.018	016
.035 .0					0.1.6
Lower Reach		.02	.016	.018	.016
.035 .0					
Lower Reach	706.6820	.02	.035	.035	.04
.02					

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Lower Reach	300.1583	.02	.045	.045	.045
.045 .02					
Lower Reach	13.60388	.06	.06	.06	.06
.06					

SUMMARY OF REACH LENGTHS

River: Alvarado(west)

Reach	River Sta.	Left	Channel	Right
Lower Reach	3415.773	137.5	139	140.2
Lower Reach	3276.77*	345.32	350.14	353.92
Lower Reach	2926.628	455.11	458.98	464.26
Lower Reach	2467.648	232.89	236.01	234.37
Lower Reach	2231.639	16.13	16.91	37.54
Lower Reach	2214.731	31.05	46.04	52.74
Lower Reach	2168.688	187.46	186.87	184.07
Lower Reach	1981.81*	187.46	186.87	184.07
Lower Reach	1794.94*	200.87	200.23	197.23
Lower Reach	1594.709	420.75	402.35	377.25
Lower Reach	1192.356	150.44	150.57	156.21
Lower Reach	1117	Culvert		
Lower Reach	1041.783	116.66	118.13	124.58
Lower Reach	923.6518	217.42	216.97	218.99
Lower Reach	706.6820	420.18	406.52	381.53
Lower Reach	300.1583	309.26	286.55	277.96
Lower Reach	13.60388	23.58	13.6	15.76

## SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS River: Alvarado(west)

River Sta.	Contr.	Expan.
3415.773	.1	.3
3276.77*	.1	. 3
2926.628	.1	.3
2467.648	.1	.3
2231.639	.1	.3
2214.731	.1	.3
2168.688	.1	. 3
1981.81*	.1	.3
1794.94*	.1	.3
1594.709	.1	. 3
1192.356	. 3	.5
1117	Culvert	
1041.783	.3	.5
923.6518	.1	.3
706.6820	.1	.3
300.1583	.1	.3
	3415.773 3276.77* 2926.628 2467.648 2231.639 2214.731 2168.688 1981.81* 1794.94* 1594.709 1192.356 1117 1041.783 923.6518 706.6820	3415.773       .1         3276.77*       .1         2926.628       .1         2467.648       .1         2231.639       .1         2214.731       .1         2168.688       .1         1981.81*       .1         1794.94*       .1         1594.709       .1         1192.356       .3         1117       Culvert         1041.783       .3         923.6518       .1         706.6820       .1

.1

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