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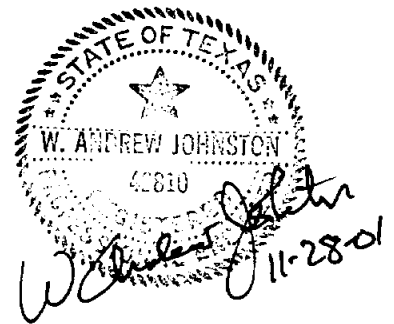
FLOOD PROTECTION PLANNING STUDY
ALPINE CREEK
BREWSTER COUNTY, TEXAS
CITY OF ALPINE

TWDB Contract No. 2001-483-375

Prepared for:
City of Alpine, Texas
Through a grant from the
Texas Water Development Board
Austin, Texas

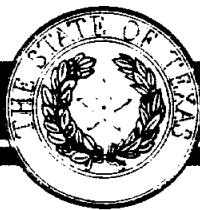
Prepared by:
PBS&J
206 Wild Basin Road, Suite 300
Austin, Texas 78746-3343

Thomas Greenwood Architects, PLLC
305 S. Cockrell
Alpine, Texas 79830



November 2001

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TEXAS WATER DEVELOPMENT BOARD

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October 2, 2001

cc Paul M -
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The Honorable Paul R. Weyerts
Mayor, City of Alpine
309 West Sul Ross Avenue
Alpine, TX 79830


Re: Flood Protection Planning Grant Contract between the City of Alpine (City) and the Texas Water Development Board (Board), Draft Final Report, Contract 2001-483-375

Dear Mayor Weyerts:

Staff members of the Texas Water Development Board have completed a review of the draft report under TWDB Contract No. 2001-483-375. As stated in the above referenced contract, the City will consider incorporating comments from the EXECUTIVE ADMINISTRATOR shown in Attachment 1 and other commentors on the draft final report into a final report. The City must include a copy of the EXECUTIVE ADMINISTRATOR's comments in the final report.

The Board looks forward to receiving one (1) electronic copy, one (1) unbound single-sided camera-ready original, and nine (9) bound double-sided copies of the final report on this planning project. Please contact Mr. Gilbert Ward at (512) 463-6418 if you have any questions about the Board's comments.

Sincerely,


Tommy Knowles, Ph.D., P.E.
Deputy Executive Administrator
Office of Planning

Cc: Gilbert Ward, TWDB
Andy Johnston, PBS&J *6/10/01*

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ATTACHMENT 1
TEXAS WATER DEVELOPMENT BOARD
Review of the Draft Final Report: Contract No. 2001-483-375
Flood Protection Planning Study, Alpine Creek, Brewster County, City of Alpine

1. An Application for Approval of Reclamation Project need not be filed with the Texas Natural Resource Conservation Commission for the referenced proposal. It was determined from our review that the proposed project, since it is in the City of Alpine, needs to be permitted by the City. The City of Alpine by virtue of its participation in the National Flood Insurance Program, and in accordance with Section 16.236 (d) (3&4) of the Texas Water Code, has approval authority for the project. If the City has not already done so, they should insure that the proposed construction is documented and permitted in accordance with their Flood Hazard Prevention Ordinance. This documentation should also be submitted by the City to the Federal Emergency Management Agency to obtain a Letter of Map Revision (LOMR) of Alpine's Flood Insurance Rate Map.
2. The technical content of the referenced report is based on acceptable hydrological and hydraulic methods and is complete. Therefore, the merits of the proposed project can be evaluated from the report. The study also appears to include a fairly good assessment of permitting requirements for SW3P, 404, etc.
3. The report describes the results of hydrologic and hydraulic analyzes completed in an effort to develop means of reducing existing flooding problems on Alpine Creek in the City of Alpine, Brewster County. Measures considered in the study include detention, channel improvements to the main channel, removal/modification of flow constrictions and floodplain storage preservation.
4. Recommendations include improvements to the main channel and associated bridges that would allow passage of the 4 percent annual chance exceedence flood (25-year flood).
5. It appears that current, acceptable methodologies have been employed in the accumulation and presentation of data in this report. Construction of main channel improvements and modification of bridges for flood control purposes are eligible for Board financing. Estimations of project costs appear to be based on reasonable assumptions. The report would be appropriate for use in support of an application to the Board for financing the proposed improvements. All additional information required by Board rules, 31 TAC 363.401-404, and required to make legal findings required by Texas Water Code Chapter 17.771-776 would be required at the time of application. Flood control work is not eligible for the Board's pre-design funding option.
6. Although detention facilities and non-structural alternatives are not recommended at this time, those activities are also eligible for TWDB financing. The purchase of floodplain property for use as public open space, removal of buildings from the floodplain, relocation of floodplain residents and installation of flood warning systems are examples of eligible non-structural activities.
7. As noted by Table 2.1 (page 8), simulated discharges increase from upstream to downstream sections for the 2-year event, however, for the 25-year, 100 year and 500 year events, sometimes the flows increase from upstream to downstream, but some sections reflect a decrease in discharge. Please explain.

FSWA model

EXECUTIVE SUMMARY

The City of Alpine, Brewster County, Texas, is located in southwestern Texas, approximately 210 miles east southeast of El Paso, Texas, and 85 miles north of Big Bend National Park. Covering approximately 150 square miles, Alpine is located in the southwest portion of a broad flat arid plain. Alpine generally has three major waterways affecting its corporate boundaries. Alpine Creek flows north through the center of the city where Toronto (Paisano) and Moss Creeks are located to the west and east of the city respectively. The total drainage area of these principal alluvial streams is approximately 71 square miles. All of these streams have their headwaters in the mountains with peak elevations ranging from 5,000 to 6,000 feet (ft) above sea level and are 1,000 to 1,500 ft higher than the City of Alpine.

The City of Alpine is a participant of the Federal Emergency Management Agency (FEMA) Flood Insurance Program and a majority of the city is within the FEMA floodplain. The principal purpose of this study is to present several flood protection planning options (alternatives) and recommend the most feasible one. In presenting the flood protection options, this study presents the methodology and findings in the hydraulic analysis, flood damages, approximate construction cost, a recommended option, and possible financial and plan implementations.

Alpine, like most other cities, tends to experience sporadic localized flooding. One of the areas of the most documented damage is within the Flood Insurance Study (FIS) flood plain along the north-south axis of Alpine Creek. This flooding is caused by the inability of drainage systems to carry the runoff from the high desert area's erratic, and sometimes intense rainfall patterns. Residential and commercial areas within the City of Alpine have historically suffered significant flooding damages including the loss of life. The level of flood protection currently provided by Alpine Creek has been achieved only through periodic attempts to define the natural channel with rock retaining walls and stone gabions.

This study has attempted to continue the effort that was established during the River Network report, Alpine Creek Opportunities (PBS&J, 2000). The report identifies potential creek improvements that are acceptable and realistic to the community. Several of the possible opportunities for the creek include channel improvement for flood protection, walking trails along the creek, and the use of treated effluent water to put flow back in the creek. It's the focus of this study to present several channel improvements for flood protection and present the most economically attainable option.

Option A focused upon improvements downstream of 2nd Street. The cost to complete Option A is included in each of the following Option summary sheets as Reach 1 (Hendryx Street to Kokernot Lodge) and Reach 2 (Golf Course to 2nd Street). The work included the "benched channel" and the estimated construction cost is \$1.2 million dollars. Including the final design and construction

management services, the total project should be around \$1.3 million. The construction is estimated to be from \$350 to \$450 per linear foot over the project length of 3,176 ft.

Table 5.1 presents the estimated construction cost for Option B to be \$4.8 million dollars. Including the final design and construction management services, the total project should be around \$5.2 million. The project length ends downstream of the Union Pacific Railroad (UPRR) trestle. The construction is estimated to be near \$710 per linear foot over the project length of 6,785 ft.

Table 5.2 presents the estimated construction cost for Option C to be \$6.4 million dollars. Option C is equivalent to Option B below the UPRR tracks, but Option C extends further upstream and, therefore, has a larger total cost. Including the final design and construction management services, the total project should be around \$6.9 million. The construction is estimated to be near \$710 per linear foot over the project length of 8,985 ft due to the cost of low water crossing (LWC) replacement in the upper reaches.

Table 5.3 presents the estimated construction cost for Option D to be \$7.5 million dollars. Option D is a deeper channel section than either Option B or Option C. The overall length of Option D is equivalent to Option C. Including the final design and construction management services, the total project should be around \$8.1 million. The construction is estimated to be near \$830 per linear foot over the project length of 8,985 ft.

Table 5.4 presents the estimated construction cost for Option E to be \$5.6 million dollars. The depth of cut is less than the other Options, yet its length is equivalent to Option C and Option D. Including the final design and construction management services, the total project should be around \$6.1 million. The construction is estimated to be near \$620 per linear foot over the project length of 8,985 ft.

Initially the focus of the flood protection planning was upon the 100-year event and reducing the floodplain width to within the existing channel banks. As discussed in previous sections, this goal requires structural improvements. There are basically two ways to achieve this goal. In order to create a larger channel (but keeping the top width the same as the current channel) stormwater detention must be used in the upper basin to reduce the peak flow through the City. This reduction in peak flow would then allow the modified channel to convey the 100-year event within the banks. However, if detention is not employed, then the top of the channel will need to be widened impacting existing structures along the route. These two basic scenarios and their large construction cost estimates (Option B, Option C, and Option D) were discussed at the second Public Meeting.

One of the outcomes of the second Public Meeting was to shift the protection focus from the 100-year event to something more “achievable.” The focus shifted to examining the existing conveyance capacity of the Holland Street structure. It was determined that an event just smaller than the

25-year event would begin to overtop that structure. Therefore, providing flooding protection for the 25-year event became the final focus. This yielded Option E which aims to provide additional channel capacity to safely convey the 25-year event through the City. The total length of Option E is larger than the length of Option B, hence the total project cost is larger for Option E and Option B. However, comparing both options for the same length shows that Option E is more than \$500,000 which is less than Option B.

When looking at the damage assessment comparisons presented in Table 6.2 and Table 6.4 for Option B and Option E respectively, it appears that each alternative generates a similar level of damage removal. They should be used simply as “relative” numbers and should not be used as exact dollars of benefits derived from the given alternative. Therefore, if the benefits are generally equivalent, and the cost of Option E is less for the same length, then Option E appears to be the most “achievable” of the alternatives presented.

As far as an “implementation plan” for Option E, the entire project does not have to be constructed all at one time. Portions of the entire Option can be built as funding allows. For example, Phase 1 could entail construction from 2nd Street to Brown Street at a project cost of approximately \$566,000. The floodplain reduction in this reach alone would be 30%. The “project cost” includes construction cost, final design cost, and construction management cost and should be used to estimate the amount of funding needed. The cost estimate information presented in Table 5.4 can be used to examine the various “reaches” along the entire project length. A criss-cross comparison with the “benefits” presented on a reach by reach basis in Table 6.5 could guide the City to select specific reaches for construction. Generally the project should proceed from a downstream to upstream direction starting no further upstream than 2nd Street. It is the depth of cut at this section that allows the “pilot channel” to be created and extended along the project length.

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1.0 INTRODUCTION

1.1 GENERAL

The City of Alpine, Brewster County, Texas, is located in southwestern Texas, approximately 210 miles east southeast of El Paso, Texas, and 85 miles north of Big Bend National Park. Covering approximately 150 square miles, Alpine is located in the southwest portion of a broad flat arid plain. Created under the Texas Constitution, Article III, Section 52, the City of Alpine functions under a "Council-Manager" government. Currently, the population of Alpine is estimated at 6,479 while the current population of Brewster County is estimated at 10,330. Over 60% of the population in Brewster County resides in the City of Alpine. The population growth of Alpine has been steady over the last ten years, but has increased greatly in the last two years.

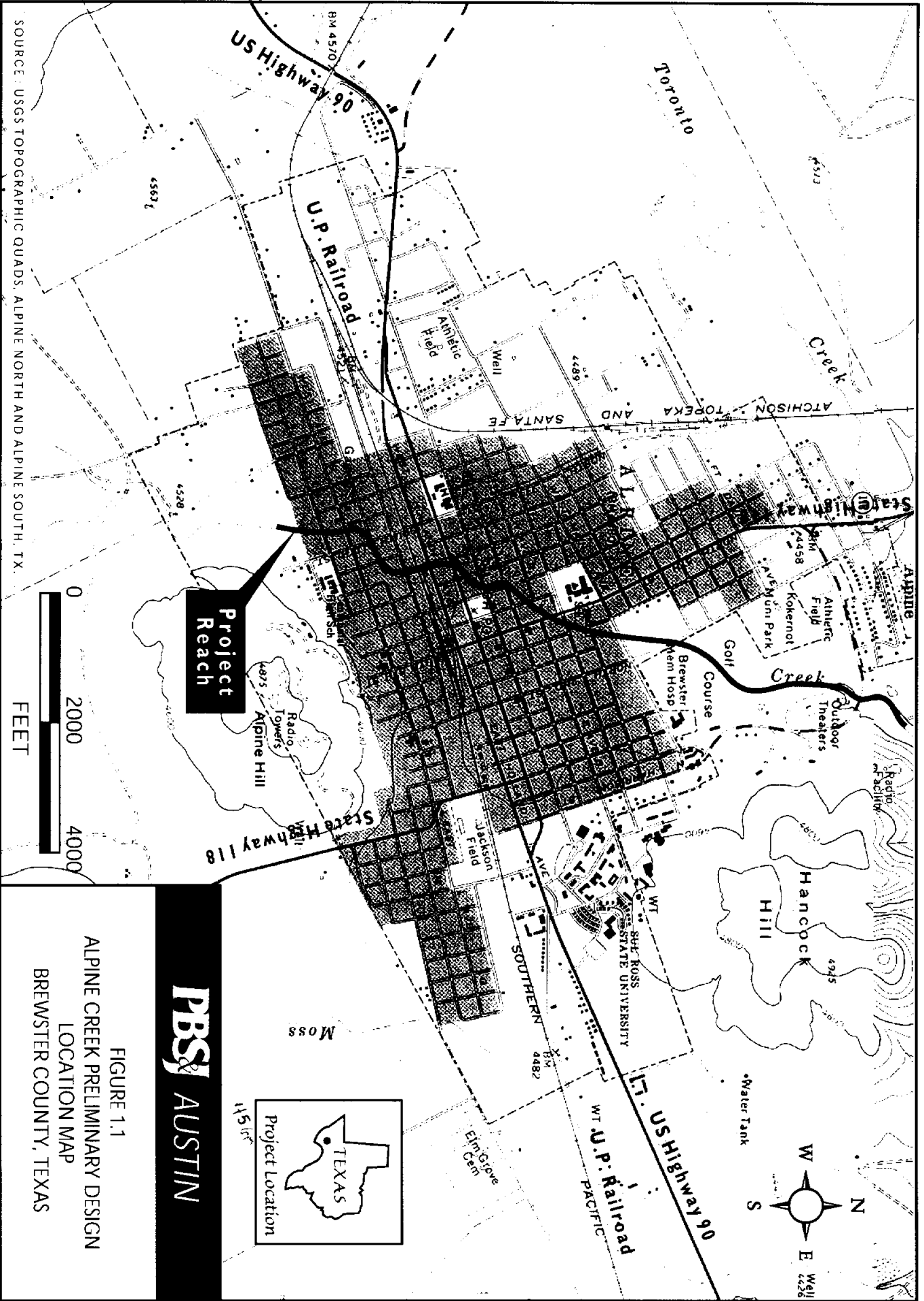
Alpine generally has three major waterways affecting its corporate boundaries. Alpine Creek flows north through the center of the City where Toronto (Paisano) and Moss Creeks are located on the west and east of the City respectively as shown in Figure 1.1. Approximately a mile north of Alpine, Toronto Creek and Moss Creek flow into Alpine Creek. The total drainage area of these principal alluvial streams is approximately 71 square miles. All of these streams have their headwaters in the mountains with peak elevations ranging from 5,000 to 6,000 feet (ft) above sea level and are 1,000 to 1,500 ft higher than the City of Alpine.

The City of Alpine is a participant of the Federal Emergency Management Agency (FEMA) Flood Insurance Program and a majority of the city is within the FEMA floodplain. Approximately 1,233 people reside in the 100-year floodplain with 125 National Flood Insurance Program policies estimated at a value of \$10,800,000. The estimated value of property in the 100-year floodplain is \$45,832,000 (U.S. Army Corps of Engineers [USACE], 1997).

The principal purpose of this study is to present several flood protection planning options (alternatives) and recommend the most feasible one. In presenting the flood protection options, this study presents the methodology and findings in the hydrologic and hydraulic analysis, flood damages, approximate construction cost, a recommended option, and plan implementation discussions including permitting.

1.2 HISTORY OF FLOODING

Alpine, like most other cities, tends to experience sporadic localized flooding. One of the areas of the most documented damage is within the Flood Insurance Study (FIS) flood plain along the north-south axis of Alpine Creek. This flooding is caused by the inability of drainage systems to carry the runoff from the high desert area's erratic, and sometimes intense, rainfall patterns. Residential and



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FIGURE 1.1
ALPINE CREEK PRELIMINARY DESIGN
LOCATION MAP
BREWSTER COUNTY, TEXAS

commercial areas within the City of Alpine have historically suffered significant flooding damages including the loss of life. According to research published in the USACE "Reconnaissance Report, Pecos River and Tributaries, Alpine, Texas" (USACE, 1997) revealed that while significant problem areas are located along Alpine Creek, Moss Creek, and Toronto Creek, the most significant problem areas were located along Alpine Creek. The level of flood protection currently provided by Alpine Creek has been achieved only through periodic attempts to define the natural channel with rock retaining walls and stone gabions.

The main flood season for the Alpine area is during the June–September period, when most of the average annual precipitation occurs. Summer rainfall usually results from intense thunderstorm activity with maximum rainfall occurring in July. Since the City is nestled so close to the large mountains in the area, these storms often produce high runoff for relatively short periods of time, which can cause serious local flash flooding. While there are no reliable records of historic flood discharges, accurate documentation of repeated flooding have been obtained from newspaper accounts and interviews with residents of the area and recorded at the Archives of the Big Bend at Sul Ross State University in Alpine. These sources reveal that since 1931, flooding has occurred on one or more of the streams, generally during the summer months. Of these, at least eight were large magnitude floods. In addition, it is understood that a major flood occurred in 1904.

Newspaper and other accounts indicate that floods have occurred in June 1904, September 1932, June 1935, September 1935, August 1945, August 1953, October 1954, September 1956, June 1958, August 1958, August 1962, September 1974, May 1977, June 1978, September 1981, October 1983, September 1986, August 1990, June 1991, July 1991 and 1994. The Alpine Avalanche describe the floods of September 1932, October 1945, August 1953, September 1956, June 1958, and September 1974 as "destructive in nature." Descriptions of damage occurring during these accounts are included in a Hydrology Design Memorandum prepared by Espey, Huston & Associates, Inc. (EH&A) for the USACE, Albuquerque District (USACE, 1977). EH&A was acquired by PBS&J several years ago, so the work PBS&J has performed in this preliminary engineering report continues our long involvement with the City of Alpine and Alpine Creek.

1.3 LEGAL AUTHORITY

The legal authority for the City of Alpine to plan and implement flood protection measures for all study watersheds lying within the corporate boundaries of the City is stated in:

- Texas Constitution Title 8, Subtitle B, Chapter 261, Section 261.001 Right of Eminent Domain
- Texas Constitution Title 8, Subtitle B, Chapter 273, Section 273.001 Exercise of Police Power
- Texas Constitution Title 12, Subtitle C, Chapter 391, Regional Planning Commissions

This study was prepared under the Research and Planning Fund Grant for Flood Protection through the Texas Water Development Board (TWDB) for the City of Alpine under TWDB Contract No. 2001-483-375.

1.4 EXISTING DATA

This study has attempted to continue the effort that was established during the River Network report, Alpine Creek Opportunities (PBS&J, 2000). The report identifies potential creek improvements that are acceptable and realistic to the community. Several of the possible opportunities for the creek include channel improvement for flood protection, walking trails along the creek, and the use of treated effluent water to put low flows back in the creek. It's the focus of this study however, to present several channel improvements for flood protection purposes and present the most economically attainable option.

To prepare the hydrology and hydraulic models, data was taken from available reports and models. Data for the hydrology model was taken from the previously mentioned Hydrology Design Memorandum, prepared by EH&A for the USACE. Likewise, data for the hydraulics model was taken from the effective FIS for the City of Alpine in 1990. Flood damage Information was also taken from a Reconnaissance Report, Pecos River and Tributaries, Alpine, Texas (USACE, 1997) and High Flood Hazard Area Studies, Alpine, Texas (USACE, 1986) both produced by the USACE, Albuquerque District.

To update the hydraulic model, several surveyed channel cross sections were taken. Thomas Greenwood Architects (TGA), a local architectural firm on the PBS&J design team, assisted in gathering the channel survey and bridge data. TGA also prepared the cross section sketches included in this report. Also, bridge plans provided by the Texas Department of Transportation (TxDOT) were used in the hydraulic model. Because this is a preliminary design, our intention is to focus on the options for flood protection measures while utilizing readily available data.

The headwaters of Alpine Creek, Paisano Creek, and Moss Creek begin in the high elevations of the mountain ranges south of the city. Once out of the steep mountain slopes, the rainfall runoff slows down and spreads out in the flatter slopes of the plains. Evidence of alluvial fans exists in the watershed. Channel slopes in the mountains are estimated at about 13 percent grade, while the slopes on the plains are generally 1 to 2 percent grade. When the runoff is in the plains, some overflow discharge from Paisano and Moss Creeks will leave those basins and flow into Alpine Creek. This is due to physical features of the area such as low topographic relief, railroad berms, roads, etc. On the southwestern part of the city, Union Pacific Railroad (UPRR) (originally Southern Pacific Railroad) diverges some high flow from Toronto Creek east into Alpine Creek. Likewise, between Hancock Hill and Alpine Hill, some high flow from Moss Creek overtops the watershed divide and flows into Alpine Creek. The Alpine Creek watershed boundary map is shown in Appendix D.

A series of flows were evaluated for the preliminary design of the optional flood protection measures. In 1977, the USACE contracted a hydrologic analysis for the City of Alpine that used the Synder's unit hydrograph method. The watersheds modeled were for Alpine Creek, Paisano (Toronto) Creek, and Moss Creek. The 1977 model was able to recreate actual observed flood events at historic U.S. Geological Survey (USGS) gauges, which indicate the model was properly representing the watershed characteristics. Also, to route the rainfall runoff through the sub watersheds, the Muskingum method was used. In this current study, the 1977 hydrologic model was recreated using the Hydrologic Modeling System (HEC-HMS) and updated with new rainfall data for Texas and the flows were compared (see Appendix D). The Corps' original 1977 model shows a 100-year discharge of 14,730 cubic feet per second (cfs) at W. Main Avenue as compared with our updated model of 12,049 cfs for the 100-year discharge.

During the FEMA study, the Corps' hydrologic model was reviewed and FEMA opted to use two different hydrologic methods to generate their flows. One method was a computation of regional regression equations for Texas and the other was the TR-20 hydrologic model using the SCS unit hydrograph method. The published effective 100-year FEMA discharge at W. Main Avenue is 11,182 cfs as compared to our updated discharge of 12,049 cfs. The 1977 model gives slightly higher discharges than were ultimately accepted by FEMA in the FIS. In this preliminary study, it was decided to use the effective FEMA discharges for analysis since they are the "officially" accepted flows. Although the flows of the 2-, 25-, 100-, and 500-year discharges are summarized in Table 2.1, the 5-, 10-, and 50-year discharges were also included in the hydraulic analysis model to determine water surface elevations. As seen in Table 2.1, the effective FEMA discharges reflect an increase from upstream to downstream for the 2-year event. However, for the 25-, 100-, and 500-year events, the flows show an occasional decrease from upstream to downstream. The decrease in flow of the higher storm events is caused by the overbank

Table 2.1
Summary of Discharges

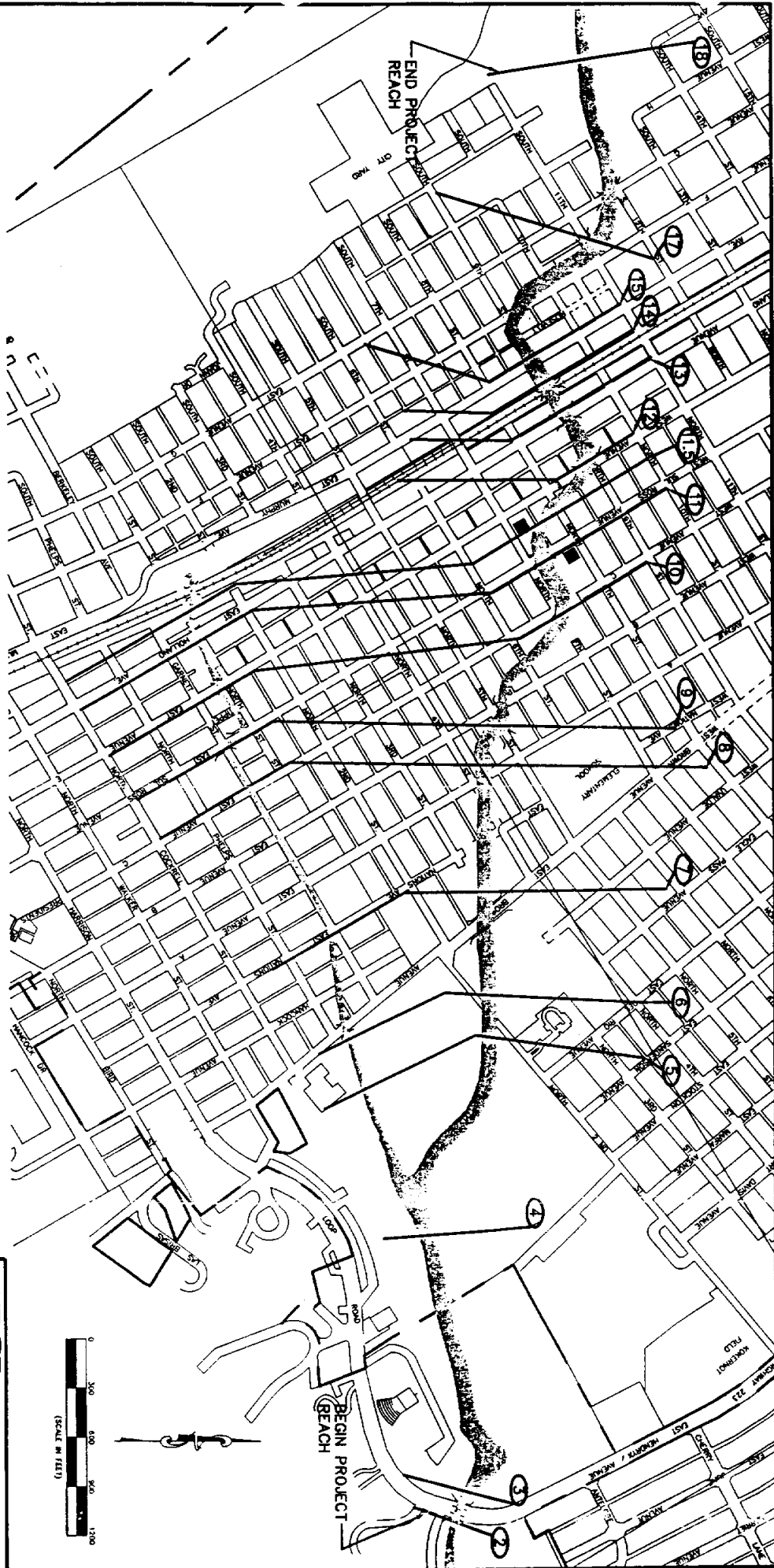
Stream Location	HEC-RAS River Station	Discharges (cubic feet/second) ¹			
		2-yr	25-yr	100-yr	500-yr
Upstream of S. 11th St.	17	426	5831	10758	16969
Upstream of Union Pacific RR	14	427	5796	10704	16916
Upstream of Holland Ave.	13	427	5790	10695	16906
Downstream of Sul Ross Ave.	11	428	5765	10656	16867
Upstream of N. 5th St.	9	428	5736	10612	16824
Upstream of N. 2nd St.	6	430	5676	10519	16732
Confluence with W. Moss Creek	4	445	6062	11340	18295
Downstream of Hendryx St.	2	448	6032	11182	18075

¹ Effective FIS flows were used in the hydraulic models.

flow being detained and the water is causing a storage effect. Because the 2-year event is contained entirely within the banks of the channel, the flows do not show a decrease from upstream to downstream.

The initial focus of the preliminary design was upon containing the 100-year flow within the existing top of banks with a lowered channel. A second option was to reduce these peak flows so that the channel would not need to be so large. Therefore, detention north of Alpine is also a possibility that could be considered in the final design of the Alpine Creek. This alteration would reduce the discharges to an acceptable level by constructing a lateral weir parallel to the channel. It would allow low flows to move downstream unchanged, but would “shave” higher flows into an off channel detention basin which would capture the high peak and reduce the flows through the city. Once the lower peak has passed the city, the detention basin would slowly release the captured water volume and allow a continued base flow for several days after the storm. A quick analysis of the size of a detention basin required to reduce the peak 100-year flows to a 50-year flow showed a size comparable to that of the Corps’ estimation in the Reconnaissance Report (USACE, 1997). It should be noted that as a detention basin that releases all the captured water, no state water rights permit would be needed. However, if a fixed volume of water was retained after the event, then a water rights permit would be needed.

In the Alpine Opportunities (PBS&J, 2000) report, one concern of the community was to bring habitat back to Alpine Creek. One way is with the use of detention in the floodplain. By using detention, water could be pooled after the storm event passes on constructed “flood benches” paralleling the channel and the captured water could either be slowly drained back into the creek or allowed to infiltrate into the ground. These “benches” are flat areas graded away from the main channel at a gentle slope.



ALPINE CREEK
FLOOD PLANNING STUDY

FIGURE 3-1
HYDRAULIC MODEL
GROSS SECTION LOCATIONS

DATE: 11, 2001
CAD FILE: newmoist.dwg
PROJ. NO.: 4-0798

survey along the creek and information at the bridges to reflect any changes in the study reach since 1990. This data was blended back into the cross section data used in the FIS. The cross sections in the FIS ran well into the neighborhood areas (overbanks). Because this information will not have changed much if at all, it was not recreated with current grant funds. Also, TxDOT bridge plans were acquired by TGA, which allowed verification of bridge data in the model. The FIS model also did not include three bridges that were constructed after the FIS was published. The updated model does include these recent bridges. These new bridges are the Brown Street bridge, the 11th Street bridge and W. Avenue G bridge near Medina Park. The UPRR bridge has also been reconstructed since the FIS in 1990 and updated in the HEC-RAS model.

The study reach for the project includes over 8,000 ft of channel, beginning upstream of Hendryx Avenue (Loop Road) bridge and ending approximately 800 ft upstream of S. 11th Street. Differences in water surface elevation between the FIS model and the revised baseline model are not extensive, and some differences are to be expected because of newer channel and bridge data. A comparison of the Revised (updated) FIS and the effective FIS water surface profile is shown in Figure 3.2. The majority of the differences in the models are due to the bridges at the UPRR crossing, S. 11th Street, and W. Avenue G. The impact of the bridges in south Alpine increases the water surface elevation about 1.5 ft as compared to the effective FIS. The revised FIS model also shows to lower the water surface elevation 0.6 ft through the Holland Avenue bridge. The bridge routines in HEC-RAS are more sophisticated than previous models and result in a better estimation of losses through the bridge, which explains the differences in water surface elevations upstream of each of the structures.

3.2 OPTIONS MODELS

The existing conditions (revised FIS) model was used as the baseline model to make comparisons to possible flood protection options. Flood channel modifications were made using the channel modification option in the HEC-RAS program. The study reach of Alpine Creek was primarily broken up into 15 reaches as shown in Table 3.1. Reach 1 and 2, spanning from Hendryx Avenue (Loop Road) to 2nd Street, will have a flood bench cut horizontally beginning about 4 ft above the natural channel bottom. Leaving the natural channel bottom alone will help minimize habitat damages. A typical cross section through this reach is shown in Figure 3.3. From reach 3 to 15, spanning from 2nd Street to the end of the study, will consist of a channel-lowering cut. A typical cross section for this channel modification can be seen in Figure 3.4. Further details about the channel modifications will be discussed in Section 4.

Along the study reach exists several low water crossings that will need to be modified for any of the alternatives presented. A total of five low water crossing will either need to be retrofitted with a new bridge constructed to span from bank to bank or single Crownspan culvert at the existing location. The streets with low water crossings across Alpine Creek are 2nd Street, Avenue A, 6th Street, 8th Street,

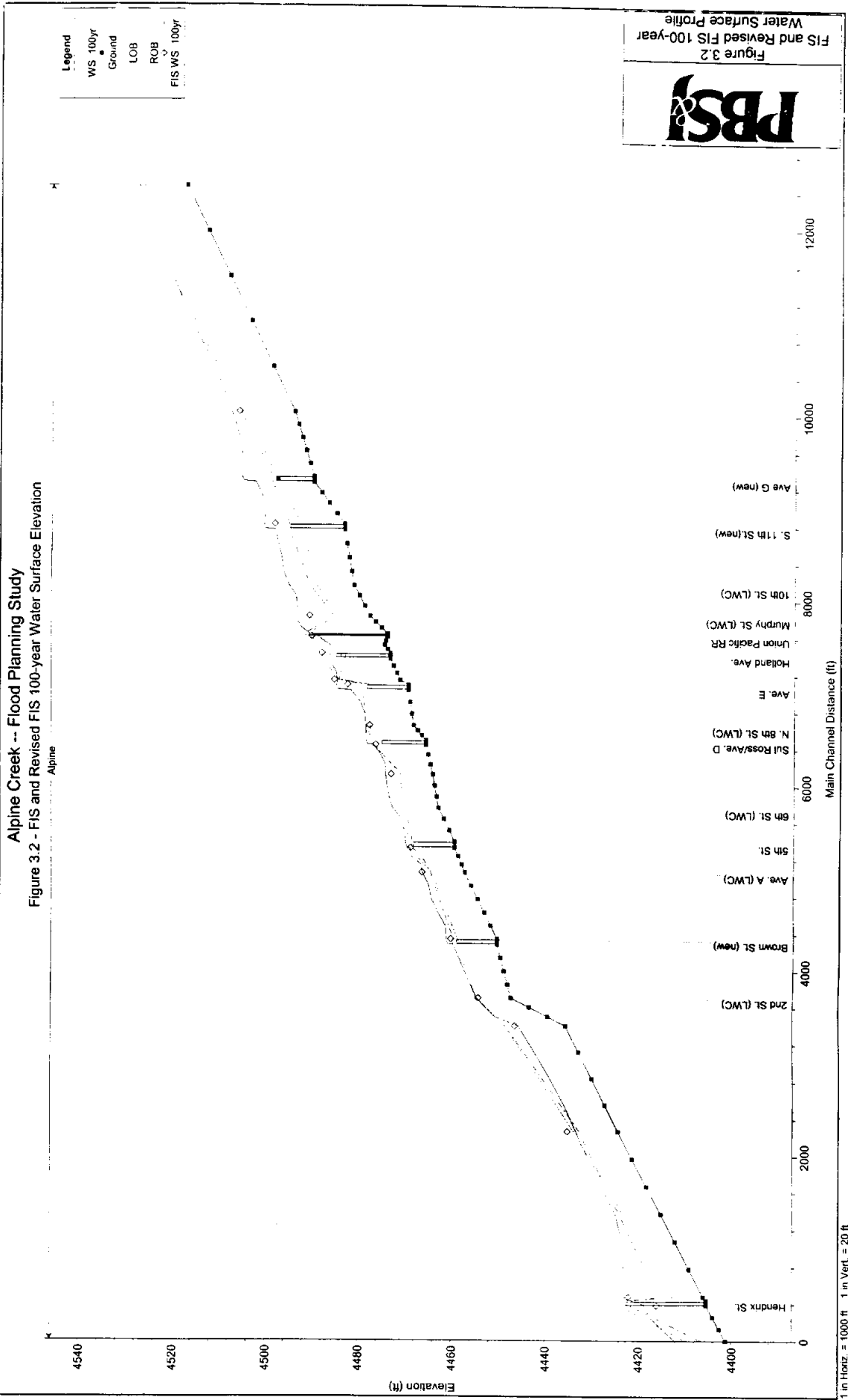


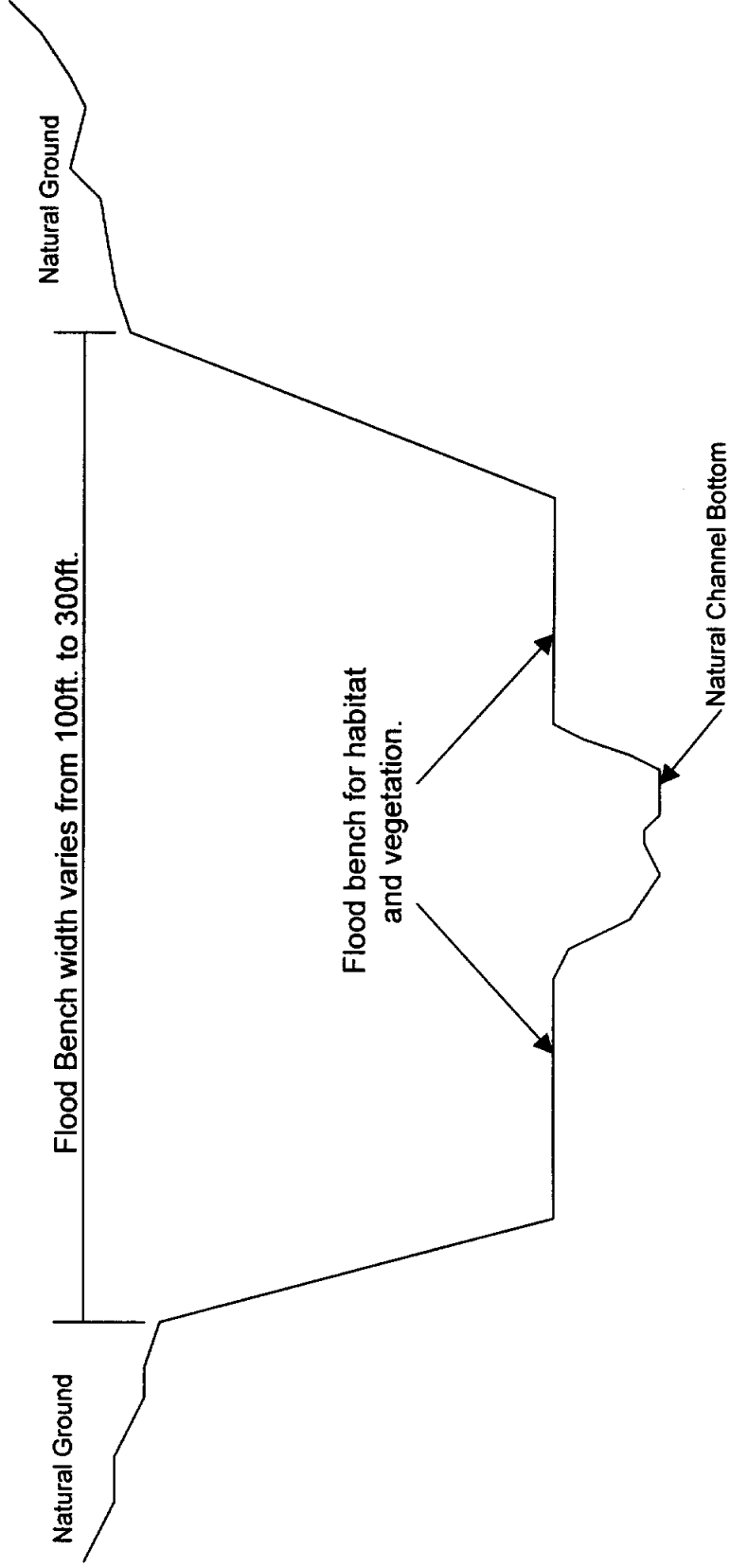
TABLE 3.1

STUDY REACH LENGTH LOCATION

No.	Location	RAS River Station		Reach Length (ft.)
		From	To	
1	Hendryx Avenue Kokernot Lodge Area	2.5	3.83	1,838
2	Golf Course to Second Street	3.83	5.66	1,338
3	Second Street to Brown Street	5.66	6.5	595
4	Brown Street to W. Avenue A	6.5	7.9	665
5	W. Avenue A To 5 th Street	7.9	9.0	272
6	5 th Street to 6 th Street	9.0	9.7	372
7	6th Street to W. Ave D (Sul Ross)	9.7	11.0	632
8	W. Avenue D (Sul Ross) to W. Avenue E.	11.0	11.7	550
9	W. Ave E. to Holland Avenue	11.7	12.7	285
10	Holland Avenue to UP RR Trestle	12.7	14.0	240
11	UP RR Trestle to Murphy Street	14.0	15.0	200
12	Murphy Street to 10 th Street	15.0	15.5	280
13	S. 10 th Street to S. 11 th Street	15.5	16.5	550
14	S. 11 th Street to W. Avenue G	16.5	17.2	460
15	W. Avenue G to End of Study	17.2	18.0	710

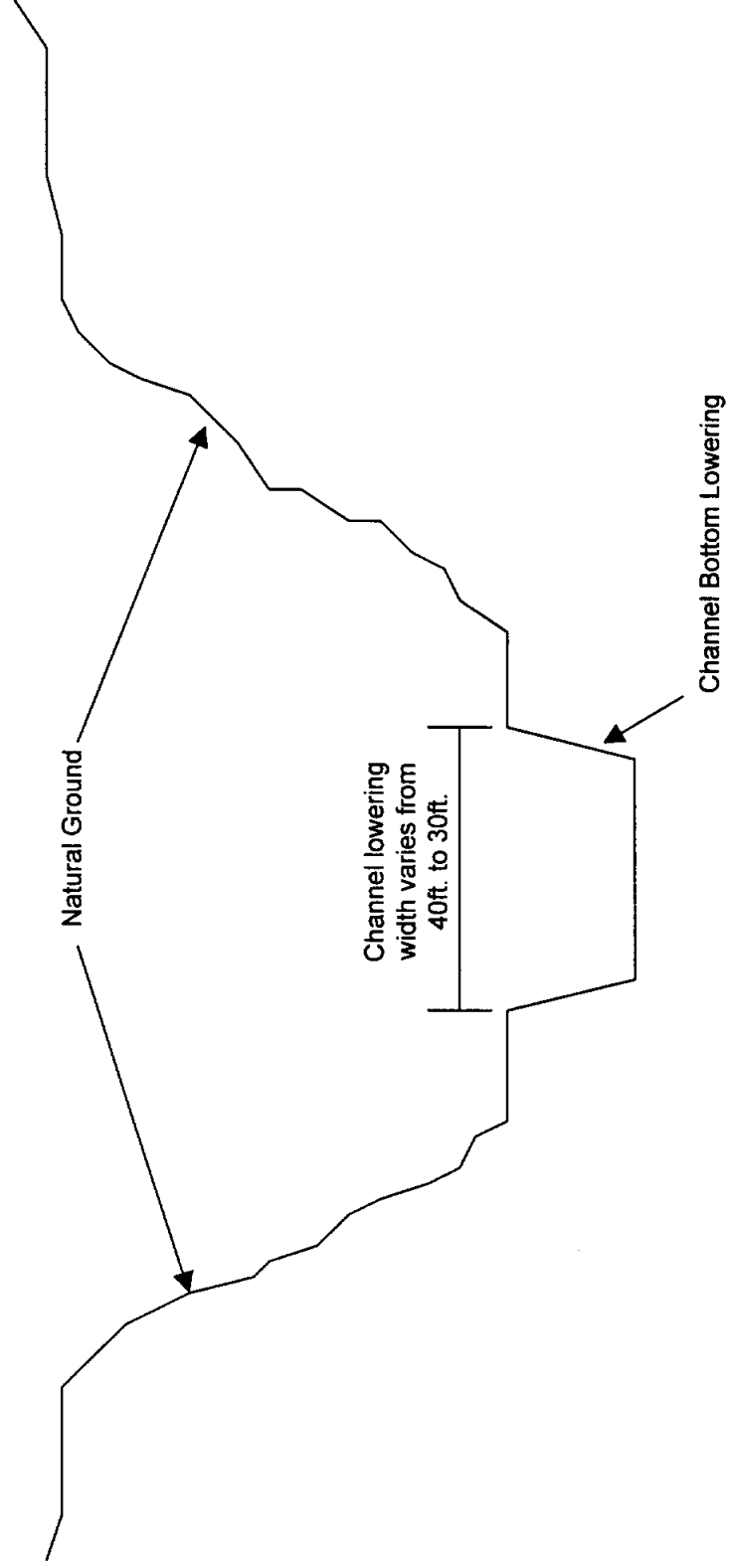
Alpine Creek – Flood Planning Study

Figure 3.3 – Typical Cross Section Between Hendryx St. and 2nd St.



Not Drawn To Scale

Alpine Creek – Flood Planning Study
Figure 3.4 – Typical Cross Section Between 2nd St. and End of
Project Reach



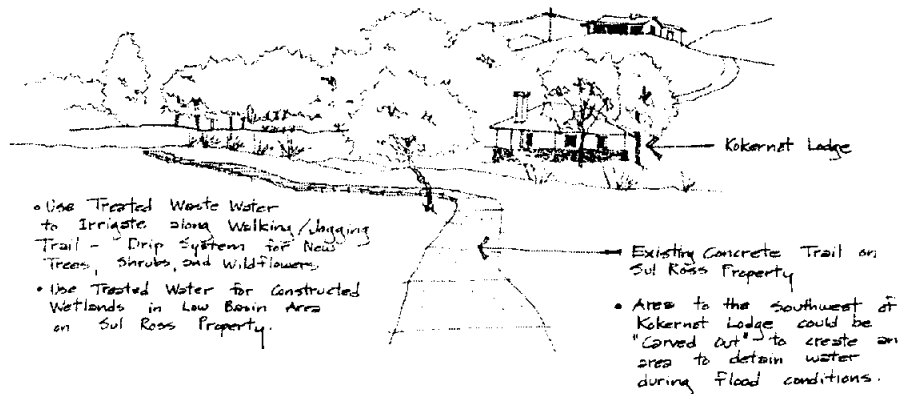
Not Drawn To Scale

Murphy Street, and S. 10th Street. The study team decided to keep the existing elevation of the low water crossings and retrofit them with a single bridge or Crownspan structure across the channel. In the hydraulic model, the low water crossings were coded as a single span at existing road elevation and treated as a bridge to allow stream flow underneath the roadway. Cross section were added where necessary to properly describe the channel through the single spans. This was done for each of the five low water crossings when needed by the channel improvements.

In the alternative models, the 2-year flow was used to represent nature's most significant "channel-forming" storm event. The water surface elevation for the 2-year flow was estimated to be less than 3 ft at a discharge of approximately 427 cfs. To keep the "channel-forming" flow at bank level, the natural low flow channel through the Alpine Golf Course and Kokernot Lodge area was left untouched and the "flood bench" was placed 4 ft above the channel bottom (Figure 3.2). The channel bottom from 2nd Street to the study end will be a natural channel bottom. Manning's n-value in the channel for the alternative models ranged from 0.040 to 0.050 for the natural bottom to 0.035 for the concrete masonry retaining walls further discussed in Section 4. The Manning's n-value for the overbanks was not changed from the existing model. The output for all the alternative models can be seen in Appendix C.

FLOOD PROTECTION MEASURES (OPTIONS/ALTERNATIVES)

The overall objective of this preliminary engineering study is to achieve as many of the “targets” as possible that were quantified in the River Network grant process. The design concepts would primarily focus upon reducing/eliminating the flooding problems, with awareness that other goals are of interest (hike and bike trail, water features, the environment) should not be “blocked” by the presented options. Several conceptual drawings are shown in this section of how these options might appear after construction. Some of these same views were presented in the River Network report (previously discussed) and are presented again in this report for continuity with that previous report. A key point is that this is just a preliminary engineering study, and as such does not represent the “final decision” of how the job will be bid and/or built.



Irrigation

The options presented herein could continue to be refined and revised through the Public Meeting process. Nevertheless, as much thought and agreement must be achieved in this process as possible before the final design is funded. Another key is that the alternatives must be economically feasible and they must be “achievable.” It would be considered a benefit if the overall project was tied to the overall ecology of the creek. The issue of right-of-way (ROW) ownership (public or private) could hinge upon just what type of measure is selected.

General nonstructural and/or structural control measures were evaluated and then refined in this preliminary design phase to provide recommended solutions to the identified problem areas. This section presents a general discussion of the process used to develop the recommended solutions and the “performance” results of the specific recommendations. The specifics of the recommendations are presented in following sections of this report. The flood control measures that best solved the individual problems while providing a pattern of continuity and consistency from reach to reach and throughout the watershed were advanced. Multi-objective solutions received consideration when evaluating the various plans of improvement.

Interaction with the city staff and the public was most critical during this evaluation stage of control measures to be considered. Control measures are usually grouped into “structural” items (typically construction projects) and “nonstructural” items (typically ordinances and criteria). Table 4.1 presents the general categories of alternative solutions to drainage problems that were considered. The table breaks the “alternative solutions” into the two main categories, and also includes a general grouping of the “means of protection” that a particular solution provides.

As mentioned above, this preliminary design study reviewed these options and recommended that “structural solutions” be used for the study reach of the Alpine Creek watershed. The structural aspects or improvements were analyzed hydrologically and hydraulically to determine the benefits provided and also to determine the costs associated with the improvements. General cost estimates and construction quantities for the controls were developed. The possibility of using the proposed improvements as multi-use facilities also was explored.

Discussions with city staff included the factors of each measure’s ability to correct existing flood problems, prevent new flood problems, provide considerable benefits for the costs involved, utilize stream corridors as open space and parks, as well as be funded and implemented. City staff input and recommendations were received throughout the process and were acted upon by the Design Team.

Each problem area or reach was examined for non-structural and structural control measures. The Design Team formulated lists of structural and non-structural improvements that were compatible with the environmental setting of the given area. The broad list presented in Table 4.1 was reduced to include only the measures that would be used in the Alpine Creek improvements. These measures included the following:

- Regional Detention Basin on the main channel,
- Channel improvements to the main channel (“benched” channel design),
- Removal/modification of flow constrictions (undersized bridges), and

TABLE 4.1

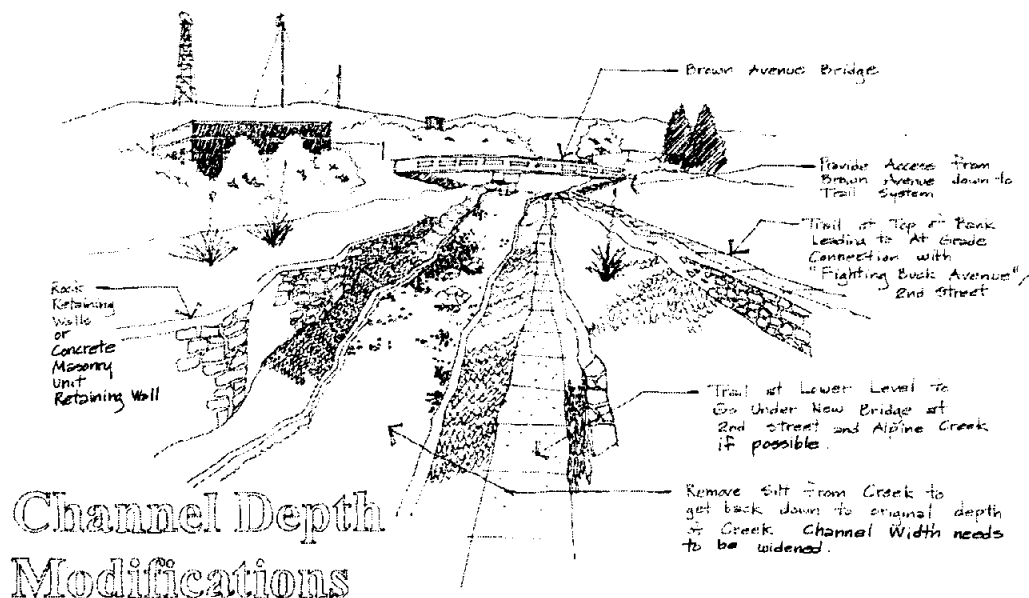
STRUCTURAL AND NON-STRUCTURAL ALTERNATIVES

Alternative Solutions	Means of Protection
STRUCTURAL	
Onsite Detention/Retention	Decrease Peak Flows
Offsite or Regional Detention/Retention	
Floodplain Storage Preservation	
Flow Diversion	
Channel Improvements (excavation)	Decrease Peak Stage for Given Flow
Removal/Modification of Flow Constrictions (bridges)	
Closed System Improvements (pipes, box culverts, inlets)	
Levees/Dikes/Pump Stations	
NONSTRUCTURAL	
Mechanical Flood-proofing of Existing Structures	Keep Water Out of Structures
Mechanical Flood-proofing of New Structures	
Elevate Foundations of Existing Structures	
Elevate Foundations of New Structures	
Relocation/Acquisition of Structures	Keep Structures Away from Water
Subdivision and/or Zoning Regulations	
Public Acquisition of Open Space	
Flood Early Warning System/Evacuation Plan	Decrease Damages Under Existing Conditions
Flood Insurance	
Street Sweeping	Water Quality
Less Fertilizer on Yards	
Public Information Programs	
Erosion and Sediment Controls	
No Action	

- Floodplain storage preservation.

For the purposes of the preliminary design, only these four items were considered. These four items may be added to or modified during “final design.”

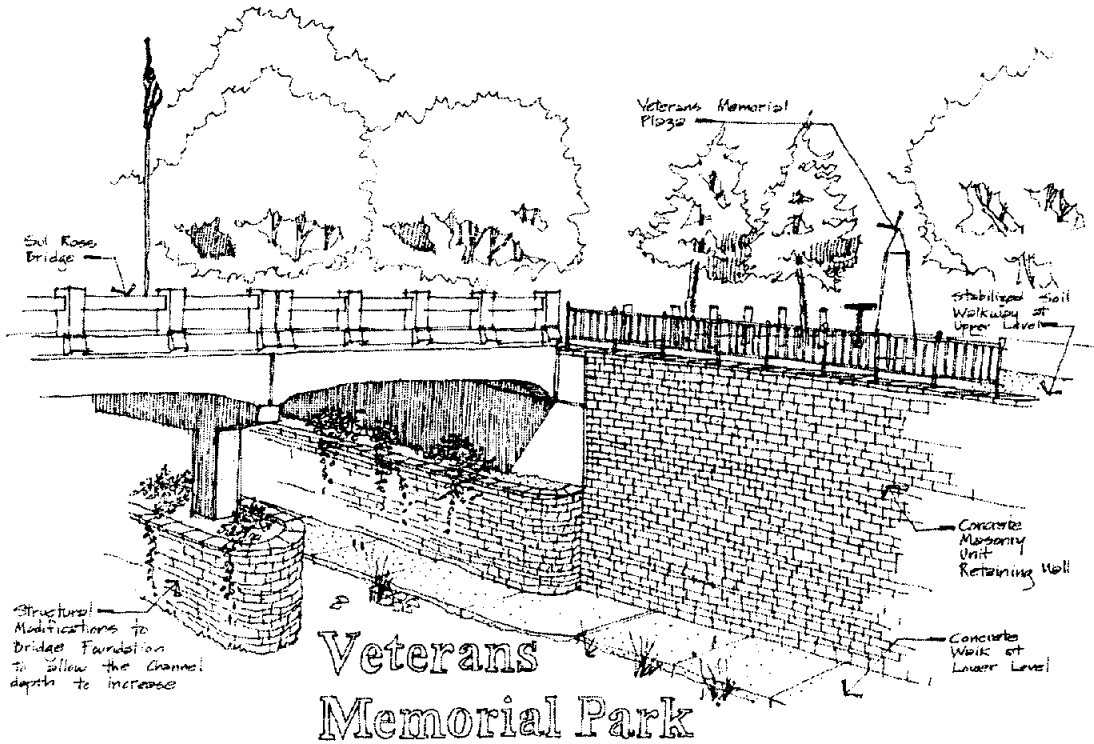
The entire reach from upstream of 2nd Street to the end of the study posed some limiting flood control measures based on physical constraints. Due to the close proximity of existing structures to the existing banks of Alpine Creek, the horizontal widening of a proposed channel was limited. The entire 100-year flood event could not be safely conveyed through the city simply by using channel improvements. Certainly there was some increased conveyance in the future channel, but not enough to carry the 100-year capacity. If this is the case, then consideration may need to be given to constructing a detention basin in the upper watershed. There are some technical considerations that will make this option somewhat more difficult to attain, however, it may end up being a future Phase of construction to the initial main channel construction phases.



As mentioned before, several streets crossing Alpine Creek are low water crossings and will need to be modified to effectively channel water through the city by lowering the channel bottom. Some of the low water crossings may need to have box culverts installed underneath or a Crownspan. For all options presented, the existing elevation and street grade back into the neighborhoods would be

maintained and not converted to flat grade bridge structures at the “top of bank” elevation. For example, the 2nd Street low water crossing could be replaced with a short bridge or Crownspan culvert and the flow line of the creek could be lowered considerably. This additional depth in the channel itself is then passed upstream under all the bridges and low water crossings, and eventually up to Medina Park. In this study, any necessary work needed to support or modify any pier depths of existing bridges and trestles is neglected. Ultimately, the final engineering design will fully analyze any necessary modifications to existing bridges. Armoring or encasement as shown in the sketch below could be an option.

The channel through the golf course is fairly deep (incised) downstream of 2nd Street. As briefly discussed in Section 3, one option to lower the water surface elevation through this area, and downstream through the Kokernot Lodge area, would be to make “flood bench” areas through this reach of the creek. By providing more area for the water to flow, the floodplain water surface elevations could be lowered which would be immediately beneficial at 2nd Street. There was positive discussion about the public reaction to shaping the overbank in this area. It is conceivable that some additional “golfing challenges” could be made while making these flood channel improvements.

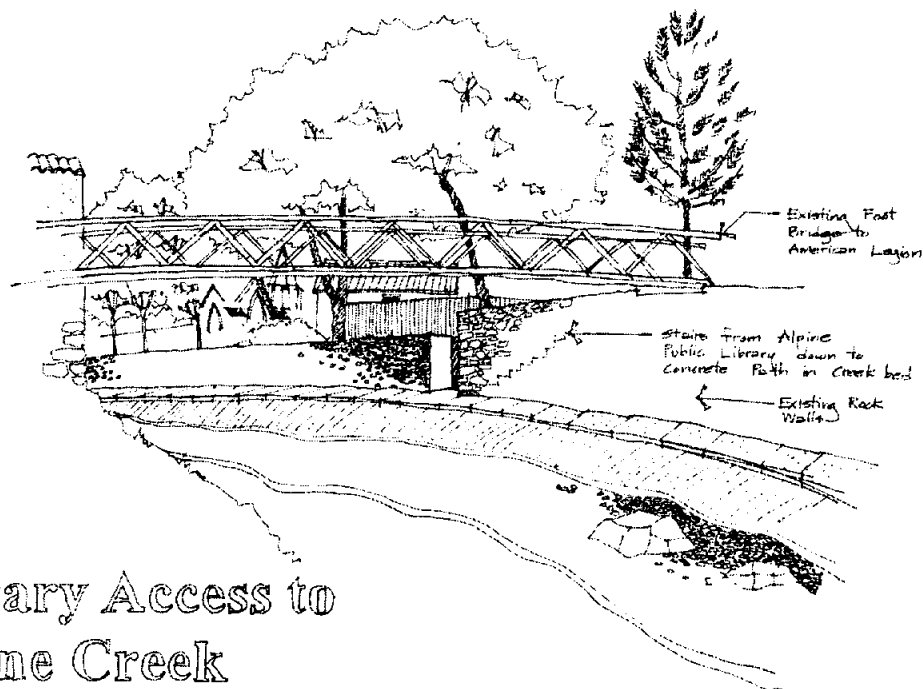


Since the reach downstream of the golf course (through the Kokernot Lodge) is part of a natural riparian area reach, the disturbance of the “bed and banks” through this most downstream area will be minimized. However, there may need to be some shaping of the wider overbank area (as mentioned above) to help reduce the water surface elevations.

Through out the channel study area, past attempts to tame Alpine Creek are seen with existing gabions and rock walls. Removal of the existing gabions was discussed. It could be that in order to widen the existing channel in certain areas, the existing gabions may need to be removed. Everything possible will be done to not have to remove these walls that are constructed of native rock. Any flood protection improvements in the channel bottom will need to be aware of the structural stability of these walls.

4.1 DESCRIPTION OF OPTIONS

Several combinations of options varying in width and depth and channel slope were run hydraulically during this preliminary study. Ultimately, four options were decided by the study team to have the best impacts along the creek. Options B through E include the Option A flood bench channel improvement in the golf course and Kokernot Lodge area.



Differences between Option B through E are based on the lowering of the channel bottom from 2nd Street to the end of the study reach by the specified channel slope.

4.1.1 Option A

Option A consists of a high flow bench of varying width that is 4 ft above the channels natural invert. The flood bench will extend from Hendryx Street bridge through the Kokernot Lodge area and the golf course, to just downstream of 2nd Street. The channel reach from Hendryx Street to just past Kokernot Lodge has a left bench only that varies from 120 ft to 300 ft. Once in the golf course and through to 2nd Street, the high flow bench extends on both the right and left side of the channel with a bottom width that varies from 250 ft to 390 ft. The water surface profile for Option A can be seen in Figure 4.1. This option is an element of each of the following Options to be discussed below.

4.1.2 Option B

Option B is proposed to have a constant channel slope of 0.00917 ft per foot beginning with an elevation of 4435 ft at 2nd Street and continuing upstream to just downstream of the UPRR. This option consists of a center channel cut that has a bottom width of varying width and side slope of 0.5 horizontal to vertical (H:V) making it nearly a vertical face. From 2nd Street to Brown Street, the bottom width is 50 ft. Through the Brown Street bridge, the bottom width is 50 ft. Once passed the bridge, a 40 ft bottom width follows through to 5th Street. A 40 ft bottom width carries through to just downstream of the UPRR. The water surface profile is shown in Figure 4.2.

4.1.3 Option C

Option C is proposed to have a constant channel slope of 0.00917 ft per foot (the same as Option B) beginning with an elevation of 4435 ft at 2nd Street and continuing upstream to just downstream of the UPRR. At that point the proposed slope is 0.00835 ft per foot beginning at an elevation of 4474 ft from upstream of UPRR to about 350 ft upstream of S. Avenue G. This option consists of a center channel cut that has a bottom varying width and side slope of 0.5 H:V. From 2nd Street to Brown Street, the bottom width is 50 ft. Through the Brown Street bridge, the bottom width is 50 ft. Once passed the bridge, a 40 ft bottom width follows through to 5th Street. A 40 ft bottom width carries through to just downstream of a point about 350 ft upstream of S. Avenue G. The water surface profile is shown in Figure 4.3.

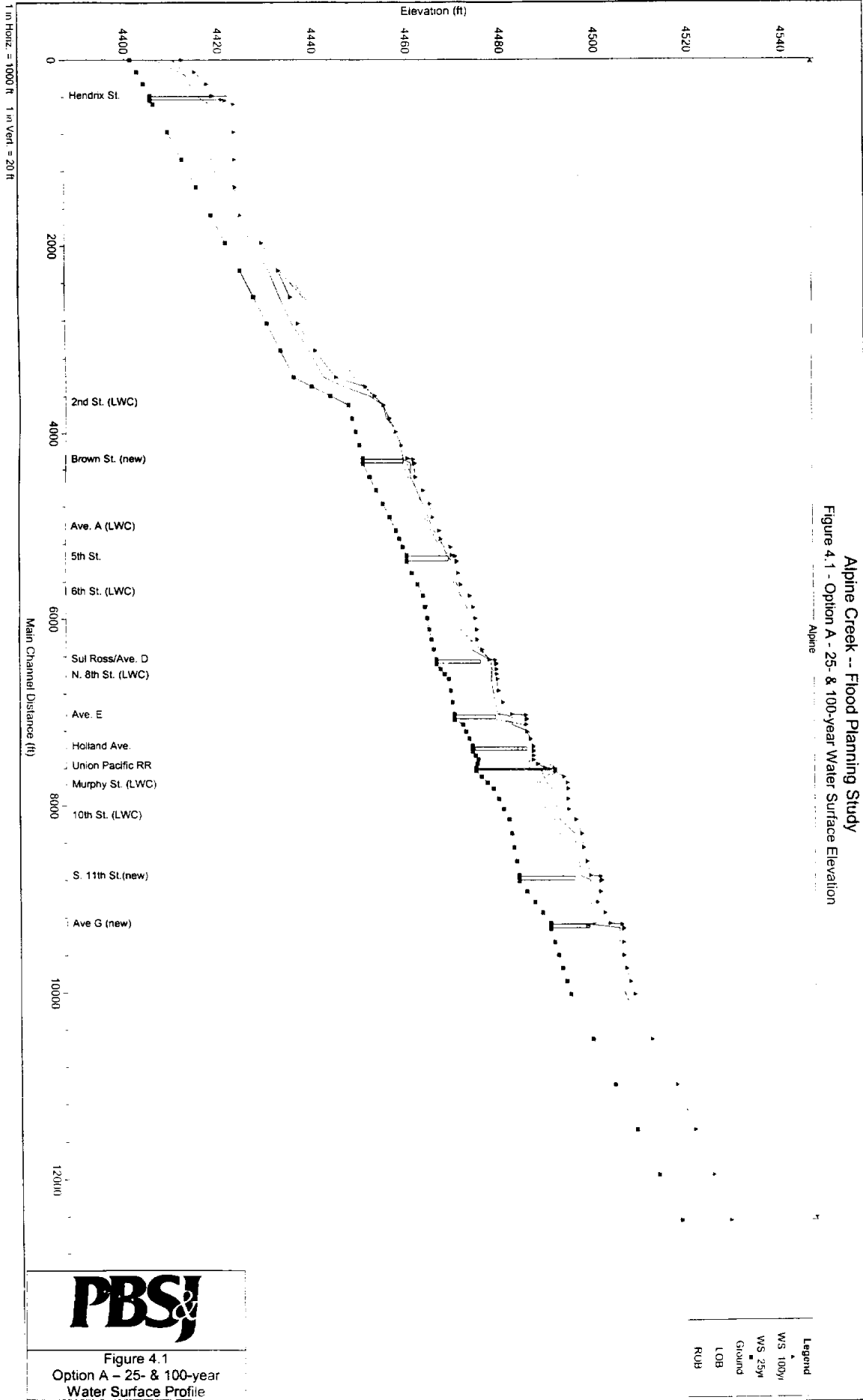


Figure 4.1
 Option A - 25- & 100-year
 Water Surface Profile

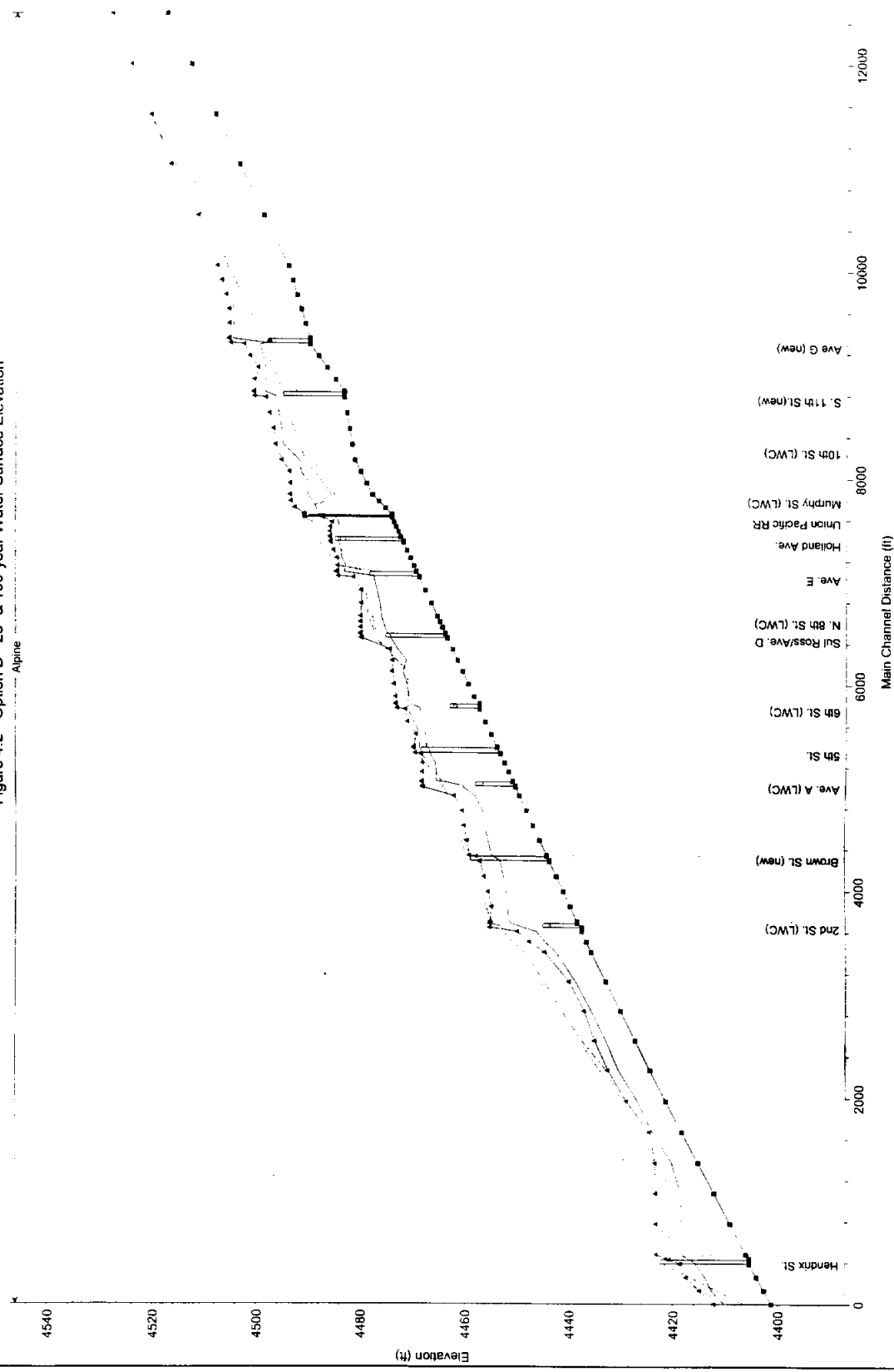




Figure 4.2
Option B - 25- & 100-year
Water Surface Profile

- Legend
- WS 100yr
 - WS 25yr
 - Ground
 - LOB
 - ROB

Alpine Creek -- Flood Planning Study
Figure 4.2 - Option B - 25- & 100-year Water Surface Elevation



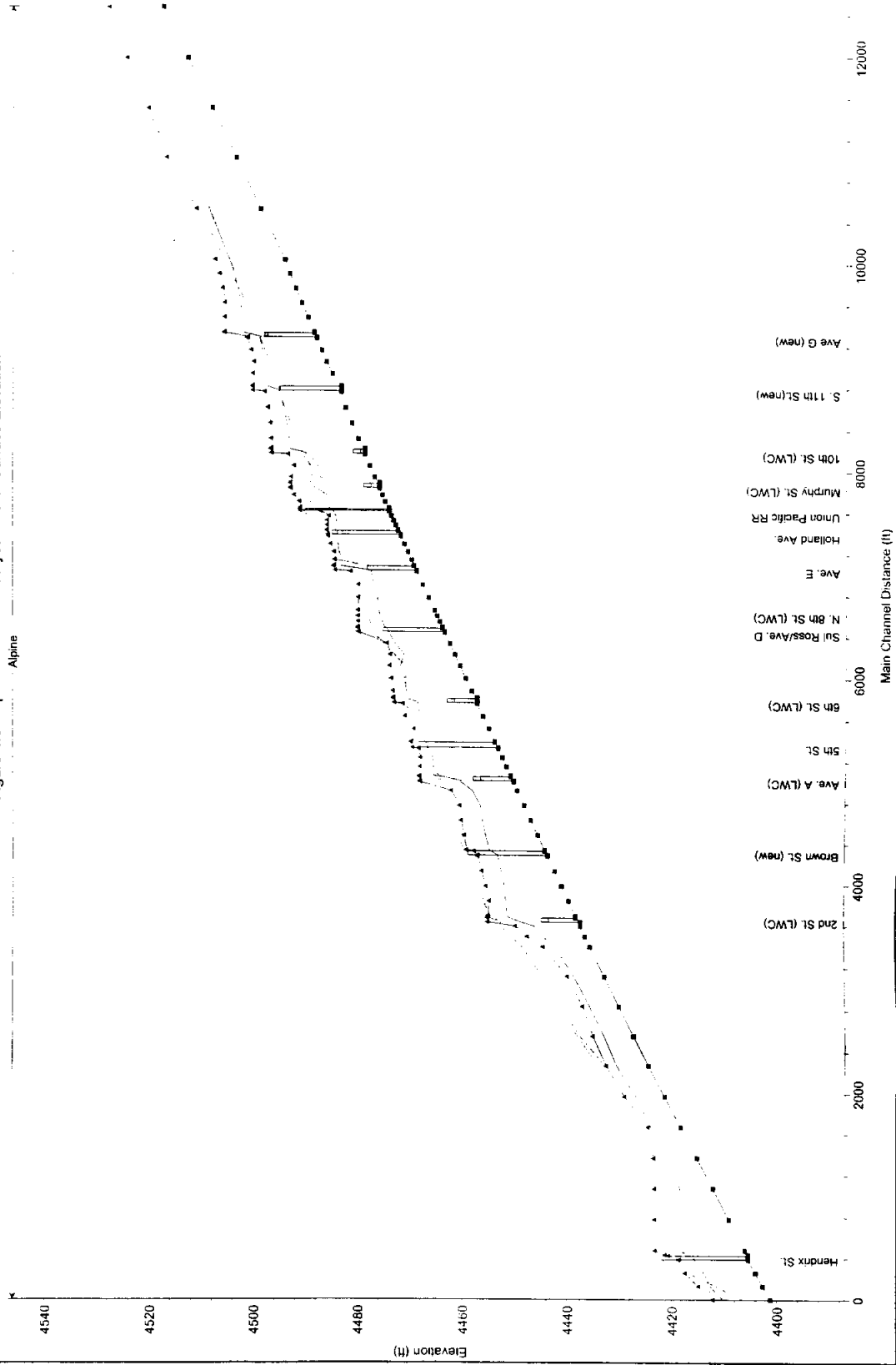
1 in Horiz. = 1000 ft 1 in Vert. = 20 ft



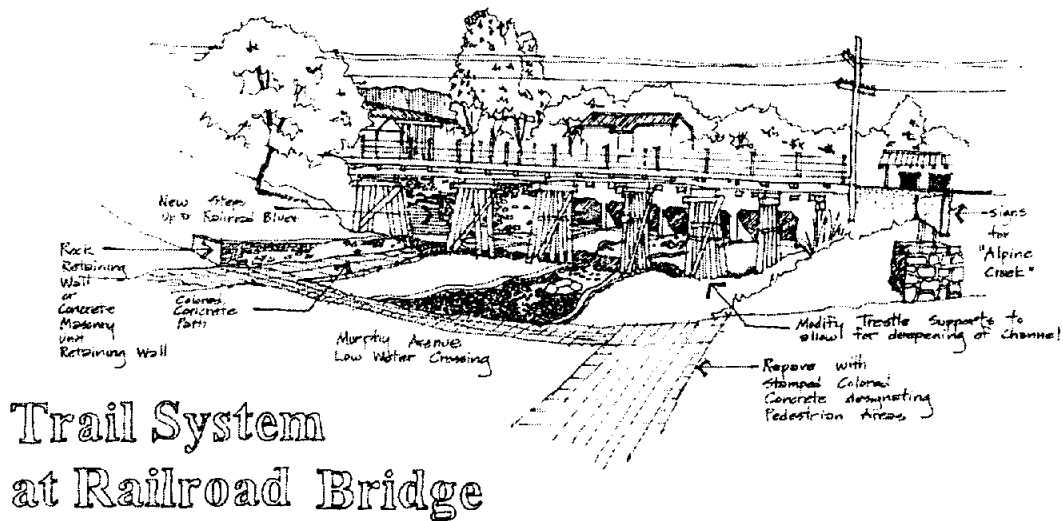
Figure 4.3
Option C - 25- & 100-year
Water Surface Profile

- Legend
- WS 100yr
 - WS 25yr
 - Ground
 - LOB
 - ROB

Alpine Creek -- Flood Planning Study
Figure 4.3 - Option C - 25- & 100-year Water Surface Elevation



1 in Horiz. = 1000 ft 1 in Vert. = 20 ft



4.1.4 Option D

Option D has a flatter initial slope than Option B or Option C and, therefore, results in a deeper pilot channel. The initial channel slope is 0.00842 ft per foot beginning at an elevation of 4,435 ft and extending from 2nd Street to just downstream of the UPRR. At that point the slope changes to 0.00963 ft per foot beginning at an elevation of 4,471 ft from just upstream of UPRR and extending to about 350 ft upstream of S. Avenue G. This option consists of a center channel cut that has a bottom width of varying width and side slope of 0.5 H:V. From 2nd Street to Brown Street, the bottom width is 60 ft. Through the Brown Street bridge, the bottom width is 50 ft. Once passed the bridge, a 40 ft bottom width follows through to 5th Street. A 40 ft bottom width carries through to just downstream of a point about 350 ft upstream of S. Avenue G. The water surface profile is shown in Figure 4.4.

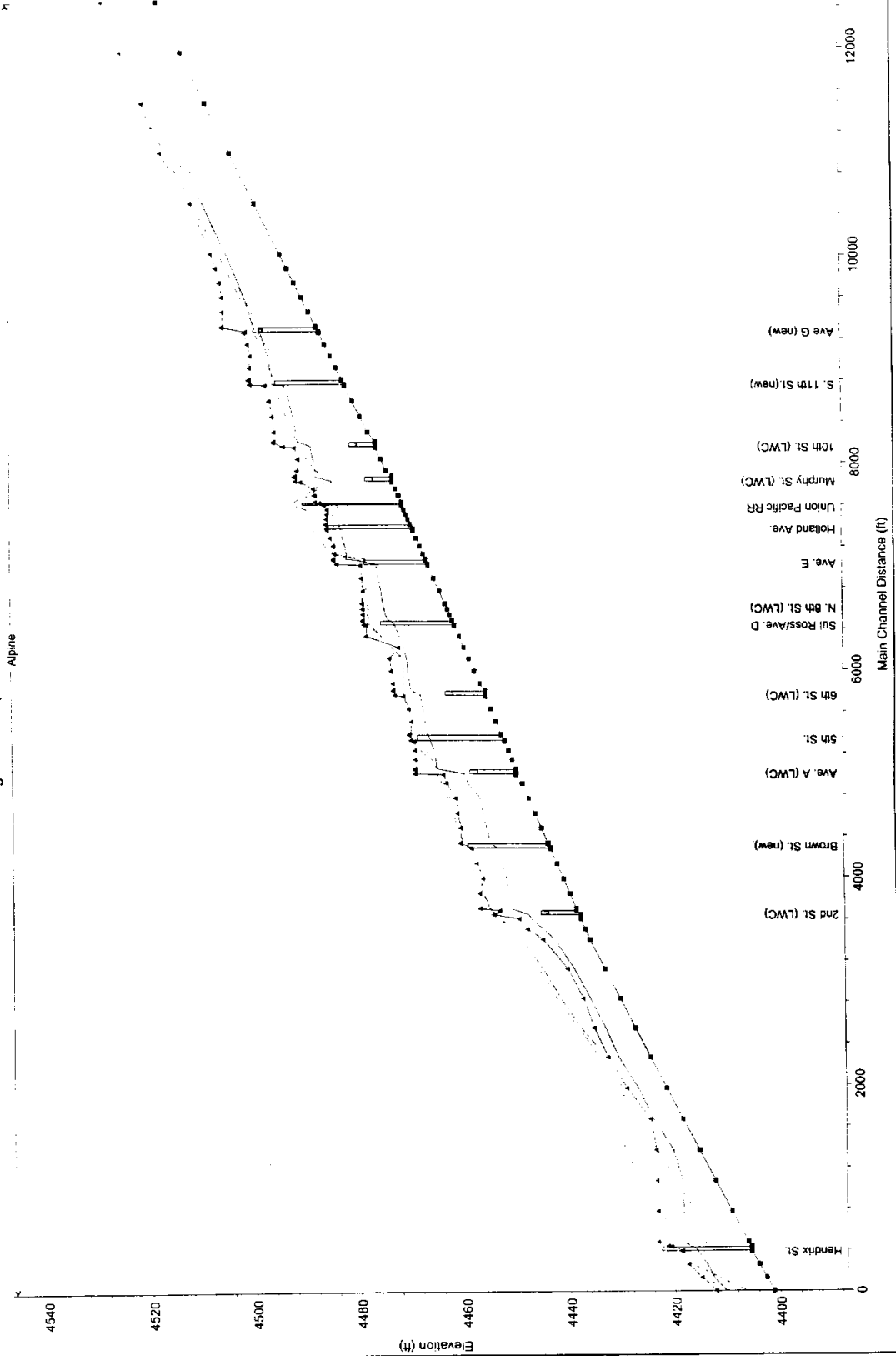
All of these Options focused upon controlling the 100-year flood event. However, after the second Public Meeting, an option that contained a flow capacity through the Holland Street bridge was desired. The 25-year flow was the determined to be the capacity to be contained under the Holland



Figure 4.4
Option D - 25- & 100-year
Water Surface Profile

Legend
WS - 100yr
WS - 25yr
Ground
LOB
ROB

Alpine Creek -- Flood Planning Study
Figure 4.4 - Option D - 25- & 100-year Water Surface Elevation

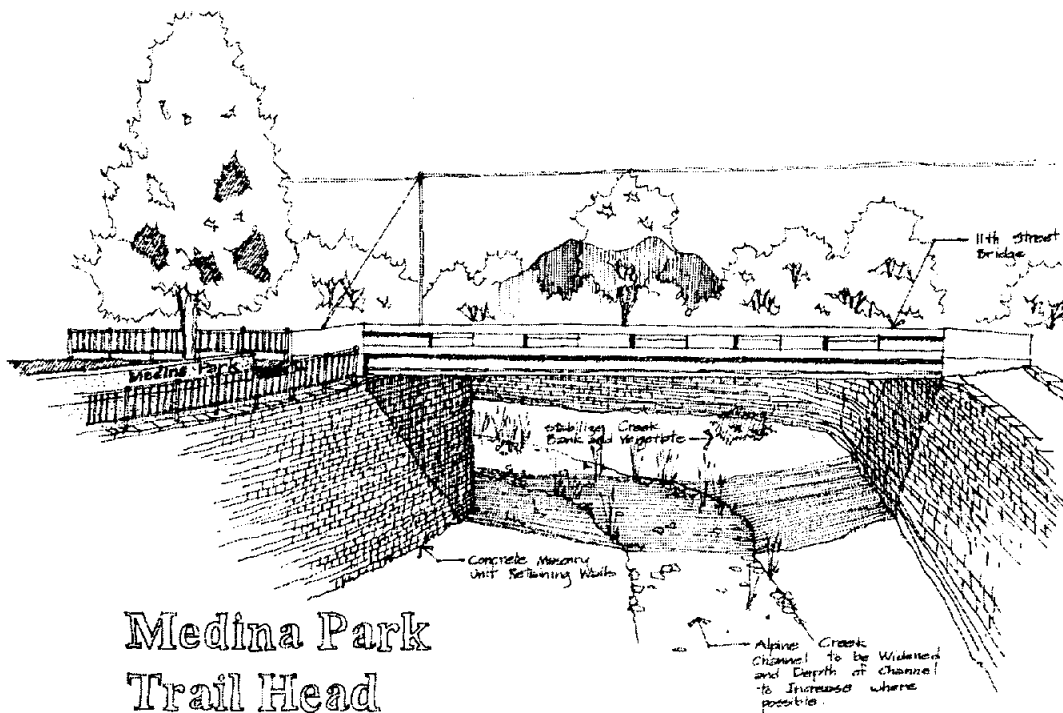


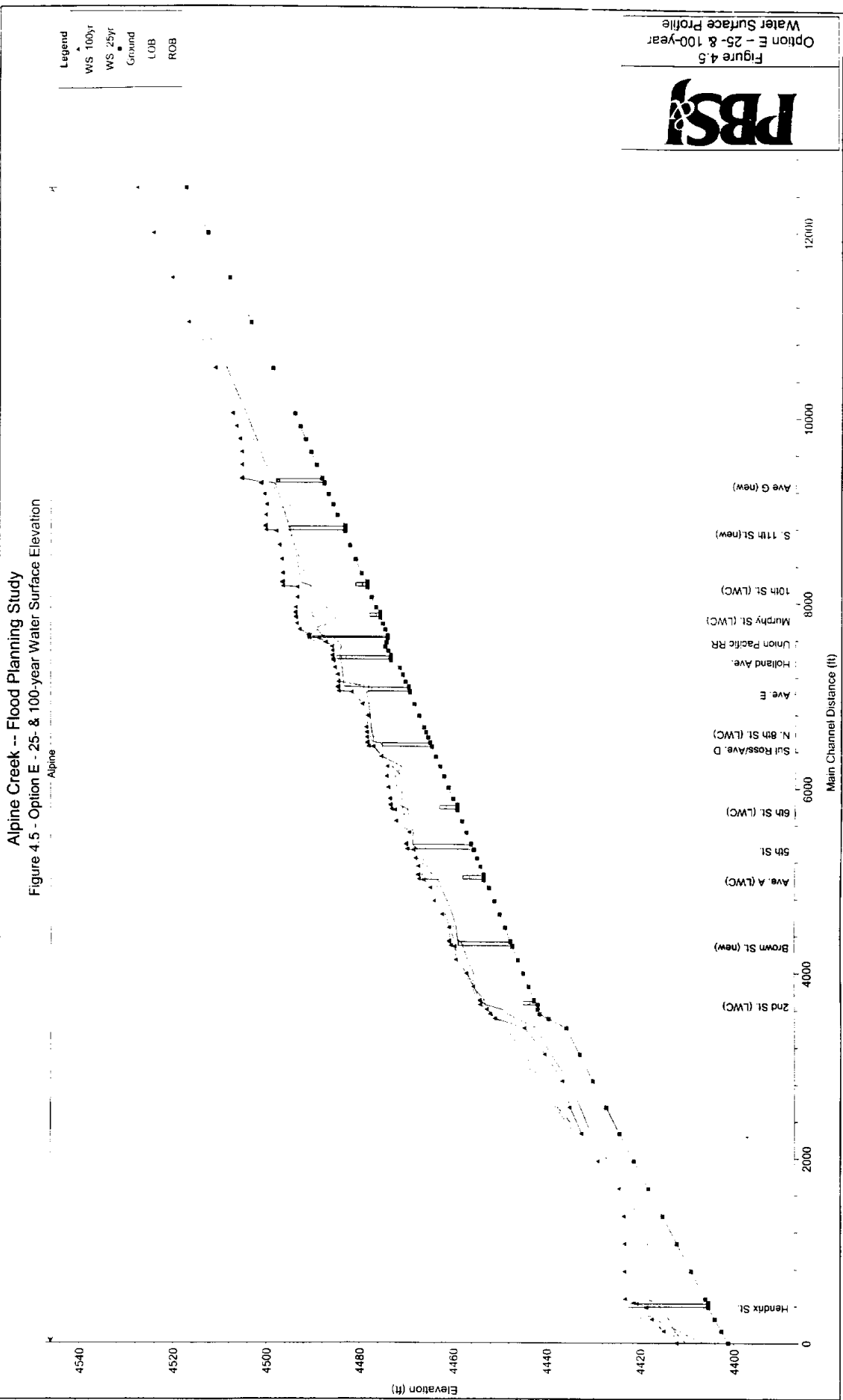
1 in Horiz. = 1000 ft 1 in Vert. = 20 ft

Avenue bridge. The decision was made to examine a new option that would focus on providing a 25-year flood protection. The 100-year flow was used to show the flood impact reduction and the damage reduction of the proposed flood option.

4.1.5 Option E

This option focuses upon the 25-year flood event. The initial depth of cut at 2nd Street is less than any of the previous Options presented. Option E begins with a channel slope of 0.00805 ft per foot at an elevation of 4,442 ft extending from 2nd Street to just downstream of Holland Avenue. There are no improvements from Holland Street to upstream of the UPRR. Above that point the proposed channel slope is 0.00835 ft per foot starting at an elevation of 4,472 ft and extending from upstream of UPRR to about 350 ft upstream of S. Avenue G. This option is half the cut of Option D at 2nd Street as compared to Option D or C. This option consists of a center channel cut that has a bottom width of 50 ft and side slopes of 0.5 H:V. The water surface profile is shown in Figure 4.5.





Alpine Creek -- Flood Planning Study
Figure 4.5 - Option E - 25- & 100-year Water Surface Elevation

Option E is considered to be the most feasible of the option attainable by the City of Alpine. This option does not fully contain the 100-year storm event, but with an area acquired in the upper watershed for detention, there is still possibility to make Alpine protected from the 100-year event using this Option.

PROBABLE COST OF CONSTRUCTION

The Section 4 discussed the “structural” solutions for reducing the flooding problems along Alpine Creek. This Section presents a summary of the estimated construction costs for the proposed improvements. Each table breaks out the costs by reach and structure. The probable construction cost for each Option is estimated along with estimates for final design and construction management. If the city decides not to use a certain item, then that item can be subtracted from the cost. Please note that any cost for the acquisition of ROW or project final design itself would need to be added to the totals.

At this preliminary design stage, even though the quantities and design have advanced beyond the “conceptual” stage, there still are some uncertainties associated with the design. Therefore, there is a “contingency” factor applied to the quantities. Also, in order to perform the final design, a consultant engineering company will have to conduct a detailed field survey of the area, finalize the design itself, and prepare construction plans and specifications for bidding purposes. This activity is estimated to be about seven percent of the construction cost. After the job is bid and awarded, there will be a cost associated with the construction inspection and material testing. This activity is estimated to be about one and a half percent of the construction cost. The total project cost does not include any bond issue “issuance” costs that may be applicable should that be the funding route that is followed.

METHODOLOGY AND INDIVIDUAL CONSTRUCTION LINE ITEMS

Table 5.1 presents the cost estimate for Option B including the individual construction items and their unit prices that were used for this project. The first column is simply a sequential numbering of the line items. The second and third columns present the TxDOT specification number and unique “descriptor code” that provides additional specific information to the contractor about the particular bid item. The next column provides the “item” description for the type of work that is to be performed. To the right of the description column are the “units of measurement” for that particular item such as Lump Sum (LS), Square Yard (SY), Cubic Yards (CY), Linear Feet (LF), Square Feet (SF), and Each (EA). The final column is the estimated unit price in 2001 dollars. Local unit prices have been incorporated into the cost estimate. It should be noted that due to the intense construction in Texas as a whole the unit prices have been changing over the last six months. If this trend continues, adjustments to the overall Project cost will need to be made in the final design process. This is another reason for the additional “contingency” factor of ten percent to be included in all the quantities at this point in the project development.

As mentioned above, each table presents the list of construction items and unit prices that were used for the project. The actual construction cost estimates should be viewed as “preliminary” and not “refined” for preparation of an actual bid (a product of the final design process). The intent of

these cost estimates is to reflect the amount of funding that this phase could require so as to assist the city in the short term and long term financial planning processes. With that in mind, the following paragraphs discuss the various “assumptions” that were made in the estimation of each of the specific line items in the cost estimation spreadsheet. The “final design” engineer can refer to these assumptions and modify them as needed once the actual design is underway.

General bid items were calculated as a percentage of the total material cost. For example, “Preparing Right of Way - General” was assumed to be one point eight (1.8) percent of the total bid amount since the Alpine Creek channel is relatively clear of major obstructions. Similarly, “Relocation of utilities - gas, telephone, power, others” was assumed to be two and one-half (2.5) percent of the total bid amount. There are several concrete encasements running across the channel that will need to be evaluated as to the nature of the utility and then relocated or armored in place to accommodate the channel expansion. “Mobilization” was assumed to be one (1.0) percent of the total bid amount since there will not be a large number or unique or specialized pieces of equipment required. “Barricades, Signs and Traffic Handling” was assumed to be one and one-half (1.5) percent of the total construction amount.

The line items for “Preparing Right of Way - Culvert Removal,” “Preparing Right of Way - Headwall Removal,” and “Removing concrete (unusual items not a part of general ROW preparation)” were for larger existing items that are not typically considered as “general” ROW preparation mentioned above. The “Excavation - easy” line item is for the quantity of dirt (CY) that would need to be cut from the existing channel in order to create the proposed trapezoidal channel previously discussed. It considers access to the channel and removal of the excavation to be easier than in other parts of the job. The downstream areas along Kokernut Lodge and through the Golf Course were evaluated as easier than in the confines of the channel through the city. The “Excavation - hard” line item is for the quantity of dirt (CY) that would need to be cut from the existing channel with more difficult access and removal issues.

“Embankment - berms, dikes, detention basin dams” represents the quantity of fill material (CY), which could be needed in final design. This is assumed to be an “in place” quantity with no shrinkage factor applied at this time. At this point in the design the fill was assumed to be zero. “Specialized Excavation Work (hard to reach areas, more difficult)” is a line item reserved for any excavation (CY) that could not be handled by the large moving equipment and would most likely require more specialized (smaller) equipment and more time to complete thereby making it more costly. This item also can represent areas that are difficult to access due to building encroachments or other constraints as discussed in previous sections. At this point in the design the quantity was assumed to be zero.

The next few items deal with the erosion and sediment control aspect for the project. “Furnishing and Placing Topsoil” was used only in those situations where a “cut section” could end up exposing buried soil that is low in nutrient sources and, therefore, would need assistance before planting

could take place successfully. The quantities were assumed to cover a depth of six inches over the face of the earthen channel sections. The channel invert and side slopes were to be lined with other materials. "Block sod (St. Augustine)" was used primarily in the neighborhood settings where yards could be disturbed by the installation of a wider channel, new pipe or box culverts around bridges. At this point in the design the quantity was assumed to be zero but can be added during the final design period. The majority of the revegetation effort (both urban and open channel) would be handled with "Seeding for Erosion Control (to include fertilizer & watering, subsidiary)." The area covered would be approximately the same quantity as the "topsoil" line item discussed above.

Continuing with the erosion and sediment control line items, in some places there appears to be the need for "Soil Retention Blanket - Temporary (ECRM)." Note that this is the temporary biodegradable material. The "shear" is a better indicator of erosion potential than simply looking at the "velocity" of the stormwater. The hydraulic models compute this parameter and it was used as the "indicator" for when the additional matting was needed. If the shear stress in the open channel or adjoining slopes was less than 3 pounds per square foot (psf) then a SY quantity of this temporary matting was estimated. This will provide the project with temporary, biodegradable matting to assist in the growth of grasses. This product should be installed as the project progresses (not waiting until the end of the job) so as to protect all the slopes that have been final graded, covered with topsoil and seeded. In some channels, the velocity was a little higher than unprotected grass could take on its own. Again this quantity can be refined during final design.

On the other hand, if the shear stress in the channel was over 3 psf, then a "Soil Retention Blanket - Permanent (TRM)" was recommended. This quantity should provide the design engineer with enough material to protect those areas in need of "soft armor" (instead of more expensive hard armor rock riprap). The use of Conlock concrete pavers may be required at some flow concentration points. Since these pavers are a "hard armor" it has been specified as its own unique bid item discussed below. The control of sediment during construction and the establishment of healthy vegetative cover along the channel should help make these projects significant contributors to the overall water quality in the watersheds. This Erosion and Sediment Control (ESC) aspect of the project should not be discounted or reduced since it will be a major contributor to satisfying regulatory requirements.

In the urban areas, as the pipes and boxes are installed at bridges, there will most likely be a need for "Flexible Base - assume 12" Thickness" to repair the streets or to create maintenance access points. This can be bid as an individual line item, or can be lumped into a large item for "bridge rehabilitation" if that is the decision made in final design. Similarly, after the base was installed, "HMAC - Type D - assume 2 inch Thickness" was estimated to be needed to repave the street or provide maintenance access. Certainly, as the urban projects are actually designed, these quantities may slightly increase or decrease depending upon the final footprint of the work at the bridges.

The line item for “Excavation and Backfill for Structures (headwalls, junction boxes)” would be for the excavation work around the drainage structures. At this point in the design the quantity was assumed to be zero. Another separate line item is used for the concrete work to actually install the new structures. “Trench Safety Protection” is a critical item. Typically this item is used with the installation of water, wastewater, or storm drainage pipes. It is intended for use when “narrow” trenches are created over 5 ft deep. However, in this project there will not be many of these traditional “narrow” trench situations since the majority of the work will be along an open channel where the width is greater than the height. Nevertheless, it is recommended to consider some type of safety precautions as the channel walls are created (some could be over 11 ft tall). As the individual project is designed this item may be modified somewhat since the requirement is only for those regions where the project depth exceeds the Federal depth requirements.

In some locations there was an estimate for “Retaining Walls (cast in place)” for the creation of a short wall between the pedestrian walking trail and the steep walls of the deepened channel. One of the major cost items for this preliminary design concept involves the construction of the walls for the deepened pilot channel section. “Retaining Walls (modular block wall) – normal” reflect the quantity of the exposed face (SF) of the wall plus an additional 2 ft of depth below the flowline of the channel. This additional depth is highly recommended as a safety factor for the toe of the slope as the channel invert adjusts through time. These modular block walls were recommended since information gathered during the Public Meetings indicated that the use of poured concrete walls was not esthetically pleasing. Although these modular blocks are made of concrete, the resulting walls do present a more natural appearance of individual rocks. The color of the blocks can be made to approximate the brown, tan and rust colors of the native rocks in the Alpine area. These walls are able to “articulate” and settle some without cracking as poured concrete walls typically can do. These walls also allow hydrostatic pressures to be relieved without the use of weeps holes. These walls need to have a geogrid material that extends back from the wall face into the slope. These geogrid strips serve as the “anchor” to hold the wall up. These “tails” can be easy to install if the overall width behind the wall is large, or can be difficult if the horizontal working room is more confined. The unit price for the normal or difficult installation situations are different so there are two unique line items.

Although the pilot channel will have stabilized walls, the invert of the channel will remain natural. This will help the stormwater in the pilot channel to infiltrate and naturally reenter the groundwater layers. Natural rock will be placed (or left) in the invert with sizes ranging from gravel to twelve inch diameter rocks. In some open channel sections, however, there may be a need for “Riprap - Stone (Channel) (assume 18” thick)” for in-line energy dissipation or for use just downstream of a bridge or headwall structure that has high exit velocities. The need for this item can best be evaluated during final design and is included here primarily as a reminder. Many times there are needs for “Steel Structures (pedestrian hand rails, others)” to provide safety to the general public along the pedestrian

trails and to the maintenance staff. Along the pedestrian trail there will be opportunities for “Steel Structures (park benches, trash cans, and accessories).”

A limited number of “Concrete Box Culvert” sizes were evaluated for use at bridge crossings and for large storm sewers. At this point in the design the quantity was assumed to be zero since the majority of the work involves the larger bridges and major crossings. During the actual “final design” of this particular project, a wider variety of box sizes and requirements (utility conflicts and other similar items) can be evaluated that could make one of the “basic sizes” used in this study. Again, these “basic sizes” were selected based upon the best cost for the open area provided. They are listed here as a reminder that there may be refinements to this overall preliminary design before the project is actually ready for construction.

One additional precast product was added to the choices called “Precast CROWNSPAN culvert structures.” This product is basically a very wide box culvert without a concrete bottom. The height of the Crownspan units varies from 2 to 12 ft (in 2-ft increments) and the width ranges from 16 ft to 40 ft (in increments of 2 to 4 ft). This product is used in situations where multiple boxes would normally be used. However, since multiple box structures many times prove to be maintenance problems with trees and trash collecting on the repeated vertical upstream members (where the multiple boxes are placed side by side), the Crownspan product provides an unobstructed open area for the stormwater to pass (minimal vertical members out in the channel). The hydraulic efficiency of this section allows it to be narrower than a multiple box section of the same conveyance capacity. The cost-effective use of these structures proves out when multiple boxes can be replaced with a single unit. A product size other than the proposed dimensions could be evaluated during detailed design. The costs estimated for Crownspan structures were based on a square yard of bridge deck basis.

In most cases a traditional bridge section was estimated. Where improved open channels met an existing bridge structure or low water crossing, an evaluation was performed to determine the size required for a new bridge to provide the necessary conveyance. The proposed construction was divided into three categories depending on the type of work. “Bridge 1 - Large span over 25 feet” is assumed to be “poured in place” and the unit price includes all piling, deck, and subsidiary items required. Different unit costs were used based on the level of difficulty of the specific bridge application. “Bridge 2 - Small span under 25 feet” are for the more minor structures. “Bridge 3 – Modifications to existing structures” is an estimate of the minor modifications that could be needed to transition from the channel to the existing structure. The existing structure will not need to be removed or replaced. It should be noted that in the design Options where existing Low Water Crossings (LWC) are being replaced, the proposed design is to leave the roadway surface at the same existing elevation. There would be a deeper “pilot channel” created underneath thereby converting the LWC to a “bridge” structure, but in the high flow conditions, there would still be stormwater overtopping the driving surface. One of two things are suggested at this point. Either plan to construct some warning lights, horns, or gates to close off access to these LWC, or

plan to raise the driving surface of the LWC up to an elevation that would match the top of bank elevation. There still may be some water crossing over these “raised” bridges depending upon the 100-year floodplain elevation for that Option. The “probable cost” estimates presented herein would need to be increased for either of these scenarios.

There were several “basic sizes” of circular concrete pipe. Again, as with the concrete box culverts, during actual “final design” there may be a situation where some pipes could be required due to utility conflicts (for example) or to where one of the larger diameter structures could be replaced with a box culvert. The recommendations presented herein will provide the final design team with an initial estimate of the conveyance required for a particular reach.

Where the concrete box culverts and the concrete pipe bid items reflect the proposed systems “conveyance” the next bid items reflect the proposed systems “collection” requirements. Certainly the two need to be balanced and compatible for the entire system to function properly. The collection system was analyzed using the following three basic sizes: “Inlet-Single,” “Inlet-Double,” and “Inlet-Triple.” The single inlet has a throat width of 5 ft and the “double” and “triple” are multiples of this base dimension. At this point in the design the quantity was assumed to be zero. As mentioned in the discussion about the boxes and the pipes, the intent is to simply provide an idea about the general “collection” capacity requirements for a particular watershed and an estimate of the construction funding required to provide that capacity.

Within the closed system design there may be needs for “drainage manholes (MH) or junction boxes (JB).” At this point in the design the quantity was assumed to be zero. Final design may reveal that an existing structure can simply be modified to accommodate a parallel pipe or another larger pipe without the need to totally build a new MH or JB structure in which case the cost estimate could be reduced. Similarly, at some point there will be a need for either a “Headwall - small” or a “Headwall - large” to allow the flow from the closed system to exit into the open channel system. Refinements and unique design structures can be evaluated during the final design phase.

For the closed system portion of the project around the bridge transitions some of the area could require new “Concrete Curb and Gutter.” Some portions of the existing system will most likely be able to be reused and the new pipes may be placed toward the centerline of the street. However, in other sections the new structures may need to be placed under/near the existing curb dictating removal and replacement. In some situations stormwater may be able to be passed across a street section with the use of a “Concrete Valley Gutter” which is included as a reminder for the final design phase.

In closed system work around the bridges there was an estimate made for the number of “Remove & Replace Driveway” efforts that may be needed. Again, final design may reveal that there may be slightly more or less than this. Similarly, there was an assumption that the major sidewalks

around the bridges would not be damaged and that only the individual sidewalk segments extending perpendicular to the street could possibly be impacted. The pedestrian access points will most likely require new concrete sidewalks to be installed. One down along the channel, the pedestrian walkway will be more natural looking as a gravel trail. "Sidewalk – soil amendment – hike and bike trail" will make use of existing granular base material and a non-toxic binding agent. The material is blended to a thickness of about four inches and then compacted in place. This method will make this shoulder area strong enough to resist erosion, yet natural in appearance. Again assuming that the majority of the work would take place out in the street ROW the need for "Chain Link Fence - 6 feet" would be minimal but could be needed in final design on a site by site basis. This quantity could be increased to address concerns of access from the public hike and bike trail up into nonpublic areas. Certainly, if a closed system project went down one side of a street, there would be a need for some work on a "Mailbox Assembly."

For final design, the contractor needs to be reminded about their responsibility to perform routine "Project Maintenance" as a subsidiary item to all others in the bid package. It is important to the safety of the citizens and the workers that this type of effort be monitored.

As discussed in Section 4, in the open channel design there may be a use for "Gabions" or "Reno Revetment Mattress" in the final design. These structures were included in areas where the existing gabion channel liner might be widened. Gabions also are used in areas that require steeper banks side slopes in order to provide the required conveyance. These design elements provide environmentally sensitive structures that allow for the exchange of stormwater and groundwater as well as providing a very "flexible" structure that can move and shift as needed to offset poor geotechnical conditions at a particular project site.

For the management of construction erosion and sedimentation there is a need to include the use of "Rock Berms" and "Silt Fence" in the project. The use of round flexible excelsior "logs" (approximately ten to twelve inches in diameter) in lieu of the standard vertical silt fence should be considered. The round products can be more easily moved along with the project as grading proceeds and seem to actually collect the sediment. Another environmental concern is the "Preservation of Trees (Type C)" along the creek corridors and along the urban streets. This will particularly be needed in the lower portions of the project through the Kokernut Lodge area and through the Golf Course. Once in the more urban section, the work will be down in the existing channel and the trees up along the street should not be impacted. This line item would provide for orange fencing along the circumference of the "drip line" of the tree to keep truck traffic away from the trunk and root zone. An allowance has been made for a "Capital Improvement Project Sign" for each project to inform the public of the contractors name and that the project is a part of the Alpine Creek improvements.

As discussed in previous sections, the proposed open channels designs included a “benched channel” concept with a “pilot channel.” The original concept was either to preserve the low flow section of the existing channel (approximately 1 to 3 ft deep) or to armor it to maintain its shape and environmental importance. Although this shape cannot be achieved, the need for infiltration and exfiltration along these reaches still exists. This can be achieved by including a quantity for “Conlock II pavers” to serve as that armoring agent along the flow line of the trapezoidal channels. These square pavers are individual concrete sections varying in thickness of four, six, or eight inches. They are about 18 inches on a side with “dog ears” and “slot” sections (like a jig-saw puzzle piece) allowing for the individual pieces to articulate as needed. This system provides a combination of the necessary armoring yet still allows for the exchange of stormwater and groundwater in this “low flow” area, which is of interest to the permitting agencies. At this point in the design the quantity was assumed to be zero

The final item on the cost estimate is “Concrete Structures (drop, energy dissipation, special)” which could be needed at major bridge crossings, outlet works for detention basins, and in-line drop structures along the reach of a channel. At this point in the design the quantity was assumed to be zero

5.2 PROBABLE COST

Table 5.1 presents the “probable cost of construction” for Option B to be \$4.8 million dollars. The project length ends downstream of the UPRR trestle. Including the final design and construction management services, the total project should be around \$5.2 million. The construction is estimated to be near \$710 per linear foot over the project length.

Table 5.2 presents the estimated construction cost for Option C to be \$6.4 million dollars. Option C is equivalent to Option B below the UPRR tracks, but Option C extends further upstream and, therefore, has a larger total cost. Including the final design and construction management services, the total project should be around \$6.9 million. The construction is estimated to be near \$710 per linear foot over the project length due to the cost of LWC replacement in the upper reaches.

Table 5.3 presents the estimated construction cost for Option D to be \$7.5 million dollars. Option D is a deeper channel section than either Option B or Option C. The overall length of Option D is equivalent to Option C. Including the final design and construction management services, the total project should be around \$8.1 million. The construction is estimated to be near \$830 per linear foot over the project length.

Table 5.4 presents the estimated construction cost for Option E to be \$5.6 million dollars. The depth of cut is less than the other Options, yet its length is equivalent to Option C and Option D. Including the final design and construction management services, the total project should be around \$6.1 million. The construction is estimated to be near \$620 per linear foot over the project length.

Option A focused upon improvements downstream of 2nd Street. The cost to complete Option A is included in each of the other Option summary sheets as Reach 1 (Hendryx Street to Kokernot Lodge) and Reach 2 (Golf Course to 2nd Street). The work included the “benched channel” and the estimated construction cost is \$1.2 million dollars. Including the final design and construction management services, the total project should be around \$1.3 million. The construction is estimated to be from \$350 to \$450 per linear foot over the project length.

6.0 FLOOD DAMAGES

One of the main aspects of any flood protection planning study is the evaluation of the “benefits” of the proposed improvements related to the “cost” of those improvements. This Section will examine the benefits of reduced flood damages. Section 5 presents information about the construction costs associated with the various Alternatives.

The intent of this Section is to present our methodology for the computation of flood damages along Alpine Creek under existing conditions and for the various design options that could reduce these damages. It should be pointed out that this will be a “relative” comparison between the various options as opposed to an exacting evaluation of the precise damage amount that could be experienced. The traditional methodologies of a pure “benefit/cost” analysis will not be able to be performed due to the limited amount of existing data.

The TWDB does require that there be an estimation and assessment of the costs and benefits of the alternatives being considered, but does not specify the exact procedures or techniques that must be used (allowing for some flexibility). The goal of this analysis is to base this particular assessment upon as much real data as can be acquired under the scope of work with the key thought to make the method “repeatable” among all the options.

6.1 AVAILABLE DATA

As mentioned earlier, the USACE, Albuquerque District, prepared a study titled “Reconnaissance Report for the Pecos River and Tributaries, Alpine, Texas” dated February 1997. A very detailed flood damage assessment was prepared as a part of their analysis. PBS&J tried to obtain as much of the detailed backup information as possible for “reuse” in this TWDB grant study. However, it seems that all of the very detailed listings of structure, elevations, and valuation are no longer available.

Therefore, the best available data at this time is from the “summary table” information presented in the actual Reconnaissance report itself. The total number of impacted structures included within their 209 acre 100-year floodplain boundary was 307, with an estimated total damage of \$4,084,000. It should be noted that the flood boundaries of the Reconnaissance study are not exactly the same as the current boundaries of the floodplain presented in the FEMA FIS. Therefore, there were several assumptions made in this flood damage analysis that blends the “best available data” from the USACE, FEMA, and “revised” hydraulic models discussed in Section 3.

It should be pointed out, however, that the methodology in this study made use of the USACE damage totals that were based upon very detailed and extensive data. This current analysis assumed a “uniform distribution” of structures throughout the floodplain area, and a uniform distribution of damage per structure. Both of these assumptions are known to not represent the actual distributions

within the floodplain, however, these assumptions will at least provide a common background in the evaluation of relative change or “benefit” derived from each of the individual flood reduction options. As mentioned above, this analysis strictly focuses upon the benefits of flood damage reduction. There are other benefits that are associated with each of the Alternatives related to improving the environment, wildlife habitat enhancements, ground water recharge, and overall stormwater quality. Since the main focus of this planning study was upon flood damages, these other benefits were not quantified.

Another piece of USACE information that is included in this analysis are the National Damage Curves. The assumption for this analysis is that although a uniform distribution of damage per structure was used, the relative changes in reduced floodplain water surface elevation would be evaluated based upon the same damage curves used in the Reconnaissance study. The National Damage Curves were used for one-story homes without basement. Table 6.1 lists the National Damage Curve relationships for this study with the upper value being the depth of floodwater above the finished floor of the structure, and the lower number being the percent of the total value that is damaged. Please note that even if the floodwater depth is reduced to 1 ft below the finished floor, statistically there have been damages reported to the structure and, therefore, are included into these national values.

The USACE used regression analysis to create the damage functions. While several independent variables, such as flood duration and flood warning lead-time, were examined in building the models, the models that were most efficient in explaining the percent damage to structure and contents were quadratic and cubic forms with depth as the only independent variable. Content damage was modeled with the dependent variable being content damage as a percentage of structure value. This differs from the previous technique of first developing content valuations and then content damage relationships as a function of content valuations. The generic content damage models are statistically significant and their use eliminates the need to establish content-to-structure ratios through surveys. Direct costs for cleanup expenses, unpaid hours for cleanup and repair, emergency damage prevention actions, and other flood-related costs are not included in these damage functions.

6.2 METHODOLOGY

The analysis for this planning study was conducted using a spreadsheet. The entire study area extends from Hendryx Street in the Kokernot Lodge area at the most downstream reach, up to Avenue G in the most upstream reach. On the left side of the spreadsheet are fifteen “subreaches” of the entire study area allowing the reader to evaluate the relative “benefits” in a more detailed manner. This will also provide feedback in the overall “prioritization” evaluation of the various options and perhaps in the “implementation” phase. Construction of smaller portions of the single most beneficial option could be based upon funding availability and prioritized or phased over time.

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Summary of Damages - USACE Recon Study - Existing Floodplain

Total Number of Structures		Assuming uniform distribution of Impact	
307		Number of Structures per Acre Inundated	
\$ 4,084,000		1.47	
Total Damages		Damages per Structure	
209		\$ 13,300	
Total Area Inundated (Acres)			

USACE National Damage Curve
Structural Depth-Damage - One Story

Structural Depth (ft)	Damage (\$/sq ft)	Damage (\$/acre)	Damage (\$/structure)
-6.0	0.0	0.5	1.0
-1.0	0.0	0.5	1.5
0.0	0.03	0.18	0.23
			0.28
			0.32
			0.36
			0.40
			0.44
			0.47
			0.53
			0.59
			6.0

Comparison of damages per reach for various Options compared to US Army Corps of Engineers Recon evaluation of existing FIS

Reach Location	USACE Recon		FIS		Flood Area (acres)	Structures	Damages (\$)
	avg weel (100 yr)	avg bank (100 yr)	avg depth above bank elev	damage %			
1 Hendix Street Kokemot Lodge Area	4431.2	4428.8	4.4	47%	15.4	22.7	\$ 302,090
2 Golf Course to Second Street	4444.0	4442.0	2.0	28%	16.4	24.1	\$ 321,068
3 Second Street to Brown Street	4458.5	4456.8	1.7	28%	16.2	23.8	\$ 316,372
4 Brown Street to West Avenue A	4466.5	4462.2	4.3	47%	35.1	51.6	\$ 686,158
5 West Avenue A to 5th Street	4469.0	4466.1	2.9	36%	15.0	22.0	\$ 292,698
6 5th Street to 6th Street	4471.2	4470.3	0.9	18%	22.6	33.2	\$ 441,591
7 6th Street to W. Ave D (Sul Ross)	4474.2	4471.1	3.1	40%	19.7	29.0	\$ 385,047
8 W. Ave D (Sul Ross) to W. Ave E	4479.9	4478.0	1.9	28%	10.7	15.8	\$ 209,741
9 W. Ave E to Holland Ave	4487.5	4483.7	3.8	44%	7.7	11.3	\$ 150,849
10 Holland Ave to UP RR Trestle	4488.1	4484.3	3.8	44%	4.4	6.5	\$ 86,675
11 UP RR Trestle to Murphy Street	4490.4	4487.0	3.4	40%	5.0	7.4	\$ 98,218
12 Murphy Street to 10th Street	4492.0	4487.9	4.1	47%	13.8	20.2	\$ 269,220
13 10th Street to 11th Street	4495.0	4490.1	4.9	47%	9.8	14.4	\$ 192,132
14 11th Street to W. Ave G	4500.5	4495.3	5.2	53%	8.0	11.7	\$ 155,545
15 W. Ave G to End of Study	4505.0	4502.1	2.9	36%	9.0	13.2	\$ 175,697
16 TOTAL	208.7	307.0	307.0		208.7	307.0	\$ 4,083,100
							avg per str = \$ 13,300

Table 6.1 presents fifteen reaches along with data extracted from the FIS floodplain boundary. The FIS 100-year floodplain was used as the “benchmark” against which to compare the performance of all the Alternatives. The damages were uniformly distributed throughout this floodplain area and the totals at the bottom of Table 6.1 match the USACE damage numbers. The various columns under the FIS grouping include the “average water surface elevation (WSEL)” in the 100-year event for the particular reach as well as the “average bank” elevation of the reach. This yields the “average depth” of the floodplain assuming the WSEL elevation is higher than the bank elevation. The next column takes the “average depth” and extracts the “percent of damage” to a structure using the USACE National Damage Curve data presented immediately above the FIS work area. The next FIS column is an approximation of the floodplain area for the given reach determined by CAD area calculations. As mentioned above, this analysis makes use of generalizations assuming “uniform distribution” of structures and damages throughout the floodplain area. Therefore, knowing the approximate floodplain area, the total number of structures impacted is computed as well as the total damage amount. This last column represents the “baseline” damages against which each of the individual Options can be evaluated on a reach-by-reach basis.

Table 6.2 presents information about Option B. Across the top of the sheet are various columns of information about the particular “option” or scenario under review. The next groupings of columns are the same for reach of the Options. The individual Option under evaluation is clearly marked in the upper left and upper right of the table. There are several columns of information about the resulting floodplain width and elevation. The “key cross section” is listed as a criss-cross reference to the hydraulic model. This floodplain information is then used with the “uniform distribution” concept to determine how much of the baseline damages have been reduced. Again, it needs to be stated that this is NOT an exacting and rigorous Flood Damage Assessment (FDA) as the USACE software would conduct. However, some of the basic notions are reflected in this methodology.

The analysis is a combination of two damage components. First, due to overall FLOODPLAIN width reduction, it is assumed that a certain number of structures will be totally removed from receiving any flood damages. Second, due to the reduction in depth of the remaining floodplain, the REMAINING STRUCTURES within the floodplain should experience a reduction in flood damages (in keeping the USACE damage curves). The various columns are grouped to support these two basic “incremental” calculations, and then totaled to the right of the table.

The first column provides the “reach length” and the second column provides a general estimate of the 100-year “floodplain width” assuming this Option is fully implemented. The third column provides an estimate of the physical “top bank width” beyond which flooding would begin. A quick reference between the second and third columns gives the reader a general idea how close this particular Option came to containing the 100-year event within the existing top of bank.

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Comparison of damages per reach for various Options compared to US Army Corps of Engineers Recon evaluation of existing FIS

OPTION B 5 Key Cause reach Station	FLOODPLAIN					REMAINING STRUCTURES					OPTION B 5											
	Reach Location	Reach Length (feet)	Reach width (feet)	Reach area (acres)	Structures removed	Flood area removed	Structures removed	Damages removed (incremental)	Differences (before % adj)	avg west (100 yr)	avg bank (100 yr)	avg slope above bank elev	damage % reduction	depth reduction	remaining damage % of original	damage \$ reduction (incremental)	OPTION TOTALS damage \$ removed	OPTION B 5 damages \$ remaining	OPTION B 5 construction cost estimate	ratio of cost to damages removed		
1	Hendrix Street Kokernell/Ludwig Area	3.06	1,036	356	157	22.2	0.3	0.5 \$	6,203 \$	295,796	4,428.6	-3.3	0%	0.74	0%	0 \$	6,203 \$	295,796	\$ 635,607	101.0		
2	Golf Course to Second Street	4.5	1,336	330	161	14.9	6.3	9.3 \$	123,203 \$	187,865	4,437.0	-5.0	0%	7.00	0%	0 \$	123,203 \$	187,865	\$ 811,021	5.0		
3	Second Street to Brown Street	6.25	595	422	122	6.5	10.4	15.3 \$	203,593 \$	112,779	4,455.2	-1.6	0%	3.34	0%	0 \$	203,593 \$	112,779	\$ 771,367	3.8		
4	Brown Street to West Avenue A	7.8	665	60	98	0.0	35.1	51.6 \$	688,158 \$	4,693.4	4,463.2	-1.8	0%	6.06	0%	0 \$	688,158 \$	0	\$ 548,226	0.8		
5	West Avenue A to 5th Street	6.33	272	2,257	66	14.1	0.9	1.3 \$	18,913 \$	275,785	4,466.1	2.0	32%	0.86	85%	\$ 245,227	262,140 \$	30,539	\$ 355,285	1.4		
6	5th Street to 6th Street	9.83	372	1,571	90	13.4	9.1	13.4 \$	178,724 \$	292,867	4,471.0	0.7	18%	0.19	100%	\$ 202,867	441,591 \$	0	\$ 306,630	0.7		
7	6th Street to W Ave D (Sul Ross)	9.8	633	1,750	76	25.4	19.7	29.0 \$	385,047 \$	4,473.6	4,471.1	2.5	36%	0.60	90%	0 \$	385,047 \$	0	\$ 611,994	1.8		
8	W Ave E to Holland Ave	11.63	556	578	84	7.3	3.4	5.0 \$	66,840 \$	4,473.9	4,470.0	1.9	28%	0.04	100%	\$ 142,701	209,741 \$	0	\$ 333,579	1.6		
9	Holland Ave to UP RR Trestle	12.83	285	623	87	4.1	6.0	5.3 \$	71,132 \$	79,717	4,485.3	1.6	28%	2.24	64%	\$ 50,640	121,776 \$	28,071	\$ 155,812	1.3		
10	UP RR Trestle to Murphy Street	13.5	240	501	113	2.6	4.1	2.5 \$	32,717 \$	53,527	4,465.9	1.8	28%	2.19	64%	\$ 34,786	69,298 \$	19,077	\$ 143,811	1.9		
11	Murphy Street to 10th Street	14.83	200	1,289	79	5.9	8.7	7.4 \$	86,218 \$	4,493.5	4,487.0	6.4	59%	3.05	146%	0 \$	96,218 \$	0	0	0.0		
12	10th Street to 11th Street	15.33	280	1,100	63	7.1	10.4	9.6 \$	130,530 \$	4,513.7	4,487.9	5.6	55%	-1.70	113%	\$ 156,051	207,182 \$	(17,647)	0	0.0		
13	11th Street to W Ave G	16	550	1,025	66	13.7	20.2	14.4 \$	192,132 \$	4,496.8	4,490.1	6.7	55%	-1.80	124%	0 \$	192,132 \$	0	0	0.0		
14	W Ave G to End of Study	17.1	460	720	83	7.6	11.2	0.5 \$	6,814 \$	4,496.7	4,495.3	4.4	47%	0.81	89%	\$ 131,077	138,491 \$	17,054	0	0.0		
15	W Ave G to End of Study	17.76	710	387	114	6.3	9.3	3.9 \$	52,361 \$	4,505.9	4,502.1	3.8	44%	-0.92	121%	\$ 148,950	201,321 \$	(25,624)	0	0.0		
16	TOTAL		138.7	204.0	138.7	204.0	115.0	189.2 \$	2,250,878 \$	1,832,424	1,173,209	3.8	44%	-0.92	121%	\$ 148,950	\$ 3,429,665	\$ 659,215	\$ 4,483,529	1.3		
																			sum items	\$ 305,521		
																			TOTAL CONSTRUCTION	\$ 4,189,048		

The fourth column calculated the “flood area” based upon the information in the first two columns, and then assuming “uniform distribution” of structures and damages throughout the floodplain computes the number of structures still receiving some amount of inundation. Note that if the floodplain width is less than the existing top bank width the assumption is that there will be NO structures inundated.

The next three columns compute the first of the two “incremental” damage components due to FLOODPLAIN width reduction. The sixth column is the difference between the FIS flooded area amount and the remaining flooded area for the given Option and is titled “flood area removed.” Similarly the next column makes a calculation of the “structures removed” due to the benefits provided by the Option. The third column in this group presents the incremental “damages removed” based upon the uniform distribution concept. These are the structures and damages that are no longer in the floodplain. The more the particular Option reduced the 100-year floodplain, the larger the number in this incremental total.

The next eight columns compute the second of the two “incremental” damage components for the REMAINING STRUCTURES. The ninth column is the difference between the total damages for this reach under the baseline FIS scenario and the “damages removed” just computed. These are the remaining damages that will need to be adjusted downward due to the reduced depth of flooding experienced as a result of this Option. Although the damages were not totally removed, the magnitude of the impacts were reduced due to a lower floodplain water elevation. The average 100-year WSEL for this Option as represented by the “key cross section” is presented along with the “average bank” elevation which was previously presented in the FIS portion of Table 6.1. The “average depth” is simply the difference between the two. Note that if the WSEL is less than the bank elevation the depth will be reported as a negative number indicating it is less than the bank elevation by a certain amount.

Assuming the elevation is positive, there will be a “damage percent” associated with that depth based upon the USACE damage curves. That percentage is listed in the next column followed by a column presenting the “depth reduction” in the 100-year WSEL between the Option and the FIS (a positive number indicating the WSEL was reduced). The next column is very important in this second “incremental” damage evaluation. Assuming that the “damage difference before any adjustment” is a result of the water being a certain depth, then reducing that depth will yield a benefit. If the average depth of the FIS yielded 70% from the damage curve, and a certain Option creates a lower depth which yielded 35% from the damage curve, then in this general analysis method the damages will be HALF those experienced during the FIS evaluation. The “damage reduction percentage” represents this ratio between the FIS damage percentage and the Option damage percentage. This percentage is then multiplied by the “damage difference” computed at the beginning of this section yielding the second the incremental

“damages removed” based upon the uniform distribution concept. These are the structures and damages that are still in the floodplain, but damaged to a lesser degree.

The “option totals” are presented to the right of the table. The first column is the total of the two “incremental” damage reduction summed into one value labeled “damages removed.” The next column simply is the difference between that value and the total damages for that reach under the baseline FIS scenario. Again, it cannot be stressed enough that these are NOT exact damages, but are simply relative comparisons based upon our “uniform distribution” assumptions. These totals can be compared against the construction cost for each reach to get some feel of the relation of cost to reduced damages for each Option.

6.3 RELATIVE FLOOD DAMAGE BENEFITS OF EACH OPTION

As mentioned above, due to several assumptions that were required, the results from this analysis are more “relative” between the various alternatives than they are “specific” as to exact benefits derived for a particular alternative. Please recall that Option B (Table 6.2), C (Table 6.3), and D (Table 6.4) were primarily focused upon reducing the limits of the 100-year event. Therefore, the FLOODPLAIN increment of damage reduction is larger than the value for Option E (Table 6.5) which primarily focused upon the 25-year event. In this first “increment” of damage reduction listed on the tables, Option B had less benefit than Option C since it did not extend as far upstream as did Option C. Option D had more benefit than did Option C because of the depth of cut and overall capacity of the Option D channel. Again, the reader must recall that this “modified” flood damage assessment method should only be used to determine these “relative” benefits of one Option compared to another and should NOT be used to determine that the benefits were exactly a certain dollar amount.

The second increment of damage reduction is for the REMAINING STRUCTURES. For this value, Option B had a larger value than Option C, and Option C had a larger value than Option D. Since so much was removed from the floodplain in Option C and Option D, it only make sense that the most benefits to the “remaining structures” would be larger under Option B (since more were left in the floodplain). Option E had more benefits in this increment than did Option B, again since it’s goal was to address the 25-year event, leaving the 100-year floodplain just slightly reduced. It should also be noted that Option B ends at the UPRR trestle, whereas Option E extends a great distance upstream of that point.

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Comparison of damages per reach for various Options compared to US Army Corps of Engineers Recon evaluation of existing FIS

Key Cross Section	OPTION C.C.5				REMAINING STRUCTURES				FLOODPLAIN				OPTION C.C.5				OPTION C.C.5				OPTION C.C.5	
	reach length (feet)	reach width (feet)	top bank width (feet)	structures inundated	structures removed	damages removed (incremental)	avg cost (100 yr)	avg bank	avg depth	damage % reduction	length reduction	damage % reduction (incremental)	damage \$ reduction (incremental)	OPTION C.C.5 damage \$ removed	OPTION C.C.5 damage \$ remaining	OPTION C.C.5 construction cost estimate	ratio of cost to damages removed					
1 Hendrix Street Kalkreuth Lodge Area	3.66	1,838	358.3	15.1	22.2	0.3	0.5	6,293	\$ 295,796	4424.5	4426.8	-2.3	0%	6.74	0%	\$	6,293	\$ 295,796	\$	635,807	101.0	
2 Golf Course to Second Street	4.5	1,335	330	10.1	14.9	6.3	9.3	\$ 123,203	\$ 197,865	4437.0	4442.0	-5.0	0%	7.00	0%	\$	123,203	\$ 197,865	\$	611,021	5.0	
3 Second Street to Brown Street	6.25	585	422	5.8	8.5	10.4	15.3	\$ 203,593	\$ 112,779	4455.2	4456.8	-1.6	0%	3.34	0%	\$	203,593	\$ 112,779	\$	771,397	3.8	
4 Brown Street to West Avenue A	7.6	665	80	0.0	0.0	35.1	51.6	\$ 686,158	\$ -	4480.4	4482.2	-1.8	0%	6.06	0%	\$	686,158	\$ -	\$	546,029	0.8	
5 West Avenue A to 5th Street	6.33	272	2,257	66	14.1	20.7	1.3	\$ 16,913	\$ 275,785	4468.1	4469.1	2.0	32%	0.86	89%	\$	245,227	\$ 30,558	\$	355,285	1.4	
6 5th Street to 6th Street	8.63	372	1,571	80	13.4	19.8	13.4	\$ 178,724	\$ 262,867	4471.0	4470.3	0.7	18%	0.19	100%	\$	262,867	\$ -	\$	308,860	0.7	
7 6th Street to W Ave D (Sul Ross)	9.8	633	1,750	76	25.4	37.4	19.7	\$ 385,947	\$ -	4471.6	4471.1	2.5	36%	0.60	96%	\$	385,947	\$ -	\$	634,094	1.4	
8 W Ave D (Sul Ross) to W Ave E	11.63	550	578	84	7.3	10.7	3.4	\$ 66,840	\$ 142,901	4470.9	4470.0	1.9	28%	0.04	100%	\$	142,901	\$ -	\$	333,579	1.6	
9 W Ave E to Holland Ave	12.03	285	623	87	4.1	6.0	3.8	\$ 71,132	\$ 79,717	4485.3	4483.7	1.6	28%	2.24	64%	\$	50,646	\$ 29,071	\$	155,812	1.3	
10 Holland Ave to UP RR Trestle	13.5	240	501	113	2.8	4.1	1.7	\$ 32,717	\$ 53,857	4485.9	4484.3	1.6	24%	2.19	64%	\$	34,280	\$ 19,577	\$	283,628	4.2	
11 UP RR Trestle to Murphy Street	14.03	200	1,129	79	5.2	7.6	5.0	\$ 98,218	\$ -	4487.0	4487.0	5.3	53%	-1.90	133%	\$	98,218	\$ -	\$	102,550	1.0	
12 Murphy Street to 10th Street	15.33	280	772	63	5.0	7.3	8.8	\$ 175,152	\$ 97,058	4487.9	4487.9	4.4	47%	-0.27	103%	\$	97,058	\$ 269,120	\$	303,175	1.1	
13 10th Street to 11th Street	16	550	1,052	66	13.7	20.1	9.9	\$ 192,132	\$ -	4498.8	4499.1	6.7	58%	-1.78	142%	\$	192,132	\$ -	\$	423,230	2.2	
14 11th Street to W Ave G	17.1	460	771	83	8.1	12.0	8.0	\$ 155,545	\$ -	4499.9	4495.3	4.6	47%	0.58	89%	\$	155,545	\$ -	\$	247,259	1.6	
15 W Ave G to End of Study	17.76	710	387	114	6.3	9.3	2.7	\$ 52,132	\$ 121,865	4505.9	4502.1	3.8	44%	-0.92	121%	\$	149,237	\$ 201,369	\$	237,052	1.2	
16 TOTAL				136.3	200.8	124.8	183.3	\$ 2,449,768	\$ 1,642,301				\$ 862,226	\$ 3,433,024	\$ 660,926	\$ 5,951,433	405,338	\$ 6,638,772	\$ 9,291			

Comparison of damages per reach for various Options compared to US Army Corps of Engineers Recon evaluation of existing FIS

Reach Location	CROSS-REACH				REMAINING STRUCTURES				FLOODPLAIN				OPTION D.5			OPTION D.2			
	Section	reach length (feet)	reach width (feet)	reach depth (ft)	structures inundated	reach area (acres)	structures removed	reach area removed (acres)	structures removed	reach area removed (acres)	structures removed	reach area removed (acres)	structures removed	reach area removed (acres)	structures removed	reach area removed (acres)	structures removed	reach area removed (acres)	
1 Herndon Street Kalamond Lodge Area	3.66	1,838	358	157	22.2	0.3	0.5	\$ 6,293	\$ 286,796	4124.5	4426.8	-2.3	0%	6.70	0%	\$ 5,793	\$ 295,796	\$ 635,807	101.0
2 Golf Course to Second Street	4.5	1,335	330	161	14.6	6.3	9.3	\$ 123,203	\$ 197,865	4437.0	4442.0	-5.0	0%	7.00	0%	\$ 123,203	\$ 197,865	\$ 611,564	5.0
3 Second Street to Brown Street	6.25	595	1,224	122	16.7	16.2	23.8	\$ 316,372	\$ -	4458.1	4458.8	-0.7	3%	2.43	9%	\$ 316,372	\$ -	\$ 762,422	2.4
4 Brown Street to West Avenue A	7.6	665	212	96	3.2	31.8	46.8	\$ 622,773	\$ 63,365	4481.1	4482.2	-1.1	0%	5.36	0%	\$ 622,773	\$ 63,365	\$ 546,238	0.9
5 West Avenue A to 5th Street	8.33	272	2,302	66	14.4	0.6	0.9	\$ 11,419	\$ 281,279	4468.8	4468.1	2.7	36%	0.23	100%	\$ 281,279	\$ 281,279	\$ 375,846	1.3
6 5th Street to 6th Street	9.63	372	1,055	90	10.3	13.6	19.9	\$ 265,113	\$ 176,478	4469.9	4470.3	-0.4	3%	1.26	14%	\$ 24,109	\$ 289,222	\$ 340,340	1.2
7 6th Street to W Ave D (Sul Ross)	9.9	633	1,987	76	24.2	19.7	29.0	\$ 365,047	\$ -	4473.2	4471.1	2.1	32%	1.00	60%	\$ 365,047	\$ -	\$ 730,224	2.1
8 W Ave D (Sul Ross) to W Ave E	11.63	550	332	84	4.9	5.8	8.5	\$ 112,852	\$ 96,789	4478.8	4478.0	0.8	19%	1.14	66%	\$ 63,844	\$ 178,895	\$ 619,744	3.5
9 W Ave E to Holland Ave	12.83	285	595	87	3.9	3.8	5.6	\$ 74,741	\$ 76,109	4484.7	4483.7	1.0	23%	2.79	13%	\$ 40,873	\$ 115,413	\$ 294,387	2.6
10 Holland Ave to UP RR Trestle	13.5	240	485	113	2.7	1.8	2.6	\$ 34,392	\$ 52,262	4485.3	4484.3	1.0	23%	2.76	53%	\$ 27,940	\$ 62,332	\$ 343,388	5.5
11 UP RR Trestle to Murphy Street	14.83	260	161	79	0.7	4.3	6.3	\$ 83,766	\$ 14,452	4487.8	4487.0	0.8	18%	2.57	48%	\$ 6,596	\$ 90,361	\$ 216,365	2.4
12 Murphy Street to 10th Street	15.33	280	439	63	2.8	10.9	16.1	\$ 214,952	\$ 55,168	4490.7	4489.9	2.9	30%	1.26	77%	\$ 42,284	\$ 256,136	\$ 344,415	1.3
13 10th Street to 11th Street	16	550	781	66	9.9	9.8	14.4	\$ 192,132	\$ -	4495.5	4490.1	5.4	53%	-0.54	113%	\$ 192,132	\$ -	\$ 457,600	2.6
14 11th Street to W Ave C	17.1	460	716	83	7.6	0.4	0.6	\$ 7,657	\$ 147,898	4499.7	4495.3	4.4	47%	0.83	89%	\$ 130,891	\$ 138,586	\$ 16,957	1.6
15 W Ave C to End of Study	17.76	710	284	114	4.8	4.2	6.2	\$ 81,940	\$ 93,758	4505.5	4502.1	3.4	40%	-0.53	111%	\$ 184,146	\$ 186,089	\$ 374,993	2.0
18 TOTAL					191.4	128.4	190.4	\$ 2,531,852	\$ 1,551,248	44,611.4	44,565.5	45.9	40%	-0.53	111%	\$ 721,900	\$ 6,937,336	\$ 8,882,668	2.1

CONSTRUCTION \$ 475,449
TOTAL CONSTRUCTION \$ 7,457,916

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Comparison of damages per reach for various Options compared to US Army Corps of Engineers Recon evaluation of existing FS

Reach Location	OPTIONALS Key Creek reach Section		REMAINING STRUCTURES		FLOODPLAIN		REMAINING STRUCTURES			OPTIONALS		OPTIONALS		OPTIONALS								
	reach length (feet)	reach width (feet)	reach length (feet)	reach width (feet)	structures inundated	structures inundated	structures removed	structures removed	avg west (100 yr)	avg depth	damage % reduction	depth reduction	damage \$ reduction (incremental)	damage \$ removed (incremental)	damage \$ reduction	damage \$ removed	ratio of cost to damages removed					
1 Hendrix Street Kohrmoor Lodge Area	3.66	1,838	358	157	15.1	22.2	0.3	0.5	6,283	285,796	4424.5	4426.8	-2.3	0%	6.74	0%	0%	6,283	245.7	\$ 635,807	101.0	
2 Golf Course to Second Street	4.5	1,335	325	161	10.0	14.7	6.4	9.5	126,081	194,987	4436.5	4442.0	5.5	0%	7.40	0%	0%	126,081	194,987	\$ 668,170	4.0	
3 Second Street to Brown Street	6.25	595	1,389	122	19.0	27.9	16.2	23.8	316,372	-	4457.1	4456.8	0.3	13%	1.40	48%	-	316,372	-	\$ 521,862	1.6	
4 Brown Street to West Avenue A	7.6	665	1,766	96	27.3	40.1	7.6	11.5	152,738	533,420	4464.0	4462.2	1.8	28%	2.47	59%	313,710	466,448	\$ 348,273	0.7		
5 West Avenue A to 5th Street	8.33	272	2,160	66	13.5	19.8	1.5	2.2	28,835	283,883	4467.4	4466.1	1.3	23%	1.61	65%	170,385	199,140	\$ 289,835	1.5		
6 5th Street to 6th Street	9.63	372	1,636	90	15.7	23.1	6.9	10.1	134,398	307,193	4472.2	4470.3	1.9	28%	-0.96	151%	464,986	599,394	\$ 249,970	0.4		
7 6th Street to W Ave D (Sul Ross)	9.8	633	1,794	76	26.1	38.3	19.7	28.9	385,047	-	4473.8	4471.1	2.7	36%	0.31	80%	-	385,047	-	\$ 574,359	1.5	
8 W Ave D (Sul Ross) to W Ave E	11.63	550	492	84	6.2	9.1	4.5	6.6	88,245	121,496	4479.4	4478.0	1.4	23%	0.55	84%	102,107	106,442	\$ 426,764	2.4		
9 W Ave E to Holland Ave	12.63	285	625	87	4.1	6.0	3.6	5.3	70,848	80,003	4483.3	4480.7	2.6	28%	2.20	64%	58,827	121,674	\$ 154,272	1.3		
10 Holland Ave to UP RR Trestle	13.5	240	560	113	2.8	4.1	1.7	2.5	31,754	53,921	4485.9	4484.3	1.6	28%	2.70	144%	34,757	47,011	\$ 80,618	1.3		
11 UP RR Trestle to Murphy Street	14.83	200	1,287	79	5.9	8.7	5.0	7.4	88,218	-	4493.4	4487.0	6.4	59%	3.02	146%	-	98,218	-	\$ 87,300	0.9	
12 Murphy Street to 10th Street	15.33	280	1,057	63	6.8	10.0	7.0	10.3	135,346	112,874	4493.4	4487.9	5.5	53%	1.36	113%	150,083	280,438	\$ 304,590	1.1		
13 10th Street to 11th Street	16	550	1,068	66	13.5	18.8	9.8	14.4	192,132	-	4496.7	4486.1	6.6	59%	1.09	144%	-	192,132	-	\$ 424,000	2.2	
14 11th Street to W Ave C	17.1	460	774	83	8.2	12.0	8.0	11.7	155,545	-	4499.0	4489.3	4.6	47%	0.57	89%	-	155,545	-	\$ 158,091	1.0	
15 W Ave C to End of Study	17.76	710	336	114	5.5	8.1	3.5	5.1	68,424	107,273	4505.8	4502.1	3.8	44%	-0.75	121%	129,559	197,964	\$ 326,633	1.6		
16 TOTAL					179.5	264.0	101.6	148.8	1,882,272	2,080,826	4488.8	4488.8	3.6	44%	-0.75	121%	129,559	197,964	\$ 3,408,198	\$ 6,490	\$ 3,414,688	1.5
																					\$ 356,989	
																					\$ 5,997,401	
Lump sum items \$ TOTAL CONSTRUCTION \$ 5,997,401																						

RECOMMENDATIONS/PRIORITIZATION/IMPLEMENTATION

The Section 4 discussed the “structural” solutions to the flooding problems along Alpine Creek. This Section presents a discussion of other items that may need to be addressed before one of the Options is selected for final design and construction. This Section will discuss an implementation plan and a general prioritization plan.

7.1 RIGHT-OF-WAY

Certainly no project can be constructed and maintained without proper ROW, easement, and access points along the reach. The “final” design should provide a more exact determination of the amounts of property required. As discussed in the Public Meetings, there is a mixture of public and private ownership along the Alpine Creek corridor. It will be up to the city to determine whether there will need to be either 1) a “fee simple” ROW purchase of the surface making it a public drainage way or public park corridor, or 2) a “drainage easement” dedication from the private owner to the city for general drainage maintenance. Ingress and egress maintenance access agreements may also be needed along corridors perpendicular to the channel itself. Consideration should be given to obtaining legal access to the open channel corridors themselves as well as a 10 to 15 ft wide strip outside the top bank of the open channel. This should provide adequate space to access the channel and for maintenance purposes. As the specific parcels of land are identified in the final design, there may need to be additional edge or remnant areas included (i.e., taking a small sliver off a larger piece could impact the larger piece where it may be necessary to acquire the entire larger piece at this time).

7.2 PRIORITIZATION

It is highly recommended to the City of Alpine to utilize this flood planning study to submit a request to FEMA for restudy of Alpine Creek and its tributaries. Since the FIS for the City of Alpine in 1990, several bridges have been constructed or replaced by TxDOT and the railroad trestle has been replaced. Also, newer hydrology and hydraulic models have been developed to better represent the flow of water through structures along the creek. With these changes since the FIS, it should be a high priority for the City of Alpine to update the effective FIS and Flood Insurance Rate Maps (FIRM).

One of the more critical features of any watershed planning is the prioritization of the individual projects or phases of projects. A key element to the plan is that adverse downstream impacts due to the construction of an individual upstream project must be avoided or at least minimized to the greatest degree possible. Hydrologic modeling was used to set this hydrologically based prioritization process.

Initially the focus of the flood protection planning was upon the 100-year event and reducing the floodplain width to within the existing channel banks. As discussed in previous sections,

this goal is not achievable without major structural improvements. There are basically two ways to achieve this goal. In order to create a larger channel (but keeping the top width the same as the current channel) stormwater detention must be used in the upper basin to reduce the peak flow through the city. This reduction in peak flow would then allow the modified channel to convey the 100-year event within the banks. However, if detention is not employed, then the top of the channel will need to be widened impacting existing structures along the route. These two basic scenarios and their large construction cost estimates (Option B, Option C, and Option D) were discussed at the second Public Meeting.

One of the outcomes of the second Public Meeting was to shift the protection focus from the 100-year event to something more “achievable.” The focus shifted to examining the existing conveyance capacity of the Holland Street structure. It was determined that an event just smaller than the 25-year event would begin to overtop that structure. Therefore, providing flooding protection for the 25-year event became the final focus. This yielded Option E which aims to provide additional channel capacity to safely convey the 25-year event through the city. The total length of Option E is larger than the length of Option B, hence the total project cost is larger for Option E and Option B. However, comparing both options for the same length shows that Option E is more than \$500,000 less than Option B.

When looking at the damage assessment comparisons presented in Table 6.1 and Table 6.4 for Option B and Option E, respectively, it appears that each alternative generates a similar level of damage removal. Please keep in mind all the caveats and discussion in Section 6 about the flood damage numbers. They should be used simply as “relative numbers” and should not be used as exact dollars of benefits derived from the given alternative. Therefore, if the benefits are generally equivalent, and the cost of Option E is less for the same length, then Option E appears to be the most “achievable” of the alternatives presented.

7.3 IMPLEMENTATION PLAN AND POTENTIAL PERMITTING REQUIREMENTS

As far as an “implementation plan” for Option E, the entire project does not have to be constructed all at one time. Portions of the entire Option can be built as funding allows. The cost estimate information presented in Table 6.4 can be used to examine the various “reaches” along the entire project length. A criss-cross comparison with the “benefits” presented on a reach-by-reach basis in Table 6.5 could guide the City to select specific reaches for construction. Generally the project should proceed from a downstream to upstream direction starting no further upstream than 2nd Street. It is the depth of cut at this section that allows the “pilot channel” to be created and extended along the project length.

One major item that needs to be addressed very early in the implementation of this project is the issue of “permitting” requirements from the various State and Federal Agencies. This section is included as a “worst case” scenario where all the many requirements of the law are assumed to

have to take place. It is included here as a reminder to the city that some action will need to be taken with the permitting agencies. It could be very simple, or it could get more involved depending upon what some of the initial field surveys discover. This permit process, however, cannot be ignored. The intent of this section is simply to provide the city with an awareness of what could be (but may not necessarily be) required as a part of the implementation plan.

One very critical part of the implementation of the project is the coordination of the Clean Water Act Section 404 permitting through USACE. This is a task that cannot be avoided or eliminated. Concerns typically voiced by the Agencies include but were not limited to the following:

- Respecting the “low flow channel” and including it in the design template of the channel improvements, and
- Including erosion and sediment controls during construction.

Some parts of this permit process that are clear at this point in time, while some parts cannot be estimated until the “kickoff” meeting with the Agencies takes place. For example, they will most likely want to know the magnitude and type of impacts to various habitats along the creek corridors. They will want to discuss these impacts (minimal, moderate, and major) and be reassured that their environmental concerns are being addressed. This could necessitate interpretation of aerial photography and field investigations to identify and delineate sensitive areas that may be impacted by various portions of the project addressed in this report. Therefore, following the permit “kickoff” meeting, there will most likely be a requirement to officially identify sensitive areas along the project route. The USACE has indicated that they could need to field verify (in detail) these sensitive locations. There will likely need to be an “iterative review” of the project with the Agencies and then a response to a variety of questions.

Nationwide Permit (NWP) 43 for Stormwater Management Facilities allows for discharges of dredged or fill material into non-tidal waters of the U.S., excluding non-tidal wetlands adjacent to tidal waters, for the construction and maintenance of stormwater management facilities. The criteria in this NWP include: 1) the discharge for the construction of the new stormwater management facility does not cause the loss of greater than 2 acre of non-tidal waters of the U.S., excluding non-tidal wetlands adjacent to tidal waters; 2) the discharge does not cause the loss of greater than 300 linear feet of stream bed; 3) the discharge of dredged or fill material for the construction of new stormwater management facilities in perennial streams is not authorized; and 4) a loss of greater than 1/10 acre of non-tidal waters, excluding non-tidal wetlands adjacent to tidal waters, requires notification to the USACE. This notification requires specific information such as wetland delineation of the affected areas, a maintenance plan, and a compensatory mitigation proposal that offsets the loss of the waters (wetlands). It also should address other general conditions, including specific activities in the 100-yr floodplain.

Based on the conditions stipulated in this nationwide permit, the extent of stream bed potentially impacted by this project exceeds the criteria limit of 300 ft, thus an individual permit would be required for the Section 404 permitting of this facility. The individual permit requires a public comment period, thus the authorization of this type of permit may take significantly longer to obtain, than a nationwide permit. Mitigative measures and compensation would be required.

The cultural resources evaluation for the project is a second item that could occur concurrently with the environmental permitting. This possibility must be explored before the construction phase can begin. Once the environmental and cultural resources concerns are addressed, the actual construction phases of the project can begin. The following section outlines the lengthy and various steps that may be encountered while obtaining Cultural Resource Management (CRM) clearance for the Alpine Creek Project. Since Federal funding or permitting will be required for development on city owned property. It is important to note that if the initial field studies do not uncover or discover certain artifacts, then the remainder of the "to do" list presented below will not have to be completed. The CRM process can be a very short, concise task or a long and involved task.

7.3.1 Procedures for Cultural Resources Management

Procedural steps are outlined below.

1. The City will first select a CRM consultant. The consultant will coordinate with the City to determine which regulatory agencies will be involved and begin coordination with those agencies. Because the City owns the property a Texas Antiquities Permit Application will need to be filed with the State prior to project initiation. Coordination with the Federal government will also be required.
2. Coordination with both regulatory agencies will determine the level of effort necessary to comply with agency standards. Upon determining the level of effort, and in agreement with the City, the consulting archaeologist will develop a Research Design that is appropriate for the project.
3. When the Research Design has been approved by all parties fieldwork will commence. This work may be conducted in phases, with each succeeding phase subsequent to the previous phase. The first phase will consist of a pedestrian survey and subsurface testing to identify cultural resource sites. If one or more cultural resource properties are identified a testing phase may be required. Data gathered during this second phase will be used to ascertain whether a site is worthy of State Archaeological Landmark (SAL) status and/or for listing on the National Register of Historic Places (NRHP). Should a site be determined significant a third phase, the data recovery phase, may be implemented in an effort to mitigate impacts to a SAL designated or NRHP-eligible site. During the course of the work it may become necessary to conduct archival and/or ethnographic research for encountered historic properties.

4. At each of these phases, a draft report will be written upon completion of the field effort.

5. Upon completion of the draft report and review by the City, it will be submitted to the regulating agencies for their respective reviews.

6. By law, review of the draft report can take up to 30 working days. Upon completion of the review, the regulatory agencies will either notify the City and consultant of their concurrence, or notify the City and consultant of comments that they would like addressed. In the event that one or both agencies have comments, the consultant and City will address the comments and resubmit a draft for a second review. Upon re-submittal, regulatory agencies can again take up to 30 days for document review. At that time they may either concur or make additional comments. With each resubmitted draft, the review agency may take 30 days to review and comment.

7. Upon final concurrence with the draft report, the consultant will prepare a final report and submit copies to the City and agencies, including 20 copies to the Texas Historical Commission (THC) required by law under the Antiquities Permit.

7.3.2 Coordination with State and Federal Agencies

Upon approval of the project by the City, coordination will be required between the City and its consultant archaeologist, the USACE, Albuquerque District, and the THC prior to project initiation. A letter addressing the requirements of each regulatory agency and project maps will be sent to each agency for their review. The letter will address the following questions: (1) will CRM work be required and, (2) if CRM work is necessary, what level of investigation will be necessary. The agencies may require up to 30 days to review the submitted letter and maps.

Two different results can be reached based upon the agency's review of the project. If both the USACE and the THC find that the project will have no affect on cultural resources, they will send a letter permitting the project to proceed. If either the USACE or the THC determines that the project is likely to impact cultural resources, some level of investigation of the project area will be required.

7.3.3 Development of Research Design/Determination of Level of Investigation

If field investigations are required by one or both agencies, a Research Design will be developed for that phase of work by the consultant and the City for approval by the USACE and the THC. This agency coordination will finalize the level of effort required at the project location and the techniques utilized for the required investigation.

An Antiquities Permit issued by the THC will be required because the project is located on City-owned property. Fieldwork cannot proceed until the permit has been granted. In order to apply for the permit the consultant will, in the City's behalf, submit an Antiquities Permit Application to the THC. The application will require the following information: (1) proposed date of fieldwork; (2) the desired duration of the permit (usually one year); (3) the research design; (4) the designated curation facility; (5) signatures of a City representative responsible for the project, (6) the signature of the consultant's Principal Investigator (PI) (their individual responsible for project completion); and, (7) the location of the project on USGS 7.5-minute quadrangle maps which show the boundaries of the project. Typically it takes approximately one week to get the permit, however, they can take up to 30 days to review the application.

7.3.4 Survey

Following agency coordination and approvals, fieldwork can proceed. Four possibilities exist for the extent of the survey, the USACE and/or THC may: (1) only require pedestrian survey of certain areas (defined as high probability areas for site occurrence) located within the project corridor; (2) require pedestrian survey of the entire project corridor; (3) require pedestrian survey in conjunction with judgmentally placed backhoe trenches to locate deeply buried sites; or (4) require a series of backhoe trenches covering most of the project corridor.

Once fieldwork has been conducted and completed, a draft report of the survey results will be written and submitted to the Client for review and comment. Upon acceptance of the draft report by the City it will be submitted to the USACE and the THC for their respective reviews and comment. Both review agencies have up to 30 calendar days to comment on the draft report's findings. If no sites were found during survey and the level of effort is considered appropriate by the review agencies, both agencies will issue letters stating that no cultural resources will be adversely impacted and that the project can proceed.

If archaeological sites are found, the PI will have made a recommendation in the draft report on each site's SAL status as defined in the Antiquities Code of Texas found as Title 9, Chapter 191, of the Texas Natural Resource Code. The PI will also have made recommendations for each site's NRHP eligibility status as listed under 36 CFR 60.4. of the National Historic Preservation Act. The USACE and the THC may agree or disagree with the consultant's recommendations. If cultural resource clearance is recommended because the sites were not recommended for SAL designation or were recommended as ineligible for the NRHP and both regulatory agencies concur with these findings, the project may proceed with no further archaeological considerations. If however, the PI and the USACE and/or the THC agree that some sites are potentially eligible for the NRHP or have potential to be a designated a SAL, a second phase of fieldwork may be necessary to assess their significance. This second phase, and any additional phases, would be required only if impacts to designated SALs or NRHP listed

or eligible properties could not be avoided. It is important to note that even if sites are determined to have designated SAL status or are eligible for the NRHP, it is not a fatal flaw for the project.

7.3.5 Field Time

Typically the time line for a survey on a project this size is one to two months from the time the survey is first undertaken, to the time that a draft report is submitted to the review agency. The review agencies then have 30 working days to comment. If comments require changes to the draft report, the agency will have an additional 30 days to comment.

7.3.6 Testing

Testing will be comprised of fieldwork to assess a site's SAL status and NRHP eligibility. A new Antiquities Permit with a new Research Design must be prepared specifically detailing the work to be conducted. If comments are made by either regulatory agency, they must be addressed and resubmitted for approval. Special analyses such as radiocarbon dating, soil sampling, macrobotanical analysis, DNA analysis, and other artifact specific types of analyses are sometimes required at this level of investigation.

At the end of the testing field effort, a draft report is written detailing the results of the investigations and after City approval it is submitted to the review agencies for a 30-day review period. By the end of the testing phase, the PI and review agencies must concur on the status of the site(s). If testing shows a site to be ineligible for NRHP or an SAL designation, no further consideration will be given and the review agencies will issue a statement of no adverse impacts to that cultural resource. If testing determines that a site is eligible for NRHP or SAL designation, the site will either need to be avoided or data recovery will be required.

7.3.7 Field Work

If required, the length of time to complete this task will depend on the number of sites located and determined potentially eligible, the size of the sites, and the amount of work required at each of the sites by the review agencies. Two to four weeks of field time can be expected for each tested site. Report documentation and agency approvals can be expected to take up to at least three times the length of the field effort.

7.3.8 Data Recovery

When a site is designated as a SAL or is determined to be eligible for the NRHP and avoidance is not feasible, a data recovery plan to mitigate project impacts will be developed. During this phase a new Research Design will be developed with a new Antiquities Permit. It will be submitted to the

USACE and the THC for review and comment. During the mitigation phase, a more intense level of effort is expected by the review agencies because the site will likely be destroyed. Special analyses such as radiocarbon dating, soil sampling, macrobotanical analysis, DNA analysis, and other artifact specific types of analyses are usually required at this level of investigation. The compilation of all the data recovered in the field and in the special analysis is presented in detail in a draft report describing the data recovery efforts. This draft report is again submitted to the City for comment and then the review agencies for their respective comments. Upon concurrence of the findings, the City may proceed with the proposed work. Coordination with the agencies during data recovery can sometimes yield a concurrence decision upon completion of fieldwork prior to completion of the draft report. This can speed the permitting process and allow construction to begin prior to the submission of the draft report.

7.3.9 Fieldwork

If required, the amount of fieldwork will depend on the number of sites, the size of the sites, and the amount of work necessary at each of the sites. One to three months of fieldwork can be expected per site. Report documentation and agency approvals can be expected to take up to four or more times the length of the field effort.

7.4 OTHER CONSIDERATIONS

7.4.1 Technical Reports

Each phase of work requires its own scientific draft and final reports detailing the results of various investigations. All investigations will be described in standard reporting formats and, where appropriate, will be accompanied by detailed maps and illustrations. Archaeological site locations will be shown only to the City and review agencies as per Texas regulations. All reports will first be submitted to the City prior to agency review. All reports will meet the professional standards specified by the Council of Texas Archeologists guidelines and will be modeled after the Society for American Archaeology Style Guide.

7.4.2 Curation

It is a prerequisite for all of the phases of cultural resources work that an agreement be in place with a repository for the curation of all of the field documents and artifacts generated by each of the different phases of work. After the fieldwork, all of the project documentation and artifacts must be processed and analyzed in preparation for curation at a federally approved repository. One such facility is the Texas Archeological Research Laboratory, at the University of Texas, J.J. Pickle Research Campus, located in Austin. All artifacts must be curated according to the standards of the curation facility and a storage fee will be assessed for each storage drawer.

7.4.3 Structure Analyses

The project may at some point encounter intact historic (defined as 50 or more years old) properties such as buildings or bridges. Once identified, these cultural resources will be subjected to the same review processes and phases outlined above. Data recovery however, if conducted, will likely require photographic analyses and measured drawings conducted under the Historic American Buildings Survey and the Historic American Engineering Record programs administered by the U.S. Department of the Interior. As above, all work would be permitted through the THC with the approval of the USACE. The THC's Architecture Division would also be involved.

7.4.4 Cemeteries

The possibility for locating human burials, prehistoric or historic, cannot be discounted. Numerous Federal and state laws are in place to protect such resources. Texas Preservation Guidelines are published by the THC. In the event that human burials are encountered, work should immediately cease at the location and the USACE and the THC should be notified immediately. The remains should be guarded against looters.

PUBLIC INVOLVEMENT

In order to keep the community and City agencies of Alpine involved through out the flood protection planning process, the TWDB requires that three public meetings be held. Newspaper advertisements of all the public meeting announcements can be seen in Appendix E. All three public meetings were held at the Kokernot Lodge in Alpine, Texas and provided positive constructive insight and information to the Design Team.

The first Pubic Meeting was held on March 15, 2001, and began with a discussion of generic options for flood protection measures such as structural and nonstructural methods (Table 4.1) that covered channel improvements, bridge improvements, detention, flood proofing, flood warning, and city ordinances. One possibility would be to open up the channel through the Alpine Golf Course with a flood bench to contain more of the floodwaters and possibly retain some floodwaters for habitat. Another possibility discussed is to lower the channel bottom from 2nd Street to a point south of Medina Park in south Alpine. This would increase the capacity of the channel and reduce some of the flooding on the overbanks. An issue about lowering the channel is the attainment by the City of an easement through private property. City records show that within the corporate limits of Alpine, the City owns half of the property that Alpine Creek flows through. The other half is privately owned. The use of detention in the upper watershed south of the City was also discussed to lower flows to an acceptable level that the natural channel would be able to contain. If detention is needed, there is a private landowner that the City would be able to negotiate the use of their land. Other topics of discussion focused on the implementation of a hike and bike trail for pedestrian traffic, the use of treated effluent water from the City water treatment plant to revive the creek with a base flow, and the construction of wetlands for habitat. The other discussions and goals identified in the River Networks report would be considered and any recommendations from this flood reduction study would not block achieving these other long-term goals.

The second Public Meeting was held on May 10, 2001. Before the public meeting was held in the evening, a 2:00 p.m. "channel walk" was conducted to discuss the possible options for flood protection and gather input from the community as well as identify any physical constraints in the channel downstream of City Hall. A second "channel walk" was conducted on the following day focusing upon the channel reaches upstream of City Hall. The evening meeting brought the participation of several city, state, and local agencies in the area including TxDOT, the local Soil Conservation authority, the City's Park Board, members of the City Council, and several local newspapers, developers and property owners. A number of items were listed on the agenda. The need for acquiring easements on privately owned land to construct any type of flood control measure would be a priority for the City. Pedestrian safety along the stream corridor was a concern as well as access to a future implementation of a hike and bike trail. In order to keep debris from building up in the channel and backing water up, the discussion of maintenance access will also be required in the final design of any flood protection measure.

In the second half of the meeting, the possible options for flood protection were discussed. The difference between retention and detention was discussed and the need for a State water rights permit if "retention" was selected for flood bench through golf course and Kokernot Lodge area. A side channel "detention" could be a real possibility to allow the lower flow through the City and allow higher flows to be captured temporarily and slowly drained back into the creek allowing a base flow for period after a major rainstorm. No State permit would be required for the detention alternative. Finally, the options that had been investigated were presented describing differences in each of the options and how each one performs. An estimated cost of each of the options was discussed and where possible funds could be acquired to construct any or part of the flood protection measures.

The third Public Meeting was held on August 6, 2001, to submit the draft report for the Flood Protection Planning Study to the City of Alpine and the TWDB. The Design Team presented the most attainable option of conveying the 25-year storm event safely through the City and what the possible steps would be to actually constructing the improvements. How this study can be used to make improvements in phases along Alpine Creek so funding would be easier to acquire were discussed. Possible State agencies that the City could acquire funding to construct phases of the study would be from TxDOT, Texas Water Development Board, and Texas Parks and Wildlife. It was also recommended by the Design Team to utilize this study to update the Flood Insurance Rate Maps for the City of Alpine. The meeting had a sense of how could the City of Alpine to accomplish the next step.

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- US Army Corps of Engineers (USACE). 1977. Prepared by Espey, Huston & Assoc., Inc. Alpine, Paisano (Toronto), and West Moss Creek Watershed, Hydrology - Design Memorandum No.1. March.
- . 1997. Reconnaissance Report, Pecos River and Tributaries, Alpine, Texas. February.
- . 1986. High Flood Hazard Area Study, Alpine, Texas. September.
- . 1998. River Analysis System Model, HEC-RAS. Version 2.2.
- . 1998. Hydrologic Modeling System, HEC-HMS. Version 2.03.
- US Geological Survey (USGS). 1998. Depth-Duration Frequency of Precipitation for Texas.
- . 1989. Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains.
- . 1972. 7.5 Minute Series Topographic Map. Alpine South, Texas.
- . 1972. 7.5 Minute Series Topographic Map. Alpine North, Texas.
- . 1972. 7.5 Minute Series Topographic Map. Paisano, Texas.
- . 1972. 7.5 Minute Series Topographic Map. Bird Mountain, Texas.

Appendix A
Project Photos



Location
Golf Course

Orientation
D/S

Figure
A.1

File
Photo-C2.JPG



Location
D/S of N. 2nd St.

Orientation
U/S @ N. 2nd St.

Figure
A.2

File
Photo-C4.JPG



Location
N. 2nd St.

Orientation
D/S

Figure
A.3

File
Photo-23.JPG



Location
N. 2nd St.

Orientation
U/S @ LWC

Figure
A.4

File
Photo-24.JPG



Location
D/S of Brown St.

Orientation
U/S

Figure
A.5

File
Photo-B4.JPG



Location
U/S of Brown St.

Orientation
U/S @ ROB

Figure
A.6

File
Photo-B7.JPG



Location
D/S of Ave. A

Orientation
U/S on ROB

Figure
A.7

File
Photo-B8.JPG



Location
Ave. A

Orientation
U/S @ LWC

Figure
A.8

File
Photo-B9.JPG

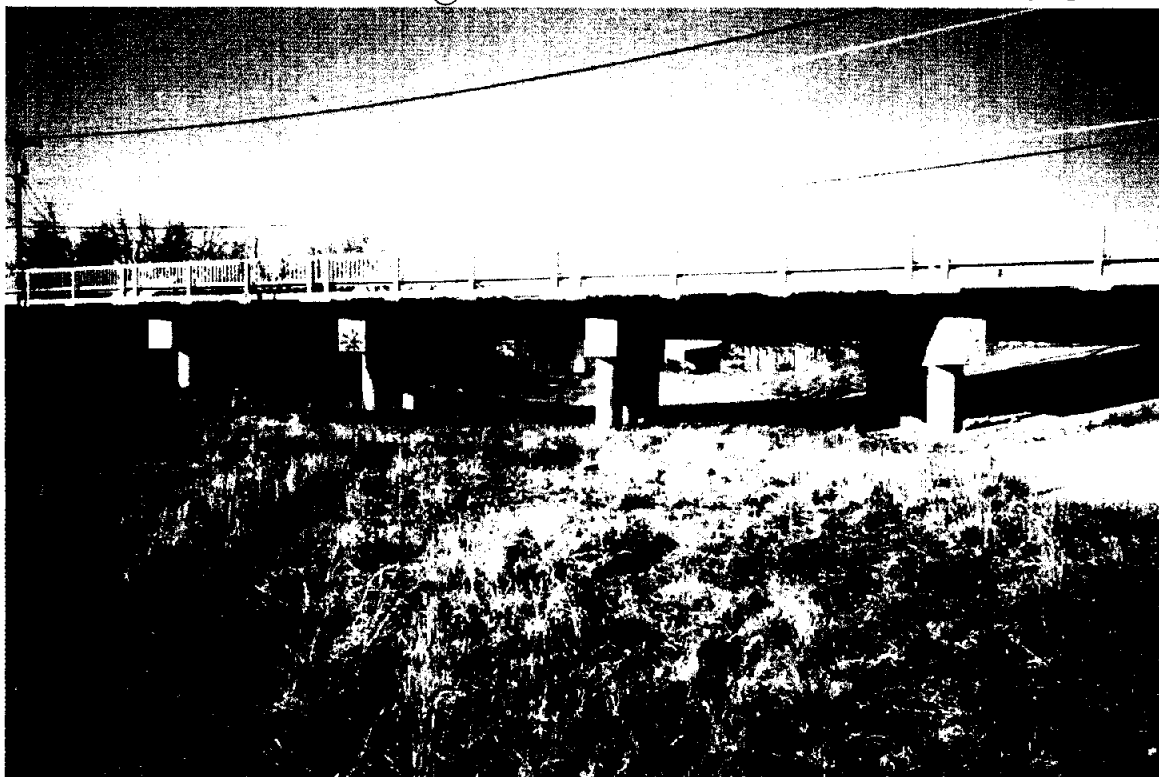


Location
Ave. A

Orientation
U/S @ 5th St.

Figure
A.9

File
Photo-22.JPG



Location
D/S of 5th St.

Orientation
U/S

Figure
A.10

File
Photo-B10.JPG



Location
U/s of 5th St.

Orientation
U/S

Figure
A.11

File
Photo-B11.JPG



Location
D/S of 6th St.

Orientation
U/S

Figure
A.12

File
Photo-B12.JPG

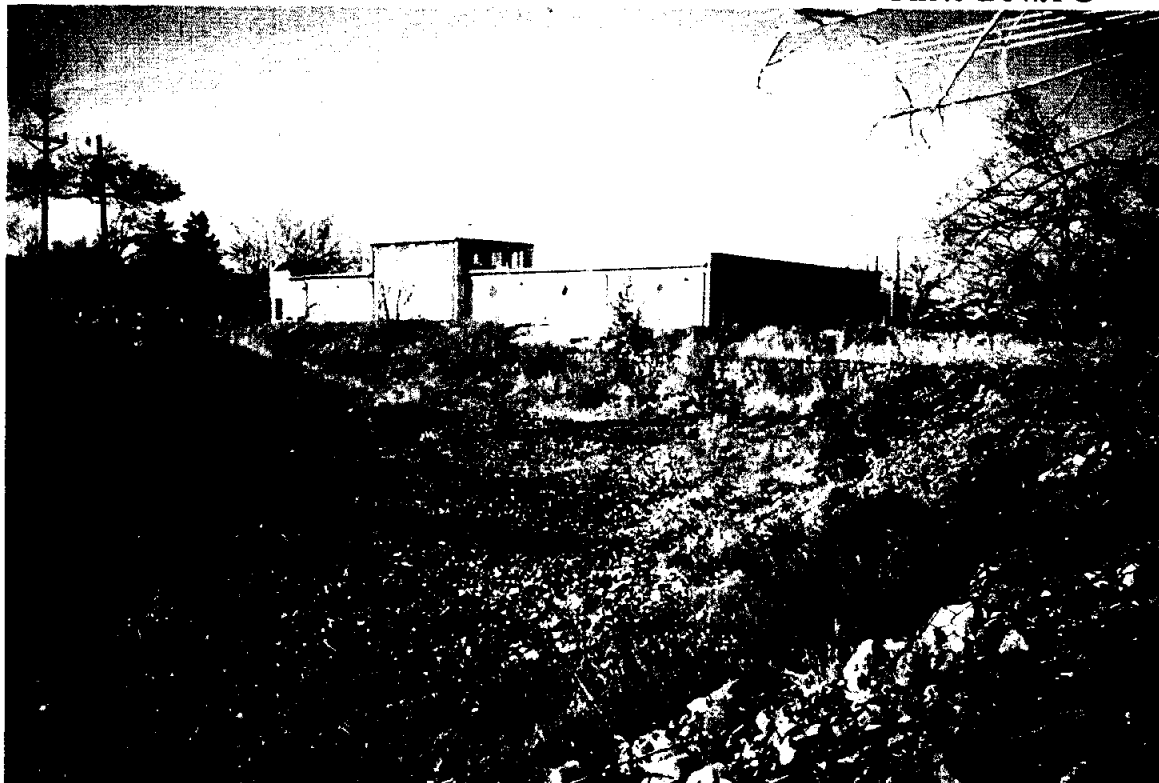


Location
U/S of 6th St.

Orientation
U/S

Figure
A.13

File
Photo-B14.JPG



Location
U/S of 6th St.

Orientation
U/S @ bend

Figure
A.14

File
Photo-B15.JPG



Location
D/S of Sul Ross Ave.

Orientation
U/S

Figure
A.15

File
Photo-B18.JPG



Location
U/S of Sul Ross Ave.

Orientation
U/S

Figure
A.16

File
Photo-B20.JPG



Location
D/S of 8th St.

Orientation
U/S @ 8th St.

Figure
A.17

File
Photo-B21.JPG



Location
D/S of 8th St.

Orientation
U/S @ 8th St.

Figure
A.18

File
Photo-B22.JPG



Location
8th St.

Orientation
D/S

Figure
A.19

File
Photo-B23.JPG



Location
Ave. E

Orientation
D/S

Figure
A.20

File
Photo-21.JPG



Location
U/S of Ave. E

Orientation
D/S @ Ave. E

Figure
A.21

File
Photo-20.JPG

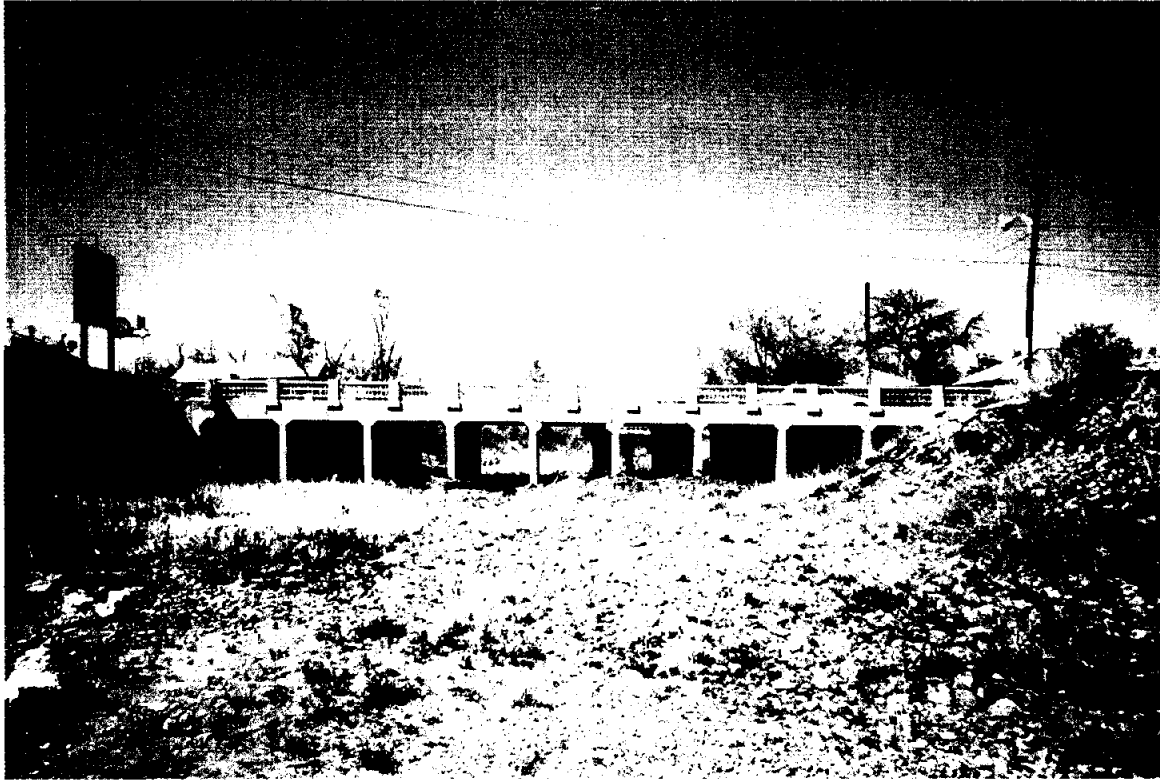


Location
Holland Ave.

Orientation
D/S @ ROB

Figure
A.22

File
Photo-18.JPG



Location
U/S of Holland Ave.

Orientation
D/S

Figure
A.23

File
Photo-17.JPG



Location
D/S of U.P. Railroad

Orientation
U/S

Figure
A.24

File
Photo-1.JPG



Location
Murphy Ave.

Orientation
D/S

Figure
A.25

File
Photo-C1.JPG



Location
U/S of Murphy Ave.

Orientation
U/S @ S. 10th St.

Figure
A.26

File
Photo-6.JPG



Location
S. 10th St.

Orientation
U/S @ S. 11th St.

Figure
A.27

File
Photo-9.JPG



Location
D/S of S. 11th St.

Orientation
U/S @ ROB

Figure
A.28

File
Photo-B12.JPG



Location
U/S of 11th St.

Orientation
U/S @ Ave. G

Figure
A.29

File
Photo-12.JPG



Location
Ave. G

Orientation
D/S

Figure
A.30

File
Photo-13.JPG



Location
Ave. G

Orientation
U/S

Figure
A.31

File
Photo-14.JPG

Appendix B
Hydraulic Model Input

HBC-RAS September 1998 Version 2.2
 U.S. Army Corp of Engineers
 Hydrologic Engineering Center
 609 Second Street, Suite D
 Davis, California 95616-4687
 (916) 756-1104

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X X X XXXXX XXXX XXXX XX XXXX
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PROJECT DATA

Project Title: Alpine Creek -- Preliminary Design
 Project File : alprk.prj
 Run Date and Time: 7/25/01 5:00:45 PM
 Project in English units
 Project Description:
 Alpine Creek, Texas Preliminary Design. Study done under a grant from the
 Texas Water Development Board.

.....

PLAN DATA

Plan Title: Revised FIS
 Plan File : d:\Projects\Alpine\ras\model\alprk.p01
 Geometry Title: Revised FIS geometry
 Geometry File : d:\Projects\Alpine\ras\model\alprk.g01
 Flow Title : Effective FIS flows
 Flow File : d:\Projects\Alpine\ras\model\alprk.f01

Plan Description:
 Effective FIS model including updated channel survey and new bridges data.

Plan Summary Information:
 Number of: Cross Sections = 86 Multiple Openings = 0
 Culverts = 1 Inline Weirs = 0
 Bridges = 8

Computational Information
 Water surface calculation tolerance = 0.01
 Critical depth calculation tolerance = 0.01
 Maximum number of iterations = 40
 Maximum difference tolerance = 0.3
 Flow tolerance factor = 0.001

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

FLOW DATA

Flow Title: Effective FIS flows
 Flow File : d:\Projects\Alpine\rap\model\alpcrk.f01

Flow Data (cfs)

River	Reach	RS	2yr	5yr	10yr	25yr	50yr	100yr	500yr
* Alpine Creek	Alpine	19	419	1699	3811	6145	8007	10240	17447
* Alpine Creek	Alpine	15	427	1691	3681	5806	7570	10719	16930
* Alpine Creek	Alpine	14	427	1691	3678	5796	7558	10704	16916
* Alpine Creek	Alpine	13	427	1691	3675	5790	7550	10695	16906
* Alpine Creek	Alpine	12	427	1691	3670	5777	7534	10675	16887
* Alpine Creek	Alpine	11	428	1690	3666	5765	7517	10656	16867
* Alpine Creek	Alpine	9	428	1690	3655	5736	7481	10612	16824
* Alpine Creek	Alpine	5	430	1688	3624	5657	7379	10490	16793
* Alpine Creek	Alpine	4	445	1687	3895	5635	7910	11340	18295
* Alpine Creek	Alpine	1	448	1720	3881	6035	7845	11182	18005

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
* Alpine Creek	Alpine	2yr	Normal S = .00969	Normal S = .010433
* Alpine Creek	Alpine	5yr	Normal S = .00969	Normal S = .010433
* Alpine Creek	Alpine	10yr	Normal S = .00969	Normal S = .010433
* Alpine Creek	Alpine	25yr	Normal S = .00969	Normal S = .010433
* Alpine Creek	Alpine	50yr	Normal S = .00969	Normal S = .010433
* Alpine Creek	Alpine	100yr	Normal S = .00969	Normal S = .010433
* Alpine Creek	Alpine	500yr	Normal S = .00969	Normal S = .010433

Observed Water Surface Marks

River	Reach	RS	2yr	5yr	10yr	25yr	50yr	100yr	500yr
* Alpine Creek	Alpine	19						4527	
* Alpine Creek	Alpine	18						4506	
* Alpine Creek	Alpine	17						4498.3	
* Alpine Creek	Alpine	15						4490.8	
* Alpine Creek	Alpine	14						4490.3	
* Alpine Creek	Alpine	13						4488.1	
* Alpine Creek	Alpine	12.5						4485.4	
* Alpine Creek	Alpine	12						4482.5	
* Alpine Creek	Alpine	11.5						4477.8	
* Alpine Creek	Alpine	11						4476.5	
* Alpine Creek	Alpine	10						4473.2	
* Alpine Creek	Alpine	9						4469	
* Alpine Creek	Alpine	8						4466.5	
* Alpine Creek	Alpine	7						4460.3	
* Alpine Creek	Alpine	6						4454.4	
* Alpine Creek	Alpine	5						4446.5	
* Alpine Creek	Alpine	4						4435.2	
* Alpine Creek	Alpine	3						4422	
* Alpine Creek	Alpine	2						4416	

GEOMETRY DATA

Geometry Title: Revised FIS geometry
 Geometry File : d:\Projects\Alpine\rap\model\alpcrk.g01

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 19

INPUT

Description: XS U
 Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4536.8	591	4532.9	600	4532.7	642	4530.8	655	4517.4
673	4518.9	689	4519.3	694	4520.7	700	4520.3	707	4523.5
800	4522.8	900	4522.9	1000	4523.2	1100	4524.4	1200	4525.5
1300	4527.2	1400	4527.6	1500	4532.2	1580	4537.5		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.085	642	.055	707	.085

Bank Sta: Left 642 Right 707 Lengths: Left Channel 486 Right Channel 403.99
 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 1

Sta L	Sta R	Elev
707	1580	4523.5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18.8*

INPUT

Description:
 Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4532.68	84.2	4532.02	252.6	4530.95	355.32	4530.11	421	4529.6
505.2	4528.84	589.4	4528.05	616.34	4527.8	620.09	4527.76	629.53	4527.55
673.6	4525.78	686.2	4519.29	694.84	4513.93	697	4512.74	703.57	4513.35
712.6	4514.12	716.04	4514.45	725.73	4514.94	732.96	4515.44	738.25	4516.83
744.6	4516.83	752	4519.76	818.19	4519.93	838.71	4519.92	847.76	4519.99
931.96	4520.17	986.6	4520.39	1005.49	4520.39	1025.2	4520.45	1118.44	4521.45
1129.43	4521.56	1211.68	4522.43	1270.26	4523.35	1304.92	4523.9	1398.16	4524.34
1411.09	4524.87	1491.41	4528.29	1543.47	4531.42	1566	4533.14		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.085	673.6	.045	752	.085

Bank Sta: Left 673.6 Right 752 Lengths: Left Channel 486 Right Channel 403.99
 Coeff Contr. .1 Expan. .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18.6*

INPUT

Description:
 Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4528.56	88.15	4527.76	264.45	4526.69	371.99	4525.66	440.75	4525.05
528.9	4524.05	617.05	4523.02	645.26	4522.67	649.18	4522.62	659.07	4522.39
705.2	4520.76	723.4	4514.99	735.88	4509.22	739	4508.08	745.93	4508.79
755.45	4509.62	759.08	4510	769.3	4510.76	776.92	4511.59	782.5	4512.96
789.19	4513.36	797	4516.02	858.39	4516.9	877.43	4517.05	885.82	4517.17
963.91	4517.44	1016.45	4517.69	1032.12	4517.64	1050.4	4517.7	1136.88	4518.51
1147.07	4518.6	1223.36	4519.37	1277.69	4520.14	1309.85	4520.61	1396.33	4521.09
1408.31	4521.5	1482.81	4524.39	1531.1	4526.94	1552	4528.78		

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .085 705.2 .045 797 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 705.2 797 403.99 486 403.99 .1 .3
 REACH: Alpine

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18.4*
 INPUT
 Description: Station Elevation Data num= 39
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4524.44 92.1 4523.51 276.3 4522.42 388.66 4521.21 460.5 4520.5
 552.6 4519.27 644.7 4517.98 674.17 4517.55 678.27 4517.48 688.6 4517.24
 736.8 4515.74 760.6 4510.69 776.92 4504.51 781 4503.42 788.28 4504.23
 798.3 4505.11 802.12 4505.55 812.87 4506.57 820.88 4507.73 826.75 4509.09
 833.79 4509.88 842 4512.28 898.6 4513.87 916.14 4514.17 923.88 4514.34
 995.87 4514.7 1044.3 4514.99 1058.75 4514.89 1075.59 4514.95 1155.32 4515.56
 1164.71 4515.63 1235.04 4516.3 1285.13 4516.93 1314.77 4517.31 1394.49 4517.83
 1405.54 4518.14 1474.22 4520.48 1518.73 4522.46 1538 4524.42

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .085 736.8 .045 842 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 736.8 842 403.99 486 403.99 .1 .3
 REACH: Alpine

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18.2*
 INPUT
 Description: Station Elevation Data num= 39
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4520.32 96.05 4519.25 288.15 4518.16 405.33 4516.75 480.25 4515.95
 576.3 4514.48 672.35 4512.94 703.09 4512.42 707.36 4512.34 718.13 4512.08
 768.4 4510.72 797.8 4506.4 817.96 4499.81 823 4498.76 830.64 4499.66
 841.15 4500.61 845.15 4501.1 856.43 4502.39 864.85 4503.87 871 4505.22
 878.38 4506.41 887 4508.54 938.8 4510.83 954.86 4511.3 961.94 4511.52
 1027.83 4511.97 1072.15 4512.3 1085.37 4512.15 1100.79 4512.2 1173.76 4512.62
 1182.36 4512.67 1246.73 4513.23 1292.56 4513.71 1319.69 4514.02 1392.66 4514.57
 1402.77 4514.77 1465.63 4516.58 1506.37 4517.98 1524 4520.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .085 768.4 .045 887 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 768.4 887 403.99 486 403.99 .1 .3
 REACH: Alpine

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18
 INPUT
 Description: XS T Station Elevation Data num= 25
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 4516.2 100 4515 300 4513.9 422 4512.3 500 4511

600	4509.7	700	4507.9	732	4507.3	800	4505.7	835	4502.1
859	4495.1	865	4494.1	873	4495.1	884	4496.1	900	4498.2
932	4504.8	979	4507.8	1000	4508.7	1100	4509.6	1112	4509.4
1200	4509.7	1300	4510.5	1400	4511.4	1494	4513.5	1510	4515.7

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 800 .045 932 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 800 932 130.74 140 130.74 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.8842'

INPUT
 Description:
 Station Elevation Data

num= 46	Sta	Elev	num= 46	Sta	Elev	num= 46	Sta	Elev	num= 46	Sta	Elev
0	4514.3	55.14	4513.66	92.91	4513.25	136.67	4513.04	278.74	4512.3	287.74	4512.19
	392.09	4510.76	464.56	4509.88	479.54	4509.62	557.48	4508.26	650.39	4506.56	680.12
	4505.99	719.33	4505.07	731.32	4504.75	743.31	4504.32	754.43	4502.49	775.25	4500.38
	797.16	4494.16	802.64	4493.27	810.26	4494.17	820.75	4495.07	836.44	4496.96	836.18
	4497.8	4506.3	926.91	4506.67	940.72	4507.16	948.25	4507.6	1049.85	4507.98	1062.94
	4507.82	1070.26	4507.86	1131.26	4508.05	1158.98	4508.16	1192.26	4508.41	1211.78	4508.53
	1253.27	4508.84	1268.1	4508.95	1314.27	4509.32	1375.27	4509.81	1377.23	4509.83	1436.27
	4510.98	1454.58	4511.36	1479.81	4511.87	1497.27	4513.85				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 743.31 .045 866.51 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 743.31 866.51 130.74 140 130.74 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.7685'

INPUT
 Description:
 Station Elevation Data

num= 46	Sta	Elev	num= 46	Sta	Elev	num= 46	Sta	Elev	num= 46	Sta	Elev
0	4512.4	50.94	4511.83	85.83	4511.49	126.24	4511.33	257.48	4510.7	265.79	4510.61
	362.19	4509.22	429.13	4508.36	442.97	4508.11	514.96	4506.83	600.78	4505.22	628.24
	4504.69	664.47	4503.83	675.54	4503.5	686.61	4502.95	696.67	4500.52	715.81	4498.66
	735.32	4493.22	740.27	4492.43	747.53	4493.24	757.5	4494.05	772.01	4495.72	772.17
	4495.75	801.02	4502.14	823.5	4503.1	856.6	4504.81	866.47	4505.18	881.44	4505.62
	889.6	4505.67	955.71	4505.94	999.69	4506.35	1013.88	4506.25	1021.82	4506.29	1087.92
	4506.49	1117.95	4506.62	1154.02	4506.88	1175.17	4506.96	1220.13	4507.29	1236.21	4507.29
	4507.4	1286.24	4507.76	1352.34	4508.24	1354.46	4508.26	1418.44	4509.35	1438.28	4509.75
	1465.62	4510.24	1484.54	4512							

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 686.61 .045 801.02 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 686.61 801.02 130.74 140 130.74 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.6528*

INPUT

Description:
 Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev					
0	4510.51	46	73	4510.01	78	74	4509.74	115	82	4509.62	236	22	4509.11	
243	84	4509.02	332	28	4507.69	393	7	4506.84	406	39	4506.6	472	44	4505.39
551	17	4503.88	576	37	4503.38	609	6	4502.59	619	76	4502.25	629	92	4501.57
638	91	4498.56	655	76	4496.94	673	48	4492.28	677	91	4491.6	684	79	4492.3
694	25	4493.02	708	01	4494.49	708	17	4494.51	735	54	4500.81	759	75	4501.64
795	41	4503.31	806	03	4503.69	822	16	4504.07	830	95	4504.12	902	17	4504.28
949	54	4504.73	964	83	4504.67	973	37	4504.73	1044	58	4504.93	1076	93	4505.07
1115	78	4505.35	1138	57	4505.4	1187	4505.74	1204	31	4505.85	1258	2	4506.2	
1329	41	4506.67	1331	69	4506.68	1400	61	4507.71	1421	98	4508.13	1451	43	4508.61
1471	82	4510.14												

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.085	629.92	.045	735.54	.085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 629.92 735.54 130.74 140 130.74 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.5371*

INPUT

Description:
 Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev					
0	4508.61	42	53	4508.18	71	65	4507.98	105	39	4507.92	214	96	4507.51	
221	9	4507.44	302	38	4506.15	358	26	4505.32	369	82	4505.1	429	92	4503.96
501	57	4502.54	524	49	4502.08	554	74	4501.35	563	98	4501	573	22	4500.2
581	16	4496.6	596	01	4495.22	611	64	4491.34	615	54	4490.76	622	05	4491.37
631		4492	644	02	4493.25	644	16	4493.27	670	05	4499.48	695	99	4500.18
734	21	4501.82	745	6	4502.21	762	88	4502.53	772	3	4502.58	848	62	4502.61
899	39	4503.1	915	77	4503.1	924	93	4503.16	1001	23	4503.36	1035	9	4503.53
1077	54	4503.81	1101	96	4503.84	1153	86	4504.19	1172	41	4504.3	1230	17	4504.64
1306	47	4505.1	1308	92	4505.11	1382	78	4506.08	1405	68	4506.51	1437	25	4506.98
1459	09	4508.29												

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.085	573.22	.045	670.05	.085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 573.22 670.05 130.74 140 130.74 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.4214

INPUT

Description: S. Ave G
 Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev					
0	4506.71	38	32	4506.35	64	57	4506.23	94	97	4506.21	193	7	4505.91	
199	95	4505.86	272	47	4504.61	322	83	4503.8	333	24	4503.59	387	4	4502.52
451	96	4501.2	472	62	4500.77	499	87	4500.11	508	2	4499.75	516	53	4498.82
523	4	4494.64	536	27	4493.5	549	8	4490.4	553	18	4489.93	559	32	4490.44
567		4490.97	580	02	4492.01	580	16	4492.03	604	56	4498.15	632	24	4498

673.01 4500.32 685.16 4500.72 703.6 4500.99 713.65 4501.03 795.07 4500.95
 849.24 4501.48 866.71 4501.52 876.48 4501.6 957.89 4501.8 994.88 4501.99
 1039.3 4502.28 1065.35 4502.28 1120.72 4502.64 1140.52 4502.75 1202.13 4503.08
 1283.54 4503.53 1286.16 4503.54 1364.95 4504.45 1389.38 4504.89 1423.06 4505.35
 1461.86 4507

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 516.53 .045 604.56 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 516.53 604.56 60 60 60 .3 .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 17.3

INPUT
 Description: W. Ave G (new)
 Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 500 4499 4497.5 618 4498 4496.5

Upstream Bridge Cross Section Data num= 46

Station Elevation Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4506.71	38.32	4506.35	64.57	4506.23	94.97	4506.21	193.7	4505.91
199.95	4505.86	272.47	4504.61	322.83	4503.8	333.24	4503.59	387.4	4502.52
451.96	4501.2	472.62	4500.77	499.87	4500.11	508.2	4499.75	516.53	4498.82
523.4	4494.64	536.27	4493.5	539.8	4490.4	553.18	4489.93	559.32	4490.44
567.75	4490.97	580.02	4492.01	580.16	4492.03	604.56	4498.15	632.24	4498.72
673.01	4500.32	685.16	4500.72	703.6	4500.99	713.65	4501.03	795.07	4500.95
849.24	4501.48	866.71	4501.52	876.48	4501.6	957.89	4501.8	994.88	4501.99
1039.3	4502.28	1065.35	4502.28	1120.72	4502.64	1140.52	4502.75	1202.13	4503.08
1283.54	4503.53	1286.16	4503.54	1364.95	4504.45	1389.38	4504.89	1423.06	4505.35
1461.86	4507								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 516.53 .045 604.56 .085

Bank Sta: Left Right Coeff Contr. Expan.
 516.53 604.56 .3 .5

Downstream Deck/Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 500 4499 4497.5 618 4498 4496.5

Downstream Bridge Cross Section Data num= 46

Station Elevation Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4506.71	38.32	4506.35	64.57	4506.23	94.97	4506.21	193.7	4505.91
199.95	4505.86	272.47	4504.61	322.83	4503.8	333.24	4503.59	387.4	4502.52
451.96	4501.2	472.62	4500.77	499.87	4500.11	508.2	4499.75	516.53	4498.82
523.4	4494.64	536.27	4493.5	539.8	4490.4	553.18	4489.93	559.32	4490.44
567.75	4490.97	580.02	4492.01	580.16	4492.03	604.56	4498.15	632.24	4498.72

673.01 4500.32 685.16 4500.72 703.6 4500.99 713.65 4501.03 795.07 4500.95
 849.24 4501.48 866.71 4501.52 876.48 4501.6 957.89 4501.8 994.88 4501.99
 1039.3 4502.28 1065.35 4502.28 1120.72 4502.64 1140.52 4502.75 1202.13 4503.08
 1283.54 4503.53 1286.16 4503.54 1364.95 4504.45 1389.38 4504.89 1423.06 4505.35
 1461.86 4506.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .11 516.53 .04 604.56 .11

Bank Sta: Left Right Coeff Contr. Expan.
 516.53 604.56 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow
 Submerged Inlet Cd = .8
 Submerged Inlet + Outlet Cd =
 Max Low Cord =

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.2

INPUT

Description: Additional XS for bridge interpolated from sta. 18 and 17.2

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4506.71	38.32	4506.35	64.57	4506.23	94.97	4506.21	193.7	4505.91
199.95	4505.86	272.47	4504.61	322.83	4503.8	333.24	4503.59	387.4	4502.52
451.96	4501.2	472.62	4500.77	499.87	4500.11	508.2	4499.75	516.53	4498.82
523.4	4494.64	536.27	4493.5	549.8	4490.4	553.18	4489.93	559.32	4490.44
567.75	4490.97	580.02	4492.01	580.16	4492.03	604.56	4498.15	632.24	4498.72
673.01	4500.32	685.16	4500.72	703.6	4500.99	713.65	4501.03	795.07	4500.95
849.24	4501.48	866.71	4501.52	876.48	4501.6	957.89	4501.8	994.88	4501.99
1039.3	4502.28	1065.35	4502.28	1120.72	4502.64	1140.52	4502.75	1202.13	4503.08
1283.54	4503.53	1286.16	4503.54	1364.95	4504.45	1389.38	4504.89	1423.06	4505.35
1461.86	4506.8								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .11 516.53 .04 604.56 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 516.53 604.56 104.07 112.5 104.07 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.15*

INPUT

Description:
 Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4504.98	34.4	4504.69	34.96	4504.63	57.96	4504.63	85.25	4504.66
86.65	4504.65	173.87	4504.46	179.48	4504.42	182.42	4504.38	244.57	4503.23
283.78	4502.43	299.12	4502.24	304.03	4502.14	347.74	4501.24	405.69	4500.01
424.23	4499.61	448.69	4499.01	456.05	4498.72	456.17	4498.71	463.65	4497.92
468.61	4494.87	470.53	4493.95	483.43	4492.12	487.73	4491.06	497	4488.85
500.39	4488.28	505.93	4488.79	513.53	4489.36	519.25	4489.9	524.61	4490.63
524.73	4490.66	546.75	4496.73	569.82	4497.3	575.95	4497.44	618.96	4499
626.04	4499.23	631.78	4499.37	651.23	4499.59	656.32	4499.61	661.83	4499.61
742.81	4499.44	747.72	4499.45	804.87	4500.01	823.3	4500.1	829.31	4500.15
833.6	4500.18	913.8	4500.37	919.48	4500.38	958.5	4500.59	1002.3	4500.87
1005.36	4500.88	1029.97	4500.86	1032.84	4500.86	1088.79	4501.22	1091.25	4501.23
1112.14	4501.34	1175.29	4501.65	1177.13	4501.66	1261.78	4502.09	1263.01	4502.1
1265.77	4502.11	1348.24	4502.96	1348.89	4502.97	1374.22	4503.41	1374.66	4503.42
1410.19	4503.87	1434.77	4504.75						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.112	463.65	.04	546.75	.117	1434.77	.117

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 463.65 546.75 104.07 112.5 104.07 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.1*

INPUT

Description:
 Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4503.25	30.47	4503.03	30.98	4503.02	51.35	4503.03	75.52	4503.1
76.77	4503.1	154.04	4503	159.01	4502.98	161.61	4502.95	216.68	4501.84
256.73	4501.07	265.01	4500.89	269.35	4500.79	308.08	4499.95	359.42	4498.81
375.85	4498.45	397.52	4497.92	404.03	4497.68	404.14	4497.67	410.77	4497.01
415.74	4494.13	417.67	4493.26	430.6	4490.74	434.9	4489.6	444.19	4487.31
447.59	4486.62	452.53	4487.13	459.32	4487.75	464.42	4488.28	469.19	4489.25
469.31	4489.28	488.95	4495.3	513.21	4496	519.66	4496.16	564.91	4497.69
572.36	4497.92	577.4	4498.02	598.86	4498.19	604.21	4498.2	610.01	4498.2
695.21	4497.93	700.47	4497.95	760.49	4498.55	779.88	4498.68	786.2	4498.73
790.72	4498.75	877.2	4498.95	881.07	4498.96	922.12	4499.19	968.2	4499.48
971.42	4499.48	997.32	4499.44	1000.33	4499.45	1059.19	4499.81	1061.78	4499.83
1083.76	4499.93	1150.19	4500.24	1152.13	4500.24	1241.19	4500.66	1242.48	4500.67
1245.39	4500.69	1332.18	4501.47	1332.83	4501.48	1359.48	4501.94	1359.94	4501.95
1397.32	4502.38	1423.18	4503.07						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.115	410.77	.04	488.95	.125	1423.18	.125

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 410.77 488.95 104.07 112.5 104.07 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.05*

INPUT

Description:
 Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev		
0	4501.53	26	99	4501.36	44	74	4501.43	65	8	4501.55	
66	88	4501.55	134	21	4501.55	138	54	4501.54	140	81	4501.53
223	68	4499.7	230	89	4499.53	234	68	4499.45	268	41	4498.67
327	46	4497.29	346	34	4496.82	352	02	4496.64	352	11	4496.63
362	87	4493.3	364	8	4492.57	377	76	4489.36	382	08	4488.14
394	79	4484.96	399	14	4485.48	405	1	4486.14	409	58	4486.67
413	88	4487.91	431	14	4493.88	456	61	4494.7	463	38	4494.89
518	68	4496.61	525	01	4496.67	546	49	4496.79	552	11	4496.8
647	6	4496.41	653	03	4496.46	716	12	4497.08	736	47	4497.25
747	85	4497.33	838	6	4497.52	842	66	4497.54	885	75	4497.79
937	48	4498.09	964	66	4498.02	967	82	4498.03	1029	6	4498.41
1055	38	4498.52	1125	1	4498.82	1127	13	4498.83	1220	59	4499.23
1225	4499.26	1316	09	4499.99	1316	77	4500	1344	74	4500.47	
1384	45	4500.9	1411	59	4501.39						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.117	357.88	.04	431.14	.132	1411.59	.132

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 357.88 431.14 104.07 112.5 104.07 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17

INPUT
 Description: XS S -- S. 11th St.
 Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	4499.8	23	4499.7	57	4500	120	4500.1	200	4498.1	
300	4495.6	305	4495.2	310	4492.46	329	25	4486.68	342	4483.31
354	75	4485.06	373	33	4492.46	400	4493.4	465	4495.3	
600	4494.9	700	4494.9	800	4496.1	900	4496.7	932	4496.6	
1000	4497	1100	4497.4	1200	4497.8	1300	4498.5	1330	4499	
1401.8	4500.54									

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	305	.04	373.33	.14

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 305 373.33 60 60 .3 .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 16.7

INPUT
 Description: S. 11th St. Bridge (new)
 Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates
 num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
305	4496.5	4495	373.8	4493.9	4492.4

Upstream Bridge Cross Section Data
 Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.8	23	4499.7	57	4500	120	4500.1	200	4498.1
300	4495.6	305	4495.2	310	4492.46	329.25	4486.68	342	4483.31
354.75	4485.06	373.33	4492.46	400	4493.4	465	4495.3	500	4495.4
600	4494.9	700	4495.9	800	4496.1	900	4496.7	932	4496.6
1000	4497	1100	4497.4	1200	4497.8	1300	4498.5	1330	4499
1401.8	4500.54								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .12 305 .04 373.33 .14

Bank Sta: Left Right Coeff Contr. Expan.
 305 373.33 .3 .5

Downstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 305 4496.5 4495 373.8 4493.9 4492.4

Downstream Bridge Cross Section Data num= 26
 Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.8	23	4499.7	57	4500	120	4500.1	200	4498.1
300	4495.6	305	4495.2	310	4492.46	329.25	4486.68	342	4483.31
354.75	4485.06	373.33	4492.46	400	4493.4	465	4495.3	500	4495.4
600	4494.9	700	4495.9	800	4496.1	900	4496.7	932	4496.6
1000	4497	1100	4497.4	1200	4497.8	1300	4498.5	1330	4499
1400	4500.48								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .12 305 .04 373.33 .14

Bank Sta: Left Right Coeff Contr. Expan.
 305 373.33 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy Methods - Highest Energy Answer

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .5
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 16.5

INPUT

Description: Additional XS for bridge copied from sta. 17

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.8	23	4499.7	57	4500.1	120	4500.1	200	4498.1
300	4495.6	305	4495.2	310	4492.46	329	25 4486.68	342	4483.31
354.75	4485.06	373.33	4492.46	400	4493.4	465	4495.3	500	4495.4
600	4494.9	700	4495.9	800	4496.1	900	4496.7	932	4496.6
1000	4497	1100	4497.4	1200	4497.8	1300	4498.5	1330	4499
1400	4500.48								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	305	.04	373.33	.14

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left Channel	Right	Coeff Contr.	Expan.
305	373.33	129.04	150 129.04	.3	.5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 16.25*

INPUT

Description:

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.47	24.81	4499.38	25.22	4499.38	56.5	4499.6	61.5	4499.61
62.5	4499.62	112.99	4499.49	129.46	4499.48	131.59	4499.47	169.49	4498.62
215.77	4497.59	219.31	4497.51	225.98	4497.36	282.47	4496.02	323.66	4494.84
328.97	4494.64	329.06	4494.64	334.45	4494.09	338.72	4491.7	339.35	4491.4
349.38	4488.46	358.21	4485.97	370.7	4482.78	383.32	4484.93	391.37	4487.9
401.7	4491.67	428.82	4492.52	465.17	4493.5	475.83	4493.73	494.9	4494.23
530.48	4494.47	538.86	4494.48	558.09	4494.42	572.8	4494.39	632.15	4494.17
651.01	4494.31	669.76	4494.44	720.7	4494.9	733.82	4495.03	766.73	4495.14
808.98	4495.24	835.49	4495.31	863.7	4495.46	937.16	4495.91	960.67	4495.9
969.69	4495.88	991.69	4495.98	1038.83	4496.26	1045.93	4496.29	1057.64	4496.34
1140.49	4496.66	1154.6	4496.71	1208.55	4496.92	1242.16	4497.1	1251.57	4497.17
1343.83	4497.91	1348.53	4497.99	1374.33	4498.42	1377.62	4498.45	1445.5	4499.18

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	334.45	.04	401.7	.14

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left Channel	Right	Coeff Contr.	Expan.
334.45	401.7	129.04	150 129.04	.3	.5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 16.*

INPUT

Description:

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.14	27	4499.05	27.44	4499.05	61.47	4499.25	66.91	4499.24
68.01	4499.23	122.94	4498.9	140.86	4498.86	143.17	4498.84	184.41	4498.01
234.77	4497	238.62	4496.92	245.88	4496.77	307.34	4495.38	352.16	4493.96
357.93	4493.69	358.03	4493.68	363.9	4492.98	368.09	4490.6	368.7	4490.3
376	4487.54	387.17	4485.26	399.4	4482.25	411.88	4484.81	419.85	4487

430.07	4490.88	457.63	4491.64	494.58	4492.55	505.42	4492.72	524.8	4493.17
560.97	4493.55	569.48	4493.6	589.03	4493.58	603.97	4493.58	664.3	4493.45
683.47	4493.54	702.53	4493.61	754.31	4494.04	767.64	4494.15	801.09	4494.32
844.03	4494.44	870.98	4494.52	899.66	4494.66	974.32	4495.12	998.21	4495.16
1007.38	4495.15	1029.74	4495.22	1077.65	4495.52	1084.87	4495.55	1096.77	4495.6
1180.99	4495.92	1195.33	4495.97	1250.16	4496.18	1284.33	4496.41	1293.89	4496.48
1387.66	4497.33	1392.44	4497.39	1418.66	4497.83	1422.01	4497.88	1491	4498.66

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .12 363.9 .04 430.07 .14

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 363.9 430.07 129.04 150 129.04 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 15.75*

INPUT

Description:
 Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4498.81	29.18	4498.73	29.66	4498.73	66.45	4498.89	72.33	4498.86
73.51	4498.85	132.89	4498.32	152.26	4498.24	154.76	4498.21	199.34	4497.39
233.77	4496.4	257.93	4496.33	265.78	4496.19	332.22	4494.73	380.66	4493.07
386.9	4492.73	387.01	4492.73	393.35	4491.87	397.45	4489.5	398.05	4489.29
407.67	4486.61	416.13	4484.54	428.11	4481.73	440.45	4484.68	448.33	4487.09
458.44	4490.08	486.44	4490.76	523.99	4491.61	535	4491.7	554.7	4492.1
591.45	4492.62	600.1	4492.73	619.96	4492.73	635.15	4492.78	696.46	4492.72
715.93	4492.77	735.3	4492.78	787.91	4493.17	801.46	4493.28	835.45	4493.5
879.09	4493.63	906.47	4493.73	935.61	4493.86	1011.47	4494.33	1035.76	4494.43
1045.07	4494.43	1067.8	4494.47	1116.48	4494.77	1123.82	4494.82	1135.91	4494.87
1231.48	4495.18	1236.05	4495.23	1291.77	4495.43	1326.49	4495.71	1336.2	4495.79
1431.49	4496.74	1436.35	4496.8	1463	4497.25	1466.39	4497.3	1536.5	4498.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .12 393.35 .045 458.44 .14

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 393.35 458.44 129.04 150 129.04 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 15.5

INPUT

Description: 10th. St. (LW King) -- Interpolated XS
 Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4498.48	31.37	4498.4	71.42	4498.54	77.74	4498.48	142.84	4497.73
163.66	4497.62	214.26	4496.78	272.77	4495.81	285.68	4495.6	357.09	4494.09
409.16	4492.19	415.98	4491.77	422.8	4490.76	426.81	4488.39	436.81	4485.69
456.81	4481.2	476.81	4486.69	486.81	4489.29	553.4	4490.66	564.59	4490.68
630.72	4491.85	650.9	4491.89	666.33	4491.97	748.39	4492	768.07	4491.95
821.52	4492.3	869.81	4492.68	914.14	4492.83	971.56	4493.06	1073.3	4493.7
1105.85	4493.72	1162.76	4494.08	1175.04	4494.13	1276.78	4494.49	1333.38	4494.69
1378.52	4495.1	1480.26	4496.21	1510.78	4496.72	1582	4497.62		

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .12 422.8 .045 486.81 .14

0	4496.5	100	4496.4	200	4494.2	300	4493.2	400	4492.2
500	4490.4	592	4486.2	600	4485.66	610	4482.4	630	4477.84
650	4482.2	660	4485.07	776	4486.6	800	4486.6	900	4486.7
1000	4487.5	1075	4487.6	1170	4488.1	1425	4489.8	1600	4490.3
1855	4494.5								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 600 .045 660 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 600 660 63.33 63.33 63.33 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 14.8333*

INPUT

Description:	Station	Elevation	Data	num=	33	Sta	Elev	Sta	Elev	Sta	Elev
.....	0	4497	14.03	4496.76	99.89	4496.39	199.78	4494.57	200.45	4494.56	
	299.67	4493.6	300.67	4493.59	399.56	4492.57	400.89	4492.55	499.44	4491.1	
	501.11	4491.05	591.34	4488.02	599.33	4487.64	600.99	4485.27	610.48	4482.04	
	614.95	4480.79	632.78	4476.61	645.55	4480.48	653.97	4482.41	663.15	4483.97	
	678.33	4487.01	768.16	4487.96	786.74	4487.94	864.18	4487.95	882.06	4488.06	
	941.62	4488.43	999.69	4488.47	1073.26	4488.76	1121.73	4489.01	1270.72	4489.76	
	1361.41	4489.92	1406.23	4490.1	1603.7	4493.18					

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 599.33 .045 678.33 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 599.33 678.33 63.33 63.33 63.33 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 14.6666*

INPUT

Description:	Station	Elevation	Data	num=	33	Sta	Elev	Sta	Elev	Sta	Elev
.....	0	4497.5	14.02	4497.03	99.78	4496.39	199.56	4494.94	200.22	4494.93	
	299.33	4494.01	300.33	4494	399.11	4492.94	400.45	4492.93	498.89	4491.81	
	500.56	4491.77	590.68	4489.85	598.67	4489.62	600.5	4485.36	610.96	4481.69	
	615.89	4480.09	635.55	4475.38	652.69	4481.28	663.99	4483.93	676.3	4485.74	
	696.67	4488.96	760.32	4489.32	773.49	4489.29	828.36	4489.2	841.03	4489.23	
	883.23	4489.37	924.39	4489.34	976.52	4489.42	1010.87	4489.51	1116.44	4489.73	
	1180.7	4489.71	1212.47	4489.9	1352.39	4491.86					

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .15 598.67 .045 696.67 .15
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 598.67 696.67 63.33 63.33 63.33 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 14.5

INPUT
 Description: Additional XS for bridge copied from sta. 14

Station Elevation Data num= 17
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4498 14 4497.3 200 4495.3 300 4494.4 400 4493.3
 500 4492.5 598 4491.6 600 4485.45 616.83 4479.39 638.33 4474.15
 659.83 4482.09 674 4485.45 715 4490.9 800 4490.4 900 4490
 1000 4489.5 1118.04 4491.41

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .15 598 .045 715 .15
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 598 715 30 30 .3 .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 14.3
 INPUT
 Description: Southern Pacific RR Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 15
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 598 4491.6 4490.1 715 4490.9 4489.4

Upstream Bridge Cross Section Data num= 17
 Station Elevation Data num= 17
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4498 14 4497.3 200 4495.3 300 4494.4 400 4493.3
 500 4492.5 598 4491.6 600 4485.45 616.83 4479.39 638.33 4474.15
 659.83 4482.09 674 4485.45 715 4490.9 800 4490.4 900 4490
 1000 4489.5 1118.04 4491.41

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .15 598 .045 715 .15
 Bank Sta: Left Right Coeff Contr. Expan.
 598 715 30 30 .3 .5

Downstream Deck/Roadway Coordinates num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 598 4491.6 4490.1 715 4490.9 4489.4
 Downstream Bridge Cross Section Data num= 17
 Station Elevation Data num= 17
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4498 14 4497.3 200 4495.3 300 4494.4 400 4493.3
 500 4492.5 598 4491.6 600 4485.45 616.83 4479.39 638.33 4474.15
 659.83 4482.09 674 4485.45 715 4490.9 800 4490.4 900 4490
 1000 4489.5 1121.13 4491.41

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .15 598 .045 715 .15
 Bank Sta: Left Right Coeff Contr. Expan.
 598 715 30 30 .3 .5

Bank Sta: Left Right Coeff Contr. Expan.
 598 715 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4490.9
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 7

Pier Data
 Pier Station Upstream= 603 Downstream= 603

Upstream num= 2
 Width Elev Width Elev

Downstream num= 1 4490
 Width Elev Width Elev

Downstream num= 2
 Width Elev Width Elev

Pier Data
 Pier Station Upstream= 616 Downstream= 616

Upstream num= 2
 Width Elev Width Elev

Downstream num= 1 4490
 Width Elev Width Elev

Downstream num= 2
 Width Elev Width Elev

Pier Data
 Pier Station Upstream= 631 Downstream= 631

Upstream num= 2
 Width Elev Width Elev

Downstream num= 1 4490
 Width Elev Width Elev

Downstream num= 2
 Width Elev Width Elev

Pier Data
 Pier Station Upstream= 646 Downstream= 646

Upstream num= 2
 Width Elev Width Elev

Downstream num= 1 4490.5
 Width Elev Width Elev

Downstream num= 2
 Width Elev Width Elev

Pier Data
 Pier Station Upstream= 661 Downstream= 661

Upstream num= 2
 Width Elev Width Elev

Downstream num= 1 4490.5
 Width Elev Width Elev

Downstream num= 2
 Width Elev Width Elev

1 4400 1 4490.5
 Pier Data
 Pier Station Upstream= 676 Downstream= 676
 Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5

Pier Data
 Pier Station Upstream= 691 Downstream= 691
 Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 1.2
 Yarnell Kval = .9
 Selected Low Flow Methods = Highest Energy Answer
 High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .5
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 14

INPUT
 Description: XS Q -- SPRR
 Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4498	14	4497.3	200	4495.3	300	4494.4
500	4492.5	598	4491.6	600	4485.45	616.83	4479.39
659.83	4482.09	674	4485.45	715	4490.9	800	4490.4
1000	4489.5	1121.13	4491.41	800	4490.4	900	4490

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .15 598 .045 715 .15

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 598 715 45 45 .3 .5

CROSS SECTION RIVER: Alpine Creek

REACH: Alpine RS: 13.75*
 INPUT
 Description:
 Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4496.1	14.12	4495.71	99.18	4495	198.36	4494.07	201.67	4494.04
297.53	4493.32	302.51	4493.28	330.26	4493	396.71	4492.44	403.34	4492.34
495.89	4491.18	504.18	4491.03	570.27	4489.8	603	4489.25	605.17	4485.87
623.39	4480.3	646.67	4474.82	666.67	4479.03	679.85	4481.14	692.06	4482.4
718	4487.6	784.6	4487.04	822.45	4486.97	868.9	4486.92	945.33	4486.8
961.63	4486.77	1012.21	4486.91	1068.21	4488.22	1071.23	4488.31	1096.52	4489.52
1132.14	4490.02	1192.44	4490.35						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	
0	.15	603	.045	718	.15	
					1192.44	.15

Bank Sta: Left 603 Right 718 Lengths: Left Channel 45 Right 45 Coeff Contr. .3 Expan. .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 13.5
 INPUT
 Description: XS P
 Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4494.2	100	4493.6	200	4492.8	300	4492.2
400	4491.5	500	4489.8	575	4487.7	608	4486.9
697	4477.6	721	4484.3	800	4483.5	900	4483.6
1070	4484.1	1140	4487.1	1170	4489.3	1212.26	4490.16

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.15	608	.045	721	.15

Bank Sta: Left 608 Right 721 Lengths: Left Channel 45 Right 45 Coeff Contr. .1 Expan. .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 13.25*
 INPUT
 Description:
 Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4494.2	100	4493.6	200	4492.8	300	4492.2	333	4491.9
400	4491.5	500	4489.8	575	4487.7	608	4487.48	608.99	4480.75
655.25	4474.08	691.36	4476.01	710.81	4479.42	712	4483.79	792.26	4483.48
807.5	4483.51	893.86	4483.59	905.95	4483.6	1005.62	4483.6	1014.24	4493.64
1066.58	4484.07	1073.31	4484.24	1137.7	4487	1142.23	4487.26	1168.18	4489.17
1171.76	4489.33	1211.12	4489.98	1213.37	4490	1283.78	4490.16		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	
0	.125	608	.045	712	.145	
					1283.78	.145

Bank Sta: Left 608 Right 712 Lengths: Left Channel 45 Right 45 Coeff Contr. .3 Expan. .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 13

INPUT
 Description: XS 0 -- Holland Ave num= 21
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4494.2 100 4493.6 200 4492.8 300 4492.2 333 4491.9
 400 4491.5 500 4489.8 575 4487.7 608 4488.07 609 4474.86
 655.5 4473.45 702 4474.93 703 4483.29 800 4483.5 900 4483.6
 1010 4483.6 1070 4484.1 1140 4487.1 1170 4489.3 1212.26 4490
 1283.78 4490.16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 608 .045 703 .14
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 608 703 60 60 60 .3 .5

CULVERT RIVER: Alpine Creek
 REACH: Alpine RS: 12.9

INPUT
 Description: Holland Ave. Bridge num= 10
 Distance from Upstream XS = 35
 Deck/Roadway Width = 2.6
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 608 4488 4400 705 4483.5 4400

Upstream Bridge Cross Section Data num= 21
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4494.2 100 4493.6 200 4492.8 300 4492.2 333 4491.9
 400 4491.5 500 4489.8 575 4487.7 608 4488.07 609 4474.86
 655.5 4473.45 702 4474.93 703 4483.29 800 4483.5 900 4483.6
 1010 4483.6 1070 4484.1 1140 4487.1 1170 4489.3 1212.26 4490
 1283.78 4490.16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 608 .045 703 .14
 Bank Sta: Left Right Coeff Contr. Expan.
 608 703 60 60 60 .3 .5

Downstream Deck/Roadway Coordinates num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 608 4488 4400 705 4483.5 4400
 Downstream Bridge Cross Section Data num= 21
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4494.2 100 4493.6 200 4492.8 300 4492.2 333 4491.9
 4491.5 4489.8 575 4487.7 608 4488.07 609 4474.86

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655.5	4473.45	703	4474.93	703	4483.29	800	4483.5	900	4483.6
1010	4483.6	1070	4484.1	1140	4487.1	1170	4489.3	1212.26	4490
1283.78	4490.16								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .1 608 .045 703 .14

Bank Sta: left Right Coeff Contr. Expan.
 608 703 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4484.3
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Culverts = 7

Culvert Name Shape Rise Span
 Culvert #1 Box 11 9
 FHWA Chart # 10 - 90 degree headwall; Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 1
 Upstream Elevation = 4474
 Centerline Station = 615
 Downstream Elevation = 4474
 Centerline Station = 615

Culvert Name Shape Rise Span
 Culvert #5 Box 11 9
 FHWA Chart # 10 - 90 degree headwall; Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 1
 Upstream Elevation = 4474
 Centerline Station = 625
 Downstream Elevation = 4474
 Centerline Station = 625

Culvert Name Shape Rise Span
 Culvert #2 Box 10 9
 FHWA Chart # 10 - 90 degree headwall; Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 1
 Number of Piers = 2
 Upstream Elevation = 4474
 Centerline Stations
 Sta. 635
 Downstream Elevation = 4474
 Centerline Stations
 Sta. 645

Culvert Name Shape Rise Span
 Culvert #6 Box 10 9
 FHWA Chart # 10 - 90 degree headwall; Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)

Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 1

Number of Barrels = 2
 Upstream Elevation = 4474
 Centerline Stations
 Sta. 665

Downstream Elevation = 4474
 Centerline Stations
 Sta. 665

Culvert Name Shape Rise Span
 Culvert #4 Box 9 9
 FWA Chart # 10- 90 degree headwall; Chamfered or beveled inlet
 FWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 1
 Upstream Elevation = 4474
 Centerline Station = 675
 Downstream Elevation = 4474
 Centerline Station = 675

Culvert Name Shape Rise Span
 Culvert #3 Box 9 9
 FWA Chart # 10- 90 degree headwall; Chamfered or beveled inlet
 FWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 1
 Upstream Elevation = 4474
 Centerline Station = 685
 Downstream Elevation = 4474
 Centerline Station = 685

Culvert Name Shape Rise Span
 Culvert #7 Box 9 9
 FWA Chart # 10- 90 degree headwall; Chamfered or beveled inlet
 FWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 1
 Upstream Elevation = 4474
 Centerline Station = 695
 Downstream Elevation = 4474
 Centerline Station = 695

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12.7

INPUT
 Description: Additional XS for bridge copied from sta. 13
 Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4494.2	100	4493.6	200	4492.8	300	4492.2
400	4491.5	500	4489.8	575	4487.7	608	4488.07
655.5	4473.45	702	4474.93	703	4483.29	800	4483.5
1010	4483.6	1070	4484.1	1140	4487.1	1170	4489.3
1283.78	4490.16					1212.26	4490

Manning's n Values num= 3
 Sta n Val Sta n Val
 .1 608 .045 703 .14

Bank Sta: Left 608 Right 703 Lengths: Left Channel 75 Right 75 Coeff Contr. .3 Expan. .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12.6333*

INFUT

Description:		Station Elevation Data		num= 43	
Sta	Elev	Sta	Elev	Sta	Elev
0	4492.33	41.7	4492.5	84.16	4492.3
252.47	4491.1	280.34	4490.82	320.79	4490.51
365.71	4489.14	420.78	4488.16	481.19	4486.56
512.66	4478.02	527.78	4476.9	546.91	4473.25
584.6	4474.65	597.4	4476.57	598.16	4477.3
636.93	4483.6	675.57	4482.51	714.2	4482.19
848.94	4482.67	921.42	4483.07	988.5	4483.31
1111.07	4484.81	1153.44	4485.62	1177.81	4486.47
1248.05	4487.84	1328.83	4488.13	1335.85	4489.24

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	511.67	.045	599	.14

Bank Sta: Left 511.67 Right 599 Lengths: Left Channel 75 Right 75 Coeff Contr. .3 Expan. .5

Ineffective Flow num= 1

Sta L	Sta R	Elev
654.9	1335.85	4483.15

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12.5666*

INFUT

Description:		Station Elevation Data		num= 43	
Sta	Elev	Sta	Elev	Sta	Elev
0	4490.47	33.85	4491.1	68.31	4491
204.93	4490	227.48	4489.74	260.4	4489.4
296.85	4487.37	341.56	4486.52	390.6	4485.33
416.33	4481.18	431.39	4479.4	450.46	4472.67
483.3	4474.87	493.7	4478.23	494.32	4479.66
540.97	4483.85	587.78	4481.61	634.6	4480.9
797.88	4481.71	885.71	4482.53	967	4483.01
1115.54	4483.96	1166.87	4484.14	1196.4	4484.44
1281.52	4485.67	1379.41	4486.12	1387.93	4488.32

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	415.33	.045	495	.14

Bank Sta: Left 415.33 Right 495 Lengths: Left Channel 75 Right 75 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 1

Sta L	Sta R	Elev
561.08	1387.93	4482.29

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12.5

INPUT

Description: XS N
 Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4488.6	26	4489.7	100	4489.7	200	4488.3	227	4487.6
228	4485.6	300	4484.1	319	4484.5	335	4481.9	354	4472.1
366	4471.4	372	4472	382	4475.1	390	4479.9	391	4484.4
400	4484.1	445	4484.1	500	4480.7	555	4479.6	635	4479.5
850	4482	1010	4483.2	1120	4483.1	1215	4482.4	1315	4483.5
1430	4484.1	1440	4487.4						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	319	.045	391	.14

Bank Sta: Left 319 Right 391 Lengths: Left Channel 50 Right 50 Coeff Contr. .3 Expan. .5
 Ineffective Flow num= 1

Sta L	Sta R	Elev
463.92	1440	4483.17

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12

INPUT

Description: XS M -- Ave E
 Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4488.2	158	4486.3	230	4485.2	315	4479.22	315	4471.86
342	4469.56	369	4470.31	375	4478.03	418	4479.1	420	4480.1
515	4478.4	635	4479.1	850	4481.6	1010	4482.8	1120	4482.7
1215	4482	1315	4483.1	1430	4483.8	1440	4487		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.135	315	.045	375	.15

Bank Sta: Left 315 Right 375 Lengths: Left Channel 60 Right 60 Coeff Contr. .3 Expan. .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 11.9

INPUT

Description: Ave E Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
315	4479.3	4478.3	420	4477.3	4476.3

Upstream Bridge Cross Section Data

Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4488.2	158	4486.3	230	4485.2	315	4479.22	315	4471.86
342	4469.56	369	4470.31	375	4478.03	418	4479.1	420	4480.1
4478.4	635	4479.1	850	4481.6	1010	4482.8	1120	4482	

1215 4482 1315 4483.1 1430 4483.8 1440 4487

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .135 315 .045 375 .15

Bank Sta: Left Right Coeff Contr. Expan.
 315 375 .3 .5

Downstream Deck Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

 315 4479.3 4478.3 420 4477.3 4476.3

Downstream Bridge Cross-Section Data

Station Elevation Data num= 19
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4488.2 158 4486.3 230 4485.2 315 4479.22 315 4471.86
 342 4469.56 369 4470.31 375 4478.03 418 4479.1 420 4480.1
 515 4478.4 635 4479.1 850 4481.6 1010 4482.8 1120 4482.7
 1215 4482 1315 4483.1 1430 4483.8 1440 4487

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .135 315 .045 375 .15

Bank Sta: Left Right Coeff Contr. Expan.
 315 375 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4480.1
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of piers = 3

Pier Data
 Pier Station Upstream= 330.7 Downstream= 330.7

Upstream num= 2
 Width Elev Width Elev

 6 4400 6 4481

Downstream num= 2
 Width Elev Width Elev

 6 4400 6 4481

Pier Data
 Pier Station Upstream= 356.2 Downstream= 356.2

Upstream num= 2
 Width Elev Width Elev

 6 4400 6 4481

Downstream num= 2
 Width Elev Width Elev

 6 4400 6 4481

Pier Data
 Pier Station Upstream= 381.7 Downstream= 381.7

```

Upstream num= 2
Width Elev Width Elev
*****
6 4400 6 4481
Downstream num= 2
Width Elev Width Elev
*****
6 4400 6 4481
    
```

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

```

Energy
Momentum Cd = 1.2
Yarnell KVal = .9
Selected Low Flow Methods = Highest Energy Answer
    
```

High Flow Method

Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.7

INPUT

```

Description: Additional XS for bridge copied from sta. 12
Station Elevation Data num= 19
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 4488.2 158 4486.3 230 4485.2 315 4479.22 315 4471.86
342 4469.56 369 4470.31 375 4478.03 418 4479.1 420 4480.1
515 4478.4 635 4479.1 850 4481.6 1010 4482.8 1120 4482.7
1215 4482 1315 4483.1 1430 4483.8 1440 4487
    
```

```

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
*****
0 .135 315 .045 375 .15
    
```

```

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
315 375 80 126.67 80 .3 .5
    
```

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.6333*

INPUT

```

Description:
Station Elevation Data num= 34
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 4487.67 114.39 4486.73 171.59 4486.24 193.33 4486 252.47 4485.1
367.51 4483.2 400.38 4481.9 457.58 4480.32 503.33 4479.01 503.33 4474.11
520.08 4470.46 532.92 4470.02 546.33 4469.4 548 4469.17 564.82 4469.5
579.91 4471.83 587 4477.95 627.89 4478.47 629.79 4479.13 686.25 4478.16
720.13 4477.71 797.77 4477.98 834.23 4478.07 853.52 4478.19 1020.8 4479.69
1038.68 4479.81 1190.82 4480.4 1295.42 4480.2 1316.31 4480.06 1385.76 4479.98
1387.39 4480 1480.85 4481.33 1590.2 4482.5 1599.71 4484.7
    
```

```

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
*****
    
```

0 .135 503.33 .045 587 .15
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 503.33 587 80 126.67 80 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.5666*

INPUT
 Description: Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4447.13	157.2	4486.11	235.8	4485.57	265.66	4485.25
505.03	4481.2	550.19	4480.05	628.79	4479.41	691.67	4478.81
715.04	4469.93	732.36	4469.71	751.66	4469.15	754	4468.79
790.82	4473.34	799	4477.88	837.78	4477.85	839.58	4478.16
925.25	4477.03	994.68	4477.09	1033.47	4477.04	1051.76	4477.05
1227.36	4478.02	1371.64	4478.01	1470.84	4477.69	1490.66	4477.58
1558.07	4477.98	1646.69	4479.55	1750.4	4481.21	1759.42	4482.4

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.135	691.67	.045	799	.15

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 691.67 799 80 126.67 80 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.5

INPUT
 Description: XS L Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4486.6	260	4485.5	300	4484.9	338	4484.5
800	4478.5	880	4478.6	910	4469.4	933	4469.4
960	4468.4	982	4468.6	1011	4477.8	1100	4476.4
1250	4475.9	1400	4476.3	1665	4475.1	1728.74	4475.96

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.135	880	.045	1011	.15

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 880 1011 53.33 53.33 53.33 .1 .3

Ineffective Flow num= 1
 Sta L Sta R Elev

1036.33 1919.13 4477.4
 CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.4666*

INPUT
 Description: Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4486.17	197.04	4485.08	201.52	4485.06	295.56	4484.49
332.99	4484.12	340.56	4484.02	689.63	4477.95	705.3	4477.78
806.06	4478.07	886.67	4478.17	901.21	4473.91	912.61	4468.43
932.51	4468.25	953.27	4467.87	955.86	4467.53	978.06	4468.3
992.28	4474.08	1007.33	4477.53	1016.19	4477.28	1087.88	4476.16

1168.43 4475.83 1208.7 4475.68 1222.29 4475.68 1279.16 4475.54 1329.53 4475.68
 1449.75 4475.64 1542.98 4475.22 1712.13 4475.14 1751.15 4475.24 1823.64 4476.2
 2040.18 4480.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 886.67 .045 1007.33 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 886.67 1007.33 53.33 53.33 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev

 1015.77 2040.18 4477.28

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.4333*

INFUT

Description: Station Elevation Data num= 36
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4485.73 198.52 4484.64 203.03 4484.62 297.78 4484.05 304.55 4483.99
 335.5 4483.66 343.12 4483.54 694.81 4477.42 710.61 4477.37 794.07 4477.62
 812.12 4477.65 893.33 4477.73 905.6 4474.37 915.23 4467.47 915.73 4467.18
 932.01 4467.1 949.53 4466.84 951.72 4466.67 974.13 4468 980.8 4469.07
 988.48 4475.09 1003.67 4477.27 1013.6 4476.89 1093.94 4475.63 1117.11 4475.5
 1184.21 4475.36 1229.35 4475.14 1244.58 4475.16 1308.31 4475.19 1364.76 4475.34
 1499.51 4474.98 1603.99 4474.51 1793.56 4475.02 1837.29 4475.38 1918.54 4476.43
 2161.22 4480.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 893.33 .045 1003.67 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 893.33 1003.67 53.33 53.33 .3 .5
 Ineffective Flow num= 1
 Sta L Sta R Elev

 1013.69 2161.22 4476.89

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.4

INPUT

Description: Additional XS for bridge copied from sta. 11
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4485.3 200 4484.2 300 4483.6 338 4483.2 700 4476.9
 800 4477.2 900 4477.3 910 4474.84 918.25 4466.07 947.58 4465.8
 976.92 4468.26 984.67 4476.1 1000 4477 1011 4476.5 1100 4475.1
 1200 4474.9 1250 4474.6 1400 4475 1665 4473.8 1875 4474.9
 2282.27 4480.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 900 .045 1000 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 900 1000 50 50 .3 .5
 Ineff y e Flow num= 1

Sta L Sta R Elev

 1011.18 2282.27 4476.52

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 11.3

INPUT

Description: Sul Ross Ave D Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 35
 Hair Coefficient = 2.6
 Bridge Deck/Roadway Flow =
 Upstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

 895 4477.2 4475.2 997 4477.2 4475.2

Upstream Bridge Cross Section Data
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4485.3 200 4484.2 300 4483.6 338 4483.2 700 4476.9
 800 4477.2 900 4477.3 910 4474.84 918.25 4466.07 947.58 4465.8
 976.92 4468.26 984.67 4476.1 1000 4477 1011 4476.5 1100 4475.1
 1200 4474.9 1250 4474.6 1400 4475 1665 4473.8 1875 4474.9
 2282.27 4480.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 900 .045 1000 .13

Bank Sta: Left Right Coeff Contr. Expan.
 900 1000
 .3 .5

Ineffective Flow num= 1
 Sta L Sta R Elev

 1011.18 2282.27 4476.52

Downstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

 895 4477.2 4475.2 997 4477.2 4475.2

Downstream Bridge Cross Section Data
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4485.3 300 4484.2 300 4483.6 338 4483.2 700 4476.9
 800 4477.2 900 4477.3 910 4474.84 918.25 4466.07 947.58 4465.8
 976.92 4468.26 984.67 4476.1 1000 4477 1011 4476.5 1100 4475.1
 1200 4474.9 1250 4474.6 1400 4475 1665 4473.8 1875 4474.9
 2278.38 4480.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 900 .045 1000 .13

Bank Sta: Left Right Coeff Contr. Expan.
 900 1000
 .3 .5

Ineffective Flow num= 1
 Sta L Sta R Elev

 1011.18 2282.27 4476.52

1011.16 2278.38 4476.52

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4477.2
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
 Pier Station Upstream= 933 Downstream= 933
 Upstream num= 2
 Width Elev Width Elev

 2 4400 2 4475.5
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4475.5

Pier Data
 Pier Station Upstream= 957 Downstream= 957
 Upstream num= 2
 Width Elev Width Elev

 2 4400 2 4475.5
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4475.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 2
 Yarnell KVal = 1.05
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11

INPUT

Description: XS K -- Sul Ross/Ave. D
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4485.3 200 4484.2 300 4483.6 338 4483.2 700 4476.9
 800 4477.2 900 4477.3 910 4474.84 918.25 4466.07 947.58 4465.8
 976.92 4468.26 984.67 4476.1 1000 4477 1011 4476.5 1100 4475.1
 1200 4474.9 1250 4474.6 1400 4475 1665 4473.8 1875 4474.9
 2278.38 4480.1

Manni in Values num= 3

```

Sta n Val Sta n Val Sta n Val
.....
0 .13 900 .045 1000 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
          900 1000 106.67 106.67 106.67 .3 .5
Ineffective Flow num=
Sta L Sta R Elev num=
.....
1011.16 2278.38 4476.52
    
```

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 10.6666*

```

INPUT
Description:
Station Elevation Data num= 33
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
.....
0 4483.7 177.78 4482.5 266.67 4481.87 300.44 4481.45 533.33 4477.36
622.22 4475.78 666.67 4475.67 711.11 4475.54 800 4475.17 804.52 4472.93
808.56 4471.96 815.62 4465.76 816.59 4465.71 840.72 4465.3 852.22 4466.21
867.18 4468.02 874.17 4473.66 888 4475.07 899.91 4474.68 919.24 4474.41
996.25 4473.43 1006 4473.39 1092.77 4472.81 1104.51 4472.8 1150.04 4472.63
1158.64 4472.62 1314.03 4473.16 1321.02 4473.19 1504.92 4473.19 1607.89 4472.87
1835.22 4473.54 1860.67 4473.74 2271.9 4478.03
    
```

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 800 .045 888 .13

```

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
          800 888 106.67 106.67 106.67 .3 .5
Ineffective Flow num=
Sta L Sta R Elev num=
.....
888 2271.9 4475.07
    
```

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 10.3333*

```

INPUT
Description:
Station Elevation Data num= 33
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
.....
0 4482.1 155.56 4480.8 233.33 4480.13 262.89 4479.7 466.67 4476.08
544.44 4474.66 583.33 4474.28 622.22 4473.89 700 4473.03 703.76 4469.87
707.12 4469.08 712.99 4465.45 713.79 4465.35 733.86 4464.8 744.11 4465.56
757.45 4467.78 763.68 4471.21 776 4473.13 788.82 4472.86 809.62 4472.61
892.51 4471.76 903 4471.69 996.39 4470.71 1009.02 4470.7 1058.02 4470.62
1067.27 4470.63 1234.52 4471.33 1242.03 4471.37 1439.96 4472.14 1550.78 4471.94
1795.45 4472.18 1822.84 4472.27 2380.8 4476.46
    
```

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .13 700 .045 776 .13

```

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
          700 776 106.67 106.67 106.67 .1 .3
Ineffective Flow num=
Sta L Sta R Elev num=
.....
776 2380.8 4473.13
    
```

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 10

INPUT

Description: XS J
 Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4480.5	200	4478.4	400	4474.8	500	4472.9	600	4470.9				
603	4466.8	611	4465	627	4464.3	636	4464.9	664	4471.2				
700	4470.8	800	4470	900	4468.6	966	4468.6	1155	4469.5				
1375	4471.1	1785	4470.8	2406.57	4474.34								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.13	600	.045	664	.13

Bank Sta: Left 600 Right 664 Lengths: Left Channel 109.17 Right 120.83
 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 1

Sta L	Sta R	Elev
664	2406.57	4471.2

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.9*

INPUT

Description: XS J
 Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4480.5	200	4478.4	400	4474.8	500	4472.9	600	4470.9				
601.77	4468.15	603.24	4466.76	611.89	4464.67	612.65	4464.57	629.18	4463.89				
640.57	4464.61	642.57	4464.9	652.08	4466.76	676	4471.07	711.85	4470.71				
776.87	4470.19	811.42	4469.84	877.73	4468.91	910.99	4468.6	944.3	4468.6				
976.71	4468.65	1134.94	4469.4	1164.9	4469.57	1356.84	4470.97	1383.96	4471.09				
1770.39	4470.81	1792.21	4470.85	2264.12	4473.93								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.13	600	.045	676	.13

Bank Sta: Left 600 Right 676 Lengths: Left Channel 109.17 Right 120.83
 Coeff Contr. .1 Expan. .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.8*

INPUT

Description: XS J
 Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4480.5	200	4478.4	400	4474.8	500	4472.9	600	4470.9				
601.91	4467.65	603.48	4466.73	612.78	4464.34	613.59	4464.17	631.36	4463.48				
645.14	4464.32	647.55	4464.55	659.06	4466.58	688	4470.93	723.69	4470.61				
788.43	4470.09	822.84	4469.68	888.87	4468.76	921.98	4468.6	955.15	4468.6				
987.42	4468.7	1144.97	4469.45	1174.8	4469.64	1365.92	4471.03	1392.92	4471.09				
1777.7	4470.81	1799.42	4470.89	2269.31	4473.95								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	600	.045	688	.13

Bank Sta: Left 600 Right 688 Lengths: Left Channel 109.17 Right 109.17 Coeff Contr. .1 Expan. .3
 REACH: Alpine

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.7

INPUT
 Description: 6th St. (LW Xing) -- Interpolated x section
 Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4480.5	200	4478.4	400	4474.8	500	4472.9
602.04	4467.15	614.54	4463.77	633.54	4463.07	652.54	4464.2
700	4470.8	800	4470	900	4468.6	966	4468.6
1375	4471.1	1785	4470.8	2274.49	4473.98		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	600	.045	700	.13

Bank Sta: Left 600 Right 700 Lengths: Left Channel 109.17 Right 109.17 Coeff Contr. .1 Expan. .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.63333

INPUT
 Description:
 Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-100	4477.37	-99.31	4477.33	-98.61	4477.33	108.5	4475.19
412.44	4472.27	490.75	4471.43	540.56	4470.98	668.67	4469.76
674.56	4464.08	683.44	4462.45	702.75	4461.87	718.72	4462.73
749.52	4466.39	758.64	4470.28	857.71	4469.19	885.09	4468.78
1022.18	4468.1	1209.43	4468.7	1420.08	4469.73	1427.39	4469.78
1833.6	4469.84	2133.41	4471.11	2318.56	4472.67		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-100	.1	668.67	.045	758.64	.13

Bank Sta: Left 608.67 Right 758.64 Lengths: Left Channel 109.17 Right 109.17 Coeff Contr. .1 Expan. .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.56666

INPUT
 Description:
 Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	4474.17	-199.15	4474.16	-198.3	4474.16	54.25	4471.6
424.89	4469.74	520.37	4469.21	581.11	4469.06	737.33	4468.63
743.32	4462.02	752.34	4461.13	771.95	4460.67	784.91	4461.25
809.88	4463.38	817.27	4469.77	915.42	4468.38	942.54	4467.94
1078.35	4467.6	1263.85	4467.9	1472.54	4468.42	1479.78	4468.46
1882.19	4468.87	2179.2	4469.46	2362.62	4471.36		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.1	737.33	.05	817.27	.13

Bank Sta: Left Right Lengths: Left Channel Right Channel Coeff Contr. Expan.
 737.33 817.27 109.17 120.83 109.17 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.5

INPUT Description: Additional XS for bridge copied from sta. 9
 Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	4471	-299	4471	-298	4471	0	4468	550	4467
806	4468.7	806	4466.5	830	4461.8	858	4460	866	4459.6
882	4460	907	4461.9	930	4466.9	933	4468	933	4469.4
1000	4467.1	1525	4467.1	1685	4468	2225	4467.8	2488.4	4469.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -300 .1 806 .05 933 .13

Bank Sta: Left Right Lengths: Left Channel Right Channel Coeff Contr. Expan.
 806 933 70 70 .3 .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 9.3

INPUT Description: 5th St. Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 50
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates
 num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
806	4468.7	4467.7	933	4469.4	4468.4

Upstream Bridge Cross Section Data num= 20
 Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	4471	-299	4471	-298	4471	0	4468	550	4467
806	4468.7	806	4466.5	830	4461.8	858	4460	866	4459.6
882	4460	907	4461.9	930	4466.9	933	4468	933	4469.4
1000	4467.1	1525	4467.1	1685	4468	2225	4467.8	2488.4	4469.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -300 .1 806 .05 933 .13

Bank Sta: Left Right Lengths: Left Channel Right Channel Coeff Contr. Expan.
 806 933 70 70 .3 .5

Downstream Deck/Roadway Coordinates num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
806	4468.7	4467.7	933	4469.4	4468.4

Downstream Bridge Cross Section Data num= 20
 Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	4471	-299	4471	-298	4471	0	4468	550	4467
806	4468.7	806	4466.5	830	4461.8	858	4460	866	4459.6
882	4460	907	4461.9	930	4466.9	933	4468	933	4469.4
1000	4467.1	1525	4467.1	1685	4468	2225	4467.8	2488.4	4469.94

300	4471	299	4471	-298	4471	0	4468	550	4467
806	4468.7	806	4466.5	830	4461.8	858	4460	866	4459.6
882	4460	907	4461.9	930	4466.9	933	4468	933	4469.4
1000	4467.1	1525	4467.1	1685	4468	2225	4467.8	2488.4	4469.89

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -300 .1 806 .05 933 .13

Bank Sta: Left Right Coeff Contr. Expan.
 806 933 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4468.7
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 4

Pier Data
 Pier Station Upstream= 830 Downstream= 830

Upstream	num= 2
Width	Elev
Width	Elev
2.33	4400
2.33	4468.5
Downstream	num= 2
Width	Elev
Width	Elev
2.33	4400
2.33	4468.5

Pier Data
 Pier Station Upstream= 855 Downstream= 855

Upstream	num= 2
Width	Elev
Width	Elev
2.33	4400
2.33	4469
Downstream	num= 2
Width	Elev
Width	Elev
2.33	4400
2.33	4469

Pier Data
 Pier Station Upstream= 880 Downstream= 880

Upstream	num= 2
Width	Elev
Width	Elev
2.33	4400
2.33	4468.5
Downstream	num= 2
Width	Elev
Width	Elev
2.33	4400
2.33	4468.5

Pier Data
 Pier Station Upstream= 905 Downstream= 905

Upstream	num= 2
Width	Elev
Width	Elev
2.33	4400
2.33	4468.5
Downstream	num= 2
Width	Elev
Width	Elev
2.33	4400
2.33	4468.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 1.2
 Yarnell Kval = .9
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9

INPUT

Description: XS I -- 5th St.

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	4471	-299	4471	-298	4471	0	4468	550	4467
806	4468.7	806	4466.5	830	4461.8	858	4460	866	4459.6
882	4460	907	4461.9	930	4466.9	933	4468	933	4469.4
1000	4467.1	1525	4467.1	1685	4468	2225	4467.8	2488.4	4469.89

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-300	.1	806	.05	933	.13

Bank Sta: Left 806 Right 933 Lengths: Left Channel 83.33 Right Channel 83.33 Coeff Contr. .3 Expan. .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 8.66666*

INPUT

Description:

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	4470.33	-298.91	4470.33	-297.82	4470.32	-214	4469.28	-128	4468.29
-42	4467.36	26.58	4466.89	37.12	4466.89	104.2	4467.05	130	4466.92
302	4466.73	388	4466.8	478.07	4466.63	538.47	4466.22	625.32	4465.98
732	4465.92	768.12	4466	803.38	4465.78	854.98	4465.67	899.7	4466.16
904	4466.57	909.93	4460.77	920.87	4459.21	938.27	4458.76	955.91	4459.6
966.45	4461.09	971.94	4467.66	1034.2	4466.46	1074.42	4465.97	1207.13	4466.2
1380.07	4466.2	1507.99	4466.15	1540.13	4466.7	1725.94	4466.64	1834.89	4466.88
1936.92	4466.88	2054.6	4467.07	2086.08	4467.13	2236.13	4468.95		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-300	.1	904	.05	971.94	.13

Bank Sta: Left 904 Right 971.94 Lengths: Left Channel 83.33 Right Channel 83.33 Coeff Contr. .3 Expan. .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 8.33333*

INPUT

Description: Station Elevation Data num= 39
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 300 4469.67 -298.82 4469.65 -297.65 4469.64 -207 4468.34 114 4467.14
 -21 4466.08 53.16 4465.81 64.56 4465.79 137.1 4466.22 165 4466.01
 351 4465.91 444 4466.2 541.4 4466.02 606.72 4465.3 700.63 4464.96
 816 4464.66 855.06 4464.75 893.19 4464.24 948.99 4463.93 997.35 4464.83
 1002 4465.64 1007.77 4461.58 1018.44 4458.66 1035.39 4458.05 1052.45 4459.17
 1062.65 4461.8 1067.97 4466.08 1117.1 4464.98 1148.84 4464.84 1253.57 4465.3
 1390.03 4465.3 1490.98 4465.2 1595.25 4465.4 1662.97 4465.32 1748.94 4465.84
 1829.46 4465.89 1922.33 4466.32 1947.17 4466.46 2065.58 4467.85

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -300 .1 1002 .05 1067.97 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1002 1067.97 83.33 87.33 83.33 .1 .3

Ineffective Flow num= 2
 Sta L Elev Sta L Elev Sta R Elev

 -300 1000.06 4465.29 1094.14 2065.58 4465.5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 8

INPUT

Description: XS H -- Ave. A (LW Xing) Station Elevation Data num= 29
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 300 4469 200 4467.4 -100 4466 0 4464.8 92 4464.7
 170 4465.4 200 4465.1 400 4465.1 500 4465.6 604.73 4465.41
 674.97 4464.38 900 4463.4 942 4463.5 983 4462.7 1043 4462.2
 1095 4463.5 1100 4464.72 1116 4458.1 1132.5 4457.34 1149 4458.74
 1164 4464.49 1200 4463.5 1300 4464.4 1400 4464.4 1600 4464
 1663 4464.8 1722 4464.9 1790.05 4465.58 1895.02 4466.75

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -300 .1 1100 .05 1164 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1100 1164 143 143 143 .1 .3

Ineffective Flow num= 1
 Sta L Elev Sta R Elev

 -300 1100 4464.72

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.8*

INPUT

Description: Station Elevation Data num= 48
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -270 4467.86 -177.86 4466.16 -85.71 4464.62 -42.35 4463.97 6.43 4463.42
 88.16 4463.28 91.2 4463.28 163.07 4463.96 165.56 4463.94 190.71 4463.75
 261.18 4463.82 375 4463.96 467.14 4464.47 529.8 4464.44 563.64 4464.04
 584.71 4464.01 628.37 4463.15 640.59 4463.1 806.01 4462.57 835.71 4462.49
 874.41 4462.6 912.19 4462 967.48 4461.65 982.06 4461.98 1015.39 4462.75
 1020 4463.74 1040.76 4458.3 1042.22 4457.78 1051.92 4456.39 1065.13 4455.95

1083.92 4457.22 1083.96 4457.23 1101.4463.37 1102.26 4463.28 1135.23 4462.32
 1165.33 4462.37 1230.3 4462.8 1291.47 4462.74 1325.38 4462.84 1384.81 4462.92
 1417.6 4462.88 1515.53 4462.81 1543.74 4463.14 1575.42 4463.48 1631.52 4463.57
 1669.88 4463.9 1696.22 4464.23 1796.02 4465.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -270 .1 1020 .05 1101 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1020 1101 143 143 .1 .3

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

 -270 1017.93 4463.35 1102.72 1796.02 4463.27

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.6*

INPUT

Description:

Station Elevation Data num= 48
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -240 4466.72 -155.71 4464.92 -71.43 4463.24 -31.76 4462.5 12.86 4462.04
 87.62 4461.86 90.4 4461.87 156.14 4462.51 158.42 4462.5 181.43 4462.39
 245.88 4462.54 350 4462.81 434.29 4463.33 491.6 4463.41 522.56 4462.67
 523.53 4462.64 581.76 4461.93 592.94 4461.87 744.26 4461.6 771.43 4461.57
 806.83 4461.7 841.39 4461.29 891.96 4461.07 905.29 4461.36 935.79 4462.01
 940 4462.75 966.57 4458.07 968.44 4457.46 980.86 4455 997.77 4454.57
 1018.84 4455.7 1018.89 4455.71 1038 4462.24 1039.2 4462.11 1070.45 4461.14
 1099 4460.95 1160.6 4461.2 1218.6 4461.08 1250.75 4461.28 1307.11 4461.56
 1338.2 4461.56 1431.05 4461.63 1457.81 4461.91 1487.85 4462.17 1541.04 4462.25
 1577.41 4462.5 1602.38 4462.88 1697.01 4464.39

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -240 .1 940 .05 1038 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 940 1038 143 143 .1 .3

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

 -240 935.59 4462.01 1039.22 1697.01 4462.11

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.4*

INPUT

Description:

Station Elevation Data num= 48
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -210 4465.58 -133.57 4463.68 -57.14 4461.85 -21.18 4461.03 19.29 4460.67
 87.08 4460.44 89.6 4460.45 149.21 4461.07 151.28 4461.07 172.14 4461.04
 230.59 4461.26 325 4461.67 401.43 4462.2 453.4 4462.37 481.47 4461.3
 482.35 4461.26 535.16 4460.7 545.29 4460.65 682.51 4460.64 707.14 4460.66
 739.24 4460.81 770.58 4460.59 816.44 4460.54 828.53 4460.74 856.18 4461.26
 860 4461.77 892.38 4457.83 894.66 4457.14 909.8 4453.61 930.4 4453.18
 953.76 4454.17 953.82 4454.18 975 4461.12 976.13 4460.94 1005.68 4459.96
 1032.67 4459.53 1090.91 4459.59 1145.73 4459.42 1176.13 4459.73 1229.4 4460.21
 1258.8 4460.24 1346.58 4460.44 1371.87 4460.67 1400.27 4460.85 1450.55 4460.92
 1484.94 4461.1 1508.55 4461.53 1598.01 4463.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -210 .12 860 .05 975 .95

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 860 975 143 143 .1 .3

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

 210 855.83 4461.26 976.38 1598.01 4460.94

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.2*

INPUT
 Description:
 Station Elevation Data num= 48
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -180 4464.44 111.43 4462.44 -42.86 4460.47 -10.59 4459.57 25.71 4459.29
 86.54 4459.02 86.8 4459.04 142.29 4459.62 144.14 4459.63 162.86 4459.69
 215.29 4459.98 300 4460.52 368.57 4461.06 415.2 4461.33 440.39 4459.93
 441.18 4459.88 488.55 4459.47 497.65 4459.42 620.75 4459.67 642.86 4459.75
 671.66 4459.91 699.77 4459.89 740.91 4459.99 751.76 4460.12 776.57 4460.51
 780 4460.78 818.19 4457.6 820.88 4456.82 838.73 4452.22 863.04 4451.8
 889.68 4452.65 888.74 4452.65 912 4459.99 913.07 4459.77 940.91 4458.79
 966.32 4458.12 1021.21 4457.99 1072.87 4457.76 1101.51 4458.17 1151.7 4458.85
 1179.4 4458.92 1262.1 4459.25 1285.94 4459.44 1312.69 4459.54 1360.07 4459.6
 1332.47 4459.7 1414.71 4460.18 1499 4462.03

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -180 .12 780 .05 912 .95

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 780 912 143 143 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

 -180 776.99 4460.51 913.77 1499 4459.78

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7

INPUT
 Description: XS G -- Brown St. (new)
 Station Elevation Data num= 24
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -150 4463.3 0 4458.1 86 4457.6 137 4458.2 200 4458.7
 377 4460.3 400 4458.5 450 4458.2 559 4458.7 675 4459.5
 700 4459.8 744 4457.36 767.67 4450.83 795.67 4450.41 823.67 4451.13
 849 4458.87 850 4458.6 900 4456.7 1000 4456.1 1074 4457.5
 1100 4457.6 1200 4458.2 1300 4458.3 1400 4460.85

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -150 .12 700 .05 849 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 700 849 60 60 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

-150 675.12 4459.5 850.36 1400 4458.61

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 6.7

INPUT

Description: Brown St. Bridge (new)
 Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates

num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 700 4459.8 4458.8 769.61 4460.1 4459.01 849 4458.87 4457.87

Upstream Bridge Cross Section Data

Station	Elevation	Data	num=	24	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-150	4463.3	0	4458.1	86	4457.6	137	4458.2	200	4458.7			
377	4460.3	400	4458.5	450	4458.2	559	4458.7	675	4459.5			
700	4459.8	744	4457.36	767.67	4450.83	795.67	4450.41	823.67	4451.13			
849	4458.87	850	4458.6	900	4456.7	1000	4456.1	1074	4457.5			
1100	4457.6	1200	4458.2	1300	4458.3	1400	4460.85					

Manning's n Values

num= 3
 Sta n Val Sta n Val Sta n Val
 -150 .12 700 .05 849 .095

Bank Sta: Left 700 Right 849 Coeff Contr. Expan.
 .3 .5

Ineffective Flow

num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 -150 675.12 4459.5 850.36 1400 4458.61

Downstream Deck/Roadway Coordinates

num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 700 4459.8 4458.8 769.61 4460.1 4459.01 849 4458.87 4457.87

Downstream Bridge Cross Section Data

Station	Elevation	Data	num=	24	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-150	4463.3	0	4458.1	86	4457.6	137	4458.2	200	4458.7			
377	4460.3	400	4458.5	450	4458.2	559	4458.7	675	4459.5			
700	4459.8	744	4457.36	767.67	4450.83	795.67	4450.41	823.67	4451.13			
849	4458.87	850	4458.6	900	4456.7	1000	4456.1	1074	4457.5			
1100	4457.6	1200	4458.2	1300	4458.3	1400	4460.85					

Manning's n Values

num= 3
 Sta n Val Sta n Val Sta n Val
 -150 .12 700 .05 849 .095

Bank Sta: Left 700 Right 849 Coeff Contr. Expan.
 .3 .5

Ineffective Flow

num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 -150 674.52 4459.5 849.44 1400 4458.59

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
 Pier Station Upstream= 784 Downstream= 784
 Upstream num= 2
 Width Elev Width Elev

 2 4400 2 4460
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4460

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy Cd = 1.2
 Momentum KVal = .9
 Yarnell
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 6.5

REPORT

Description: additional XS for bridge copied from sta 7

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-150	4463.3	0	4458.1	86	4457.6	137	4458.2
377	4460.3	400	4458.5	450	4458.2	559	4458.7
700	4459.8	744	4457.36	767.67	4450.83	795.67	4450.41
849	4458.87	850	4458.6	900	4456.7	1000	4456.1
1100	4457.6	1200	4458.2	1300	4458.3	1400	4460.85

Manning's n Values num= 3
 Sta n Val Sta n Val

 -150 .12 700 .05 849 .095

Bank Sta: Left Right Lengths: Left Channel Right
 700 849 141.25 143.75 141.25
 Coeff Contr. .3

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

 -150 674.52 4459.5 849.44 1400 4458.59

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 6.375*

INPUT

Description: Station Elevation Data num= 44
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -137.5 4461.55 -115.56 4460.83 -71.69 4459.29 -49.75 4458.55 19.82 4457.03
 59.93 4456.98 60.81 4456.88 110.02 4456.45 125.74 4456.51 163.51 4456.79
 213.48 4457.03 229.59 4457.11 301.23 4457.51 388.98 4458.03 415.23 4458.18
 439.35 4456.81 457.42 4456.72 491.79 4456.58 564.47 4456.81 606.12 4456.97
 652.21 4457.23 727.78 4457.73 738.21 4457.84 745.23 4458.47 754 4458.55
 792.86 4455.32 802.05 4452.84 813.77 4450.06 838.5 4449.66 856.21 4450.32
 865.15 4450.92 889.25 4457.85 890.17 4457.65 905.13 4457.26 913.07 4456.39
 936.41 4455.41 1000.41 4455.22 1028.88 4455.22 1097.31 4456.31 1121.35 4456.4
 1213.82 4456.91 1237.4 4456.94 1306.29 4457.22 1398.76 4459.43

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val
 -137.5 .09 754 .05 889.25 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 754 889.25 141.25 143.75 141.25 .3 .5

Ineffective Flow num= 2

Sta L Sta R Elev Sta L Elev Sta R Elev
 -137.5 737.41 4457.85 890.86 1398.76 4457.66

CROSS SECTION RIVER: Alpine Creek

REACH: Alpine RS: 6.25*

INPUT

Description: Station Elevation Data num= 44
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -125 4459.8 -102.04 4459.09 -56.13 4457.46 -33.17 4456.7 39.65 4455.96
 81.62 4456.09 82.54 4455.89 134.04 4455.3 150.49 4455.24 190.02 4455.39
 242.32 4455.49 259.18 4455.52 334.15 4455.71 425.98 4455.99 453.46 4456.06
 478.71 4455.13 497.61 4455.05 533.59 4454.95 609.65 4455.11 653.23 4455.25
 701.48 4455.45 780.56 4455.96 791.47 4456.06 798.82 4457.25 808 4457.3
 841.73 4453.29 849.7 4451.2 859.87 4449.28 881.33 4448.91 898.14 4449.74
 906.62 4450.7 929.5 4456.83 930.35 4456.71 944.09 4456.54 951.38 4455.13
 972.82 4454.64 1031.61 4454.39 1057.76 4454.34 1120.61 4455.12 1142.7 4455.2
 1227.63 4455.62 1249.3 4455.66 1312.57 4456.14 1397.51 4458.02

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val
 -125 .09 808 .05 929.5 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 808 929.5 141.25 143.75 141.25 .1 .3

Ineffective Flow num= 2

Sta L Sta R Elev Sta L Elev Sta R Elev
 -125 794.79 4456.57 944.22 1397.51 4456.55

CROSS SECTION RIVER: Alpine Creek

REACH: Alpine RS: 6.125*

INPUT

Description: Station Elevation Data num= 44
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -11 458.05 -88.52 4457.34 -40.56 4455.63 -16.58 4454.85 59.47 4454.

103.31 4455.19 104.27 4454.89 158.07 4454.14 175.25 4453.97 216.54 4453.98
 271.16 4453.94 288.76 4453.93 367.08 4453.9 462.99 4453.94 491.69 4453.94
 518.06 4453.44 537.81 4453.37 575.38 4453.33 654.82 4453.4 700.35 4453.52
 750.74 4453.68 833.34 4454.2 844.74 4454.28 852.41 4456.02 862 4456.05
 890.59 4451.25 897.35 4459.55 905.97 4448.51 924.17 4448.15 940.07 4449.17
 948.1 4450.49 969.75 4455.82 970.52 4455.76 983.04 4455.82 989.69 4453.86
 1009.23 4453.6 1062.8 4453.45 1086.64 4453.45 1143.92 4453.93 1164.04 4454
 1241.45 4454.33 1261.19 4454.38 1318.86 4455.07 1396.27 4456.6

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -112.5 .09 862 .05 969.75 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 862 969.75 141.25 143.75 141.25 .1 .3

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

 -112.5 847.91 4455.02 985.65 1396.27 4455.01

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 6

INPUT

Description: XS F num= 25
 Station Elevation Data num= 25
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -100 4456.3 .75 4455.6 -25 4453.8 0 4453 125 4454.3
 126 4453.9 200 4452.7 300 4452.4 400 4452.1 500 4451.9
 578 4451.7 700 4451.7 800 4451.9 898 4452.5 906 4454.8
 916 4454.8 945 4447.9 967 4447.4 982 4448.6 1010 4454.8
 1022 4455.1 1028 4452.6 1094 4452.5 1273.09 4453.1 1395.02 4455.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -100 .09 916 .05 1010 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 916 1010 110 110 100 110 .1 .3

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

 -100 903.08 4454.02 1024.18 1395.02 4454

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 5.66666*

INPUT

Description: num= 43
 Station Elevation Data num= 43
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -66.67 4454.57 -42.4 4453.99 6.12 4452.58 30.38 4451.94 39.81 4451.97
 146.29 4452.59 151.69 4452.63 152.66 4452.36 214.44 4451.65 224.48 4451.58
 250.64 4451.65 252.77 4451.44 321.52 4451.21 359.25 4451.09 418.57 4450.97
 465.73 4450.9 466.8 4450.9 515.62 4450.56 526.42 4450.48 572.21 4450.63
 591.31 4450.6 678.69 4450.6 709.71 4450.66 734.06 4450.73 768.13 4450.45
 785.17 4450.5 806.76 4450.75 808.59 4450.77 901.86 4451.19 909.63 4452.73
 919.33 4452.73 949.09 4444.03 949.47 4443.96 972.33 4443.5 991.29 4444.33
 993.5 4444.59 1026.67 4452.12 1036.12 4452.97 1040.85 4451.31 1092.85 4451.28
 1113.34 4451.36 1233.95 4451.98 1330.01 4453.59

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -66.67 .085 919.33 .05 1026.67 .08
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 919.33 1026.67 110 100 110 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 5.33333*

INPUT
 Description:
 Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
33.33	4452.83	-9.81	4452.39	37.24	4451.36	60.76	4450.88	69.91	4450.83
173.15	4450.95	178.38	4450.96	179.32	4450.83	239.22	4450.42	248.95	4450.46
274.32	4450.67	276.39	4450.27	343.04	4450.03	379.63	4449.89	437.14	4449.83
482.87	4449.8	483.9	4449.8	531.23	4449.22	541.71	4449.09	586.11	4449.52
604.63	4449.5	689.34	4449.5	719.42	4449.61	743.03	4449.72	776.07	4449.07
792.58	4449.15	813.52	4449.6	815.3	4449.64	905.73	4449.89	913.26	4450.66
922.67	4450.67	953.54	4440.06	953.94	4440.03	977.67	4439.6	1000.57	4440.06
1003.25	4440.2	1043.33	4450.73	1050.24	4450.85	1053.7	4450.02	1091.7	4450.07
1106.67	4450.13	1194.81	4450.86	1265.01	4452.01				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -33.33 .085 922.67 .05 1043.33 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 922.67 1043.33 110 100 110 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 5

INPUT
 Description: XS E
 Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4451.1	100	4449.7	200	4449.3	264	4449.2	298	4449.7
300	4449.1	400	4448.7	500	4448.7	501	4448.7	557	4447.7
600	4448.4	700	4448.4	752	4448.7	784	4447.7	800	4447.8
822	4448.5	926	4448.6	958	4436.1	983	4435.7	1013	4435.8
1060	4448.7	1100	4448.9	1200	4450.42				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .085 926 .05 1060 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 926 1060 276.25 283.75 276.25 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 4.75*

INPUT
 Description:
 Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4448.2	90.09	4447.13	149.24	4446.93	180.18	4446.82	237.84	4446.74
268.47	4447.1	270.28	4446.65	298.47	4446.56	360.37	4446.25	447.71	4446.1
450.46	4446.1	451.36	4446.09	501.81	4445.25	540.55	4445.7	596.95	4445.6
629.78	4445.58	630.64	4445.57	677.49	4445.5	704.48	4444.62	706.32	4444.56
720	4444.51	740.56	4444.88	778.63	4444.59	834.25	4444.62	871.44	4443.3

871.87	4433.45	894.34	4433.02	901.25	4432.88	922.32	4433.4	932.71	4433.25
939.87	4434.53	960.06	4438.42	961.81	4439.99	968.83	4441.24	982	4445
1016.67	4445.18	1030	4445.25	1083.33	4445.83	1112	4446.13	1140	4446.75
1147.33	4447.61	1150	4447.87						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	834.25	.05	982	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

834.25	982	276.25	283.75	276.25	.1	.3
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CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 4.5*

INVERT

Description: Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4445.3	80.18	4444.57	132.82	4444.42	160.37	4444.34
238.95	4444.51	240.55	4444.21	265.65	4444.14	320.74	4443.79
400.92	4443.49	401.72	4443.49	446.63	4442.8	481.1	4443.01
560.52	4442.75	561.29	4442.74	602.98	4442.29	627	4441.48
641.47	4441.23	659.11	4441.25	693	4440.65	742.51	4440.63
785.73	4430.81	811.56	4430.25	819.5	4430.05	841.54	4431.03
859.91	4431.39	881.04	4433.88	882.88	4436.56	890.22	4437.23
944.44	4441.52	960	4441.59	1022.22	4442.09	1055.67	4442.32
1096.89	4444.84	1100	4445.31				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	742.51	.05	904	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

742.51	904	276.25	283.75	276.25	.1	.3
--------	-----	--------	--------	--------	----	----

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 4.25*

INVERT

Description: Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4442.4	70.28	4442	116.41	4441.91	140.55	4441.86
209.42	4441.92	210.83	4441.76	232.82	4441.72	281.1	4441.34
351.38	4440.88	352.08	4440.88	391.44	4440.35	421.66	4440.31
491.26	4439.92	491.93	4439.91	528.48	4439.08	549.53	4438.33
562.21	4437.94	577.67	4437.63	607.37	4436.7	650.76	4436.65
699.6	4428.16	728.78	4427.47	737.75	4427.23	760.77	4428.67
779.96	4428.24	802.02	4429.34	803.94	4433.13	811.61	4433.21
872.22	4437.86	890	4437.94	961.11	4438.34	999.33	4438.51
1046.44	4442.07	1050	4442.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	650.76	.05	826	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

650.76	826	276.25	283.75	276.25	.1	.3
--------	-----	--------	--------	--------	----	----

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 4

INPUT

Description: XS D
 Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4439.5	100	4439.4	200	4439.3	300	4438.3	400	4437.2
422	4437.1	472.05	4435.19	521.74	4432.75	559.01	4432.66	612.84	4425.53
546	4424.7	656	4424.4	680	4426.3	700	4425.1	723	4424.8
725	4429.7	733	4429.2	748	4433.9	800	4434.2	900	4434.6
943	4434.7	985	4436.1	996	4439.3	1000	4440.2		

Manning's n Values

num= 3

Sta	n Val	Sta	n Val
0	.075	559.01	.05
748	.08		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 559.01 748 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek

REACH: Alpine RS: 3.83333*

INPUT

Description: XS D
 Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4436.7	1.68	4436.58	75.56	4436.08	92.52	4435.99	142.73	4435.72
167.91	4435.6	185.03	4435.58	277.55	4434.71	335.83	4434.11	364.37	4433.94
370.06	4433.85	390.42	4433.63	436.72	4431.73	455.05	4430.8	482.69	4429.85
485.27	4429.87	503.74	4429.81	517.17	4429.8	530.94	4427.73	537.82	4426.03
565.55	4422.48	595.35	4421.63	604.33	4421.33	626.68	4423.15	628.13	4423.09
645.3	4422.45	645.58	4422.45	666.72	4422.42	668.58	4426.53	669.38	4426.49
676.03	4426.22	690	4430.35	740.21	4430.58	777.6	4430.7	794.63	4431.46
811.67	4431.76	836.77	4432.21	878.29	4432.88	918.85	4434.63	929.47	4437.44
933.33	4438.25								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val
0	.075	517.17	.05
690	.08		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 517.17 690 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek

REACH: Alpine RS: 3.66566*

INPUT

Description: XS D
 Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4433.9	1.54	4433.67	69.45	4432.75	85.03	4432.58	131.18	4432.1
154.33	4431.88	170.06	4431.85	255.1	4431.11	308.66	4430.6	334.9	4430.61
340.13	4430.49	358.84	4430.16	401.4	4428.27	418.24	4427.38	443.65	4426.95
446.02	4427	462.99	4426.93	475.34	4426.94	487.55	4424.82	493.65	4422.44
518.26	4419.43	544.69	4418.56	552.67	4418.27	573.36	4420	574.7	4419.97
590.61	4419.79	590.86	4419.8	610.44	4420.04	612.17	4423.35	612.9	4423.33
619.07	4423.24	632	4426.8	680.42	4426.96	716.48	4427.04	732.91	4428.48
749.33	4429.03	773.54	4429.62	813.59	4431.07	852.7	4433.15	862.94	4435.59
866.67	4436.3								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val
0	.075	517.17	.05
690	.08		

0 .075 475.34 .05 632 .08
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 475.34 632 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3.5*

INPUT

Description:
 Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4431.1	1.41	4430.75	63.34	4429.41	77.55	4429.17	119.64	4428.47
140.75	4428.16	155.1	4428.13	232.65	4427.52	281.5	4427.1	305.42	4427.28
310.19	4427.14	327.26	4426.68	366.07	4424.81	381.43	4423.96	404.6	4424.05
406.76	4424.12	422.25	4424.05	433.51	4424.08	444.16	4421.92	449.49	4418.86
470.97	4416.38	494.04	4415.49	501	4415.2	520.04	4416.85	521.28	4416.85
515.91	4417.14	536.15	4417.15	554.16	4417.67	555.75	4420.18	556.43	4420.17
562.1	4420.26	574	4423.25	620.63	4423.34	655.36	4423.38	671.18	4425.51
687	4426.3	710.32	4427.42	748.88	4429.25	786.55	4431.68	796.41	4433.73
800	4434.35								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	433.51	.045	574	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 433.51 574 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3.33333*

INPUT

Description:
 Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4428.3	1.27	4427.83	57.22	4426.07	70.06	4425.76	108.09	4424.85
127.17	4424.44	140.13	4424.41	210.19	4423.93	254.33	4423.6	275.95	4423.96
280.26	4423.78	295.67	4423.21	330.74	4421.35	344.62	4420.54	365.56	4421.15
367.51	4421.25	381.5	4421.17	391.67	4421.22	400.77	4419.01	405.33	4415.27
423.67	4413.33	443.39	4412.42	449.33	4412.13	466.72	4413.71	467.85	4413.74
481.22	4414.48	481.43	4414.5	497.88	4415.29	499.33	4417	499.95	4417.02
505.13	4417.28	516	4419.7	560.85	4419.72	594.24	4419.72	609.45	4422.54
624.67	4423.57	647.09	4425.03	684.17	4427.43	720.4	4430.21	729.88	4431.88
733.33	4432.4								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	391.67	.045	516	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 391.67 516 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3.16666*

INPUT

Description:
 Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4425.5	1.14	4424.92	51.11	4422.74	62.58	4422.35	96.55	4421.22
113.58	4420.72	125.16	4420.68	187.74	4420.33	227.17	4420.1	246.47	4420.63

250.32 4420.43 264.09 4419.74 295.41 4417.89 307.81 4417.12 326.51 4418.25
 328.25 4418.37 340.75 4418.28 349.83 4418.36 357.39 4416.11 361.16 4411.69
 376.38 4410.28 392.74 4409.35 397.67 4409.07 413.41 4410.56 414.43 4410.62
 426.52 4411.83 426.72 4411.85 441.61 4412.91 442.92 4413.83 443.48 4413.86
 448.16 4414.29 458 4416.15 501.06 4416.1 533.12 4416.06 547.73 4419.57
 562.33 4420.83 583.86 4422.64 619.47 4425.61 654.25 4428.73 663.35 4430.02
 666.67 4430.45

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .075 349.83 .045 458 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 349.83 458 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3

INPUT
 Description: XS C
 Station Elevation Data num= 22
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4422.7 1 4422 45 4419.4 85 4417.6 100 4417
 200 4416.6 217 4417.3 271 4413.7 289 4415.5 300 4415.4
 308 4415.5 314 4413.2 317 4408.1 346 4406 361 4407.5
 372 4409.2 387 4410.7 400 4412.6 472 4412.4 486 4416.6
 500 4418.1 600 4428.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .075 308 .045 400 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 308 400 35 40 35 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 2.5

INPUT
 Description: Additional XS for bridge copied from sta. 2
 Station Elevation Data num= 27
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -450 4429.3 0 4422.9 70 4421.2 71 4420.6 100 4420
 200 4420.3 294 4421.7 294 4418.9 306 4415.5 313 4414.2
 314 4410.1 320 4408.1 328 4406.2 335 4405.5 346 4406.6
 351 4406.3 358 4405.4 366 4406.4 372 4409.1 376 4411.5
 380 4412.6 386 4413.8 400 4419.1 400 4423.8 500 4426.3
 582 4432.4 600 4433.3

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 -450 .09 294 .045 400 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 294 400 50 50 .3 .5

Ineffective Flow num= 1
 Sta L Sta R Elev

 -450 294 4421.7

BRIDGE RIVER: Alpine Creek
 REACH RS: 2.3

INPUT

Description: Hendrix St., Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 35
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Sk-w =
 Upstream Deck/Roadway Coordinates
 num=

2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 294 4421.7 4420.3 400 4423.8 4422.6

Upstream Bridge Cross Section Data

Station Elevation Data		num= 27	
Sta	Elev	Sta	Elev
450	4429.3	0	4422.9
200	4420.3	294	4421.7
314	4410.1	320	4408.1
351	4406.3	358	4405.4
380	4412.6	386	4413.8
582	4432.4	600	4433.3

Manning's n Values

num= 3
 Sta n Val Sta n Val Sta n Val
 294 4421.7 4420.3 400 4423.8 4422.6
 -450 .09 294 .045 400 .075

Bank Sta: Left Right Coeff Contr. Expan.
 294 400 .3 .5

Ineffective Flow

num= 1
 Sta L Sta R Elev
 -450 294 4421.7

Downstream Deck/Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 294 4421.7 4420.3 400 4423.8 4422.6

Downstream Bridge Cross Section Data

Station Elevation Data		num= 27	
Sta	Elev	Sta	Elev
450	4429.3	0	4422.9
200	4420.3	294	4421.7
314	4410.1	320	4408.1
351	4406.3	358	4405.4
380	4412.6	386	4413.8
582	4432.4	600	4433.3

Manning's n Values

num= 3
 Sta n Val Sta n Val Sta n Val
 294 4421.7 4420.3 400 4423.8 4422.6
 -450 .09 294 .045 400 .075

Bank Sta: Left Right Coeff Contr. Expan.
 294 400 .3 .5

Ineffective Flow

num= 1
 Sta L Sta R Elev
 -450 294 4421.7

Upstream Embankment side slope

Downstream Embankment side slope = 0 horiz. to 1.0 vertical

= 0 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4421.7
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data
 Pier Station Upstream= 320 Downstream= 320
 Upstream num= 2

Width Elev Width Elev

 2 4400 2 4421.5
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4421.5

Pier Data
 Pier Station Upstream= 351 Downstream= 351
 Upstream num= 2

Width Elev Width Elev

 2 4400 2 4422
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4422

Pier Data
 Pier Station Upstream= 380 Downstream= 380
 Upstream num= 2

Width Elev Width Elev

 2 4400 2 4423
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4423

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy Cd = 1.2
 Momentum KVal = .9
 Yarnell
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 2

INFUT

Description: XS B -- Hendrix
 Station Elevation Data num= 27
 Sta Elev Sta Elev Sta Elev Sta Elev
 *****)

-450	4429.3	0	4422.9	70	4421.2	71	4420.6	100	4420
200	4420.3	294	4421.7	294	4418.9	306	4415.5	313	4414.2
314	4410.1	320	4408.1	328	4406.2	335	4405.5	346	4406.6
351	4406.3	358	4405.4	366	4406.4	372	4409.1	376	4411.5
380	4412.6	386	4413.8	400	4419.1	400	4423.8	500	4426.3
582	4432.4	600	4433.3						

Manning's n Values num= 3
 Sta n Val Sta n Val

 -450 .09 294 .045 400 .075

Bank Sta: Left 294 Right 400 Lengths: Left Channel 128.33 Right 109.33
 Coeff Contr. .3 Expan. .5

Ineffective Flow num= 1
 Sta L Sta R Elev

 -450 294 4421.7

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 1.66666*

INPUT

Description:
 Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	4426.07	244.5	4425.32	-153.94	4423.53	-7.88	4420.93	88.52	4420.07
88.71	4420.06	98.75	4419.65	113.35	4417.4	138.18	4416.74	149.18	4416.5
150.04	4416.1	175.09	4415.62	261.47	4415.54	284.24	4415.73	342.67	4416.63
342.67	4414.77	351.67	4411.82	356.92	4410.55	357.67	4407.76	360.67	4406.64
362.17	4406.18	368.17	4404.83	373.42	4404.3	381.67	4404.92	385.42	4404.67
390.67	4404	397.97	4404.8	403.44	4406.7	407.1	4408.36	409.22	4408.83
410.75	4409.33	416.22	4410.83	429	4416	429	4419.13	439.68	4419.39
521.86	4420.58	537.47	4420.78	541.17	4420.84	570.34	4422.22	587.59	4424.12
604.03	4425.01	633.14	4426.71	653.33	4427.6				

Manning's n Values num= 3
 Sta n Val Sta n Val

 -300 .09 342.67 .045 429 .075

Bank Sta: Left 342.67 Right 429 Lengths: Left Channel 128.33 Right 109.33
 Coeff Contr. .3 Expan. .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 1.33333*

INPUT

Description:
 Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-150	4422.83	-103.25	4422.26	-26.97	4420.17	96.06	4417.36	177.26	4417.23
177.42	4417.22	185.87	4416.67	198.18	4412.6	219.09	4411.97	228.35	4411.8
229.08	4411.59	250.18	4411.23	322.94	4410.78	342.12	4410.76	391.33	4411.57
391.33	4410.63	397.33	4408.13	400.83	4406.9	401.33	4405.42	403.33	4404.52
404.33	4404.26	408.33	4403.47	411.83	4403.09	417.33	4403.24	419.83	4403.04
423.33	4402.6	429.94	4403.2	434.89	4404.29	438.19	4405.22	440.11	4405.51
441.49	4406.06	446.44	4407.86	458	4412.9	458	4414.47	469.84	4414.75
560.93	4415.29	578.23	4415.34	582.33	4415.39	614.67	4416.21	633.8	4418.86
652.01	4419.56	684.29	4421.03	706.67	4421.9				

Manning's n Values num= 3
 Sta n Val Sta n Val

 -150 .09 391.33 .045 458 .075

Bank Sta: Left 391.33 Right 458 Lengths: Left Channel 109.33 Right 128.33 Coeff Contr. .1 Expan. .3
 109.33 128.33 109.33

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 1

INPUT

Description: XS A	Sta	Elev	Sta	Elev	num=	Sta	Elev	Sta	Elev	Sta	Elev
Station Elevation Data	21										
0	4419.6	38	4419.2	100	4416.8	200	4413.8	266	4414.4		
273	4413.7	283	4407.8	300	4407.2	400	4405.8	440	4406.5		
446	4402.4	456	4401.2	471	4402.2	487	4409.8	500	4410.1		
600	4410	619	4409.9	659	4410.2	680	4413.6	700	4414.1		
760	4416.2										

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 440 .045 487 .075

Bank Sta: Left 440 Right 487 Coeff Contr. .1 Expan. .3

SUMMARY OF MANNING'S N VALUES

River: Alpine Creek	Reach	Sta	Sta	n	Sta	Sta	n	Sta	Sta	n	Sta	Sta	n	Sta	Sta	n
* Alpine	19	*	*	.085	*	*	.085	*	*	.085	*	*	.085	*	*	.085
* Alpine	18.8*	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	18.6*	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	18.4*	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	18.2*	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	18	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	17.8842*	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	17.7685*	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	17.6528*	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	17.5371*	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	17.4214	*	*	.085	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	17.3	*	*	*Bridge	*	*	.045	*	*	.085	*	*	.085	*	*	.085
* Alpine	17.2	*	*	.11	*	*	.04	*	*	.11	*	*	.11	*	*	.11
* Alpine	17.15*	*	*	.112	*	*	.04	*	*	.117	*	*	.117	*	*	.117
* Alpine	17.1*	*	*	.115	*	*	.04	*	*	.125	*	*	.125	*	*	.125
* Alpine	17.05*	*	*	.117	*	*	.04	*	*	.132	*	*	.132	*	*	.132
* Alpine	17	*	*	.12	*	*	.04	*	*	.14	*	*	.14	*	*	.14
* Alpine	16.7	*	*	*Bridge	*	*	.04	*	*	.14	*	*	.14	*	*	.14
* Alpine	16.5	*	*	.12	*	*	.04	*	*	.14	*	*	.14	*	*	.14
* Alpine	16.25*	*	*	.12	*	*	.04	*	*	.14	*	*	.14	*	*	.14
* Alpine	16.1*	*	*	.12	*	*	.04	*	*	.14	*	*	.14	*	*	.14
* Alpine	15.75*	*	*	.12	*	*	.045	*	*	.14	*	*	.14	*	*	.14
* Alpine	15.5	*	*	.12	*	*	.045	*	*	.14	*	*	.14	*	*	.14
* Alpine	15.3333*	*	*	.12	*	*	.045	*	*	.14	*	*	.14	*	*	.14
* Alpine	15.1666*	*	*	.12	*	*	.045	*	*	.095	*	*	.095	*	*	.095
* Alpine	15	*	*	.13	*	*	.045	*	*	.095	*	*	.095	*	*	.095
* Alpine	14.8333*	*	*	.13	*	*	.045	*	*	.095	*	*	.095	*	*	.095
* Alpine	14.6666*	*	*	.15	*	*	.045	*	*	.15	*	*	.15	*	*	.15
* Alpine	14.5	*	*	.15	*	*	.045	*	*	.15	*	*	.15	*	*	.15
* Alpine	14.3	*	*	*Bridge	*	*	.045	*	*	.15	*	*	.15	*	*	.15
* Alpine	14	*	*	.15	*	*	.045	*	*	.15	*	*	.15	*	*	.15
* Alpine	13.75*	*	*	.15	*	*	.045	*	*	.15	*	*	.15	*	*	.15
* Alpine	13.5	*	*	.15	*	*	.045	*	*	.15	*	*	.15	*	*	.15

Alpine	13.25	*	.125*	.045*	.145*	.145*
*Alpine	13	*	.1*	.045*	.14*	.14*
*Alpine	12.9	*Culvert		*	*	*
Alpine	12.7		.1	.045*	.14*	.14*
Alpine	12.6333			.045*	.14*	.14*
Alpine	12.5666		.1*	.045*	.14*	.14*
Alpine	12.5		.1	.045*	.14*	.14*
Alpine	12		.135	.045*	.15*	.15*
*Alpine	11.9	*Bridge		*	*	*
Alpine	11.7		.135	.045*	.15*	.15*
Alpine	11.6333		.135*	.045*	.15*	.15*
Alpine	11.5666		.135*	.045*	.15*	.15*
Alpine	11.5		.135	.045*	.15*	.15*
Alpine	11.4666		.13*	.045*	.13*	.13*
Alpine	11.4333		.13*	.045*	.13*	.13*
Alpine	11.4		.13	.045*	.13*	.13*
*Alpine	11.3	*Bridge		*	*	*
Alpine	11		.13	.045*	.13*	.13*
Alpine	10.6666		.13*	.045*	.13*	.13*
Alpine	10.3333		.13*	.045*	.13*	.13*
Alpine	10		.13	.045*	.13*	.13*
Alpine	9.9		.13	.045*	.13*	.13*
Alpine	9.8		.1	.045*	.13*	.13*
Alpine	9.7		.1	.045*	.13*	.13*
Alpine	9.63333		.1*	.045*	.13*	.13*
Alpine	9.56666		.1*	.05*	.13*	.13*
Alpine	9.5		.1	.05*	.13*	.13*
*Alpine	9.3	*Bridge		*	*	*
Alpine	8.66666		.1*	.05*	.13*	.13*
Alpine	8.33333		.1*	.05*	.13*	.13*
Alpine	8		.1	.05*	.13*	.13*
Alpine	7.8		.1	.05*	.13*	.13*
Alpine	7.6		.1	.05*	.13*	.13*
Alpine	7.4		.12	.05*	.95*	.95*
Alpine	7.2		.12	.05*	.95*	.95*
Alpine	7		.12	.05*	.095*	.095*
*Alpine	6.7	*Bridge		*	*	*
Alpine	6.5		.12	.05*	.095*	.095*
Alpine	6.375		.09*	.05*	.09*	.09*
Alpine	6.25		.09*	.05*	.09*	.09*
Alpine	6.125		.09*	.05*	.085*	.085*
Alpine	6		.09	.05*	.085*	.085*
Alpine	5.66666		.085*	.05*	.08*	.08*
Alpine	5.33333		.085*	.05*	.08*	.08*
Alpine	5		.085	.05*	.08*	.08*
Alpine	4.75		.08*	.05*	.08*	.08*
Alpine	4.5		.08*	.05*	.08*	.08*
Alpine	4.25		.08*	.05*	.08*	.08*
Alpine	4		.075	.05*	.08*	.08*
Alpine	3.83333		.075*	.05*	.08*	.08*
Alpine	3.66666		.075*	.05*	.08*	.08*
Alpine	3.5		.075*	.045*	.08*	.08*
Alpine	3.33333		.075*	.045*	.08*	.08*
Alpine	3.16666		.075*	.045*	.08*	.08*
Alpine	3		.075	.045*	.08*	.08*
Alpine	2.5		.09	.045*	.075*	.075*
*Alpine	2.3	*Bridge		*	*	*
Alpine	2		.09	.045*	.075*	.075*
Alpine	1.66666		.09*	.045*	.075*	.075*
Alpine	1.33333		.09*	.045*	.075*	.075*
Alpine	1		.09	.045*	.075*	.075*

River: Alpine Creek

Reach	River Sta.	Left	Channel	Right
Alpine	19	403.99	486*	403.99*
Alpine	18.8	403.99*	486*	403.99*
Alpine	18.6	403.99*	486*	403.99*
Alpine	18.4	403.99*	486*	403.99*
Alpine	18.2	403.99*	486*	403.99*
Alpine	18	130.74	140*	130.74*
Alpine	17.8842	130.74*	140*	130.74*
Alpine	17.7685	130.74*	140*	130.74*
Alpine	17.6528	130.74*	140*	130.74*
Alpine	17.5371	130.74*	140*	130.74*
Alpine	17.4214	60	60*	60*
*Alpine	17.3	*Bridge	*	*
Alpine	17.2	104.07	112.5*	104.07*
Alpine	17.15	104.07*	112.5*	104.07*
Alpine	17.1	104.07*	112.5*	104.07*
Alpine	17.05	104.07*	112.5*	104.07*
Alpine	17	60	60*	60*
*Alpine	16.7	*Bridge	*	*
Alpine	16.5	129.04	150*	129.04*
Alpine	16.25	129.04*	150*	129.04*
Alpine	16.4	129.04	150*	129.04*
Alpine	15.75	129.04*	150*	129.04*
Alpine	15.5	94.63	110*	94.63*
Alpine	15.3333	94.63*	110*	94.63*
Alpine	15.1666	94.63*	110*	94.63*
Alpine	15	63.33	63.33*	63.33*
Alpine	14.8333	63.33*	63.33*	63.33*
Alpine	14.6666	63.33*	63.33*	63.33*
Alpine	14.5	30	30*	30*
*Alpine	14.3	*Bridge	*	*
Alpine	14	45	45*	45*
Alpine	13.75	45*	45*	45*
Alpine	13.5	45	45*	45*
Alpine	13.25	45*	45*	45*
Alpine	13	60	60*	60*
*Alpine	12.9	*Culvert	*	*
Alpine	12.7	75	75*	75*
Alpine	12.6333	75*	75*	75*
Alpine	12.5666	75*	75*	75*
Alpine	12.5	50	50*	50*
Alpine	12	60	60*	60*
*Alpine	11.9	*Bridge	*	*
Alpine	11.7	80	126.67*	80*
Alpine	11.6333	80*	126.67*	80*
Alpine	11.5666	80*	126.67*	80*
Alpine	11.5	53.33	53.33*	53.33*
Alpine	11.4666	53.33*	53.33*	53.33*
Alpine	11.4333	53.33*	53.33*	53.33*
Alpine	11.4	50	50*	50*
*Alpine	11.3	*Bridge	*	*
Alpine	11	106.67	106.67*	106.67*
Alpine	10.6666	106.67*	106.67*	106.67*
Alpine	10.3333	106.67*	106.67*	106.67*
Alpine	10	108.17	120.83*	109.17*
Alpine	9.9	109.17*	120.83*	109.17*
Alpine	9.8	109.17*	120.83*	109.17*
Alpine	9.7	109.17	120.83*	109.17*
Alpine	9.63333	109.17*	120.83*	109.17*
Alpine	9.56666	109.17*	120.83*	109.17*
Alpine	9.5	70	70*	70*
*Alpine	9.3	*Bridge	*	*
Alpi	9	83.33	87.33*	83.33*

* Alpine	* 8.66666*	* 83.33*	* 87.33*	* 83.33*	* 83.33*
* Alpine	* 8.33333*	* 83.33*	* 87.33*	* 83.33*	* 83.33*
* Alpine	* 8	* 143	* 143	* 143	* 143
* Alpine	* 7.8*	* 143	* 143	* 143	* 143
* Alpine	* 7.6*	* 143	* 143	* 143	* 143
* Alpine	* 7.4*	* 143	* 143	* 143	* 143
* Alpine	* 7.2*	* 143	* 143	* 143	* 143
* Alpine	* 7	* 60*	* 60*	* 60*	* 60*
* Alpine	* 6.7	* Bridge	* *	* *	* *
* Alpine	* 6.5	* 141.25*	* 143.75*	* 141.25*	* 141.25*
* Alpine	* 6.375*	* 141.25*	* 143.75*	* 141.25*	* 141.25*
* Alpine	* 6.25*	* 141.25*	* 143.75*	* 141.25*	* 141.25*
* Alpine	* 6.125*	* 141.25*	* 143.75*	* 141.25*	* 141.25*
* Alpine	* 6	* 110*	* 100*	* 110*	* 110*
* Alpine	* 5.66666*	* 110*	* 100*	* 110*	* 110*
* Alpine	* 5.33333*	* 110*	* 100*	* 110*	* 110*
* Alpine	* 5	* 276.25*	* 283.75*	* 276.25*	* 276.25*
* Alpine	* 4.75*	* 276.25*	* 283.75*	* 276.25*	* 276.25*
* Alpine	* 4.5*	* 276.25*	* 283.75*	* 276.25*	* 276.25*
* Alpine	* 4.25*	* 276.25*	* 283.75*	* 276.25*	* 276.25*
* Alpine	* 4	* 281.65*	* 298*	* 281.65*	* 281.65*
* Alpine	* 3.83333*	* 281.65*	* 298*	* 281.65*	* 281.65*
* Alpine	* 3.66666*	* 281.65*	* 298*	* 281.65*	* 281.65*
* Alpine	* 3.5*	* 281.65*	* 298*	* 281.65*	* 281.65*
* Alpine	* 3.33333*	* 281.65*	* 298*	* 281.65*	* 281.65*
* Alpine	* 3.16666*	* 281.65*	* 298*	* 281.65*	* 281.65*
* Alpine	* 3	* 35*	* 40*	* 35*	* 35*
* Alpine	* 2.5	* 50*	* 50*	* 50*	* 50*
* Alpine	* 2.3	* Bridge	* *	* *	* *
* Alpine	* 2	* 109.33*	* 128.33*	* 109.33*	* 109.33*
* Alpine	* 1.66666*	* 109.33*	* 128.33*	* 109.33*	* 109.33*
* Alpine	* 1.33333*	* 109.33*	* 128.33*	* 109.33*	* 109.33*
* Alpine	* 1	* *	* *	* *	* *

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
 River: Alpine Creek

* Reach	* River Sta.	* Contr.	* Expan.
* Alpine	* 19	* .1*	* .3*
* Alpine	* 18.8*	* .1*	* .3*
* Alpine	* 18.6*	* .1*	* .3*
* Alpine	* 18.4*	* .1*	* .3*
* Alpine	* 18.2*	* .1*	* .3*
* Alpine	* 18	* .1*	* .3*
* Alpine	* 17.8842*	* .1*	* .3*
* Alpine	* 17.7685*	* .1*	* .3*
* Alpine	* 17.6528*	* .1*	* .3*
* Alpine	* 17.5371*	* .3*	* .5*
* Alpine	* 17.4214*	* .3*	* .5*
* Alpine	* 17.3	* Bridge	* *
* Alpine	* 17.2	* .3*	* .5*
* Alpine	* 17.15*	* .3*	* .5*
* Alpine	* 17.1*	* .3*	* .5*
* Alpine	* 17.05*	* .3*	* .5*
* Alpine	* 17	* .3*	* .5*
* Alpine	* 16.7	* Bridge	* *
* Alpine	* 16.5	* .3*	* .5*
* Alpine	* 16.25*	* .3*	* .5*
* Alpine	* 16*	* .1*	* .3*
* Alpine	* 15.75*	* .1*	* .3*
* Alpine	* 15.5	* .1*	* .3*
* Alpine	* 15.3333*	* .1*	* .3*

*Alpine	15.1666**	.1*	.3*
Alpine	15	.1	.3*
*Alpine	14.8333**	.1*	.3*
*Alpine	14.6666**	.3*	.5*
Alpine	14.5	.3	.5*
*Alpine	14.3	*Bridge	.5*
Alpine	14	.3	.5*
Alpine	13.75	.3*	.5*
Alpine	13.5	.1	.3*
Alpine	13.25	.3*	.5*
Alpine	13	.3	.5*
*Alpine	12.9	*Culvert	.5*
Alpine	12.7	.3	.5*
*Alpine	12.6333**	.3*	.5*
*Alpine	12.5666**	.1*	.3*
Alpine	12.5	.3	.5*
Alpine	12	.3	.5*
*Alpine	11.9	*Bridge	.5*
Alpine	11.7	.3	.5*
*Alpine	11.6333**	.3*	.5*
*Alpine	11.5666**	.3*	.5*
Alpine	11.5	.1	.3*
*Alpine	11.4666**	.1*	.3*
*Alpine	11.4333**	.3*	.5*
Alpine	11.4	.3	.5*
*Alpine	11.3	*Bridge	.5*
Alpine	11	.3	.5*
*Alpine	10.6666**	.3*	.5*
*Alpine	10.3333**	.1*	.3*
Alpine	10	.1	.3*
Alpine	9.9	.1*	.3*
Alpine	9.8	.1*	.3*
Alpine	9.7	.1	.3*
*Alpine	9.6333**	.1*	.3*
*Alpine	9.5666**	.3*	.5*
Alpine	9.5	.3	.5*
*Alpine	9.3	*Bridge	.5*
*Alpine	8.6666**	.3*	.5*
*Alpine	8.3333**	.1*	.3*
Alpine	8	.1	.3*
Alpine	7.8	.1*	.3*
Alpine	7.6	.1*	.3*
Alpine	7.4	.1*	.3*
Alpine	7.2	.3*	.5*
Alpine	7	.3	.5*
*Alpine	6.7	*Bridge	.5*
Alpine	6.5	.3	.5*
Alpine	6.375	.3*	.5*
Alpine	6.25	.1*	.3*
Alpine	6.125	.1*	.3*
Alpine	6	.1	.3*
*Alpine	5.6666**	.1*	.3*
*Alpine	5.3333**	.1*	.3*
Alpine	5	.1	.3*
Alpine	4.75	.1*	.3*
Alpine	4.5	.1*	.3*
Alpine	4.25	.1*	.3*
Alpine	4	.1	.3*
*Alpine	3.8333**	.1*	.3*
*Alpine	3.6666**	.1*	.3*
Alpine	3.5	.1*	.3*
*Alpine	3.3333**	.1*	.3*
*Alpine	3.1666**	.1*	.3*
Alpine	3	.3	.5*
Alpine	2.5	.3	.5*
*Alpi	2.3	*Bridge	.5*

*Alpine * 2 * .3* .5*
*Alpine * 1.66666** .3* .5*
*Alpine * 1.33333** .1* .3*
*Alpine * 1 * .1* .3*

HEC-RAS September 1998 Version 2.2
 U.S. Army Corp of Engineers
 Hydrologic Engineering Center
 609 Second Street, Suite D
 Davis, California 95616-4687
 (916) 756-1104

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PROJECT DATA

Project Title: Alpine Creek -- Preliminary Design
 Project File : alpctrk.prj
 Run Date and Time: 7/18/01 4:38:31 PM

Project in English units

Project Description:

Alpine Creek, Texas Preliminary Design. Study done under a grant from the Texas Water Development Board.

PLAN DATA

Plan Title: Opt. E
 Plan File : D:\Projects\Alpine\ras\model\alpctrk.p06

Geometry Title: Opt. E
 Geometry File : D:\Projects\Alpine\ras\model\alpctrk.gll

Flow Title : Effective FIS flows
 Flow File : D:\Projects\Alpine\ras\model\alpctrk.f01

Plan Description:
 Channel cut beginning from 2nd St. to UFRR at a slope of 0.00805 and from UFRR to Medina Park at a slope of 0.00835.

Plan Summary Information:

Number of: Cross Sections = 91 Multiple Openings = 0
 Culverts = 1 Inline Weirs = 0
 Bridges = 13

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 where necessary
 Conveyance Calculation Method: At breaks in n values only
 Friction Slope Method: Average Conveyance
 Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Effective FIS flows
 Flow File : D:\Projects\Alpine\ras\model\alpcrk.f01

Flow Data (cfs)

River	Reach	RS	2yr	5yr	10yr	25yr	50yr	100yr	500yr
Alpine Creek	Alpine	19	419	1699	3811	6145	8007	11240	17447
Alpine Creek	Alpine	15	427	1691	3681	5806	7570	10719	16930
Alpine Creek	Alpine	14	427	1691	3678	5796	7538	10704	16916
Alpine Creek	Alpine	13	427	1691	3675	5790	7550	10695	16906
Alpine Creek	Alpine	12	427	1691	3670	5777	7534	10675	16887
Alpine Creek	Alpine	11	428	1690	3666	5765	7517	10656	16867
Alpine Creek	Alpine	9	428	1690	3655	5736	7481	10612	16824
Alpine Creek	Alpine	5	430	1688	3624	5657	7379	10490	16703
Alpine Creek	Alpine	4	445	1687	3895	5635	7910	11340	18295
Alpine Creek	Alpine	1	448	1720	3881	6035	7845	11182	18075

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Alpine Creek	Alpine	2yr	Normal S = .00969	Normal S = .010433
Alpine Creek	Alpine	5yr	Normal S = .00969	Normal S = .010433
Alpine Creek	Alpine	10yr	Normal S = .00969	Normal S = .010433
Alpine Creek	Alpine	25yr	Normal S = .00969	Normal S = .010433
Alpine Creek	Alpine	50yr	Normal S = .00969	Normal S = .010433
Alpine Creek	Alpine	100yr	Normal S = .00969	Normal S = .010433
Alpine Creek	Alpine	500yr	Normal S = .00969	Normal S = .010433

Observed Water Surface Marks

River	Reach	RS	2yr	5yr	10yr	25yr	50yr	100yr	500yr
Alpine Creek	Alpine	19						4527	
Alpine Creek	Alpine	18						4506	
Alpine Creek	Alpine	17						4498.3	
Alpine Creek	Alpine	15						4490.8	
Alpine Creek	Alpine	14						4490.3	
Alpine Creek	Alpine	13						4488.1	
Alpine Creek	Alpine	12.5						4485.4	
Alpine Creek	Alpine	12						4482.5	
Alpine Creek	Alpine	11.5						4477.8	
Alpine Creek	Alpine	11						4476.5	
Alpine Creek	Alpine	10						4473.2	
Alpine Creek	Alpine	9						4469	
Alpine Creek	Alpine	8						4466.5	
Alpine Creek	Alpine	7						4460.3	
Alpine Creek	Alpine	6						4454.4	
Alpine Creek	Alpine	5						4446.5	
Alpine Creek	Alpine	4						4435.2	
Alpine Creek	Alpine	3						4422	
Alpine Creek	Alpine	2						4416	

GEOMETRY DATA

Geometry Title: Opt. E
 Geometry File : D:\Projects\Alpine\ras\model\alpcrk.g11

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 19

INPUT

Description: XS 0		num= 19	
Station	Elevation	Data	
Sta	Elev	Sta	Elev
0	4536.8	591	4532.9
673	4518.9	689	4519.3
800	4522.8	900	4522.2
1300	4527.2	1400	4527.6
		1500	4532.2
		1580	4537.5

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.085	643	.055
		707	.085

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
642	707			403.99	486	403.99	.1	.3

Ineffective Flow

Sta L	Sta R	Elev
707	1580	4523.5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18.8*

INPUT

Description:		num= 39	
Station	Elevation	Data	
Sta	Elev	Sta	Elev
0	4532.68	84.2	4532.02
505.2	4528.84	589.4	4528.05
673.6	4525.78	686.2	4519.29
712.6	4514.12	716.04	4514.45
744.6	4516.83	752	4519.76
931.96	4520.17	988.6	4520.39
1129.43	4521.56	1211.68	4522.43
1411.09	4524.87	1491.41	4528.29
		1543.47	4531.42
		1566	4533.14

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.085	673.6	.045
		752	.085

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
673.6	752			403.99	486	403.99	.1	.3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18.6*

INPUT

Description:		num= 39	
Station	Elevation	Data	
Sta	Elev	Sta	Elev
0	4528.56	88.15	4527.76
528.9	4524.05	617.05	4523.02
705.2	4520.76	723.4	4514.99
755.45	4509.62	759.08	4510.76
789.19	4513.36	797	4516.02
963.91	4517.44	1016.45	4517.69
1147.07	4518.6	1223.36	4519.37
1408.31	4521.5	1482.81	4524.39
		1531.1	4526.94
		1552	4528.78

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .085 705.2 .045 797 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 705.2 797 403.99 486 403.99 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18.4*

INPUT

Description: Station Elevation Data num= 39
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4524.44 92.1 4523.51 276.3 4522.42 388.66 4521.21 460.5 4520.5
 552.6 4519.27 644.7 4517.98 674.17 4517.55 678.27 4517.48 688.6 4517.24
 736.8 4515.74 760.6 4510.69 776.92 4504.51 781 4503.42 788.28 4504.23
 798.3 4505.11 802.12 4505.55 812.87 4506.57 820.88 4507.73 826.75 4509.09
 833.79 4509.88 842 4512.28 898.6 4513.87 916.14 4514.17 923.88 4514.34
 995.87 4514.7 1044.3 4514.99 1058.75 4514.89 1075.59 4514.95 1155.32 4515.56
 1164.71 4515.63 1235.04 4516.3 1285.13 4516.93 1314.77 4517.31 1394.49 4517.83
 1405.54 4518.14 1474.22 4520.48 1518.73 4522.46 1538 4524.42

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .085 736.8 .045 842 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 736.8 842 403.99 486 403.99 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18.2*

INPUT

Description: Station Elevation Data num= 39
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4520.32 96.05 4519.25 288.15 4518.16 405.33 4516.75 480.25 4515.95
 576.3 4514.48 672.35 4512.94 703.09 4512.42 707.36 4512.34 718.13 4512.08
 768.4 4510.72 797.8 4506.4 817.96 4499.81 823 4498.76 830.64 4499.66
 841.15 4500.61 845.15 4501.1 856.43 4502.39 864.85 4503.87 871 4505.22
 878.38 4506.41 887 4508.54 938.8 4510.83 954.86 4511.3 961.94 4511.52
 1027.83 4511.97 1072.15 4512.3 1085.37 4512.15 1100.79 4512.2 1173.76 4512.62
 1182.36 4512.67 1246.73 4513.23 1292.56 4513.71 1319.69 4514.02 1392.66 4514.57
 1402.77 4514.77 1465.63 4516.58 1506.37 4517.98 1524 4520.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .085 768.4 .045 887 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 768.4 887 403.99 486 403.99 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 18

INPUT

Description: XS T Station Elevation Data num= 28
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

Sta	Elev	Right	Lengths	Left Channel	Right	Coeff	Contr.	Expan.	
0	4516.2	100	4515	300	4513.9	422	4512.3	500	4511.4
600	4509.7	700	4507.9	732	4507.3	800	4505.7	835	4502.1
843.2	4499.71	846	4494.11	864.94	4494.11	865	4494.1	865.08	4494.11
886	4494.11	887.21	4496.52	900	4498.2	932	4504.8	979	4507.8
1000	4508.7	1100	4509.6	1112	4509.4	1200	4509.7	1300	4510.5
1400	4511.4	1494	4513.5	1510	4515.7				

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.085	800	.045	843.2	.025	846	.05	886	.025
887.21	.045	932	.085						

Bank Sta: Left 800 Right 932 Lengths: Left Channel 130.74 Right 140 Expan. 130.74

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.8842*

INPUT

Description: Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4514.3	55.14	4513.66	92.91	4513.25	136.67	4513.04	278.74	4512.3
287.74	4512.19	392.09	4510.76	464.56	4509.88	479.54	4509.62	557.48	4508.26
650.39	4506.56	680.12	4505.99	719.33	4505.07	731.32	4504.75	743.31	4504.32
754.43	4502.49	775.25	4500.38	782.17	4498.41	784.91	4492.94	824.91	4492.94
826.32	4495.76	836.44	4496.96	836.18	4497	866.51	4503.47	887.25	4504.55
917.8	4506.3	926.61	4506.67	940.72	4507.16	948.25	4507.22	1009.26	4507.6
1049.95	4507.98	1062.94	4507.82	1070.26	4507.86	1131.26	4508.05	1158.98	4508.16
1192.26	4508.41	1211.78	4508.53	1253.27	4508.84	1268.1	4508.95	1314.27	4509.32
1375.27	4509.81	1377.23	4509.83	1436.27	4510.98	1454.58	4511.36	1479.81	4511.87
1497.27	4513.85								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.085	743.31	.045	782.17	.025	784.91	.05	824.91	.025
826.32	.045	866.51	.085						

Bank Sta: Left 743.31 Right 866.51 Lengths: Left Channel 130.74 Right 130.74

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.7685*

INPUT

Description: Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4512.4	50.94	4511.83	85.83	4511.49	126.24	4511.33	257.48	4510.7
265.79	4510.61	362.19	4509.22	429.13	4508.36	442.97	4508.11	514.96	4506.83
600.78	4505.22	628.24	4504.69	664.47	4503.83	675.54	4503.5	686.61	4502.95
696.67	4500.52	715.51	4498.66	721.15	4497.11	723.82	4491.77	763.82	4491.77
765.42	4494.96	772.01	4495.72	772.17	4495.75	801.02	4502.14	823.5	4503.1
856.6	4504.81	866.47	4505.18	881.44	4505.62	889.6	4505.67	955.71	4505.94
999.69	4506.35	1013.88	4506.25	1021.82	4506.29	1087.92	4506.49	1117.95	4506.62
1154.02	4506.88	1175.17	4506.96	1220.13	4507.13	1236.21	4507.4	1286.24	4507.76
1352.34	4508.24	1354.46	4508.26	1418.44	4509.35	1438.28	4509.75	1465.62	4510.24
1484.54	4512								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.085	686.61	.045	721.15	.025	723.82	.05	763.82	.025

765.42 .045 801.02 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 686.61 801.02 130.74 140 130.74 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.6528*

INPUT

Description:

Station	Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4510.51	46.73	4510.01	78.74	4509.74	115.82	4509.62	236.22	4509.11				
243.84	4509.02	332.28	4507.69	393.7	4506.84	406.39	4506.6	472.44	4505.39				
551.17	4503.88	576.37	4503.38	609.6	4502.59	619.76	4502.25	629.92	4501.57				
638.91	4498.56	655.76	4496.94	660.14	4495.79	662.73	4490.6	702.73	4490.6				
704.49	4494.11	708.01	4494.49	708.17	4494.51	735.54	4500.81	759.75	4501.64				
795.41	4503.31	806.03	4503.69	822.16	4504.07	830.95	4504.12	902.17	4504.28				
949.54	4504.73	964.83	4504.67	973.37	4504.73	1044.58	4504.93	1076.93	4505.07				
1115.78	4505.35	1138.57	4505.4	1187	4505.74	1204.31	4505.85	1258.2	4506.2				
1329.41	4506.67	1331.69	4506.68	1400.61	4507.71	1421.98	4508.13	1451.43	4508.61				
1471.82	4510.14												

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.085	629.92	.045	660.14	.025	662.73	.05	702.73	.025
704.49	.045	735.54	.085						

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 629.92 735.54 130.74 140 130.74 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.5371*

INPUT

Description:

Station	Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4508.61	42.53	4508.18	71.65	4507.98	105.39	4507.92	214.96	4507.51				
221.9	4507.44	302.38	4506.15	358.26	4505.32	369.82	4505.1	429.92	4503.96				
501.57	4502.54	524.49	4502.08	554.74	4501.35	563.98	4501	573.22	4500.2				
581.16	4496.6	596.01	4495.22	599.13	4494.44	601.64	4489.43	641.64	4489.43				
643.53	4493.2	644.02	4493.25	644.16	4493.27	670.05	4499.48	695.99	4500.18				
734.21	4501.82	745.6	4502.21	762.88	4502.53	772.3	4502.58	848.62	4502.61				
899.39	4503.1	915.77	4503.1	924.93	4503.16	1001.23	4503.36	1035.9	4503.53				
1077.54	4503.81	1101.96	4503.84	1153.86	4504.19	1172.41	4504.3	1230.17	4504.64				
1306.47	4505.1	1308.92	4505.11	1382.78	4506.08	1405.68	4506.51	1437.25	4506.98				
1459.09	4508.29												

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.085	573.22	.045	599.13	.025	601.64	.05	641.64	.025
643.53	.045	670.05	.085						

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 573.22 670.05 130.74 140 130.74 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.4214

INPUT

Description: S. Ave G

Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4506.71	38.32	4506.35	64.57	4506.23	94.97	4506.21	193.7	4505.91
199.95	4505.86	272.47	4504.61	322.83	4503.8	333.24	4503.59	387.4	4502.52
451.96	4501.2	472.62	4500.77	499.87	4500.11	508.2	4499.75	516.53	4498.82
523.4	4494.64	536.27	4493.5	538.14	4493.07	540.55	4488.26	580.55	4488.26
582.76	4492.68	604.56	4498.15	632.24	4498.72	673.01	4500.32	685.16	4500.72
703.6	4500.99	713.65	4501.03	795.07	4500.95	849.24	4501.48	866.71	4501.52
876.48	4501.6	957.89	4501.8	994.88	4501.99	1039.3	4502.28	1065.35	4502.28
1120.72	4502.64	1140.52	4502.75	1202.13	4503.08	1283.54	4503.53	1286.16	4503.54
1364.95	4504.45	1389.38	4504.89	1423.06	4505.35	1461.86	4507		

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.085	516.53	.045	538.14	.025	540.55	.05	580.55	.025
582.76	.045	604.56	.085						

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 516.53 604.56 60 60 60 .3 .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 17.3

INPUT
 Description: W. Ave G (new)
 Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 500 4499 4497.5 618 4498 4496.5

Upstream Bridge Cross Section Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4506.71	38.32	4506.35	64.57	4506.23	94.97	4506.21	193.7	4505.91
199.95	4505.86	272.47	4504.61	322.83	4503.8	333.24	4503.59	387.4	4502.52
451.96	4501.2	472.62	4500.77	499.87	4500.11	508.2	4499.75	516.53	4498.82
523.4	4494.64	536.27	4493.5	538.14	4493.07	540.55	4488.26	580.55	4488.26
582.76	4492.68	604.56	4498.15	632.24	4498.72	673.01	4500.32	685.16	4500.72
703.6	4500.99	713.65	4501.03	795.07	4500.95	849.24	4501.48	866.71	4501.52
876.48	4501.6	957.89	4501.8	994.88	4501.99	1039.3	4502.28	1065.35	4502.28
1120.72	4502.64	1140.52	4502.75	1202.13	4503.08	1283.54	4503.53	1286.16	4503.54
1364.95	4504.45	1389.38	4504.89	1423.06	4505.35	1461.86	4507		

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.085	516.53	.045	538.14	.025	540.55	.05	580.55	.025
582.76	.045	604.56	.085						

Bank Sta: Left Right Coeff Contr. Expan.
 516.53 604.56 60 60 60 .3 .5

Downstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 500 4499 4497.5 618 4498 4496.5

Downstream Bridge Cross Section Data
 Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4506.71	38.32	4506.35	64.57	4506.23	94.97	4506.21
199.95	4505.86	272.47	4504.61	322.83	4503.8	333.24	4503.59
451.96	4501.2	472.62	4500.77	499.87	4500.11	508.2	4499.75
523.4	4494.64	536.27	4493.5	537.86	4493.14	540.55	4487.76
583.05	4492.75	604.56	4498.15	632.24	4498.72	673.01	4500.32
703.6	4500.99	713.65	4501.03	795.07	4500.95	849.24	4501.48
876.48	4501.6	957.89	4501.8	994.88	4501.99	1039.3	4502.28
1120.72	4502.64	1140.52	4502.75	1202.13	4503.08	1283.54	4503.53
1364.95	4504.45	1389.38	4504.89	1423.06	4505.35	1461.86	4506.8

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.11	516.53	.04	537.86	.025	540.55	.05
583.05	.04	604.56	.11				

Bank Sta: Left Right Coeff Contr. Expan.
 516.53 604.56 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.2

INPUT
 Description: Additional XS for bridge interpolated from sta. 18 and 17.2
 Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4506.71	38.32	4506.35	64.57	4506.23	94.97	4506.21
199.95	4505.86	272.47	4504.61	322.83	4503.8	333.24	4503.59
451.96	4501.2	472.62	4500.77	499.87	4500.11	508.2	4499.75
523.4	4494.64	536.27	4493.5	537.86	4493.14	540.55	4487.76
583.05	4492.75	604.56	4498.15	632.24	4498.72	673.01	4500.32
703.6	4500.99	713.65	4501.03	795.07	4500.95	849.24	4501.48
876.48	4501.6	957.89	4501.8	994.88	4501.99	1039.3	4502.28
1120.72	4502.64	1140.52	4502.75	1202.13	4503.08	1283.54	4503.53
1364.95	4504.45	1389.38	4504.89	1423.06	4505.35	1461.86	4506.8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.11	516.53	.04	537.86	.025	540.55	.05	580.55	.025
583.05	.04	604.56	.11						

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 516.53 604.56 104.07 112.5 104.07 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.15*

INFUT

Description: Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4504.98	34.4	4504.69	34.96	4504.69	57.96	4504.63	85.25	4504.66
86.65	4504.65	173.87	4504.46	179.48	4504.42	182.42	4504.38	244.57	4503.23
289.78	4502.43	299.12	4502.24	304.03	4502.14	347.74	4501.24	405.69	4500.01
424.23	4499.61	448.69	4499.01	456.05	4498.72	456.17	4498.71	463.65	4497.92
468.61	4494.97	470.53	4493.95	482.48	4492.25	485.2	4486.82	525.2	4486.82
527.5	4491.42	546.75	4496.73	569.82	4497.3	575.95	4497.44	618.96	4499
626.04	4499.23	631.78	4499.37	651.23	4499.59	656.32	4499.61	661.83	4499.61
742.81	4499.44	747.72	4499.45	804.87	4500.01	823.3	4500.1	829.31	4500.15
833.6	4500.18	915.8	4500.37	919.48	4500.38	958.5	4500.59	1002.3	4500.87
1005.36	4500.88	1029.97	4500.86	1032.84	4500.86	1088.79	4501.22	1091.25	4501.23
1112.14	4501.34	1175.29	4501.66	1177.13	4501.66	1261.78	4502.09	1263.01	4502.1
1265.77	4502.11	1348.28	4502.96	1348.89	4502.97	1374.22	4503.41	1374.66	4503.42
1410.19	4503.87	1434.77	4504.75						

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.112	463.65	.04	482.48	.025	485.2	.05	525.2	.025
527.5	.04	546.75	.117	1434.77	.117				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 463.65 546.75 104.07 112.5 104.07 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.1*

INFUT

Description: Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4503.25	30.47	4503.03	30.98	4503.02	51.35	4503.03	75.52	4503.1
76.77	4503.1	154.04	4503	159.01	4502.98	161.61	4502.95	216.68	4501.84
256.73	4501.07	265.01	4500.89	269.35	4500.79	308.08	4499.95	359.42	4498.81
375.85	4498.45	397.52	4497.92	404.03	4497.68	404.14	4497.67	410.77	4497.01
415.74	4494.13	417.67	4493.26	427.09	4491.42	429.86	4485.88	469.86	4485.88
471.97	4490.09	488.95	4495.3	513.21	4496	519.66	4496.16	564.91	4497.69
572.36	4497.92	578.4	4498.02	598.86	4498.19	604.21	4498.2	610.01	4498.2
695.21	4497.93	700.37	4497.95	760.49	4498.55	779.88	4498.68	786.2	4498.73
790.72	4498.75	877.2	4498.95	881.07	4498.96	922.12	4499.19	968.2	4499.48
971.42	4499.48	997.32	4499.44	1000.33	4499.45	1059.19	4499.81	1061.78	4499.83
1083.76	4499.93	1150.19	4500.24	1152.13	4500.24	1241.19	4500.66	1242.48	4500.67
1245.39	4500.69	1332.18	4501.47	1332.83	4501.48	1359.48	4501.94	1359.94	4501.95
1397.32	4502.38	1423.18	4503.07						

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.115	410.77	.04	427.09	.025	429.86	.05	469.86	.025
471.97	.04	488.95	.125	1423.18	.125				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 410.77 488.95 104.07 112.5 104.07 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17.05*

INPUT
 Description:
 Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4501.53	26.55	4501.36	26.99	4501.36	44.74	4501.43
66.88	4501.55	134.21	4501.55	138.54	4501.54	140.81	4501.53
223.68	4499.7	230.89	4499.53	234.68	4499.45	268.41	4498.67
327.46	4497.29	346.34	4496.82	352.02	4496.64	352.11	4496.63
362.87	4493.3	364.8	4492.57	371.53	4490.9	374.51	4484.94
416.44	4488.79	431.14	4493.88	456.61	4494.7	463.38	4494.89
518.68	4496.61	525.01	4496.67	546.49	4496.79	552.11	4496.8
647.6	4496.41	653.03	4496.46	716.12	4497.08	736.47	4497.25
747.85	4497.33	838.6	4497.52	842.66	4497.54	885.75	4497.79
937.48	4498.09	964.66	4498.02	967.82	4498.03	1029.6	4498.41
1055.38	4498.52	1125.1	4498.82	1127.13	4498.83	1220.59	4499.23
1225	4499.26	1316.09	4499.99	1316.77	4500	1344.74	4500.47
1384.45	4500.9	1411.59	4501.39				

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.117	357.88	.04	371.53	.025	374.51	.05
416.44	.04	431.14	.132	1411.59	.132		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 357.88 431.14 104.07 112.5 104.07 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 17

INPUT
 Description: XS S -- S. 11th St.
 Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.8	23	4499.7	57	4500	120	4500.1
300	4495.6	305	4495.2	310	4492.46	315.8	4490.72
339.39	4484	342	4483.31	347.03	4484	359.16	4484
373.33	4492.46	400	4493.4	465	4495.3	500	4495.4
700	4495.9	800	4496.1	900	4496.7	932	4496.6
1100	4497.4	1200	4497.8	1300	4498.5	1330	4499

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	305	.04	315.8	.025	319.16	.05
347.03	.05	359.16	.025	360.92	.04	373.33	.14

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 305 373.33 60 60 60 60 .3 .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 16.7

INPUT
 Description: S. 11th St. Bridge (new)
 Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Skew/Roadway Skew =

Upstream Deck/Roadway Coordinates
 num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
305	4496.5	4495	373.8	4493.9	4492.4

Upstream Bridge Cross Section Data
 Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.8	23	4499.7	57	4500	120	4500.1	200	4498.1
300	4495.6	495	4495.2	310	4492.46	315.8	4490.72	319.16	4484
319.39	4484	342	4483.31	347.03	4484	359.16	4484	360.92	4487.52
373.33	4492.46	400	4493.4	465	4495.3	500	4495.4	600	4494.9
700	4495.9	800	4496.1	900	4496.7	932	4496.6	1000	4497
1100	4497.4	1200	4497.8	1300	4498.5	1330	4499	1401.8	4500.54

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	305	.04	315.8	.025	319.16	.05	339.39	.04
347.03	.05	359.16	.025	360.92	.04	373.33	.14		

Bank Sta: Left Right Coeff Contr. Expan.
 305 373.33 .3 .5

Downstream Deck/Roadway Coordinates

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
305	4496.5	4495	373.8	4493.9	4492.4

Downstream Bridge Cross Section Data
 Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.8	23	4499.7	57	4500	120	4500.1	200	4498.1
300	4495.6	305	4495.2	310	4492.46	315.51	4490.81	319.16	4483.5
341.28	4483.5	342	4483.31	343.38	4483.5	359.16	4483.5	361.23	4487.64
373.33	4492.46	400	4493.4	465	4495.3	500	4495.4	600	4494.9
700	4495.9	800	4496.1	900	4496.7	932	4496.6	1000	4497
1100	4497.4	1200	4497.8	1300	4498.5	1330	4499	1400	4500.48

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	305	.04	315.51	.025	319.16	.05	341.28	.04
343.38	.05	359.16	.025	361.23	.04	373.33	.14		

Bank Sta: Left Right Coeff Contr. Expan.
 305 373.33 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1
 Low Flow Methods and Data
 Energy
 Selected Low Flow Methods = Highest Energy Answer
 High Flow Method

Pressure and Weir flow =
 Submerged Inlet Cd = .5
 Submerged Inlet + Outlet Cd =
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 16.5

INPUT
 Description: Additional XS for bridge copied from sta. 17
 Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.8	23	4499.7	57	4500.1	120	4500.1	200	4498.1
300	4495.6	305	4495.2	310	4492.46	315.51	4490.81	319.16	4483.5
341.28	4483.5	342	4483.31	343.38	4483.5	359.16	4483.5	361.23	4487.64
373.33	4492.46	400	4493.4	465	4495.3	500	4495.4	600	4494.9
700	4495.9	800	4496.1	900	4496.7	932	4496.6	1000	4497
1100	4497.4	1200	4497.8	1300	4498.5	1330	4499	1400	4500.48

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	305	.04	315.51	.025	319.16	.05
343.38	.05	359.16	.025	361.23	.04	373.33	.14

Bank Sta: Left 305 Right 373.33
 Lengths: Left Channel 150 Right 129.04
 Coeff Contr. .3 Expan. .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 16.25*

INPUT
 Description:
 Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.47	24.81	4499.38	25.22	4499.38	56.5	4499.6	61.5	4499.61
62.5	4499.62	112.99	4499.49	129.46	4499.48	131.59	4499.47	169.49	4498.62
215.77	4497.59	219.31	4497.51	225.98	4497.36	282.47	4496.02	323.66	4494.84
328.97	4494.64	329.06	4494.64	334.45	4494.09	338.72	4491.7	339.35	4491.4
344.22	4489.97	348.08	4482.25	388.08	4482.25	390.8	4487.69	391.37	4487.9
401.7	4491.67	428.82	4492.52	465.17	4493.5	475.83	4493.73	494.9	4494.23
530.48	4494.47	538.86	4494.48	558.09	4494.42	572.8	4494.39	632.15	4494.17
651.01	4494.31	669.76	4494.44	720.7	4494.9	737.82	4495.03	766.73	4495.14
808.98	4495.24	835.49	4495.31	863.7	4495.46	937.16	4495.91	960.67	4495.9
969.69	4495.88	991.69	4495.98	1038.83	4496.26	1045.93	4496.29	1057.64	4496.34
1140.49	4496.66	1154.6	4496.71	1208.55	4496.92	1242.16	4497.1	1251.57	4497.17
1343.83	4497.91	1348.53	4497.99	1374.33	4498.42	1377.62	4498.45	1445.5	4499.18

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	334.45	.04	344.22	.025	348.08	.05
390.8	.04	401.7	.14				

Bank Sta: Left 334.45 Right 401.7
 Lengths: Left Channel 150 Right 129.04
 Coeff Contr. .3 Expan. .5

CROSS SECTION RIVER: Alpine Creek

REACH: Alpine RS: 16.*

INPUT

Description:	Station	Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
	Sta	Elev		59	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4499.14	27	4499.05	27.44	4499.05	61.47	4499.25	66.91	4499.24			
68.01	4499.23	122.94	4498.9	140.86	4498.86	143.17	4498.84	184.41	4498.01			
234.77	4497	238.62	4496.92	245.88	4496.77	307.34	4495.38	352.16	4493.96			
357.93	4493.69	358.03	4493.68	363.9	4492.98	368.09	4490.6	368.7	4490.35			
372.91	4489.15	376.98	4481	416.98	4481	420.31	4487.65	430.07	4490.88			
457.63	4491.64	494.58	4492.55	505.42	4492.72	524.8	4493.17	560.97	4493.55			
569.48	4493.6	589.03	4493.58	603.97	4493.58	664.3	4493.45	683.47	4493.54			
702.53	4493.61	754.31	4494.04	767.64	4494.15	801.09	4494.32	844.03	4494.44			
870.98	4494.52	899.66	4494.66	974.32	4495.12	998.21	4495.16	1007.38	4495.15			
1029.74	4495.22	1077.65	4495.52	1084.87	4495.55	1096.77	4495.6	1180.99	4495.92			
1195.33	4495.97	1250.16	4496.18	1284.33	4496.41	1293.89	4496.48	1387.66	4497.33			
1392.44	4497.39	1418.66	4497.83	1422.01	4497.88	1491	4498.66					

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	363.9	.04	372.91	.025	376.98	.05	416.98	.025
420.31	.04	430.07	.14						

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 363.9 430.07 129.04 150 129.04 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 15.75*

INPUT

Description:	Station	Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
	Sta	Elev		59	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4498.81	29.18	4498.73	29.66	4498.73	66.45	4498.89	72.33	4498.86			
73.51	4498.85	132.89	4498.32	152.26	4498.24	154.76	4498.21	199.34	4497.39			
253.77	4496.4	257.93	4496.33	265.78	4496.19	332.22	4494.73	380.66	4493.07			
386.9	4492.73	387.01	4492.73	393.35	4491.87	397.45	4489.5	398.05	4489.29			
401.62	4488.29	405.9	4479.74	445.9	4479.74	449.79	4487.52	458.44	4490.08			
486.44	4490.76	523.99	4491.61	535	4491.7	554.7	4492.1	591.45	4492.62			
600.1	4492.73	619.96	4492.73	635.15	4492.78	696.46	4492.72	715.93	4492.77			
735.3	4492.78	787.91	4493.17	801.46	4493.28	835.45	4493.5	879.09	4493.63			
906.47	4493.73	935.61	4493.86	1011.47	4494.33	1035.76	4494.43	1045.07	4494.43			
1067.8	4494.47	1116.48	4494.77	1123.82	4494.82	1135.91	4494.87	1221.48	4495.18			
1236.05	4495.23	1291.77	4495.43	1326.49	4495.71	1336.2	4495.79	1431.49	4496.74			
1436.35	4496.8	1463	4497.25	1466.39	4497.3	1536.5	4498.14					

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	393.35	.045	401.62	.025	405.9	.05	445.9	.025
449.79	.045	458.44	.14						

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 393.35 458.44 79.04 90 79.04 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 15.6

INPUT

Description:	Station	Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
	Sta	Elev		40	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4498.81	29.18	4498.73	29.66	4498.73	66.45	4498.89	72.33	4498.86			

0 4498.48 31.37 4498.4 71.42 4498.54 77.74 4498.48 142.84 4497.73
 163.66 4497.62 214.26 4496.78 272.77 4495.81 285.68 4495.6 357.09 4494.09
 409.16 4492.19 415.98 4491.77 422.8 4490.76 426.81 4488.39 430.32 4487.44
 434.8 4478.49 474.8 4478.49 479.21 4487.31 486.81 4489.29 553.4 4490.66
 564.59 4490.68 630.72 4491.85 650.9 4491.89 666.33 4491.97 748.39 4492
 768.07 4491.95 821.52 4492.3 869.81 4492.68 914.14 4492.83 971.56 4491.06
 1073.3 4493.7 1105.85 4493.72 1162.76 4494.08 1175.04 4494.13 1276.78 4494.49
 1333.38 4494.69 1378.52 4495.1 1480.26 4496.21 1510.78 4496.72 1582 4497.62

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .12 422.8 .045 430.32 .025 434.8 .05 474.8 .025
 479.21 .045 486.81 .14

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 422.8 486.81 50 60 50 .3 .5

BRIDGE: Alpine
 REACH: Alpine
 RIVER: Alpine Creek
 RS: 15.55

INPUT
 Description: 10th St. (LW King)
 Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 430 4481 4479.5 481 4481 4479.5

Upstream Bridge Cross Section Data num= 40
 Station Elevation Data num= 40
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4498.48 31.37 4498.4 71.42 4498.54 77.74 4498.48 142.84 4497.73
 163.66 4497.62 214.26 4496.78 272.77 4495.81 285.68 4495.6 357.09 4494.09
 409.16 4492.19 415.98 4491.77 422.8 4490.76 426.81 4488.39 430.32 4487.44
 434.8 4478.49 474.8 4478.49 479.21 4487.31 486.81 4489.29 553.4 4490.66
 564.59 4490.68 630.72 4491.85 650.9 4491.89 666.33 4491.97 748.39 4492
 768.07 4491.95 821.52 4492.3 869.81 4492.68 914.14 4492.83 971.56 4491.06
 1073.3 4493.7 1105.85 4493.72 1162.76 4494.08 1175.04 4494.13 1276.78 4494.49
 1333.38 4494.69 1378.52 4495.1 1480.26 4496.21 1510.78 4496.72 1582 4497.62

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .12 422.8 .045 430.32 .025 434.8 .05 474.8 .025
 479.21 .045 486.81 .14

Bank Sta: Left Right Coeff Contr. Expan.
 422.8 486.81 50 60 50 .3 .5

Downstream Deck/Roadway Coordinates num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 430 4481 4479.5 481 4481 4479.5

Downstream Bridge Cross Section Data num= 40
 Station Elevation Data num= 40
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4498.48 31.37 4498.4 71.42 4498.54 77.74 4498.48 142.84 4497.73
 163 4497.62 214.26 4496.78 272.77 4495.81 285.68 4495.6 357.09 4494.09

409.16	4492.19	415.98	4491.77	422.8	4490.76	426.81	4488.39	430.32	4487.44
434.8	4478.49	474.8	4478.49	479.21	4487.31	486.81	4489.29	553.4	4490.66
564.59	4490.68	630.72	4491.85	650.9	4491.89	666.33	4491.97	748.39	4492
768.07	4491.95	821.52	4492.3	869.81	4492.68	914.14	4492.83	971.56	4493.06
1073.3	4493.7	1105.85	4493.72	1162.76	4494.08	1175.04	4494.13	1276.78	4494.49
1333.38	4494.69	1378.52	4495.1	1480.26	4496.21	1510.78	4496.72	1582	4497.62

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	422.8	.045	430.32	.025	434.8	.05	474.8	.025
479.21	.045	486.81	.14						

Bank Sta: Left Right Coeff Contr. Expan.
 422.8 486.81 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B Flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION FIVER: Alpine Creek
 REACH: Alpine RS: 15.5

THRT
 Description: 10th. St. (LW Xing) -- Interpolated XS
 Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4498.48	31.37	4498.4	71.42	4498.54	77.74	4498.48	142.84	4497.73
163.66	4497.62	214.26	4496.78	272.77	4495.81	285.68	4495.6	357.09	4494.09
409.16	4492.19	415.98	4491.77	422.8	4490.76	426.81	4488.39	430.32	4487.44
434.8	4478.49	474.8	4478.49	479.21	4487.31	486.81	4489.29	553.4	4490.66
564.59	4490.68	630.72	4491.85	650.9	4491.89	666.33	4491.97	748.39	4492
768.07	4491.95	821.52	4492.3	869.81	4492.68	914.14	4492.83	971.56	4493.06
1073.3	4493.7	1105.85	4493.72	1162.76	4494.08	1175.04	4494.13	1276.78	4494.49
1333.38	4494.69	1378.52	4495.1	1480.26	4496.21	1510.78	4496.72	1582	4497.62

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	422.8	.045	430.32	.025	434.8	.05	474.8	.025
479.21	.045	486.81	.14						

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 422.8 486.81 94.63 110 94.63 .3 .5

CROSS SECTION RIVER: Alpine Creek

650 4475.74 653.77 4483.28 660 4485.07 776 4486.6 800 4486.6
 900 4486.7 1000 4487.5 1075 4487.6 1170 4488.1 1425 4489.8
 1600 4490.3 1855 4494.5

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .13 600 .045 606.02 .025 610 .05 650 .025
 653.77 .045 660 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 600 660 40 60 40 .3 .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 15.05

INPUT
 Description: Murphy St. (LW Xing) 10
 Distance from Upstream XS = 40
 Deck/Roadway Width = 2.6
 Weir Coefficient =
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 605 4478 4476.5 656 4478 4476.5

Upstream Bridge Cross Section Data

Station Elevation Data num= 22
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4496.5 100 4496.4 200 4494.2 300 4493.2 400 4492.2
 500 4490.4 592 4486.2 600 4485.66 606.02 4483.7 610 4475.74
 650 4475.74 653.77 4483.28 660 4485.07 776 4486.6 800 4486.6
 900 4486.7 1000 4487.5 1075 4487.6 1170 4488.1 1425 4489.8
 1600 4490.3 1855 4494.5

Manning's n Values num= 7

Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .13 600 .045 606.02 .025 610 .05 650 .025
 653.77 .045 660 .095

Bank Sta: Left Right Coeff Contr. Expan.
 600 660 40 60 40 .3 .5

Downstream Deck Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 605 4478 4476.5 656 4478 4476.5

Downstream Bridge Cross Section Data

Station Elevation Data num= 22
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4496.5 100 4496.4 200 4494.2 300 4493.2 400 4492.2
 500 4490.4 592 4486.2 600 4485.66 606.02 4483.7 610 4475.74
 650 4475.74 653.77 4483.28 660 4485.07 776 4486.6 800 4486.6
 900 4486.7 1000 4487.5 1075 4487.6 1170 4488.1 1425 4489.8
 1600 4490.3 1855 4494.5

Manning's n Values num= 7

Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .13 600 .045 606.02 .025 610 .05 650 .025

653.77 .045 660 .095

Bank Sta: Left Right Coeff Contr. Expan.
 600 660 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design = Broad Crested
 Weir crest shape =

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 15

INPUT

Description: XS R -- Murphy St. (LW Xing)

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4496.5	100	4496.4	200	4494.2	300	4493.2	400	4492.2
500	4490.4	592	4486.2	600	4485.66	606.02	4483.7	610	4475.74
650	4475.74	653.77	4483.28	660	4485.07	776	4486.6	800	4486.6
900	4486.7	1000	4487.5	1075	4487.6	1170	4488.1	1425	4489.8
1600	4490.3	1855	4494.5						

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.13	600	.045	606.02	.025	610	.05
653.77	.045	660	.095			650	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 600 660 63.33 63.33 63.33 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 14.8333*

INPUT

Description: Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4497	14.03	4496.76	99.89	4496.39	199.78	4494.57
299.67	4493.6	300.67	4493.59	399.56	4492.57	400.89	4492.55
501.11	4491.05	591.34	4488.02	599.33	4487.64	600.99	4485.27
614.95	4480.79	616.18	4480.5	618.83	4475.21	658.83	4475.21
678.33	4487.01	768.16	4487.96	786.74	4487.94	864.18	4487.95
941.62	4488.43	999.69	4488.47	1073.26	4488.76	1121.73	4489.01
1361	4489.92	1406.23	4490.1	1603.7	4493.18		

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 0 .13 599.33 .045 616.18 .025 618.83 .05 658.83 .025
 663.22 .045 678.33 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 599.33 678.33 63.33 63.33 63.33 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 14.66666

INPUT
 Description: Station Elevation Data num= 34
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4497.5 14.62 4497.03 99.78 4496.39 199.56 4494.94 200.22 4494.93
 299.33 4494.01 300.33 4494 399.11 4492.94 400.45 4492.93 498.89 4491.81
 500.56 4491.77 590.68 4489.85 598.67 4489.62 600.5 4485.36 610.96 4481.69
 615.89 4480.09 626.2 4477.62 627.67 4474.68 667.67 4474.68 672.95 4485.25
 676.3 4485.74 696.67 4488.96 760.32 4489.32 773.49 4489.29 828.36 4489.2
 841.03 4489.23 883.23 4489.37 924.39 4489.34 976.52 4489.42 1010.87 4489.51
 1116.44 4489.73 1180.7 4489.71 1212.47 4489.9 1352.39 4491.86

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 0 .15 598.67 .045 626.2 .025 627.67 .05 667.67 .025
 672.95 .045 696.67 .15
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 598.67 696.67 63.33 63.33 63.33 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 14.5

INPUT
 Description: Additional XS for bridge copied from sta. 14
 Station Elevation Data num= 17
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4498 14 4497.3 200 4495.3 300 4494.4 400 4493.3
 500 4492.5 598 4491.6 600 4485.45 616.83 4479.39 638.33 4474.15
 659.83 4482.09 674 4485.45 715 4490.9 800 4490.4 900 4490
 1000 4489.5 1121.13 4491.41

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .15 598 .045 715 .15
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 598 715 30 30 30 .3 .5
 Ineffective Flow num= 1
 Sta L Sta R Elev

 715 1121.13 4490.9

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 14.3

INPUT
 Description: Southern Pacific RR Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 15

Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

 598 4491.6 4490.1 715 4490.9 4489.4

Upstream Bridge Cross Section Data
 Station Elevation Data num= 17
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4498 14 4497.3 200 4495.3 300 4494.4 400 4493.3
 500 4492.5 598 4491.6 600 4485.45 616.83 4479.39 638.33 4474.15
 659.83 4482.09 674 4485.45 715 4490.9 800 4490.4 900 4490
 1000 4489.5 1121.13 4491.41

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .15 598 .045 715 .15
 Bank Sta: Left Right Coeff Contr. Expan.
 598 715
 .3 .5
 Ineffective Flow num= 1
 Sta L Sta R Elev

 715 1121.13 4490.9

Downstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

 598 4491.6 4490.1 715 4490.9 4489.4

Downstream Bridge Cross Section Data
 Station Elevation Data num= 17
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4498 14 4497.3 200 4495.3 300 4494.4 400 4493.3
 500 4492.5 598 4491.6 600 4485.45 616.83 4479.39 638.33 4474.15
 659.83 4482.09 674 4485.45 715 4490.9 800 4490.4 900 4490
 1000 4489.5 1121.13 4491.41

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .15 598 .045 715 .15
 Bank Sta: Left Right Coeff Contr. Expan.
 598 715
 .3 .5
 Ineffective Flow num= 1
 Sta L Sta R Elev

 715 1121.13 4490.9

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4490.9
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 7

Pier I

Pier Station num= 603 Upstream= 603 Downstream= 603
 Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490

Pier Data
 Pier Station num= 616 Upstream= 616 Downstream= 616
 Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490

Pier Data
 Pier Station num= 631 Upstream= 631 Downstream= 631
 Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490

Pier Data
 Pier Station num= 646 Upstream= 646 Downstream= 646
 Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5

Pier Data
 Pier Station num= 661 Upstream= 661 Downstream= 661
 Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5

Pier Data
 Pier Station num= 676 Upstream= 676 Downstream= 676
 Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5

Pier Data
 Pier Station num= 691 Upstream= 691 Downstream= 691

Upstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5
 Downstream num= 2
 Width Elev Width Elev

 1 4400 1 4490.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy Momentum Cd = 1.2
 Yarnell KVal = .9
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .5
 Max Low Cord =

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 14

INPUT

Description: XS Q -- SPFR

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4498	14	4497.3	200	4495.3	300	4494.4
500	4492.5	598	4491.6	600	4485.45	616.83	4479.39
659.83	4482.09	674	4485.45	715	4490.9	800	4490.4
1000	4489.5	1121.13	4491.41			900	4490

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.15	598	.045	715	.15

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 598 715 45 45 45 45 .3 .5

Ineffective Flow

Sta L Sta R Elev num=
 715 1121.13 4490.9

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 13.75*

INPUT

Description:

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4496.1	14.12	4495.71	99.18	4495	198.36	4494.07
297.53	4493.32	302.51	4493.28	330.26	4493	396.71	4492.44
495.89	4491.18	504.18	4491.03	570.27	4489.8	603	4489.25
623.1	4480.3	646.67	4474.42	666.67	4479.03	679.85	4481.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .1 608 .045 703 .14

Bank Sta: Left Right Coeff Contr. Expan.
 608 703 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4444.3
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Culverts = 7

Culvert Name Shape Rise Span
 Culvert #1 Box 11 9
 FHWA Chart # 10- 90 degree headwall; Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 .1

Upstream Elevation = 4474
 Centerline Station = 615
 Downstream Elevation = 4474
 Centerline Station = 615

Culvert Name Shape Rise Span
 Culvert #5 Box 11 9
 FHWA Chart # 10- 90 degree headwall; Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 .1

Upstream Elevation = 4474
 Centerline Station = 625
 Downstream Elevation = 4474
 Centerline Station = 625

Culvert Name Shape Rise Span
 Culvert #2 Box 10 9
 FHWA Chart # 10- 90 degree headwall; Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 .1

Number of Barrels = 2
 Upstream Elevation = 4474
 Centerline Stations
 Sta. 635
 Sta. 645

Downstream Elevation = 4474
 Centerline Stations
 Sta. 635
 Sta. 645

Culvert Name Shape Rise Span
 Culvert #6 Box 10 9
 FHWA Chart # 10- 90 degree headwall; Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2 .1

Number of Barrels = 2
 Upstream Elevation = 4474
 Centerline Stations
 Sta. 655
 Sta. 665
 Downstream Elevation = 4474
 Centerline Stations
 Sta. 655
 Sta. 665

Culvert Name Shape Rise Span
 Culvert #4 Box 9 9
 FHWA Chart # 10- 90 degree headwall: Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2
 Upstream Elevation = 4474
 Centerline Station = 675
 Downstream Elevation = 4474
 Centerline Station = 675

Culvert Name Shape Rise Span
 Culvert #3 Box 9 9
 FHWA Chart # 10- 90 degree headwall: Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2
 Upstream Elevation = 4474
 Centerline Station = 685
 Downstream Elevation = 4474
 Centerline Station = 685

Culvert Name Shape Rise Span
 Culvert #7 Box 9 9
 FHWA Chart # 10- 90 degree headwall: Chamfered or beveled inlet
 FHWA Scale # 2 - Inlet edges beveled 1/2 inch at 45 degrees (1:1)
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length n Value Entrance Loss Coef Exit Loss Coef
 10 35 .02 .2
 Upstream Elevation = 4474
 Centerline Station = 695
 Downstream Elevation = 4474
 Centerline Station = 695

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12.7

INPUT
 Description: Additional XS for bridge copied from sta. 13
 Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4494.2	100	4493.6	200	4492.8	300	4492.2
400	4491.5	500	4489.8	575	4487.7	608	4488.07
655.5	4473.45	702	4474.93	703	4483.29	800	4483.5
1010	4483.6	1070	4484.1	1140	4487.1	1170	4489.3
1283.78	4490.16					1212.26	4490

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

 0 .1 608 .045 703 .14

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 608 703 75 75 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12.6333*

INPUT

Description:
 Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4492.33	41.7	4492.5	84.16	4492.3	160.4	4491.82
252.47	4491.1	280.24	4490.82	320.79	4490.51	336.62	4490.35
365.71	4489.14	420.78	4488.16	481.19	4486.56	483.9	4486.51
512.66	4478.02	527.98	4476.9	533.15	4475.88	535.34	4471.5
576.55	4473.93	584.6	4474.65	597.4	4476.57	598.16	4477.3
605.32	4483.57	636.93	4483.6	675.57	4482.51	714.2	4482.19
770.39	4482.19	848.94	4482.67	921.42	4483.07	988.5	4483.31
1064.62	4483.79	1111.07	4484.81	1153.44	4485.62	1177.81	4486.47
1245.11	4487.82	1248.05	4487.84	1328.83	4488.13	1335.85	4489.24

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	511.67	.045	533.15	.025	535.34	.05
576.55	.045	599	.14			575.34	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Sta L	Sta R	Elev	num=
511.67	599		1

Ineffective Flow num= 1

Sta L Sta R Elev

654.9 1335.85 4483.08

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12.5666*

INPUT

Description:
 Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4490.47	33.85	4491.1	68.31	4491	130.2	4490.76
204.93	4490	227.48	4489.74	260.4	4489.4	273.25	4489.2
296.85	4487.37	341.56	4486.52	390.6	4485.33	392.79	4485.32
416.33	4481.18	430.88	4479.46	435.16	4470.9	475.16	4470.9
483.3	4474.87	493.7	4478.23	494.32	4479.66	495	4484.03
540.97	4483.85	587.78	4481.61	634.6	4480.9	644.13	4480.89
797.88	4481.73	885.71	4482.53	967	4483.01	1021.9	4483.43
1115.54	4483.96	1166.87	4484.14	1196.4	4484.44	1212.99	4484.84
1281.52	4485.67	1379.41	4486.12	1387.93	4488.32		

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	415.33	.045	430.88	.025	435.16	.05
476.56	.045	495	.14			475.16	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Sta L	Sta R	Elev	num=
415.33	495		1

Ineffective Flow num= 1

Sta L Sta R Elev

557.47 1387.93 4483.08

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 12.5

INPUT

324.42 4471.06 325 4469.89 338.12 4469.89 342 4469.56 353.88 4469.89
 365 4469.89 365.16 4470.2 369 4470.31 375 4478.03 418 4479.1
 420 4480.1 515 4478.4 635 4479.1 850 4481.6 1010 4482.8
 1120 4482.7 1215 4482 1315 4483.1 1430 4483.8 1440 4487

Manning's n Values num= 9
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .135 315 .045 324.42 .025 325 .045 338.12 .045
 353.88 .05 365 .025 365.16 .045 375 .15

Bank Sta: Left Right Coeff Contr. Expan.
 315 375 .3 .5

Downstream Deck/Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 315 4479.3 4478.3 420 4477.3 4476.3

Downstream Bridge Cross Section Data

Station Elevation Data num= 22
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4488.2 158 4486.3 230 4485.2 315 4479.22 315 4471.86
 324.17 4471.08 325 4469.41 365 4469.41 365.4 4470.21 369 4470.31
 375 4478.03 418 4479.1 420 4480.1 515 4478.4 635 4479.1
 850 4481.6 1010 4482.8 1120 4482.7 1215 4482 1315 4483.1
 1430 4483.8 1440 4487

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .135 315 .045 324.17 .025 325 .05 365 .025
 365.4 .045 375 .15

Bank Sta: Left Right Coeff Contr. Expan.
 315 375 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4480.1
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data
 Pier Station Upstream= 330.7 Downstream= 330.7
 Upstream num= 2
 Width Elev Width Elev
 6 4400 6 4481
 Downstream num= 2
 Width Elev Width Elev
 6 4400 6 4481

Pier Data
 Pier Station Upstream= 356.2 Downstream= 356.2
 Upstream num= 2
 Width Elev Width Elev
 6 4400 6 4481
 Downstream num= 2

Width Elev Width Elev

 6 4400 6 4481

Pier Data
 Pier Station Upstream= 381.7 Downstream= 381.7
 Upstream num= 2
 Width Elev Width Elev

 6 4400 6 4481
 Downstream num= 2
 Width Elev Width Elev

 6 4400 6 4481

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 1.2
 Yarnell KVal = .9

Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.7

INPUT

Description: Additional XS for bridge copied from sta. 12

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4488.2	158	4486.3	230	4485.2	315	4479.22	315	4471.86
324.17	4471.08	325	4469.41	365	4469.41	365.4	4470.21	369	4470.31
375	4478.03	418	4479.1	420	4480.1	515	4478.4	635	4479.1
850	4481.6	1010	4482.8	1120	4482.7	1215	4482	1315	4483.1
1430	4483.8	1440	4487						

Manning's n Values

Sta	n	Sta	n	Sta	n	Sta	n
0	.135	315	.045	324.17	.025	325	.05
365.4	.045	375	.15			365	.025

Bank Sta: Left Right Lengths: Left Channel Right Ccoeff Contr. Expan.
 315 375 80 126.67 80 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.6333*

INPUT

Description:

Station	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4487.67	114.39	4486.73	171.59	4486.24	193.33	4486
367.51	4483.2	400.38	4481.9	457.58	4480.32	503.33	4479.01
520	4470.46	524.2	4470.32	525.16	4468.39	565.16	4468.39
						565.79	4469.7

579.91 4471.83 587 4477.95 627.89 4478.47 629.79 4479.13 686.25 4478.16
 720.13 4477.71 797.77 4477.98 834.23 4478.07 853.52 4478.19 1020.8 4479.69
 1038.68 4479.81 1190.82 4480.4 1295.42 4480.2 1316.31 4480.06 1385.76 4479.98
 1387.39 4480 1480.85 4481.33 1590.2 4482.5 1599.71 4484.7

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 0 .135 503.33 .045 524.2 .025 525.16 .05 565.16 .025
 565.79 .045 587 .15

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 503.33 587 80 126.67 80 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.5666*

INPUT

Description: Station Elevation Data num= 35
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4487.13 157.2 4486.11 235.8 4485.57 265.66 4485.25 346.93 4483.9
 505.03 4481.2 550.19 4480.05 628.79 4479.41 691.67 4478.81 691.67 4476.35
 715.04 4469.93 724.11 4469.82 725.33 4467.37 765.33 4467.37 766.12 4468.95
 773.41 4469.05 790.82 4473.34 799 4477.88 837.78 4477.85 839.58 4478.16
 893.12 4477.28 925.25 4477.03 998.88 4477.09 1033.47 4477.04 1051.76 4477.05
 1210.4 4477.99 1227.36 4478.02 1371.64 4478.01 1470.84 4477.69 1490.66 4477.58
 1556.51 4477.96 1558.07 4477.98 1646.69 4479.55 1750.4 4481.21 1759.42 4482.4

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 0 .135 691.67 .045 724.11 .025 725.33 .05 765.33 .025
 766.12 .045 799 .15

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 691.67 799 80 126.67 80 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.5

INPUT

Description: XS L Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4446.6 200 4485.5 300 4484.9 338 4484.5 700 4478.2
 800 4478.5 880 4478.6 910 4469.4 923.98 4469.4 925.5 4466.35
 965.5 4466.35 966.55 4468.46 982 4468.6 1011 4477.8 1100 4476.4
 1200 4476.2 1250 4475.9 1400 4476.3 1665 4475.1 1728.74 4475.96
 1919.13 4480.1

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 0 .135 880 .045 923.98 .025 925.5 .05 965.5 .025
 966.55 .045 1011 .15

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 880 1011 53.33 53.33 53.33 .1 .3

Ineffective Flow num= 1

Sta L Sta R Elev

 1011 1919.13 4477.8

CROSS SECTION RIVER: Alpine Creek

REACH: Alpine RS: 11.4666*

INPUT

Description:
 Station Elevation Data num= 37
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4486.17 197.04 4485.08 201.52 4485.06 295.56 4484.49 302.27 4484.44
 332.99 4484.12 340.56 4484.02 689.63 4477.95 705.3 4477.78 788.15 4478.03
 806.06 4478.07 886.67 4478.17 901.21 4473.91 912.61 4468.43 913.21 4468.29
 925.83 4468.26 927 4465.92 967 4465.92 968.02 4467.95 978.06 4468.3
 984.67 4469.87 992.28 4474.08 1007.33 4477.53 1016.19 4477.28 1087.88 4476.16
 1108.56 4475.95 1168.43 4475.83 1208.7 4475.68 1222.29 4475.68 1279.16 4475.54
 1329.53 4475.68 1449.75 4475.64 1542.98 4475.22 1712.13 4475.14 1751.15 4475.24
 1823.64 4476.2 2040.18 4480.1

Manning's n Values num= 7

Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 .13 886.67 .045 925.83 .025 927 .05 967 .025
 968.02 .045 1007.33 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 886.67 1007.33 53.33 53.33 .1 .3

Ineffective Flow num= 1

Sta L Sta R Elev
 1007.333 2040.18 4477.53

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.4333*

INPUT

Description:
 Station Elevation Data num= 37
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4485.73 198.52 4484.64 203.03 4484.62 297.78 4484.05 304.55 4483.99
 335.5 4483.66 343.12 4483.54 694.81 4477.42 710.61 4477.37 794.07 4477.62
 812.12 4477.65 893.33 4477.73 905.6 4474.37 915.23 4467.47 915.73 4467.18
 927.68 4467.12 928.5 4465.49 968.5 4465.49 969.62 4467.73 974.13 4468
 980.8 4469.07 988.48 4475.09 1003.67 4477.27 1013.6 4476.89 1093.94 4475.63
 1117.11 4475.5 1184.21 4475.36 1229.35 4475.14 1244.58 4475.16 1308.31 4475.19
 1364.76 4475.34 1499.51 4474.98 1603.99 4474.51 1793.56 4475.02 1837.29 4475.38
 1918.54 4476.43 2161.22 4480.1

Manning's n Values num= 7

Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 .13 893.33 .045 927.68 .025 928.5 .05 968.5 .025
 969.62 .045 1003.67 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 893.33 1003.67 53.33 53.33 .3 .5

Ineffective Flow num= 1

Sta L Sta R Elev
 1003.67 2161.22 4477.27

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11.4

INPUT

Description: Additional XS for bridge copied from sta. 11

Station Elevation Data num= 24
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 1003.67 2161.22 4477.27

0	4485.3	200	4484.2	300	4483.6	338	4483.2	700	4476.9
800	4477.2	900	4477.3	910	4474.84	918.25	4466.07	929.55	4465.97
930	4465.06	970	4465.06	971.37	4467.79	976.92	4468.26	984.67	4476.1
1000	4477	1011	4476.5	1100	4475.1	1200	4474.9	1250	4474.6
1400	4475	1665	4473.8	1875	4474.9	2282.27	4480.1		

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.13	900	.045	929.55	.025	930	.05	970	.025
971.37	.045	1000	.13						

Bank Sta: left Right Lengths: Left Channel Right Coeff Contr. Expan.

900	1000	50	50	50	.3	.5
-----	------	----	----	----	----	----

Ineffective Flow num= 1

Sta L	Sta R	Elev
1000	2282.27	4477

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 11.3

INPUT

Description: Sul Ross Ave D Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 35
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates

num= 2

Sta Hi	Cord Lo	Cord	Sta Hi	Cord Lo	Cord
895	4477.2	4475.2	997	4477.2	4475.2

Upstream Bridge Cross Section Data

Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4485.3	200	4484.2	300	4483.6	338	4483.2
800	4477.2	900	4477.3	910	4474.84	918.25	4466.07
930	4465.06	970	4465.06	971.37	4467.79	976.92	4468.26
1000	4477	1011	4476.5	1100	4475.1	1200	4474.9
1400	4475	1665	4473.8	1875	4474.9	2282.27	4480.1

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.13	900	.045	929.55	.025	930	.05
971.37	.045	1000	.13				

Bank Sta: left Right Coeff Contr. Expan.

900	1000	50	50	.3	.5
-----	------	----	----	----	----

Ineffective Flow num= 1

Sta L	Sta R	Elev
1000	2282.27	4477

Downstream Deck/Roadway Coordinates

num= 2

Sta Hi	Cord Lo	Cord	Sta Hi	Cord Lo	Cord
895	4477.2	4475.2	997	4477.2	4475.2

Downstream Bridge Cross Section Data

Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-----	------	-----	------	-----	------	-----	------

Sta	n Val	200	4484.2	300	4483.6	338	4483.2	700	4476.9
0	4485.3	200	4484.2	300	4483.6	338	4483.2	700	4476.9
800	4477.2	900	4477.3	910	4474.84	918.25	4466.07	929.35	4465.97
930	4464.66	970	4464.66	971.58	4467.81	976.92	4468.26	984.67	4476.1
1000	4477	1011	4476.5	1100	4475.1	1200	4474.9	1250	4474.6
1400	4475	1665	4473.8	1875	4474.9	2278.38	4480.1		

Manning's n Values
 num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 0 .13 900 .045 929.35 .025 930 .05 970 .025
 971.58 .045 1000 .13

Bank Sta: Left Right Coeff Contr. Expan.
 num= 1
 Ineffective Flow num= 1
 Sta L Sta R Elev

 1000 2278.38 4477

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4477.2
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
 Pier Station Upstream= 933 Downstream= 933
 Upstream num= 2
 Width Elev Width Elev

 2 4400 2 4475.5
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4475.5

Pier Data
 Pier Station Upstream= 957 Downstream= 957
 Upstream num= 2
 Width Elev Width Elev

 2 4400 2 4475.5
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4475.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 Momentum Cd = 2
 Yarnell KVal = 1.05
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .5
 Max Low Cord =

Additional Bridge Parameters
 Friction component to Momentum

Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 11

INPUT
 Description: XS K -- Sul Ross/Ave. D
 Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4485.3	200	4484.2	300	4483.6	338	4483.2
800	4477.2	900	4477.3	910	4474.84	918.25	4466.07
930	4464.66	970	4464.66	971.58	4467.81	976.92	4468.26
1000	4477	1011	4476.5	1100	4475.1	1200	4474.9
1400	4475	1665	4473.8	1875	4474.9	2278.38	4480.1

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.13	900	.045	929.35	.025	930	.05
971.58	.045	1000	.13			970	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 960 1000 106.67 106.67 106.67 .3 .5

Ineffective Flow num= 1
 Sta L Sta R Elev
 1000 2278.38 4477

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 10.6666*

INPUT
 Description:
 Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4483.7	177.78	4482.5	266.67	4481.87	300.44	4481.45
622.22	4475.78	666.67	4475.67	711.11	4475.54	800	4475.17
808.56	4471.96	815.62	4465.76	816.59	4465.71	823.1	4465.6
864	4463.8	866.04	4467.88	867.18	4468.02	874.17	4473.66
899.91	4474.68	919.24	4474.41	996.25	4473.43	1006	4473.39
1104.51	4472.8	1150.04	4472.63	1158.64	4472.62	1314.03	4473.16
1504.92	4473.19	1607.89	4472.87	1835.22	4473.54	1860.67	4473.74
						2271.9	4478.03

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.13	800	.045	823.1	.025	824	.05
866.04	.045	888	.13			864	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 800 888 106.67 106.67 106.67 .3 .5

Ineffective Flow num= 1
 Sta L Sta R Elev
 888 2271.9 4475.07

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 10.3333*

INPUT
 Description:
 Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4482.1	155.56	4480.8	233.33	4480.13	262.89	4479.7	466.67	4476.08
544.44	4474.66	583.33	4474.28	622.22	4473.89	700	4473.03	703.76	4469.87
707.12	4469.08	712.99	4465.45	713.79	4465.35	716.84	4465.27	718	4462.94
758	4462.94	761.55	4470.04	763.68	4471.21	776	4473.13	788.82	4472.86
809.62	4472.61	892.51	4471.76	903	4471.69	996.39	4470.71	1009.02	4470.7
1058.02	4470.62	1067.27	4470.63	1234.52	4471.33	1242.03	4471.37	1439.96	4472.14
1550.78	4471.94	1795.45	4472.18	1822.84	4472.27	2380.8	4476.46		

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.13	700	.045	716.84	.025	718	.05
761.55	.045	776	.13				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Sta	Left	Right	Lengths	Left Channel	Right	Coeff Contr.	Expan.
700	776	776	106.67	106.67	106.67	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
776	2380.8	4473.13

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 10

INPUT Description: XS J

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4480.5	200	4478.4	400	4474.8	500	4472.9
603	4466.8	610.48	4465.12	612	4462.08	652	4462.08
664	4471.2	700	4470.8	800	4470	900	4468.6
1155	4469.5	1375	4471.1	1785	4470.8	2406.57	4474.34

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.13	600	.045	610.48	.025	612	.05
655.62	.045	664	.13				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Sta	Left	Right	Lengths	Left Channel	Right	Coeff Contr.	Expan.
600	664	664	109.17	120.83	109.17	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
664	2406.57	4471.2

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.9*

INPUT Description:

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4480.5	200	4478.4	400	4474.8	500	4472.9
601.77	4468.15	603.24	4466.76	611.89	4464.67	612.65	4464.57
618	4461.11	658	4461.11	661.69	4468.49	676	4471.07
776.87	4470.19	811.42	4469.84	877.73	4468.91	910.99	4468.6
976.71	4468.65	1134.94	4469.4	1164.9	4469.57	1356.84	4470.97
1770.39	4470.81	1792.21	4470.85	2264.12	4473.93		

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.13	600	.045	610.48	.025	612	.05

0	.13	600	.045	616.35	.025	618	.05	658	.025
661.69	.045	676	.13						
Bank Sta: Left	Right	Lengths: Left	Channel	Right					
600	676	109.17	120.83	109.17					
					Coeff	Contr.			Expan.
					.1				.3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.8*

INPUT

Description: Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4480.5	200	4478.4	400	4474.8	500	4472.9	600	4470.9
601.91	4467.65	603.48	4466.73	612.78	4464.34	613.59	4464.17	622.15	4463.84
624	4460.14	664	4460.14	667.88	4467.91	688	4470.93	723.69	4470.61
788.43	4470.09	822.84	4469.68	888.87	4468.76	921.98	4468.6	955.15	4468.6
987.42	4468.7	1144.97	4469.45	1174.8	4469.64	1365.92	4471.03	1392.92	4471.09
1777.7	4470.81	1799.42	4470.89	2269.31	4473.95				

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	600	.045	622.15	.025	624	.05	664	.025
667.88	.045	688	.13						
Bank Sta: Left	Right	Lengths: Left	Channel	Right					
600	688	69.17	60.83	69.17					
					Coeff	Contr.			Expan.
					.3				.5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.75

INPUT

Description: Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4480.5	200	4478.4	400	4474.8	500	4472.9	600	4470.9
602.04	4467.15	614.54	4463.77	627.95	4463.28	630	4459.17	670	4459.17
674.14	4467.45	700	4470.8	800	4470.8	900	4468.6	956	4468.6
1155	4469.5	1375	4471.1	1785	4470.8	2274.49	4473.98		

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	600	.045	627.95	.025	630	.05	670	.025
674.14	.045	700	.13						
Bank Sta: Left	Right	Lengths: Left	Channel	Right					
600	700	40	60	40					
					Coeff	Contr.			Expan.
					.3				.5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 9.73

INPUT

Description: 6th St. (LW King)

Distance from Upstream XS =	10				
Deck/Roadway Width	= 40				
Weir Coefficient	= 2.6				
Bridge Deck/Roadway Skew =					
Upstream Deck/Roadway Coordinates					
num=	2				
Sta Hi Cord	Lo Cord	Sta Hi	Cord	Lo Cord	
605	4463	4461.5	678	4463	4461.5

Upstream Bridge Cross Section Data
 Station Elevation Data num= 19
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4480.5 200 4478.4 400 4474.8 500 4472.9 600 4470.9
 602.04 4467.15 614.54 4463.77 627.95 4463.28 630 4459.17 670 4459.17
 674.14 4467.45 700 4470.8 800 4470 900 4468.6 966 4468.6
 1155 4469.5 1375 4471.1 1785 4470.8 2274.49 4473.98

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 0 .1 600 .045 627.95 .025 630 .05 670 .025
 674.14 .045 700 .13

Bank Sta: Left Right Coeff Contr. Expan.
 600 700 .3 .5

Downstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

 605 4463 4461.5 678 4463 4461.5

Downstream Bridge Cross Section Data
 Station Elevation Data num= 19
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 0 4480.5 200 4478.4 400 4474.8 500 4472.9 600 4470.9
 602.04 4467.15 614.54 4463.77 627.95 4463.28 630 4459.17 670 4459.17
 674.14 4467.45 700 4470.8 800 4470 900 4468.6 966 4468.6
 1155 4469.5 1375 4471.1 1785 4470.8 2274.49 4473.98

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 0 .1 600 .045 627.95 .025 630 .05 670 .025
 674.14 .045 700 .13

Bank Sta: Left Right Coeff Contr. Expan.
 600 700 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

REACH: Alpine RS: 9.7

INPUT
 Description: 6th St. (LW Xing) -- Interpolated x-section
 Station Elevation Data num= 19
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4480.5 200 4478.4 400 4474.8 500 4472.9 600 4470.9
 602.04 4467.15 614.54 4463.77 627.95 4463.28 630 4459.17 670 4459.17
 674.14 4467.45 700 4470.8 800 4470 900 4468.6 966 4468.6
 1155 4469.5 1375 4471.1 1785 4470.8 2274.49 4473.98

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .1 600 .045 627.95 .025 630 .05 670 .025
 674.14 .045 700 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 600 700 109.17 120.83 109.17 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.63333*

INPUT
 Description:
 Station Elevation Data num= 29
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -100 4477.33 -99.31 4477.33 -98.61 4477.33 108.5 4475.19 156.22 4474.89
 412.44 4472.27 490.75 4471.43 540.56 4470.98 668.67 4469.76 670.74 4466.38
 674.56 4464.08 683.44 4462.45 691.65 4462.2 693.66 4458.19 733.66 4458.19
 737.08 4465.03 749.52 4466.39 758.64 4470.28 857.71 4469.19 885.09 4468.78
 956.79 4468.1 1022.18 4468.1 1209.43 4468.7 1420.08 4469.73 1427.39 4469.78
 1583.13 4469.99 1833.6 4469.84 2133.41 4471.11 2318.56 4472.67

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 -100 .1 668.67 .045 691.65 .025 693.66 .05 733.66 .025
 737.08 .045 758.64 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 668.67 758.64 109.17 120.83 109.17 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.56666*

INPUT
 Description:
 Station Elevation Data num= 29
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 4474.17 -199.15 4474.16 -198.3 4474.16 54.25 4471.6 112.44 4471.38
 424.89 4469.74 520.37 4469.21 581.11 4469.06 737.33 4468.63 739.44 4465.61
 743.32 4462.02 752.34 4461.13 755.38 4461.06 757.3 4457.22 797.3 4457.22
 799.99 4462.6 809.88 4463.38 817.27 4469.77 915.42 4468.38 942.54 4467.94
 1013.57 4467.6 1078.35 4467.6 1263.85 4467.9 1472.54 4468.42 1479.78 4468.46
 1634.06 4469 1862.19 4468.87 2179.2 4469.46 2362.62 4471.36

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 -200 .1 737.33 .05 755.38 .025 757.3 .05 797.3 .025
 799.99 .05 817.27 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 737.33 817.27 109.17 120.83 109.17 .3 .5

737.33 817.27 109.17 120.83 109.17 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9.5

INPUT
 Description: Additional XS for bridge copied from sta. 9

Station Elevation Data		num= 21	
Sta	Elev	Sta	Elev
-300	4471	-299	4471
806	4468.7	806	4466.5
889.5	4456.25	891.75	4460.74
933	4469.4	1000	4467.1
2488.4	4469.94		

Manning's n Values		num= 7	
Sta	n Val	Sta	n Val
-300	.1	806	.05
891.75	.05	933	.13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 806 933 70 70 70 70 .3 .5

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 9.3

INPUT
 Description: 5th St. Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 50
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates

num= 2	
Sta	Hi Cord Lo Cord
806	4468.7 4467.7 933 4469.4 4468.4

Upstream Bridge Cross Section Data

Station Elevation Data		num= 21	
Sta	Elev	Sta	Elev
-300	4471	-299	4471
806	4468.7	806	4466.5
889.5	4456.25	891.75	4460.74
933	4469.4	1000	4467.1
2488.4	4469.94		

Manning's n Values num= 7

Sta	n Val	Sta	n Val
-300	.1	806	.05
891.75	.05	933	.13

Bank Sta: Left Right Coeff Contr. Expan.
 806 933 70 70 70 70 .3 .5

Downstream Deck/Roadway Coordinates

num= 2	
Sta	Hi Cord Lo Cord
806	4468.7 4467.7 933 4469.4 4468.4

Downstream Bridge Cross Section Data

Station Elevation Data		num= 21	
Sta	Elev	Sta	Elev
-300	4471	-299	4471
806	4468.7	806	4466.5
889.5	4456.25	891.75	4460.74
933	4469.4	1000	4467.1
2488.4	4469.94		

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	4471	-299	4471	-298	4471	0	4468	550	4467
806	4468.7	806	4466.5	830	4461.8	846.99	4460.71	849.5	4455.68
889.5	4455.68	892.04	4460.76	907	4461.9	930	4466.9	933	4468
933	4469.4	1000	4467.1	1525	4467.1	1685	4468	2225	4467.8
2488.4	4469.89								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-300	.1	806	.05	846.99	.025	849.5	.05	889.5	.025
892.04	.05	933	.13						

Bank Sta: Left Right Coeff Contr. Expan.
 R06 933 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 4468.7
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 4

Pier Data

Pier Station	Upstream num=	Upstream=	Downstream=	830	Downstream=	830
Width	Elev	Width	Elev			
2.33	4400	2.33	4468.5			
Width	Elev	Width	Elev			
2.33	4400	2.33	4468.5			

Pier Data

Pier Station	Upstream num=	Upstream=	Downstream=	855	Downstream=	855
Width	Elev	Width	Elev			
2.33	4400	2.33	4469			
Width	Elev	Width	Elev			
2.33	4400	2.33	4469			

Pier Data

Pier Station	Upstream num=	Upstream=	Downstream=	880	Downstream=	880
Width	Elev	Width	Elev			
2.33	4400	2.33	4468.5			
Width	Elev	Width	Elev			
2.33	4400	2.33	4468.5			

Pier Data

Pier Station	Upstream num=	Upstream=	Downstream=	905	Downstream=	905
Width	Elev	Width	Elev			
2.33	4400	2.33	4468.5			
Width	Elev	Width	Elev			
2.33	4400	2.33	4468.5			

Width Elev Width Elev

 2.33 4400 2.33 4468.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 1.2
 Yarnell KVal = .9
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 9

INPUT

Description: XS I -- 5th St.

Station Elevation Data		num= 21	
Sta	Elev	Sta	Elev
-300	4471	-299	4471
806	4468.7	806	4466.5
889.5	4455.68	892.04	4460.76
933	4469.4	1000	4467.1
2488.4	4469.89	1525	4467.1
		1685	4468
		2225	4467.8

Manning's n Values

num= 7	
Sta	n Val
-300	.1
806	.05
892.04	.05
933	.13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 806 933 83.33 87.33 83.33 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 8.66666*

INPUT

Description:

Station Elevation Data		num= 40	
Sta	Elev	Sta	Elev
-300	4470.33	-298.91	4470.33
-42	4467.36	26.58	4466.9
302	4466.73	388	4466.8
732	4465.92	768.12	4466
904	4466.57	909.93	4460.77
960.61	4460.26	966.45	4461.09
1207.13	4466.2	1380.07	4466.2
1834.89	4466.88	1936.92	4466.88
		2054.5	4467.07
		2086.08	4467.13
		2236.13	4468.95

Manning's n Values

num= 7	
Sta	n Val
-300	.1
904	.05
960	.05
971.94	.13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 904 971.94 83.33 87.33 83.33 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 8.333333*

INPUT

Description:
 Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
300	4469.67	298.82	4469.65	297.65	4469.64	-207	4468.34	-114	4467.14
-21	4466.08	53.16	4465.81	64.56	4465.79	137.1	4466.22	165	4466.01
451	4465.91	434	4466.2	541.4	4466.02	606.72	4465.3	700.63	4464.96
816	4464.66	855.06	4464.75	893.19	4464.24	948.99	4463.93	997.35	4464.83
1002	4465.64	1007.77	4461.58	1011.89	4460.45	1014.98	4454.28	1054.98	4454.28
1058.16	4460.64	1062.65	4461.8	1067.97	4466.08	1117.1	4464.98	1148.84	4464.84
1253.57	4465.3	1390.03	4465.3	1490.98	4465.2	1595.25	4465.4	1662.97	4465.32
1748.94	4465.84	1829.46	4465.89	1922.33	4466.32	1947.17	4466.46	2065.58	4467.85

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
300	.1	1002	.05	1011.89	.025	1014.98	.05
1058.16	.05	1067.97	.13				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
1002	1067.97		83.33	87.33	
-300	999.02	4465.26	1094.44	2065.58	4465.51

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 8

INPUT

Description: XS H -- Ave. A (LW Xing)
 Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	4469	-200	4467.4	-100	4466	0	4464.8	92	4464.7
170	4465.4	200	4465.1	400	4465.1	500	4465.6	604.73	4465.41
674.97	4464.38	900	4463.4	942	4463.5	983	4462.7	1043	4462.2
1095	4463.5	1100	4464.72	1108.11	4461.37	1112	4453.58	1152	4453.58
1155.9	4461.39	1164	4464.49	1200	4463.5	1300	4464.4	1400	4464.4
1600	4464	1663	4464.8	1722	4464.9	1790.05	4465.58	1895.02	4466.75

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-300	.1	1100	.05	1108.11	.025	1112	.05
1155.9	.05	1164	.13				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
1100	1164		60	60	
-300	1097.32	4464.2	1175.37	1895.02	4464.2

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.95

INPUT
 Description: Ave. A (LW Xing)

Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1100 4458 4456.5 1160 4458 4456.5

Upstream Bridge Cross Section Data

Station Elevation Data		num= 30	
Sta	Elev	Sta	Elev
-300	4469	-200	4467.4
170	4465.4	200	4465.1
674.97	4464.38	900	4463.4
1095	4463.5	1100	4464.72
1155.9	4461.39	1164	4464.49
1600	4464	1663	4464.8

Manning's n Values num= 7

Sta	n Val	Sta	n Val
-300	.1	1100	.05
1155.9	.05	1164	.13

Bank Sta: Left Right Coeff Contr. Expan.

1100 1164 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev
-300	1097.32	4464.2
	1175.37	1895.02
		4464.2

Downstream Deck/Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1100 4458 4456.5 1160 4458 4456.5

Downstream Bridge Cross Section Data

Station Elevation Data		num= 30	
Sta	Elev	Sta	Elev
-300	4469	-200	4467.4
170	4465.4	200	4465.1
674.97	4464.38	900	4463.4
1095	4463.5	1100	4464.72
1155.9	4461.39	1164	4464.49
1600	4464	1663	4464.8

Manning's n Values num= 7

Sta	n Val	Sta	n Val
-300	.1	1100	.05
1155.9	.05	1164	.13

Bank Sta: Left Right Coeff Contr. Expan.

1100 1164 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev
-300	1097.54	4464.19
	1174.99	1895.02
		4464.2

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maxim allowable submergence for weir flow = .95

Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Para

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Kn-ry Only

Additional Bridge Parameters

Add Friction Component to Momentum

Do not add Weight Component to Momentum

Class B Flow critical depth computations use critical depth

inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.9

INPUT

Description:

Station Elevation Data		num= 30		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
300	4469	-200	4467.4	-100	4466	0	4464.8	92	4464.7
170	4465.4	200	4465.1	400	4465.1	500	4465.6	604.73	4465.41
674.97	4464.38	900	4463.4	942	4463.5	983	4462.7	1043	4462.2
1095	4463.5	1100	4464.72	1108.11	4461.37	1112	4453.58	1152	4453.58
1155.9	4461.39	1164	4464.49	1200	4463.5	1300	4464.4	1400	4464.4
1600	4464	1663	4464.8	1722	4464.9	1790.05	4465.58	1895.02	4466.75

Manning's n Values

Sta n Val		Sta n Val		Sta n Val		Sta n Val	
-300	.1	1100	.05	1108.11	.025	1112	.05
1155.9	.05	1164	.13				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Bank Sta	Left	Right	Lengths	Left Channel	Right	Coeff Contr.	Expan.
	1100	1164		83	83	.3	.5

Ineffective Flow num= 2
 Sta L Elev Sta R Elev
 -300 1097.54 4464.19 1174.99 1895.02 4464.2

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.8*

INPUT
 Description:
 Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-270	4467.86	-177.86	4466.16	-85.71	4464.62	-42.35	4463.97	6.43	4463.42
88.16	4463.28	91.2	4463.28	163.07	4463.96	165.56	4463.94	190.71	4463.75
261.18	4463.82	375	4463.96	467.14	4464.47	529.8	4464.44	563.64	4464.04
564.71	4464.01	628.37	4463.15	640.59	4463.1	806.01	4462.57	835.71	4462.49
874.41	4462.6	912.19	4462	967.48	4461.65	982.06	4461.98	1015.39	4462.75
1020	4463.74	1037.08	4459.26	1040.5	4452.42	1080.5	4452.42	1082.86	4457.15
1083.92	4457.22	1083.96	4457.23	1101	4463.37	1102.26	4463.28	1135.23	4462.32
1165.33	4462.37	1230.3	4462.8	1291.47	4462.74	1325.38	4462.84	1384.81	4462.92
1417.6	4462.88	1515.53	4462.81	1543.74	4463.14	1575.42	4463.48	1631.52	4463.57
1669.88	4463.9	1696.22	4464.23	1796.02	4465.57				

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 -270 .1 1020 .05 1037.08 .025 1040.5 .05 1080.5 .025
 1082.86 .05 1101 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1020 1101 143 143 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 -270 1017.9 4463.31 1102.35 1796.02 4463.27

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.6*

INPUT
 Description:
 Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-240	4466.72	-155.71	4464.92	-71.43	4463.24	-31.76	4462.5	12.86	4462.04
87.62	4461.86	90.4	4461.87	156.14	4462.51	158.42	4462.5	181.43	4462.39
245.88	4462.54	350	4462.81	434.29	4463.33	491.6	4463.41	522.56	4462.67
523.53	4462.64	581.76	4461.93	592.94	4461.87	744.26	4461.6	771.43	4461.57
806.83	4461.7	841.39	4461.29	891.96	4461.09	905.29	4461.36	935.79	4462.01
940	4462.75	965.51	4458.26	969	4451.27	1009	4451.27	1011	4455.28
1018.84	4455.7	1018.89	4455.71	1038	4462.24	1039.2	4462.11	1070.45	4461.14
1099	4460.95	1160.6	4461.2	1218.6	4461.08	1250.75	4461.28	1307.11	4461.56
1338.2	4461.56	1431.05	4461.63	1457.81	4461.91	1487.85	4462.17	1541.04	4462.25
1577.41	4462.5	1602.38	4462.88	1697.01	4464.39				

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 -240 .1 940 .05 965.51 .025 969 .05 1009 .025
 1011 .05 1038 .13

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 940 1038 143 143 .1 .3
 Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 -240 936.14 4462.01 1039.47 1697.01 4462.1

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.4*

INPUT
 Description:
 Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-210	4465.58	-133.57	4463.68	-57.14	4461.85	-21.18	4461.03	19.29	4460.67
87.08	4460.44	89.6	4460.45	149.21	4461.07	151.28	4461.07	172.14	4461.04
230.59	4461.26	325	4461.67	401.43	4462.2	453.4	4462.37	481.47	4461.3
482.35	4461.26	535.16	4460.7	545.29	4460.65	682.51	4460.64	707.14	4460.66
739.24	4460.81	770.58	4460.59	816.44	4460.54	828.53	4460.74	856.18	4461.26
860	4461.77	892.38	4457.83	893.87	4457.38	897.5	4450.12	937.5	4450.12
939.22	4453.55	953.76	4454.17	953.82	4454.18	975	4461.12	976.13	4460.94
1005.68	4459.96	1032.67	4459.53	1090.91	4459.59	1145.73	4459.42	1176.13	4459.73
1229.4	4460.21	1258.8	4460.24	1346.58	4460.44	1371.87	4460.67	1400.27	4460.85
1450.55	4460.92	1484.94	4461.1	1508.55	4461.53	1598.01	4463.21		

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 -210 .1 940 .05 965.51 .025 969 .05 1009 .025
 1011 .05 1038 .13

Sta	Elev	num	Left Channel	Right	Coeff Contr.	Expan.
210	.12	860	.05	893.87	.025	897.5
939.22	.05	975	.95			937.5
Bank Sta: Left Right Lengths: Left Channel Right						
	860	975	143	143	.1	.3
Ineffective Flow num= 2						
Sta L	Sta R	Elev	Sta L	Sta R	Elev	
210	855.87	4461.26	976.07	1598.01	4460.94	

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7.2*

INPUT

Description: Station Elevation Data num= 50

Sta	Elev	num	Left Channel	Right	Coeff Contr.	Expan.
180	4464.44	-111.43	4462.44	-42.86	4460.47	-10.59
86.54	4459.02	88.8	4459.04	142.29	4459.62	144.14
215.29	4459.98	300	4460.52	368.57	4461.06	415.2
441.19	4459.88	488.55	4459.47	497.65	4459.42	620.75
671.66	4459.91	699.77	4459.89	740.91	4459.99	751.76
780	4460.78	818.19	4457.6	820.88	4456.82	822.25
866	4458.97	867.39	4451.95	888.68	4452.65	888.74
913.07	4459.77	940.91	4458.79	966.33	4458.12	1021.21
1101.51	4458.17	1151.7	4458.85	1179.4	4458.92	1262.1
1312.69	4459.54	1360.07	4459.6	1392.47	4459.7	1414.71

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
180	.12	780	.05	822.25	.025	826	.05
867.49	.05	912	.95			866	.025
Bank Sta: Left Right Lengths: Left Channel Right							
	780	912	143	143	143		
Ineffective Flow num= 2							
Sta L	Sta R	Elev	Sta L	Sta R	Elev		
180	776.49	4460.52	913.44	1499	4459.76		

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 7

INPUT

Description: XS G -- Brown St. (new) num= 26

Station Elevation Data num= 26

Sta	Elev	num	Left Channel	Right	Coeff Contr.	Expan.
150	4463.3	0	4458.1	86	4457.6	137
377	4460.3	400	4458.5	450	4458.2	559
700	4459.8	744	4457.36	750.65	4455.53	754.5
795.8	4450.41	823.67	4451.13	849	4458.87	850
1000	4456.1	1074	4457.5	1100	4457.6	1200
1400	4460.85					1300

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
150	.12	700	.05	750.65	.025	754.5	.05
795.8	.05	849	.095			794.5	.025

Bank Sta: Left Right Lengths: Left Channel Right

Ineffective Flow num= 2

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
700	.05	849	.095	60	60	60	60
Coeff Contr. Expan.							
				.3	.3	.5	.5

Sta L Sta R Elev Sta L Sta R Elev

 -150 674.77 4459.5 850.13 1400 4458.59

BRIDGE: Alpine RIVER: Alpine Creek
 REACH: Alpine RS: 6.7

INPUT

Description: Brown St. Bridge (new)
 Distance from Upstream XS = 10
 Deck/Roadway Width = 40
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates
 num= 3

Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

 700 4459.8 4458.8 769.61 4460.1 4459.01 849 4458.87 4457.87

Upstream Bridge Cross Section Data

Station Elevation Data		num= 26		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
.....
-150	4463.3	0	4458.1	86	4457.6	137	4458.2	200	4458.7	200	4458.7
377	4460.3	400	4458.5	450	4458.2	559	4458.7	675	4459.5	675	4459.5
700	4459.8	744	4457.36	750.65	4455.53	754.5	4447.82	794.5	4447.82	794.5	4447.82
795.8	4450.41	823.67	4451.13	849	4458.87	850	4458.6	900	4456.7	900	4456.7
1000	4456.1	1074	4457.5	1100	4457.6	1200	4458.2	1300	4458.3	1300	4458.3
1400	4460.85										

Manning's n Values

num= 7		Sta n Val		Sta n Val		Sta n Val		Sta n Val	
.....
-150	.12	700	.05	750.65	.025	754.5	.05	794.5	.025
795.8	.05	849	.095						

Bank Sta: Left Right Coeff Contr. Expan.

Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev

 -150 674.77 4459.5 850.13 1400 4458.59

Downstream Deck/Roadway Coordinates

num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

 700 4459.8 4458.8 769.61 4460.1 4459.01 849 4458.87 4457.87

Downstream Bridge Cross Section Data

Station Elevation Data		num= 26		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
.....
-150	4463.3	0	4458.1	86	4457.6	137	4458.2	200	4458.7	200	4458.7
377	4460.3	400	4458.5	450	4458.2	559	4458.7	675	4459.5	675	4459.5
700	4459.8	744	4457.36	750.37	4455.6	754.5	4447.34	794.5	4447.34	794.5	4447.34
796.04	4450.42	823.67	4451.13	849	4458.87	850	4458.6	900	4456.7	900	4456.7
1000	4456.1	1074	4457.5	1100	4457.6	1200	4458.2	1300	4458.3	1300	4458.3
1400	4460.85										

Manning's n Values

num= 7		Sta n Val		Sta n Val		Sta n Val		Sta n Val	
.....
-150	.12	700	.05	750.37	.025	754.5	.05	794.5	.025
796.04	.05	849	.095						

Bank Sta: Left Right Coeff Contr. Expan.

Ineffective Flow num= 2 .3 .5
 Sta L Sta R Elev Sta L Sta R Elev
 -150 674.46 4459.5 849.95 1400 4458.6

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of piers = 1

Pier Data
 Pier Station Upstream= 784 Downstream= 784
 Upstream num= 2
 Width Elev Width Elev
 2 4400 2 4460
 Downstream num= 2
 Width Elev Width Elev
 2 4400 2 4460

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy Cd = 1.2
 Momentum Kval = .9
 Yarnell

Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 Inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 6.5

INRUP

Description: additional XS for bridge copied from sta 7
 Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-150	4463.3	0	4458.1	86	4457.6	137	4458.2	200	4458.7
377	4460.3	400	4458.5	450	4458.2	559	4458.7	675	4459.5
700	4459.8	744	4457.36	750.37	4455.6	754.5	4447.34	794.5	4447.34
796.04	4450.42	823.67	4451.13	849	4458.87	850	4458.6	900	4456.7
1000	4456.1	1074	4457.5	1100	4457.6	1200	4458.2	1300	4458.3
1400	4460.85								

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-150	.12	700	.05	750.37	.025	754.5	.05	794.5	.025
796.04	.05	849	.095						

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

700 849 141.25 143.75 141.25 .3 .5
 Ineffective Flow num= 2
 Sta L Elev Sta L Sta R Elev

 -150 674.46 4459.5 849.95 1400 4458.6

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 6.375*

INPUT
 Description:
 Station Elevation Data num= 45
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -137.5 4461.55 -115.56 4460.83 -71.69 4459.29 -49.75 4458.55 19.82 4457.03
 59.93 4456.98 60.81 4456.88 110.02 4456.45 125.74 4456.51 163.51 4456.79
 213.48 4457.03 229.59 4457.11 301.23 4457.51 388.98 4458.03 415.23 4458.18
 439.35 4456.81 457.42 4456.72 491.79 4456.58 564.47 4456.81 606.12 4456.97
 652.21 4457.23 727.78 4457.73 738.21 4457.84 745.23 4458.47 754 4458.55
 792.86 4455.32 797.72 4454.01 801.63 4446.18 841.63 4446.18 843.46 4449.85
 856.21 4450.32 865.15 4450.92 889.25 4457.85 890.17 4457.65 905.13 4457.26
 913.07 4456.39 936.41 4455.67 1000.41 4455.34 1028.88 4455.22 1097.31 4456.31
 1121.35 4456.4 1213.82 4456.91 1237.4 4456.94 1306.29 4457.22 1398.76 4459.43

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 -137.5 .09 754 .05 797.72 .025 801.63 .05 841.63 .025
 843.46 .05 889.25 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 754 889.25 141.25 143.75 141.25 .3 .5
 Ineffective Flow num= 2
 Sta L Elev Sta L Sta R Elev

 -137.5 744.48 4458.48 890.48 1398.76 4457.64

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 6.25*

INPUT
 Description:
 Station Elevation Data num= 45
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

 -125 4459.8 -102.04 4459.09 -56.13 4457.46 -33.17 4456.7 39.65 4455.96
 81.62 4456.09 82.54 4455.89 134.04 4455.3 150.49 4455.24 190.02 4455.39
 242.32 4455.49 259.18 4455.52 334.15 4455.71 425.98 4455.99 453.46 4456.06
 478.71 4455.13 497.61 4455.05 533.59 4454.95 609.65 4455.11 653.23 4455.25
 701.48 4455.45 780.56 4455.96 791.47 4456.06 798.82 4457.25 808 4457.3
 841.73 4453.29 845.05 4452.42 848.75 4445.02 888.75 4445.02 890.93 4449.38
 898.14 4449.74 906.62 4450.7 929.5 4456.83 930.35 4456.71 944.09 4456.54
 951.38 4455.13 972.82 4454.64 1031.61 4454.39 1057.76 4454.34 1120.61 4455.12
 1142.7 4455.2 1227.63 4455.62 1249.3 4455.66 1312.57 4456.14 1397.51 4458.02

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val

 -125 .09 808 .05 845.05 .025 848.75 .05 888.75 .025
 890.93 .05 929.5 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 808 929.5 141.25 143.75 141.25 .1 .3
 Ineffective Flow num= 2
 Sta L Elev Sta L Sta R Elev

 -125 798.47 4457.26 944.71 1397.51 4456.54

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 6.125*

INPUT

Description:
 Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-112.5	4458.05	-88.52	4457.34	-40.56	4455.63	-16.58	4454.85	59.47	4454.89
103.31	4455.19	104.27	4454.89	158.07	4454.14	175.25	4453.97	216.54	4453.98
271.16	4453.94	288.76	4453.93	367.08	4453.9	462.99	4453.94	491.69	4453.94
518.06	4453.44	537.81	4453.37	575.38	4453.33	654.82	4453.4	700.35	4453.52
750.74	4453.68	833.34	4454.2	844.74	4454.28	852.41	4456.02	862	4456.05
890.59	4451.25	892.41	4450.79	895.88	4443.86	935.88	4443.86	938.48	4449.07
940.07	4449.17	948.1	4450.49	969.75	4455.82	970.52	4455.76	983.04	4455.82
989.69	4453.86	1009.23	4453.6	1062.8	4453.45	1086.64	4453.45	1143.92	4453.93
1164.04	4454.1241.45	4454.33	1261.19	4454.38	1318.86	4455.07	1396.27	4456.6	

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-112.5	.09	862	.05	892.41	.025	895.88	.05
938.48	.05	969.75	.085				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Sta L	Sta R	Elev	num=	Sta L	Sta R	Elev	num=
862	969.75		2	141.25	143.75	141.25	.3
Ineffective Flow							.5
-112.5	847.4	4455.02	985.91	1396.27	4455		

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 6

INPUT

Description: XS F
 Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-100	4456.3	-75	4455.6	-25	4453.8	0	4453	125	4454.3
126	4453.9	200	4452.7	300	4452.4	400	4452.1	500	4451.9
578	4451.7	700	4451.7	800	4451.9	898	4452.5	906	4454.8
916	4454.8	939.78	4449.14	943	4442.71	983	4442.71	986.44	4449.58
1010	4454.8	1022	4455.1	1028	4452.6	1094	4452.5	1273.09	4453.1
1395.02	4455.18								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-100	.09	916	.05	939.78	.025	943	.05
986.44	.05	1010	.085				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Sta L	Sta R	Elev	num=	Sta L	Sta R	Elev	num=
916	1010		2	110	100	110	.3
Ineffective Flow							.5
-100	902.81	4454	1024.86	1395.02	4454.02		

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 5.75

INPUT

Description: 2nd St. (LW Xing)
 Distance from Upstream XS = 10
 Deck/Roadway width = 40

Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 940 4445 4443.5 995 4445 4443.5

Upstream Bridge Cross Section Data
 Station Elevation Data num= 26
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -100 4456.3 -75 4455.6 -25 4453.8 0 4453 125 4454.3
 126 4453.9 200 4452.7 300 4452.4 400 4452.1 500 4451.9
 578 4451.7 700 4451.7 800 4451.9 898 4452.5 906 4454.8
 916 4454.8 939.78 4449.14 943 4442.71 983 4442.71 986.44 4449.58
 1010 4454.8 1022 4455.1 1028 4452.6 1094 4452.5 1273.09 4453.1
 1395.02 4455.18

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 -100 .09 916 .05 939.78 .025 943 .05 983 .025
 986.44 .05 1010 .085

Bank Sta: Left Right Coeff Contr. Expan.
 916 1010 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 -100 902.81 4454 1024.86 1395.02 4454.02

Downstream Deck/Roadway Coordinates
 num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 940 4445 4443.5 995 4445 4443.5

Downstream Bridge Cross Section Data
 Station Elevation Data num= 44
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -66.67 4454.57 -42.4 4453.99 6.12 4452.58 30.38 4451.94 39.81 4451.97
 146.29 4452.59 151.69 4452.63 152.66 4452.36 214.44 4451.65 224.48 4451.58
 250.64 4451.65 252.77 4451.44 321.52 4451.21 359.25 4451.09 418.57 4450.97
 465.73 4450.9 466.8 4450.9 515.62 4450.56 526.42 4450.48 572.21 4450.63
 591.31 4450.6 678.89 4450.6 709.71 4450.66 734.06 4450.73 768.13 4450.45
 785.17 4450.5 806.76 4450.75 808.59 4450.77 901.86 4451.19 909.63 4452.73
 919.33 4452.73 949.09 4444.03 949.47 4443.96 952 4443.91 953 4441.9
 993 4441.9 994.46 4444.83 1026.67 4452.77 1036.12 4452.97 1040.85 4451.31
 1092.85 4451.28 1113.34 4451.36 1233.95 4451.98 1330.01 4453.59

Manning's n Values num= 7
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 -66.67 .085 919.33 .05 952 .025 953 .05 993 .025
 994.46 .05 1026.67 .08

Bank Sta: Left Right Coeff Contr. Expan.
 919.33 1026.67 .3 .5
 Upstream Embankment side slope =
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = 0 horiz. to 1.0 vertical
 Elevation at which weir flow begins = .95
 Energy head used in spillway design =
 Spillway fight used in design =

-50 .085 921 .05 957.81 .025 958 .05 998 .025
 998.46 .05 1035 .08 1297.51 .08
 Bank Sta: Left Right Lengths: Left Channel Right Right Coeff Contr. Expan.
 921 1035 55 50 55 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 5.33

INPUT
 Description:
 Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-33.33	4452.83	-9.81	4452.39	37.24	4451.36	60.76	4450.88	69.91	4450.83
173.15	4450.95	178.38	4450.96	179.32	4450.83	239.22	4450.82	248.95	4450.46
274.32	4450.67	276.39	4450.77	343.04	4450.83	379.63	4449.89	437.14	4449.83
482.87	4449.8	483.9	4449.8	531.23	4449.22	541.71	4449.09	586.11	4449.52
604.63	4449.5	689.34	4449.5	719.42	4449.61	743.03	4449.72	776.07	4449.07
792.58	4449.15	813.52	4449.6	815.3	4449.64	905.73	4449.89	913.26	4450.66
922.67	4450.67	953.54	4440.06	953.94	4440.03	977.67	4439.6	1000.57	4440.06
1003.25	4440.2	1043.33	4450.73	1050.24	4450.85	1053.7	4450.02	1091.7	4450.07
1106.67	4450.13	1194.81	4450.86	1265.01	4452.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-33.33	.085	922.67	.05	1043.33	.08

Bank Sta: Left Right Lengths: Left Channel Right Right Coeff Contr. Expan.
 922.67 1043.33 110 100 110 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 5

INPUT
 Description: XS E
 Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4451.1	100	4449.7	200	4449.3	264	4449.2	298	4449.7
300	4449.1	400	4448.7	500	4448.7	501	4448.7	557	4447.7
600	4448.4	700	4448.4	752	4448.7	784	4447.7	800	4447.8
822	4448.5	926	4448.6	958	4436.1	983	4435.7	1013	4435.8
1060	4448.7	1100	4448.9	1200	4450.42				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.085	926	.05	1060	.08

Bank Sta: Left Right Lengths: Left Channel Right Right Coeff Contr. Expan.
 926 1060 276.25 283.75 276.25 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 4.75*

INPUT
 Description:
 Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4448.2	90.09	4447.13	149.24	4446.93	180.18	4446.82	237.84	4446.74
268.47	4447.1	270.28	4446.65	298.47	4446.56	360.37	4446.25	447.71	4446.1
450.46	4446.1	451.36	4446.09	501.81	4445.25	540.55	4445.75	596.95	4445.6
629.78	4445.58	630.64	4445.57	677.49	4445.5	704.48	4444.62	706.32	4444.56
720.77	4444.51	740.56	4444.88	769.85	4444.66	808.13	4437	859.87	4437

871.44 4433.56 871.87 4433.45 894.34 4433.02 901.25 4432.88 922.32 4433.4
 932.71 4433.25 939.87 4434.53 952.69 4437.10 968.13 4437.10 985.49 4445.47
 1083.33 4445.83 1112 4446.13 1140 4446.75 1147.33 4447.61 1150 4447.87

Manning's n Values num= 5
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .08 769.85 .04 859.87 .05 952.69 .04 1050.49 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 769.85 1050.49 276.25 283.75 276.25 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 4.5'

INPUT
 Description:
 Station Elevation Data num= 39
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4445.3 80.18 4444.57 132.82 4444.42 160.37 4444.34 211.69 4444.27
 238.95 4444.51 240.55 4444.21 265.65 4444.14 320.74 4443.79 398.47 4443.5
 400.92 4444.49 401.72 4443.49 446.63 4442.8 481.1 4443.01 531.3 4442.8
 560.52 4442.75 561.29 4442.74 602.98 4442.29 627 4441.48 628.64 4441.42
 636.76 4441.3 673.26 4434 771.6 4434 785.24 4430.89 785.73 4430.81
 811.56 4430.25 819.5 4430.05 841.54 4431.03 852.42 4430.69 859.91 4431.39
 881.04 4433.88 881.12 4434 973.26 4434 1013.35 4442.02 1022.22 4442.09
 1055.67 4442.32 1088.33 4443.2 1096.89 4444.84 1100 4445.31

Manning's n Values num= 5
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .08 636.76 .04 771.6 .05 881.12 .04 1013.35 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 636.76 1013.35 276.25 283.75 276.25 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 4.25'

INPUT
 Description:
 Station Elevation Data num= 40
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 4442.4 70.28 4442 116.41 4441.91 140.55 4441.86 185.53 4441.81
 209.42 4441.92 210.83 4441.76 232.82 4441.72 281.1 4441.34 349.24 4440.9
 351.38 4440.88 352.08 4440.88 391.44 4440.35 421.66 4440.31 465.65 4440
 491.26 4439.92 491.93 4439.91 528.48 4439.08 549.53 4438.33 550.97 4438.27
 562.21 4437.94 574.96 4437.68 613.38 4430 688.8 4430 699.04 4428.21
 689.6 4428.16 728.78 4427.47 737.75 4427.23 760.77 4428.67 772.13 4428.14
 779.96 4428.24 802.02 4429.34 802.35 4430 863.38 4430 903.46 4438.02
 961.11 4438.34 999.33 4438.51 1036.67 4439.65 1046.44 4442.07 1050 4442.75

Manning's n Values num= 5
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .08 574.96 .04 688.8 .05 802.35 .04 903.46 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 574.96 903.46 276.25 283.75 276.25 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 4

INPUT
 Description: XS D

Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4439.5	100	4439.4	200	4439.3	300	4438.3	400	4437.2
422	4437.1	472.05	4435.19	521.74	4432.75	542.51	4432.7	566.01	4428
594.19	4428	612.84	4425.53	646	4424.7	656	4424.4	680	4426.3
700	4425.1	723	4424.8	724.31	4428	741.01	4428	771.18	4434.03
800	4434.2	900	4434.6	943	4434.7	985	4436.1	996	4439.3
1000	4440.2								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.075	542.51	.04	594.19	.05	724.31	.04	771.18	.08
542.51	771.18	281.65	298	281.65					

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 542.51 771.18 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3.83333*

INPUT Description: Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4436.7	1.68	4436.58	75.56	4436.08	92.52	4435.99	142.73	4435.72
167.91	4435.6	185.03	4435.58	277.55	4434.71	335.83	4434.11	364.37	4433.94
370.06	4433.85	390.42	4433.63	436.72	4431.73	455.05	4430.8	482.69	4429.85
485.27	4429.87	491.84	4429.85	516.08	4425	545.86	4425	565.55	4422.48
595.35	4421.63	604.33	4421.33	626.68	4423.15	628.13	4423.09	645.3	4422.45
645.58	4422.45	666.72	4422.42	667.89	4425	691.08	4425	718.48	4430.48
740.21	4430.58	777.6	4430.7	794.63	4431.46	811.67	4431.76	836.77	4432.21
878.29	4432.88	918.85	4434.63	929.47	4437.44	933.33	4438.25		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.075	491.84	.04	545.86	.05	667.89	.04	718.48	.08
491.84	718.48	281.65	298	281.65					

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 491.84 718.48 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3.66666*

INPUT Description: Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4433.9	1.54	4433.67	69.45	4432.75	85.03	4432.58	131.18	4432.1
154.33	4431.88	170.06	4431.85	230.9	4431.32	277.5	4422	497.25	4422
518.26	4419.43	544.69	4418.56	552.67	4418.27	573.36	4420	574.7	4419.97
590.61	4419.79	590.86	4419.8	610.44	4420.04	612.17	4423.35	612.9	4423.33
619.07	4423.24	632	4426.8	680.42	4426.96	716.48	4427.04	732.91	4428.48
749.33	4429.03	773.54	4429.82	813.59	4431.07	852.7	4433.15	862.94	4435.59
866.67	4436.3								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.075	230.9	.04	497.25	.05	632	.08		
230.9	632	281.65	298	281.65					

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 230.9 632 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3.5*

INPUT

Description:

Station Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4431.1	1.41	4430.75	63.34	4429.41	73.84	4429.23	125	4419	
449.25	4419	449.49	4418.86	470.97	4416.38	494.04	4415.99	501	4415.2	
520.04	4416.85	521.28	4416.85	535.91	4417.14	536.15	4417.15	554.16	4417.67	
555.75	4420.18	556.43	4420.17	562.1	4420.26	574	4423.25	620.63	4423.34	
655.36	4423.38	671.18	4425.51	687	4426.3	710.32	4427.42	748.88	4429.25	
786.55	4431.68	796.41	4433.73	800	4434.35					

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	73.84	.04	449.25	.045
				574	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 73.84 574 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3.33333*

INPUT

Description:

Station Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4428.3	1.27	4427.83	42.3	4426.54	95	4416	404.44	4416	
405.33	4415.27	423.67	4413.33	443.39	4412.42	449.33	4412.13	466.72	4413.71	
467.85	4413.74	481.22	4414.48	481.43	4414.5	497.88	4415.29	499.33	4417	
499.95	4417.02	505.13	4417.28	516	4419.7	560.85	4419.72	594.24	4419.72	
609.45	4422.54	624.67	4423.57	647.09	4425.03	684.17	4427.43	720.4	4430.21	
729.88	4431.88	733.33	4432.4							

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	42.3	.04	404.44	.045
				516	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 42.3 516 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3.16666*

INPUT

Description:

Station Elevation	Data	num=	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4425.5	1.14	4424.92	38.56	4423.29	90	4413	360.04	4413	
361.16	4411.69	376.38	4410.28	392.74	4409.35	397.67	4409.07	413.41	4410.56	
414.43	4410.62	426.52	4411.83	426.72	4411.85	441.61	4412.91	442.92	4413.83	
443.48	4413.86	448.16	4414.29	458	4416.15	501.06	4416.1	533.12	4416.06	
547.73	4419.57	562.33	4420.83	583.86	4422.64	619.47	4425.61	654.25	4428.73	
663.35	4430.02	666.67	4430.45							

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	38.56	.04	360.04	.045
				458	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 38.56 458 281.65 298 281.65 .1 .3

38.56 458 281.65 298 281.65 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 3

INPUT
 Description: XS C num= 18
 Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	4422.7	1	4422	45	4419.4	85	4417.6	100	4417
105.1	4416.98	140	4410	315.88	4410	317	4408.1	346	4406
361	4407.5	372	4409.2	387	4410.7	400	4412.6	472	4412.4
486	4416.6	500	4418.1	600	4428.5				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val
0	.075	105.1	.04	315.88	.045
				400	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 105.1 400 35 40 35 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 2.5

INPUT
 Description: Additional XS for bridge copied from sta. 2
 Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-450	4429.3	0	4422.9	70	4421.2	71	4420.6
200	4420.3	294	4421.7	294	4418.9	306	4415.5
314	4410.1	320	4408.1	328	4406.2	335	4405.5
351	4406.3	358	4405.4	366	4406.4	372	4409.1
380	4412.6	386	4413.8	400	4419.1	400	4423.8
582	4432.4	600	4433.3			500	4426.3

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-450	.09	294	.045	400	.075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 294 400 50 50 .3 .5

Ineffective Flow num= 1

Sta L	Sta R	Elev
-450	294	4421.7

BRIDGE RIVER: Alpine Creek
 REACH: Alpine RS: 2.3

INPUT
 Description: Hendrix St. Bridge
 Distance from Upstream XS = 10
 Deck/Roadway Width = 35
 Weir Coefficient = 2.6
 Bridge Deck/Roadway Skew =
 Upstream Deck/Roadway Coordinates num= 2

Sta Hi	Cord Lo	Sta Hi	Cord Lo
294	4421.7	4420.3	400
		4423.8	4422.6

Upstream Bridge Cross Section Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
450	4429.3	0	4422.9	70	4421.2	71	4420.6	100	4420
200	4420.3	294	4421.7	294	4418.9	306	4415.5	313	4414.2
314	4410.1	320	4408.1	328	4406.2	335	4405.5	346	4406.6
351	4406.3	358	4405.4	366	4406.4	372	4409.1	376	4411.5
380	4412.6	386	4413.8	400	4419.1	400	4423.8	500	4426.3
582	4432.4	600	4433.3						

Manning's n Values num= 3
 Sta n Val Sta n Val
 -450 .09 294 .045 400 .075

Bank Sta: Left Right Coeff Contr. Expan.
 Ineffective Flow num= 1 .3 .5

Sta L Sta R Elev
 -450 294 4421.7

Downstream Deck/Roadway Coordinates

num= 2
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 294 4421.7 4420.3 400 4423.8 4422.6

Downstream Bridge Cross Section Data

Station	Elevation	Data	num=	27	Sta	Elev	Sta	Elev	Sta	Elev
-450	4429.3	0	4422.9	70	4421.2	71	4420.6	100	4420	
200	4420.3	294	4421.7	294	4418.9	306	4415.5	313	4414.2	
314	4410.1	320	4408.1	328	4406.2	335	4405.5	346	4406.6	
351	4406.3	358	4405.4	366	4406.4	372	4409.1	376	4411.5	
380	4412.6	386	4413.8	400	4419.1	400	4423.8	500	4426.3	
582	4432.4	600	4433.3							

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -450 .09 294 .045 400 .075

Bank Sta: Left Right Coeff Contr. Expan.
 Ineffective Flow num= 1 .3 .5
 Sta L Sta R Elev
 -450 294 4421.7

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = 4421.7
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data
 Pier Station Upstream= 320 Downstream= 320
 Upstream num= 2
 Width Elev Width Elev
 2 4400 2 4421.5
 Downstream num= 2

Width Elev Width Elev

 2 4400 2 4421.5

Pier Data
 Pier Station Upstream= 351 Downstream= 351
 Upstream num= 2

Width Elev Width Elev

 2 4400 2 4422
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4422

Pier Data
 Pier Station Upstream= 380 Downstream= 380
 Upstream num= 2

Width Elev Width Elev

 2 4400 2 4423
 Downstream num= 2
 Width Elev Width Elev

 2 4400 2 4423

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 1.2
 Yarnell KVal = .9
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 2

INPUT

Description: XS B -- Hendrix
 Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-450	4429.3	0	4422.9	70	4421.2	71	4420.6
200	4420.3	294	4421.7	294	4418.9	306	4415.5
314	4410.1	320	4408.1	328	4406.2	335	4405.5
351	4406.3	358	4405.4	366	4406.4	372	4409.1
380	4412.6	386	4413.8	400	4419.1	400	4423.8
582	4432.4	600	4433.3			500	4426.3

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-450	.09	294	.045	400	.075

Bank Sta: Left 294 Right 400 Lengths: Left Channel 109.33 Right 109.33 Coeff Contr. .3 Expan. .5

Ineffe 'e Flow num= 1

Sta L Sta R Elev

 -450 294 4421.7

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 1.66666*

INPUT
 Description:
 Station Elevation Data num= 43
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

-300	4426.07	-244.5	4425.32	-153.94	4423.53	-7.88	4420.93	88.52	4420.07
88.71	4420.06	98.75	4419.65	113.35	4417.4	138.18	4416.74	149.18	4416.5
150.04	4416.1	175.09	4415.62	261.47	4415.54	284.24	4415.73	342.67	4416.63
342.67	4414.77	351.67	4411.82	356.92	4410.55	357.67	4407.76	360.67	4406.64
362.17	4406.18	368.17	4404.83	373.42	4404.3	381.67	4404.92	385.42	4404.67
390.67	4404	397.97	4404.8	403.44	4406.7	407.1	4408.36	409.22	4408.83
410.75	4409.33	416.22	4410.83	429	4416	429	4419.13	439.68	4419.39
521.86	4420.58	537.47	4420.78	541.17	4420.84	570.34	4422.22	587.59	4424.12
604.03	4425.01	633.14	4426.71	653.33	4427.6				

Manning's n Values num= 3
 Sta n Val Sta n Val

 .300 .09 342.67 .045 429 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 342.67 429 109.33 128.33 109.33 .3 .5

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 1.33333*

INPUT
 Description:
 Station Elevation Data num= 43
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

-150	4422.83	-103.25	4422.26	-26.97	4420.17	96.06	4417.36	177.26	4417.23
177.42	4417.22	185.87	4416.67	198.18	4412.6	219.09	4411.97	228.35	4411.87
229.08	4411.59	250.18	4411.23	322.94	4410.78	342.12	4410.76	391.33	4411.57
391.33	4410.63	397.33	4408.13	400.83	4406.9	401.33	4405.42	403.33	4404.52
404.33	4404.26	408.33	4403.47	411.83	4403.09	417.33	4403.24	419.83	4403.04
423.33	4402.6	429.94	4403.2	434.89	4404.29	438.19	4405.22	440.11	4405.51
441.49	4406.06	446.44	4407.86	458	4412.9	458	4414.47	469.84	4414.75
560.93	4415.29	578.23	4415.39	582.33	4415.39	614.67	4416.21	633.8	4418.86
652.01	4419.56	684.29	4421.03	706.67	4421.9				

Manning's n Values num= 3
 Sta n Val Sta n Val

 -150 .09 391.33 .045 458 .075

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 391.33 458 109.33 128.33 109.33 .1 .3

CROSS SECTION RIVER: Alpine Creek
 REACH: Alpine RS: 1

INPUT
 Description: XS A
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

0	4419.6	38	4419.2	100	4416.8	200	4413.8	266	4414.4
273	4413.7	283	4407.8	300	4407.2	400	4405.8	440	4406.5
446	4402.4	456	4401.2	471	4402.2	487	4409.8	500	4410.1

Alpine	11.5666	.135*	.045*	.025*	.05*	.025*	.045*	.15*
Alpine	11.5	.135	.045*	.025*	.05*	.025*	.045*	.15*
Alpine	11.4666	.13*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	11.4333	.13*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	11.4	.13	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	11.3	.13	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	11	.13	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	10.6666	.13*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	10.3333	.13*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	10	.13	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.9	.13*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.8	.1*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.75	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.73	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.7	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.6333	.1*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.5666	.1*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.5	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9.3	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	9	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	8.6666	.1*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	8.3333	.1*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	8	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	7.95	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	7.9	.1	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	7.8	.1*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	7.6	.1*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	7.4	.12*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	7.2	.12*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	7	.12	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	6.7	.12	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	6.5	.12	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	6.375	.09*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	6.25	.09*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	6.125	.09*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	6	.09	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	5.75	.085	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	5.66	.085	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	5.49	.085	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	5.33	.085	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	5	.085	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	4.75	.08*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	4.5	.08*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	4.25	.08*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	4	.075	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	3.8333	.075*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	3.6666	.075*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	3.5	.075*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	3.3333	.075*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	3.1666	.075*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	3	.075	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	2.5	.09	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	2.3	.09	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	2	.09	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	1.6666	.09*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	1.3333	.09*	.045*	.025*	.05*	.025*	.045*	.13*
Alpine	1	.09	.045*	.025*	.05*	.025*	.045*	.13*

SUMMARY OF REACH LENGTHS

River: Alpine Creek
 * Reach * River Sta. * Left * Channel * Right *

* Alpine	19	*	403.99*	486*	403.99*
* Alpine	18.8*	*	403.99*	486*	403.99*
* Alpine	18.6*	*	403.99*	486*	403.99*
* Alpine	18.4*	*	403.99*	486*	403.99*
* Alpine	18.2*	*	403.99*	486*	403.99*
* Alpine	18	*	130.74*	140*	130.74*
* Alpine	17.8842*	*	130.74*	140*	130.74*
* Alpine	17.7685*	*	130.74*	140*	130.74*
* Alpine	17.6528*	*	130.74*	140*	130.74*
* Alpine	17.5371*	*	130.74*	140*	130.74*
* Alpine	17.4214	*	60*	60*	60*
* Alpine	17.3	*Bridge*			
* Alpine	17.2	*	104.07*	112.5*	104.07*
* Alpine	17.15*	*	104.07*	112.5*	104.07*
* Alpine	17.1*	*	104.07*	112.5*	104.07*
* Alpine	17.05*	*	104.07*	112.5*	104.07*
* Alpine	17	*	60*	60*	60*
* Alpine	16.7	*Bridge*			
* Alpine	16.5	*	129.04*	150*	129.04*
* Alpine	16.25*	*	129.04*	150*	129.04*
* Alpine	16*	*	129.04*	150*	129.04*
* Alpine	15.75*	*	79.04*	90*	79.04*
* Alpine	15.6	*	50*	60*	50*
* Alpine	15.55	*Bridge*			
* Alpine	15.5	*	94.63*	110*	94.63*
* Alpine	15.3333*	*	94.63*	110*	94.63*
* Alpine	15.1666*	*	54.63*	50*	54.63*
* Alpine	15.1	*	40*	60*	40*
* Alpine	15.05	*Bridge*			
* Alpine	15	*	63.33*	63.33*	63.33*
* Alpine	14.8333*	*	63.33*	63.33*	63.33*
* Alpine	14.6666*	*	63.33*	63.33*	63.33*
* Alpine	14.5	*	30*	30*	30*
* Alpine	14.3	*Bridge*			
* Alpine	14	*	45*	45*	45*
* Alpine	13.75*	*	45*	45*	45*
* Alpine	13.5	*	45*	45*	45*
* Alpine	13.25*	*	45*	45*	45*
* Alpine	13	*	60*	60*	60*
* Alpine	12.9	*Culvert*			
* Alpine	12.7	*	75*	75*	75*
* Alpine	12.6333*	*	75*	75*	75*
* Alpine	12.5666*	*	75*	75*	75*
* Alpine	12.5	*	50*	50*	50*
* Alpine	12	*	60*	60*	60*
* Alpine	11.9	*Bridge*			
* Alpine	11.7	*	80*	126.67*	80*
* Alpine	11.6333*	*	80*	126.67*	80*
* Alpine	11.5666*	*	80*	126.67*	80*
* Alpine	11.5	*	53.33*	53.33*	53.33*
* Alpine	11.4666*	*	53.33*	53.33*	53.33*
* Alpine	11.4333*	*	53.33*	53.33*	53.33*
* Alpine	11.4	*	50*	50*	50*
* Alpine	11.3	*Bridge*			
* Alpine	11	*	106.67*	106.67*	106.67*
* Alpine	10.6666*	*	106.67*	106.67*	106.67*
* Alpine	10.3333*	*	106.67*	106.67*	106.67*
* Alpine	10	*	109.17*	120.83*	109.17*
* Alpine	9.9*	*	109.17*	120.83*	109.17*
* Alpine	9.8*	*	69.17*	60.83*	69.17*
* Alpine	9.75	*	40*	60*	40*
* Alpine	9.73	*Bridge*			
* Alpine	9.7	*	109.17*	120.83*	109.17*
* Alpine	9.63333*	*	109.17*	120.83*	109.17*
* Alpine	9.56666*	*	109.17*	120.83*	109.17*
* Alpine	9.5	*	70*	70*	70*
* Alpine	9.3	*Bridge*			

Alpine	9		83.33	87.33*	83.33*
Alpine	8.66666		83.33*	87.33*	83.33*
Alpine	8.33333		83.33*	87.33*	83.33*
Alpine	8		60	60*	60*
Alpine	7.95		60	60*	60*
Alpine	7.9		83	83*	83*
Alpine	7.8		143*	143*	143*
Alpine	7.6		143*	143*	143*
Alpine	7.4		143*	143*	143*
Alpine	7.2		143*	143*	143*
Alpine	7		60	60*	60*
Alpine	6.7		60	60*	60*
Alpine	6.5		141.25	143.75*	141.25*
Alpine	6.375		141.25*	143.75*	141.25*
Alpine	6.25		141.25*	143.75*	141.25*
Alpine	6.125		141.25*	143.75*	141.25*
Alpine	6		110	100*	110*
Alpine	5.75		110	100*	110*
Alpine	5.66		55	50*	55*
Alpine	5.49		55	50*	55*
Alpine	5.33		110	100*	110*
Alpine	5		276.25	283.75*	276.25*
Alpine	4.75		276.25*	283.75*	276.25*
Alpine	4.5		276.25*	283.75*	276.25*
Alpine	4.25		276.25*	283.75*	276.25*
Alpine	4		281.65	298*	281.65*
Alpine	3.83333		281.65*	298*	281.65*
Alpine	3.66666		281.65*	298*	281.65*
Alpine	3.5		281.65*	298*	281.65*
Alpine	3.33333		281.65*	298*	281.65*
Alpine	3.16666		281.65*	298*	281.65*
Alpine	3		35	40*	35*
Alpine	2.5		35	40*	35*
Alpine	2.3		50	50*	50*
Alpine	2		109.33	128.33*	109.33*
Alpine	1.66666		109.33*	128.33*	109.33*
Alpine	1.33333		109.33*	128.33*	109.33*
Alpine	1		109.33	128.33*	109.33*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
 River: Alpine Creek

Reach	River Sta.	Contr.	Expan.
Alpine	19	.1	.3*
Alpine	18.8	.1*	.3*
Alpine	18.6	.1*	.3*
Alpine	18.4	.1*	.3*
Alpine	18.2	.1*	.3*
Alpine	18	.1	.3*
*Alpine	17.8842**	.1*	.3*
*Alpine	17.7685**	.1*	.3*
*Alpine	17.6528**	.1*	.3*
*Alpine	17.5371**	.3*	.5*
Alpine	17.4214	.3*	.5*
*Alpine	17.3	*Bridge	*
Alpine	17.2	.3	.5*
Alpine	17.15	.3*	.5*
Alpine	17.1	.1*	.3*
Alpine	17.05	.3*	.5*
Alpine	17	.3	.5*
*Alpine	16.7	*Bridge	*
Alpine	16.5	.3	.5*

Alpine	16.25	*	.3*	.5*
Alpine	16.	*	.1*	.3*
Alpine	15.75	*	.3	.5*
*Alpine	15.6	*	.3*	.5*
*Alpine	15.55	*Bridge	*	*
*Alpine	15.5	*	.3*	.5*
*Alpine	15.3333**	*	.3	.5*
*Alpine	15.1666**	*	.3*	.5*
*Alpine	15.1	*	.3	.5*
*Alpine	15.05	*Bridge	*	*
*Alpine	15	*	.3*	.5*
*Alpine	14.8333**	*	.3*	.5*
*Alpine	14.6666**	*	.3*	.5*
*Alpine	14.5	*	.3*	.5*
*Alpine	14.3	*Bridge	*	*
*Alpine	14	*	.3*	.5*
Alpine	13.75	*	.3*	.5*
*Alpine	13.5	*	.1*	.3*
Alpine	13.25	*	.3	.5*
*Alpine	13	*	.3*	.5*
*Alpine	12.9	*Culvert	*	*
*Alpine	12.7	*	.3*	.5*
*Alpine	12.6333**	*	.3	.5*
*Alpine	12.5666**	*	.1*	.3*
*Alpine	12.5	*	.3*	.5*
*Alpine	12	*	.3*	.5*
*Alpine	11.9	*Bridge	*	*
*Alpine	11.7	*	.3*	.5*
*Alpine	11.6333**	*	.3*	.5*
*Alpine	11.5666**	*	.1*	.3*
*Alpine	11.5	*	.1*	.3*
*Alpine	11.4666**	*	.1*	.3*
*Alpine	11.4333**	*	.3*	.5*
*Alpine	11.4	*	.3*	.5*
*Alpine	11.3	*Bridge	*	*
*Alpine	11	*	.3*	.5*
*Alpine	10.6666**	*	.3*	.5*
*Alpine	10.3333**	*	.1*	.3*
*Alpine	10	*	.1*	.3*
Alpine	9.9	*	.1*	.3*
Alpine	9.8	*	.3*	.5*
*Alpine	9.75	*	.3*	.5*
*Alpine	9.73	*Bridge	*	*
*Alpine	9.7	*	.3*	.5*
*Alpine	9.6333**	*	.3*	.5*
*Alpine	9.5666**	*	.3*	.5*
*Alpine	9.5	*	.3*	.5*
*Alpine	9.3	*Bridge	*	*
*Alpine	9	*	.3*	.5*
*Alpine	8.6666**	*	.3*	.5*
*Alpine	8.3333**	*	.3*	.5*
*Alpine	8	*	.3*	.5*
*Alpine	7.95	*Bridge	*	*
*Alpine	7.9	*	.3*	.5*
Alpine	7.8	*	.3*	.5*
Alpine	7.6	*	.1*	.3*
Alpine	7.4	*	.1*	.3*
Alpine	7.2	*	.3*	.5*
*Alpine	7	*	.3*	.5*
*Alpine	6.7	*Bridge	*	*
*Alpine	6.5	*	.3*	.5*
Alpine	6.375	*	.3	.5*
Alpine	6.25	*	.1*	.3*
Alpine	6.125	*	.3*	.5*
*Alpine	6	*	.3*	.5*
*Alpine	5.75	*Bridge	*	*
*Alpin	5.66	*	.3*	.5*

*Alpine	*	5.49	*	.3*	5*
*Alpine	*	5.33	*	.1*	.3*
*Alpine	*	5	*	.1*	.3*
*Alpine	*	4.75*	*	.1*	.3*
*Alpine	*	4.5*	*	.1*	.3*
*Alpine	*	4.25*	*	.1*	.3*
*Alpine	*	4	*	.1*	.3*
*Alpine	*	3.83333**	*	.1*	.3*
*Alpine	*	3.66666**	*	.1*	.3*
*Alpine	*	3.5*	*	.1*	.3*
*Alpine	*	3.33333**	*	.1*	.3*
*Alpine	*	3.16666**	*	.1*	.3*
*Alpine	*	3	*	.3*	.5*
*Alpine	*	2.5	*	.3*	.5*
*Alpine	*	2.3	*Bridge	*	*
*Alpine	*	2	*	.3*	.5*
*Alpine	*	1.66666**	*	.3*	.5*
*Alpine	*	1.33333**	*	.1*	.3*
*Alpine	*	1	*	.1*	.3*

Appendix C
Hydraulic Model Output

HEC-RAS Plan: Revised FIS River: Alpine Creek Reach: Alpine																
Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/ft ²)	Shear Chan (lb/ft ²)	Shear ROB (lb/ft ²)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Cnl
Alpine	1	2yr		448.00		1.47	5.81		0.53	1.47		4404.48	4403.86	4405.00	32.84	0.67
Alpine	1	5yr	167.82	1552.18		3.08	8.63		1.61	2.67		4407.22	4407.11	4408.26	181.99	0.73
Alpine	1	10yr	214.13	2666.87		4.00	10.32		2.38	3.49		4409.02	4408.80	4410.20	204.43	0.76
Alpine	1	25yr	2369.28	3636.89	28.83	4.50	11.52	0.75	2.84	4.11	0.15	4410.26	4409.74	4411.59	380.51	0.78
Alpine	1	50yr	3195.85	4324.30	324.85	5.17	12.34	1.95	3.50	4.56	0.61	4410.99	4410.79	4412.42	386.29	0.80
Alpine	1	100yr	4596.94	5426.79	1158.27	6.15	13.51	3.19	4.19	5.22	1.29	4412.08	4411.77	4413.64	394.87	0.81
Alpine	1	500yr	7322.23	7477.60	3275.17		15.35	4.62		6.32	2.25	4413.90	4413.32	4415.71	434.96	0.84
Alpine	1.33333*	2yr		445.00			5.14			1.18		4405.84		4406.25	39.75	0.61
Alpine	1.33333*	5yr		1687.00			8.08			2.39		4408.55		4409.56	51.70	0.71
Alpine	1.33333*	10yr		3895.00			12.85			5.60		4410.24	4410.24	4412.81	59.65	1.01
Alpine	1.33333*	25yr	522.62	5112.38		2.01	11.31		0.83	3.95		4412.60	4412.60	4414.41	259.08	0.76
Alpine	1.33333*	50yr	1377.60	6532.40		2.97	12.53		1.52	4.65		4413.64	4413.64	4415.68	262.97	0.79
Alpine	1.33333*	100yr	2808.12	8530.18	1.70	4.01	14.20	0.52	2.43	5.72	0.09	4414.83	4414.83	4417.25	292.58	0.83
Alpine	1.33333*	500yr	5756.68	11878.42	659.90	5.33	16.37	2.77	3.75	7.14	1.07	4416.71	4416.71	4419.55	432.96	0.87
Alpine	1.66666*	2yr		445.00			4.87			1.08		4407.01		4407.38	44.46	0.60
Alpine	1.66666*	5yr		1687.00			7.08			1.80		4409.93		4410.71	55.86	0.60
Alpine	1.66666*	10yr		3895.00			8.30			2.19		4413.45		4414.51	75.98	0.59
Alpine	1.66666*	25yr		7910.00			11.30			4.02		4413.82		4415.81	78.06	0.79
Alpine	1.66666*	50yr		9100.00			13.88			5.92		4414.71		4417.70	82.97	0.93
Alpine	1.66666*	100yr	640.68	10699.32		2.02	13.42		0.84	5.08		4417.36	4417.36	4420.01	314.31	0.78
Alpine	1.66666*	500yr	3137.33	15154.26	3.40	3.72	15.31	0.67	2.09	6.18	0.12	4419.60	4419.60	4422.65	354.81	0.80
Alpine	2	2yr		445.00			4.73			1.04		4408.17		4408.52	50.14	0.61
Alpine	2	5yr		1687.00			6.75			1.66		4410.92		4411.62	61.23	0.59
Alpine	2	10yr		3895.00			8.26			2.16		4414.22		4415.28	74.21	0.58
Alpine	2	25yr		5635.00			9.64			2.86		4415.64		4417.08	85.36	0.65
Alpine	2	50yr		7910.00			10.21			3.06		4417.71		4419.33	98.13	0.64
Alpine	2	100yr		11340.00			13.09			4.94		4418.62		4421.28	103.75	0.80
Alpine	2	500yr		18295.00			17.65			8.59		4420.23		4425.06	192.15	0.99
Alpine	2.3		Bridge													
Alpine	2.5	2yr		445.00			3.63			0.57		4408.72		4408.93	53.03	0.42
Alpine	2.5	5yr		1687.00			5.71			1.14		4411.65		4412.16	62.92	0.46
Alpine	2.5	10yr		3895.00			7.18			1.60		4415.14		4415.94	81.58	0.49
Alpine	2.5	25yr		5635.00			8.02			1.92		4416.96		4417.95	93.47	0.52
Alpine	2.5	50yr		7910.00			8.66			2.14		4419.07		4420.23	105.92	0.52
Alpine	2.5	100yr		11340.00			9.93			2.65		4421.22		4422.75	278.39	0.53
Alpine	2.5	500yr	3377.08	14822.47	95.45	1.84	9.00	1.00	0.51	1.94	0.16	4425.98	4420.15	4427.01	794.05	0.40
Alpine	3	2yr		445.00			4.84			1.12		4408.89		4409.25	53.46	0.65
Alpine	3	5yr		1687.00			5.82			1.27		4411.83		4412.36	79.95	0.54
Alpine	3	10yr	50.04	3388.72	456.24	0.83	5.33	1.79	0.11	0.87	0.40	4415.78		4416.17	243.53	0.36

HEC-RAS Plan_Revise FIS River_Alpine_Creek_Reach_Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	3	25yr	383.09	4398.21	853.69	1.04	5.30	1.93	0.15	0.78	0.41	4417.89		4418.24	419.53	0.31
Alpine	3	50yr	1382.82	5232.22	1294.97	1.40	4.98	1.83	0.21	0.64	0.34	4420.30		4420.57	491.42	0.26
Alpine	3	100yr	2985.06	6410.41	1944.53	1.68	4.95	1.83	0.25	0.59	0.31	4422.96		4423.20	546.73	0.23
Alpine	3	500yr	6354.02	8613.20	3327.77	2.09	5.15	1.91	0.33	0.58	0.31	4427.06		4427.29	586.17	0.21
Alpine	3.16666*	2yr		445.00			4.25			0.89		4411.91		4412.20	66.65	0.60
Alpine	3.16666*	5yr		1687.00			6.54			1.70		4413.87		4414.54	84.31	0.66
Alpine	3.16666*	10yr		3876.71	16.29		7.76	0.73		2.05	0.14	4416.44		4417.37	178.39	0.62
Alpine	3.16666*	25yr	19.20	5268.24	347.56	0.92	7.64	2.03	0.16	1.82	0.59	4418.25		4419.10	229.17	0.53
Alpine	3.16666*	50yr	321.32	6717.99	870.69	1.57	7.25	2.36	0.21	1.49	0.66	4420.44		4421.14	379.13	0.44
Alpine	3.16666*	100yr	1537.81	8251.14	1551.05	1.71	6.82	2.32	0.33	1.20	0.56	4423.05		4423.60	544.84	0.36
Alpine	3.16666*	500yr	5003.17	10413.92	2877.91	2.18	6.30	2.20	0.41	0.92	0.45	4427.16		4427.54	636.75	0.28
Alpine	3.33333*	2yr		445.00			4.13			0.88		4414.81		4415.07	78.09	0.62
Alpine	3.33333*	5yr		1687.00			6.19			1.55		4416.60		4417.20	95.29	0.65
Alpine	3.33333*	10yr		3895.00			8.05			2.28		4418.65		4419.66	110.08	0.68
Alpine	3.33333*	25yr	11.47	5632.76	2.24		9.16	0.34		2.80	0.05	4419.80		4421.10	197.15	0.71
Alpine	3.33333*	50yr	11.47	7637.70	260.83	0.83	9.66	2.07	0.11	2.91	0.68	4421.25		4422.65	269.51	0.67
Alpine	3.33333*	100yr	376.53	10064.36	899.10	2.08	9.55	2.77	0.56	2.58	0.95	4423.37		4424.63	330.26	0.58
Alpine	3.33333*	500yr	2626.29	13149.14	2319.57	2.21	8.54	2.72	0.52	1.82	0.77	4427.27		4428.11	662.69	0.43
Alpine	3.5*	2yr		445.00			3.71			0.73		4417.77		4417.98	95.29	0.58
Alpine	3.5*	5yr		1687.00			6.02			1.51		4419.34		4419.90	106.56	0.65
Alpine	3.5*	10yr		3895.00			7.80			2.19		4421.27		4422.22	120.85	0.68
Alpine	3.5*	25yr		5635.00			8.66			2.52		4422.49		4423.65	129.63	0.68
Alpine	3.5*	50yr		7894.08	15.92		9.88	0.72		3.14	0.15	4423.59		4425.10	221.01	0.72
Alpine	3.5*	100yr	76.94	10961.44	301.63	1.52	11.21	2.25	0.41	3.79	0.81	4424.87		4426.76	301.62	0.75
Alpine	3.5*	500yr	756.19	16125.99	1412.82	2.20	11.85	3.20	0.65	3.80	1.26	4427.60		4429.53	491.07	0.67
Alpine	3.66666*	2yr		445.00			3.44			0.78		4420.67		4420.86	102.68	0.54
Alpine	3.66666*	5yr		1687.00			5.53			1.58		4422.28		4422.75	116.64	0.60
Alpine	3.66666*	10yr		3895.00			7.28			2.37		4424.13		4424.95	132.97	0.64
Alpine	3.66666*	25yr		5635.00			8.19			2.82		4425.25		4426.29	141.30	0.65
Alpine	3.66666*	50yr		7910.00			8.97			3.20		4426.56		4427.81	153.63	0.66
Alpine	3.66666*	100yr	79.51	11119.22	141.28	1.57	10.21	1.66	0.43	3.89	0.52	4427.89		4429.48	317.58	0.68
Alpine	3.66666*	500yr	642.48	16770.85	881.66	3.03	12.13	2.97	1.16	5.07	1.25	4429.76		4431.87	403.82	0.72
Alpine	3.83333*	2yr		445.00			3.27			0.71		4423.56		4423.72	110.10	0.52
Alpine	3.83333*	5yr		1687.00			5.30			1.45		4425.12		4425.56	123.05	0.58
Alpine	3.83333*	10yr		3895.00			6.88			2.14		4426.99		4427.73	144.71	0.61
Alpine	3.83333*	25yr		5635.00			7.73			2.53		4428.08		4429.01	153.74	0.63
Alpine	3.83333*	50yr		7910.00			8.52			2.91		4429.33		4430.46	166.24	0.64
Alpine	3.83333*	100yr	56.84	11276.63	6.53	1.42	9.71	0.50	0.37	3.56	0.08	4430.69		4432.15	315.66	0.66
Alpine	3.83333*	500yr	553.75	17193.28	547.97	2.83	11.49	2.20	1.03	4.58	0.78	4432.63		4434.56	448.13	0.69

HEC-RAS, P10n, Revised FIS, River, Alpine Creek, Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	4	2yr		445.00			3.24			0.71		4426.40		4426.56	117.40	0.53
Alpine	4	5yr		1687.00			5.24			1.44		4427.90		4428.32	129.30	0.59
Alpine	4	10yr		3895.00			6.78			2.11		4429.73		4430.44	153.52	0.62
Alpine	4	25yr		5635.00			7.61			2.50		4430.77		4431.67	164.77	0.63
Alpine	4	50yr		7910.00			8.38			2.87		4431.96		4433.05	177.51	0.64
Alpine	4	100yr		11303.48			9.40			3.39		4433.37		4434.74	237.19	0.65
Alpine	4	500yr		17557.90			11.23		1.59	4.44	0.48	4435.28		4437.16	490.80	0.69
Alpine	4.25*	2yr		430.00			3.41			0.78		4429.30		4429.48	108.45	0.56
Alpine	4.25*	5yr		1688.00			5.76			1.74		4430.77		4431.28	118.34	0.64
Alpine	4.25*	10yr		3624.00			7.32			2.43		4432.41		4433.24	128.54	0.66
Alpine	4.25*	25yr		5657.00			8.75			3.30		4433.53		4434.72	144.07	0.73
Alpine	4.25*	50yr		7379.00			9.21			3.48		4434.57		4435.89	153.40	0.71
Alpine	4.25*	100yr		10490.00			10.32			4.14		4435.92		4437.57	165.53	0.73
Alpine	4.25*	500yr	124.18	16577.11		1.71	12.36	0.45	0.62	5.52	0.08	4437.81	4436.69	4440.16	294.12	0.79
Alpine	4.5*	2yr		430.00			3.57			0.81		4432.13		4432.33	86.37	0.53
Alpine	4.5*	5yr		1688.00			5.84			1.74		4433.86		4434.39	108.68	0.63
Alpine	4.5*	10yr		3624.00			7.86			2.78		4435.38		4436.34	116.55	0.70
Alpine	4.5*	25yr		5657.00			9.04			3.41		4436.75		4438.02	125.50	0.71
Alpine	4.5*	50yr		7379.00			9.93			3.98		4437.65		4439.18	136.03	0.75
Alpine	4.5*	100yr		10490.00			11.20			4.81		4439.02		4440.96	146.68	0.78
Alpine	4.5*	500yr	30.22	16672.77		1.10	13.27	0.31	0.31	6.32		4441.09	4440.08	4443.82	234.90	0.84
Alpine	4.75*	2yr		430.00			3.87			0.93		4434.84		4435.07	74.34	0.56
Alpine	4.75*	5yr		1688.00			6.23			1.91		4436.77		4437.38	90.88	0.64
Alpine	4.75*	10yr		3624.00			8.15			2.92		4438.54		4439.57	105.51	0.70
Alpine	4.75*	25yr		5657.00			9.61			3.77		4439.87		4441.30	111.45	0.74
Alpine	4.75*	50yr		7379.00			10.41			4.27		4440.91		4442.59	120.21	0.76
Alpine	4.75*	100yr		10490.00			11.73			5.16		4442.38		4444.52	131.06	0.79
Alpine	4.75*	500yr	3.43	16699.57		0.42	13.75	0.07	0.07	6.66		4444.68	4443.63	4447.62	241.98	0.84
Alpine	5	2yr		430.00			4.03			0.98		4437.60		4437.85	65.40	0.56
Alpine	5	5yr		1688.00			6.61			2.09		4439.67		4440.35	78.24	0.64
Alpine	5	10yr		3624.00			8.62			3.17		4441.63		4442.78	90.37	0.70
Alpine	5	25yr		5657.00			10.10			4.09		4443.10		4444.68	99.50	0.75
Alpine	5	50yr		7379.00			11.01			4.68		4444.17		4446.05	106.14	0.77
Alpine	5	100yr		10490.00			12.38			5.63		4445.76		4448.14	116.04	0.81
Alpine	5	500yr	33.12	16669.88		0.93	14.41	0.26	0.26	7.18		4448.27	4447.20	4451.48	246.70	0.86
Alpine	5.33333*	2yr		428.00			6.17			2.52		4441.16		4441.76	56.59	0.98
Alpine	5.33333*	5yr		1690.00			9.22			4.35		4442.98		4444.30	68.81	0.99
Alpine	5.33333*	10yr		3655.00			11.30			5.73		4444.85		4446.83	81.34	1.00
Alpine	5.33333*	25yr		5736.00			12.58			6.59		4446.38		4448.84	91.63	0.99
Alpine	5.33333*	50yr		7481.00			13.38			7.16		4447.46		4450.24	98.89	0.99

HEC-RAS Plan, Revised FIS River, Albine Creek, Reach, Albine (Continued)

Reach	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cmt (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.O. Elev (ft)	Top Width (ft)	Friction # CH
Alpine	5.33333* 100yr	1058.54	9553.45	0.01	1.55	10.42	0.26	0.50	3.94	0.03	4450.72	4450.72	4452.24	848.42	0.67
Alpine	5.33333* 500yr	4588.16	11608.66	627.18	2.40	10.69	1.99	0.93	3.92	0.63	4452.12	4452.12	4453.37	1262.58	0.63
Alpine	5.66666* 2yr		428.00			6.36			2.62		4445.28	4445.28	4445.91	51.49	0.98
Alpine	5.66666* 5yr		1690.00			9.29			4.37		4447.23	4447.23	4448.57	66.07	0.99
Alpine	5.66666* 10yr		3655.00			11.33			5.74		4449.15	4449.15	4451.14	80.43	1.00
Alpine	5.66666* 25yr		5736.00			12.55			6.57		4450.71	4450.71	4453.16	92.08	0.99
Alpine	5.66666* 50yr		7481.00			13.34			7.13		4451.79	4451.79	4454.55	100.14	0.99
Alpine	5.66666* 100yr	3654.83	6377.71	579.46	2.33	9.39	1.94	0.93	3.40	0.63	4452.92	4452.92	4453.78	1293.51	0.66
Alpine	5.66666* 500yr	7057.49	8455.46	1311.05	3.21	11.26	2.68	1.60	4.72	1.11	4453.59	4453.59	4454.66	1358.70	0.75
Alpine	6 2yr		428.00			6.59			2.76		4449.38	4449.38	4450.06	46.78	0.99
Alpine	6 5yr		1690.00			9.38			4.44		4451.45	4451.45	4452.82	64.80	0.99
Alpine	6 10yr		3655.00			11.19			5.62		4453.44	4453.44	4455.39	82.16	0.99
Alpine	6 25yr	3650.33	2085.67	0.00	1.62	4.67	0.02	0.46	0.92		4454.81	4454.81	4454.96	1063.27	0.38
Alpine	6 50yr	4296.03	2132.50	1052.47	1.59	4.35	1.37	0.42	0.78	0.30	4455.27	4454.81	4455.38	1460.77	0.34
Alpine	6 100yr	6753.37	3858.63	0.00	3.00	8.64	0.04	1.56	3.15		4454.81	4454.81	4455.32	1063.27	0.70
Alpine	6 500yr	9702.47	4685.96	2435.57	3.47	9.37	3.00	1.94	3.58	1.44	4455.37	4454.83	4455.86	1463.69	0.72
Alpine	6.125* 2yr		428.00			3.24			0.57		4451.25	4450.06	4451.42	60.65	0.39
Alpine	6.125* 5yr		1690.00			5.13			1.20		4459.92	4452.01	4454.33	87.36	0.47
Alpine	6.125* 10yr		2668.04	986.96		5.08	1.48		1.08	0.38	4455.94	4453.97	4456.24	500.00	0.40
Alpine	6.125* 25yr		5736.00			12.10			6.25		4455.44	4455.44	4457.72	102.60	0.99
Alpine	6.125* 50yr	3161.54	3102.88	1216.59	1.75	5.78	1.72	0.56	1.39	0.50	4456.04	4456.04	4456.28	1415.61	0.46
Alpine	6.125* 100yr	4607.03	4218.28	1786.68	2.37	7.62	2.33	1.00	2.39	0.89	4456.19	4456.04	4456.60	1431.94	0.59
Alpine	6.125* 500yr	7891.46	5770.54	3162.00	3.15	9.33	3.09	1.63	3.45	1.46	4456.80	4456.28	4457.36	1469.62	0.69
Alpine	6.25* 2yr		428.00			3.14			0.54		4451.87	4450.71	4452.02	63.82	0.38
Alpine	6.25* 5yr		1690.00			4.85			1.07		4454.66	4452.56	4455.03	91.24	0.44
Alpine	6.25* 10yr		3655.00			7.09			2.14		4456.32	4454.48	4457.10	111.31	0.58
Alpine	6.25* 25yr	2162.73	2301.37	1271.90	0.96	3.08	1.00	0.15	0.37	0.16	4456.25	4455.95	4458.32	1475.88	0.22
Alpine	6.25* 50yr	3145.94	5710.83	1770.17		9.72	2.59		3.93	1.31	4456.94	4456.94	4458.08	537.65	0.77
Alpine	6.25* 100yr	6201.01	5423.64	2042.42	2.25	8.65	2.48	0.99	3.07	1.14	4457.27	4457.27	4457.90	1407.49	0.67
Alpine	6.25* 500yr		6964.58	3658.41	2.92	9.56	3.04	1.45	3.57	1.55	4458.11	4457.73	4458.77	1471.85	0.69
Alpine	6.375* 2yr		428.00			3.04			0.51		4452.46	4451.31	4452.60	66.84	0.37
Alpine	6.375* 5yr		1690.00			4.70			0.98		4455.29	4453.09	4455.64	87.41	0.41
Alpine	6.375* 10yr		3655.00			6.25			1.64		4457.46	4454.91	4458.07	120.76	0.50
Alpine	6.375* 25yr	1716.35	4239.50	1496.49		6.10	1.72		1.52	0.55	4458.33	4456.48	4458.77	595.98	0.47
Alpine	6.375* 50yr	2032.93	3956.14	1808.51	1.26	5.12	1.58	0.31	1.04	0.43	4458.90	4457.84	4459.13	1436.80	0.38
Alpine	6.375* 100yr	4609.39	6133.05	2446.01	1.88	8.45	2.50	0.73	2.89	1.13	4458.56	4458.48	4459.23	1412.30	0.64
Alpine	6.375* 500yr		7943.91	4270.70	2.60	9.45	3.07	1.20	3.45	1.54	4459.41	4459.04	4460.13	1472.73	0.67
Alpine	6.5 2yr		428.00			2.95			0.48		4453.02	4451.90	4453.16	70.15	0.36
Alpine	6.5 5yr		1690.00			4.55			0.92		4455.86	4453.60	4456.18	89.70	0.39

HFC-IRAS Plan: Revised FIS River: Alpine Creek Reach...Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	6.5	10yr		3655.00			5.97			1.47		4458.25	4455.37	4458.81	119.11	0.46
Alpine	6.5	25yr		4638.97	1097.03		6.57	1.52		1.76	0.51	4459.00	4456.81	4459.55	612.92	0.50
Alpine	6.5	50yr		5788.31	1692.69		7.76	1.97		2.45	0.82	4459.29	4457.95	4460.02	629.36	0.59
Alpine	6.5	100yr	0.00	7673.27	2998.73	0.04	9.44	2.69		3.58	1.43	4459.75	4459.48	4460.78	657.24	0.71
Alpine	6.5	500yr	2537.51	9415.94	4870.55	1.81	9.96	3.12	1.10	3.80	1.75	4460.64	4460.33	4461.56	1465.17	0.70
Alpine	6.7	Bridge														
Alpine	7	2yr		428.00			2.62			0.37		4453.28	4451.90	4453.39	71.94	0.31
Alpine	7	5yr		1690.00			4.24			0.78		4456.16	4453.60	4456.44	91.78	0.36
Alpine	7	10yr		2905.14	749.86		4.03	0.97		0.66	0.20	4459.11	4455.37	4459.31	619.27	0.31
Alpine	7	25yr	583.46	3637.49	1515.05	0.66	4.31	1.26	0.16	0.74	0.31	4459.96	4456.81	4460.15	1375.96	0.32
Alpine	7	50yr	1018.66	4340.93	2121.41	0.82	4.74	1.46	0.23	0.87	0.39	4460.44	4457.95	4460.65	1451.35	0.34
Alpine	7	100yr	1979.01	5381.33	3251.65	1.07	5.21	1.73	0.35	1.01	0.50	4461.23	4459.45	4461.46	1490.26	0.35
Alpine	7	500yr	3704.77	7697.24	5421.98	1.52	6.75	2.38	0.65	1.64	0.90	4461.95	4460.33	4462.31	1511.09	0.43
Alpine	7.2*	2yr		428.00			4.46			1.21		4453.89	4453.41	4454.19	60.39	0.62
Alpine	7.2*	5yr		1690.00			5.82			1.57		4456.65	4455.23	4457.18	79.90	0.54
Alpine	7.2*	10yr		3655.00			6.75			1.92		4459.33	4457.08	4460.04	112.57	0.54
Alpine	7.2*	25yr	5629.32	7297.92	106.68		9.07	0.18	0.81	3.40	0.81	4460.01	4458.69	4461.26	617.62	0.71
Alpine	7.2*	50yr	2071.42	8156.65	383.93	1.65	10.13	0.29	1.58	5.05	1.42	4460.30	4459.99	4462.17	634.68	0.86
Alpine	7.2*	100yr	5130.32	10980.88	712.80	2.39	11.68	0.37	1.73	3.99	1.58	4461.43	4461.43	4462.67	1548.23	0.72
Alpine	7.2*	500yr								5.04	2.35	4462.46	4462.46	4463.87	1610.95	0.77
Alpine	7.4*	2yr		428.00			4.39			1.14		4455.52	4454.95	4455.82	56.31	0.59
Alpine	7.4*	5yr		1690.00			7.02			2.34		4457.75	4456.86	4458.51	72.05	0.68
Alpine	7.4*	10yr		3655.00			8.00			2.74		4460.26	4458.84	4461.26	99.99	0.66
Alpine	7.4*	25yr		5597.77	138.23		9.44	0.20		3.65	0.92	4461.53	4460.32	4462.89	646.85	0.73
Alpine	7.4*	50yr	2030.93	5170.81	279.26	1.21	6.91	0.19	0.50	1.82	0.69	4462.89	4462.08	4463.41	1681.51	0.48
Alpine	7.4*	100yr	3168.61	7032.67	410.72	1.68	9.09	0.26	0.92	3.11	1.22	4463.11	4462.74	4463.97	1702.48	0.62
Alpine	7.4*	500yr	6911.13	9144.84	768.03	2.22	10.00	0.32	1.39	3.56	1.72	4464.34	4463.74	4465.21	1757.98	0.62
Alpine	7.6*	2yr		428.00			4.61			1.25		4457.07	4456.50	4457.40	52.42	0.61
Alpine	7.6*	5yr		1690.00			7.19			2.46		4459.39	4458.52	4460.20	70.60	0.70
Alpine	7.6*	10yr		3655.00			8.80			3.30		4461.64	4460.52	4462.84	89.96	0.72
Alpine	7.6*	25yr	1285.83	3398.71	1061.47	1.01	5.71	0.98	0.27	1.27	0.38	4463.50	4462.80	4463.81	1775.75	0.41
Alpine	7.6*	50yr	1858.24	4185.59	1437.16	1.29	6.86	1.22	0.42	1.82	0.57	4463.66	4463.15	4464.08	1744.27	0.48
Alpine	7.6*	100yr	3579.54	4733.80	2298.66	1.57	6.89	1.37	0.54	1.76	0.65	4464.45	4463.69	4464.80	1819.32	0.46
Alpine	7.6*	500yr	6965.79	5760.75	4097.46	1.93	7.15	1.65	0.71	1.80	0.84	4465.67	4464.37	4465.97	1867.79	0.44
Alpine	7.8*	2yr		428.00			4.70			1.27		4458.66	4458.06	4459.00	48.52	0.61
Alpine	7.8*	5yr		1690.00			7.43			2.58		4461.07	4460.17	4461.93	64.43	0.70
Alpine	7.8*	10yr		3471.79	183.21		8.96	0.78		3.37	0.36	4463.30	4462.27	4464.49	535.93	0.71
Alpine	7.8*	25yr	1229.46	3761.08	745.46	1.48	8.32	1.12	0.46	2.78	0.58	4464.11	4464.11	4464.82	1581.03	0.62
Alpine	7.8*	50yr	1975.31	4207.62	1298.07	1.48	8.53	1.34	0.58	2.84	0.74	4464.61	4464.61	4465.26	1809.34	0.61

HEC-RAS Plan: Revised FIS River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Val Left (ft/s)	Val Chnl (ft/s)	Val Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Friction # CN
Alpine	7.8*	100yr	3478.54	5088.09	2045.37	1.92	9.65	1.65	0.90	3.56	1.06	4465.03	4465.02	4465.75	1865.95	0.87
Alpine	7.8*	500yr	7278.89	5688.73	3856.38	2.28	9.13	1.88	1.06	3.01	1.18	4466.21	4466.64	4466.70	1976.79	0.58
Alpine	8	2yr		428.00			5.02			1.41		4460.22	4459.59	4460.61	41.96	0.62
Alpine	8	5yr		1690.00			8.14			3.03		4462.75	4461.92	4463.78	54.68	0.74
Alpine	8	10yr	1086.39	2198.95	369.66	1.29	6.19	0.72	0.28	1.55	0.26	4465.19	4464.28	4465.55	1536.72	0.46
Alpine	8	25yr	1822.47	3233.88	679.65	1.83	8.84	1.10	0.58	3.13	0.58	4465.35	4465.21	4466.06	1645.47	0.65
Alpine	8	50yr	2488.96	3768.86	1223.18	1.69	9.59	1.39	0.76	3.60	0.83	4465.78	4465.57	4466.52	1869.28	0.68
Alpine	8	100yr	4503.87	4048.50	2059.63	1.99	9.31	1.56	0.92	3.28	0.94	4466.43	4466.26	4466.98	1997.45	0.63
Alpine	8	500yr	8161.31	4948.23	3714.46	2.51	10.20	1.96	1.31	3.79	1.34	4467.22	4466.85	4467.76	2082.15	0.65
Alpine	8.33333*	2yr		428.00			3.96			0.87		4461.12	4460.14	4461.36	50.54	0.48
Alpine	8.33333*	5yr		1690.00			6.23			1.69		4463.99	4462.27	4464.59	61.02	0.52
Alpine	8.33333*	10yr		3655.00			11.57			5.60		4464.71	4464.35	4466.79	62.94	0.91
Alpine	8.33333*	25yr	1390.27	3402.64	943.09	1.20	7.75	0.94	0.39	2.30	0.41	4466.60	4466.60	4467.16	2026.15	0.53
Alpine	8.33333*	50yr	2134.18	3917.28	1429.54	1.48	8.58	1.15	0.56	2.78	0.57	4466.87	4466.87	4467.48	2071.91	0.57
Alpine	8.33333*	100yr	3546.15	4718.61	2347.24	1.89	9.79	1.47	0.85	3.55	0.87	4467.25	4467.25	4467.94	2137.46	0.64
Alpine	8.33333*	500yr	6486.31	6087.31	4248.38	2.56	11.71	1.97	1.44	4.96	1.44	4467.83	4467.83	4468.65	2230.72	0.74
Alpine	8.66666*	2yr		428.00			3.43			0.65		4461.69	4460.66	4461.87	57.96	0.41
Alpine	8.66666*	5yr		1690.00			5.59			1.34		4464.61	4462.52	4465.10	63.39	0.45
Alpine	8.66666*	10yr	681.33	2973.67		0.81	6.15	1.42	0.19	1.42		4467.37	4464.52	4467.85	1015.06	0.41
Alpine	8.66666*	25yr		5736.00			14.03			7.78		4466.26	4466.26	4469.31	66.45	1.00
Alpine	8.66666*	50yr	1705.08	4293.25	1482.67	1.35	8.36	1.02	0.47	2.59	0.46	4467.81	4467.81	4468.44	2225.43	0.54
Alpine	8.66666*	100yr	2847.37	5253.49	2511.14	1.77	9.78	1.34	0.76	3.49	0.75	4468.16	4468.16	4468.91	2286.40	0.61
Alpine	8.66666*	500yr	5361.68	6680.18	4782.15	2.39	11.56	1.84	1.27	4.75	1.26	4468.76	4468.76	4469.62	2368.83	0.70
Alpine	9	2yr		428.00			3.38			0.70		4462.21	4461.48	4462.39	80.50	0.48
Alpine	9	5yr		1690.00			4.06			0.75		4465.25	4463.06	4465.51	110.02	0.37
Alpine	9	10yr		3655.00			5.10			1.04		4467.75	4464.62	4468.16	126.32	0.38
Alpine	9	25yr	1353.29	2611.00	1771.71	0.56	2.51	0.45	0.07	0.22	0.07	4470.29	4465.91	4470.34	2715.93	0.15
Alpine	9	50yr		7481.00			9.93			3.88		4468.04	4466.78	4469.57	127.00	0.72
Alpine	9	100yr	2001.51	8610.49	0.00	1.66	9.78	0.06	0.71	3.58		4469.04	4469.04	4470.25	1037.23	0.65
Alpine	9	500yr	3204.53	9416.44	4203.02	1.94	10.00	1.54	0.89	3.67	0.93	4469.52	4469.52	4470.41	2592.20	0.65
Alpine	9.3		Bridge													
Alpine	9.5	2yr		428.00			2.48			0.35		4462.76	4461.48	4462.86	85.87	0.31
Alpine	9.5	5yr		1690.00			3.62			0.58		4465.70	4463.04	4465.90	114.35	0.32
Alpine	9.5	10yr		3666.00			4.60			0.82		4468.38	4464.63	4468.71	127.00	0.32
Alpine	9.5	25yr	1383.97	2571.87	1809.16	0.55	2.45	0.45	0.06	0.21	0.07	4470.38	4465.91	4470.42	2724.51	0.15
Alpine	9.5	50yr	1888.10	3155.82	2473.08	0.68	2.91	0.55	0.09	0.30	0.10	4470.64	4466.80	4470.70	2750.60	0.18
Alpine	9.5	100yr	3486.99	2939.32	4229.69	0.64	2.11	0.51	0.14	0.40	0.07	4473.09	4468.10	4473.11	2788.40	0.11
Alpine	9.5	500yr	4369.63	6771.58	5725.78	1.45	6.10	1.20	0.42	1.29	0.47	4470.85	4469.52	4471.09	2771.12	0.36

HEC-RAS Plan_RevISED FIS River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Friction # Chl
Alpine	10	100yr	252.61	3060.24	7343.15	0.78	5.98	1.22	0.24	1.04	0.47	4474.48	4472.62	4474.66	1989.76	0.37
Alpine	10	500yr	544.13	4028.27	12294.59	0.99	6.94	1.56	0.35	1.34	0.70	4475.55	4473.34	4475.76	2048.45	0.41
Alpine	10.3333*	2yr		428.00			3.52			0.53		4468.18	4466.87	4468.37	49.60	0.40
Alpine	10.3333*	5yr		1690.00			5.88			1.20		4471.15	4469.06	4471.69	61.35	0.48
Alpine	10.3333*	10yr		3666.00			12.35			5.27		4471.30	4471.30	4473.67	62.23	1.00
Alpine	10.3333*	25yr	0.15	3775.05	1989.80	0.17	8.86	1.24	0.03	2.57	0.66	4473.17	4473.17	4473.98	1255.13	0.66
Alpine	10.3333*	50yr	5.34	4426.05	3085.61	0.43	9.72	1.50	0.14	3.03	0.90	4473.55	4473.55	4474.43	1341.15	0.70
Alpine	10.3333*	100yr	74.16	5031.78	5550.06	0.75	9.55	1.70	0.30	2.78	1.02	4474.50	4474.08	4475.19	1568.29	0.64
Alpine	10.3333*	500yr	353.69	6479.67	10033.64	1.19	10.59	2.07	0.60	3.25	1.38	4475.62	4474.93	4476.32	1776.18	0.66
Alpine	10.6666*	2yr		428.00			3.16			0.43		4468.57	4467.19	4468.72	55.44	0.36
Alpine	10.6666*	5yr		1690.00			5.29			0.95		4471.68	4469.20	4472.11	62.83	0.41
Alpine	10.6666*	10yr		3666.00			7.51			1.78		4474.14	4471.28	4475.02	76.81	0.53
Alpine	10.6666*	25yr		5765.00			13.47			5.80		4473.31	4473.12	4476.13	70.00	0.96
Alpine	10.6666*	50yr		7517.00			14.23			6.37		4474.65	4474.65	4477.79	82.81	0.99
Alpine	10.6666*	100yr	4.01	6493.74	4158.25	0.32	10.79	1.75	0.09	3.58	1.15	4475.49	4475.49	4476.61	1306.35	0.73
Alpine	10.6666*	500yr	173.71	8657.66	8035.63	1.01	12.68	2.32	0.52	4.74	1.82	4476.42	4476.42	4477.74	1530.61	0.80
Alpine	11	2yr		428.00			2.95			0.38		4468.89	4467.54	4469.02	61.94	0.34
Alpine	11	5yr		1690.00			4.79			0.78		4472.08	4469.40	4472.44	68.10	0.37
Alpine	11	10yr		3666.00			6.75			1.38		4474.78	4471.34	4475.48	73.30	0.44
Alpine	11	25yr	0.43	3883.15	1881.42	0.09	5.32	0.85	0.01	0.85	0.27	4477.05	4472.98	4477.35	1201.36	0.35
Alpine	11	50yr	195.65	3863.12	3458.22	0.45	4.27	0.83	0.09	0.51	0.22	4478.81	4474.18	4478.96	1587.87	0.25
Alpine	11	100yr	0.02	7336.88	3319.10	0.07	10.21	1.58	0.01	3.14	0.94	4476.94	4476.94	4478.06	1144.82	0.66
Alpine	11	500yr	131.59	10001.82	6739.58	0.82	12.39	2.21	0.38	4.49	1.66	4477.83	4477.83	4479.27	1455.21	0.77
Alpine	11.3	Bridge														
Alpine	11.4	2yr		427.00			2.70			0.31		4469.10	4467.54	4469.21	62.34	0.30
Alpine	11.4	5yr		1691.00			4.55			0.69		4472.36	4469.39	4472.68	68.65	0.34
Alpine	11.4	10yr		3670.00			6.36			1.21		4475.23	4471.33	4475.86	54.42	0.40
Alpine	11.4	25yr	15.20	3623.50	2138.30	0.20	4.69	0.80	0.03	0.65	0.23	4477.48	4472.99	4477.69	1409.73	0.30
Alpine	11.4	50yr	222.22	3779.21	3532.57	0.45	4.09	0.80	0.08	0.47	0.20	4478.99	4474.20	4479.12	1615.32	0.24
Alpine	11.4	100yr	196.70	5794.55	4683.75	0.62	6.69	1.26	0.18	1.28	0.51	4478.41	4476.95	4478.80	1537.09	0.40
Alpine	11.4	500yr	708.33	7806.30	8372.38	0.99	7.89	1.61	0.37	1.70	0.77	4479.65	4477.83	4480.12	1704.95	0.44
Alpine	11.4333*	2yr		427.00			3.32			0.51		4469.22	4468.33	4469.39	68.20	0.43
Alpine	11.4333*	5yr		1691.00			4.63			0.74		4472.48	4470.01	4472.82	76.92	0.37
Alpine	11.4333*	10yr		3670.00			6.03			1.12		4475.46	4471.81	4476.03	89.48	0.41
Alpine	11.4333*	25yr	0.60	4115.61	1660.79	0.09	5.05	0.79	0.01	0.76	0.23	4477.53	4473.35	4477.81	1170.81	0.33
Alpine	11.4333*	50yr	152.41	4344.88	3086.71	0.42	4.44	0.83	0.08	0.55	0.22	4479.02	4474.50	4479.20	1486.57	0.26
Alpine	11.4333*	100yr	118.84	6592.07	3964.08	0.55	7.14	1.27	0.15	1.46	0.54	4478.50	4476.52	4479.00	1423.09	0.44
Alpine	11.4333*	500yr	569.31	8909.28	7406.41	0.97	8.40	1.65	0.37	1.93	0.83	4479.75	4478.19	4480.35	1577.46	0.48

HEC-RAS Plan: Revised FIS River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	11.4666*	2yr		427.00			4.35			0.98		4469.50	4469.15	4469.79	72.70	0.66
Alpine	11.4666*	5yr		1691.00			4.88			0.86		4472.62	4470.71	4472.99	85.73	0.43
Alpine	11.4666*	10yr		3670.00			5.82			1.07		4475.66	4472.39	4476.19	103.93	0.42
Alpine	11.4666*	25yr		4540.54	1236.46		5.38	0.76		0.23		4477.57	4473.82	4477.93	101.23	0.36
Alpine	11.4666*	50yr	91.77	4877.42	2564.81	0.38	4.78	0.86	0.07	0.65	0.24	4479.04	4474.92	4479.27	1354.48	0.29
Alpine	11.4666*	100yr	56.45	7318.10	3300.45	0.44	7.58	1.29	0.12	1.66	0.57	4478.59	4476.58	4479.21	1303.20	0.47
Alpine	11.4666*	500yr	438.95	9962.52	6485.53	0.94	8.92	1.71	0.37	2.19	0.91	4479.84	4478.51	4480.59	1444.83	0.52
Alpine	11.5	2yr		427.00			4.67			1.20		4470.21	4470.01	4470.55	79.70	0.77
Alpine	11.5	5yr		1691.00			5.30			1.08		4472.80	4471.47	4473.23	96.31	0.51
Alpine	11.5	10yr		3670.00			5.71			1.06		4475.84	4473.04	4476.35	115.84	0.43
Alpine	11.5	25yr		5777.00			6.91			1.46		4477.45	4474.37	4478.19	126.12	0.47
Alpine	11.5	50yr	40.81	5587.74	1905.45	0.31	5.35	0.80	0.06	0.83	0.29	4479.05	4475.32	4479.38	1219.65	0.33
Alpine	11.5	100yr	10.16	8271.54	2393.30	0.25	8.36	1.18	0.06	2.05	0.67	4478.63	4476.77	4479.48	1176.72	0.54
Alpine	11.5	500yr	298.50	11563.87	5024.63	0.91	10.08	1.64	0.40	2.84	1.13	4479.84	4478.91	4480.93	1301.38	0.60
Alpine	11.5668*	2yr		427.00			3.20			0.48		4471.39		4471.55	73.20	0.42
Alpine	11.5668*	5yr		1691.00			5.60			1.20		4473.47		4473.96	88.89	0.54
Alpine	11.5668*	10yr		3670.00			6.47			1.37		4476.22		4476.87	103.88	0.49
Alpine	11.5668*	25yr		5688.31	88.69		7.67	0.43		1.79	0.12	4477.86		4478.76	579.56	0.51
Alpine	11.5668*	50yr	0.71	6702.57	830.72	0.17	7.68	0.73	0.03	1.71	0.30	4479.09		4479.90	957.98	0.47
Alpine	11.5668*	100yr	0.00	9770.14	904.86	0.02	11.58	0.99		3.93	0.59	4478.82		4480.72	914.13	0.73
Alpine	11.5668*	500yr	53.91	13678.98	3154.11	0.76	14.17	1.68	0.36	5.61	1.40	4479.96		4482.49	1110.18	0.83
Alpine	11.6333*	2yr		427.00			3.42			0.54		4471.95		4472.13	66.81	0.44
Alpine	11.6333*	5yr		1691.00			5.88			1.30		4474.17		4474.71	79.30	0.54
Alpine	11.6333*	10yr		3670.00			7.47			1.80		4476.69		4477.56	82.21	0.54
Alpine	11.6333*	25yr		5753.80	23.20		9.22	0.35		2.56	0.11	4478.29		4479.61	297.12	0.59
Alpine	11.6333*	50yr	0.29	7250.20	283.52	0.23	10.26	0.76	0.05	3.05	0.38	4479.28		4480.85	480.87	0.62
Alpine	11.6333*	100yr	6.17	9984.49	684.34	0.58	13.33	1.17	0.24	5.04	0.80	4479.79		4482.37	559.35	0.78
Alpine	11.6333*	500yr	241.21	12463.82	4181.97	1.28	13.01	1.58	0.71	4.43	1.14	4482.28		4484.23	1179.25	0.68
Alpine	11.7	2yr		427.00			3.55			0.57		4472.51		4472.71	55.71	0.43
Alpine	11.7	5yr		1691.00			6.67			1.60		4474.87		4475.56	57.54	0.56
Alpine	11.7	10yr		3670.00			9.36			2.80		4477.24		4478.60	59.36	0.64
Alpine	11.7	25yr		5763.50	13.50		11.84	0.42		4.22	0.16	4478.82		4480.99	196.78	0.73
Alpine	11.7	50yr	0.80	7322.18	211.02	0.46	13.55	0.92	0.17	5.35	0.56	4479.72		4482.49	357.68	0.80
Alpine	11.7	100yr	58.15	8987.81	1629.03	1.20	13.47	1.51	0.68	4.93	1.12	4481.83		4484.21	602.34	0.71
Alpine	11.7	500yr	314.10	10962.15	5610.75	1.64	13.33	1.68	1.01	4.50	1.23	4484.41		4486.22	1190.68	0.63
Alpine	11.9	Bridge														
Alpine	12	2yr		427.00			2.79			0.32		4473.10		4473.22	56.17	0.30
Alpine	12	5yr		1691.00			4.98			0.82		4476.35		4476.74	58.70	0.36
Alpine	12	10yr	4.13	3410.66	255.22	0.35	5.80	0.51	0.07	0.95	0.15	4480.50		4480.99	459.02	0.33

HEC-RAS Plan, Revised FIS River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta.	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev. (ft)	Crit W.S. (ft)	E.O. Elev. (ft)	Top Width (ft)	Froude # Ch
Alpine	12	25yr	91.18	4093.14	1592.67	0.61	5.21	0.59	0.14	0.70	0.16	4483.81	4477.26	4484.11	1180.32	0.25
Alpine	12	50yr	111.56	5465.09	1957.35	0.81	7.05	0.78	0.26	1.28	0.29	4483.63	4479.61	4484.19	1148.88	0.35
Alpine	12	100yr	217.09	6577.69	3960.22	0.99	7.79	1.04	0.36	1.52	0.45	4484.79	4481.83	4485.37	1197.20	0.37
Alpine	12	500yr	407.75	8429.01	8050.24	0.94	8.86	1.43	0.34	1.89	0.75	4486.57	4484.41	4487.19	1303.27	0.39
Alpine	12.5	2yr		427.00			7.73			2.78		4474.16	4474.16	4475.08	28.95	0.99
Alpine	12.5	5yr		1691.00			11.08			4.60		4476.93	4476.93	4478.83	40.40	1.00
Alpine	12.5	10yr		3675.00			13.24			5.82		4479.68	4479.68	4482.40	50.33	0.99
Alpine	12.5	25yr		5790.00			12.96			5.13		4482.78	4481.69	4485.39	61.08	0.84
Alpine	12.5	50yr		7550.00			15.43			7.22		4483.46	4483.46	4487.15	65.36	0.99
Alpine	12.5	100yr	12.60	6085.34	4597.07	0.66	10.50	1.70	0.17	3.26	1.17	4484.76	4484.56	4485.75	1163.59	0.65
Alpine	12.5	500yr	288.01	7113.36	9504.63	1.60	9.88	2.01	0.58	2.69	1.35	4486.71	4485.45	4487.38	1210.45	0.55
Alpine	12.5666	2yr		427.00			4.19			0.76		4475.61	4474.53	4475.88	43.47	0.48
Alpine	12.5666	5yr		1691.00			5.93			1.23		4479.04	4476.95	4479.59	61.64	0.49
Alpine	12.5666	10yr		3675.00			6.96			1.51		4482.39	4479.19	4483.14	78.68	0.47
Alpine	12.5666	25yr	0.43	4117.66	1671.91	0.14	5.29	0.79	0.01	0.78	0.25	4485.55	4481.17	4485.86	880.62	0.30
Alpine	12.5666	50yr	76.90	4331.49	3141.60	0.51	4.65	0.83	0.07	0.57	0.23	4487.48	4482.22	4487.68	1087.95	0.24
Alpine	12.5666	100yr		8129.92	2565.08		11.12	1.53		3.51	0.99	4484.95	4484.69	4486.42	806.77	0.65
Alpine	12.5666	500yr	47.66	11028.03	5830.29	1.01	13.02	2.05	0.33	4.60	1.57	4486.41	4486.41	4488.15	1034.58	0.70
Alpine	12.6333	2yr		427.00			3.31			0.49		4476.08	4474.91	4476.25	62.06	0.40
Alpine	12.6333	5yr		1691.00			4.14			0.59		4479.63	4476.89	4479.89	85.99	0.33
Alpine	12.6333	10yr		3675.00			5.24			0.82		4483.01	4478.69	4483.43	338.86	0.33
Alpine	12.6333	25yr		4861.60	928.40		5.23	0.69		0.75	0.20	4485.63	4480.08	4485.99	641.90	0.28
Alpine	12.6333	50yr	14.45	5517.73	2017.82	0.34	5.05	0.83	0.04	0.66	0.24	4487.50	4481.08	4487.80	777.03	0.25
Alpine	12.6333	100yr		8891.39	1803.61		9.46	1.27		2.43	0.66	4485.75	4482.56	4486.91	645.45	0.51
Alpine	12.6333	500yr	3.64	12852.67	4049.70	0.41	12.36	1.95	0.08	4.03	1.39	4486.90	4486.17	4488.72	719.26	0.63
Alpine	12.7	2yr		427.00			2.08			0.19		4476.38		4476.45	93.29	0.25
Alpine	12.7	5yr		1691.00			3.17			0.33		4479.88		4480.03	93.97	0.23
Alpine	12.7	10yr		3675.00	0.00		4.30	0.01		0.53		4483.29		4483.58	96.22	0.25
Alpine	12.7	25yr		5329.64	460.36		4.91	0.56		0.65	0.14	4485.74		4486.08	499.99	0.26
Alpine	12.7	50yr		6322.64	1227.36		5.02	0.77		0.65	0.21	4487.56		4487.89	536.21	0.24
Alpine	12.7	100yr		9601.36	1093.64		8.48	1.07		1.91	0.47	4486.22		4487.23	511.38	0.43
Alpine	12.7	500yr		14216.01	2689.99		11.36	1.72		3.32	1.07	4487.48		4489.17	537.13	0.55
Alpine	12.9		Culvert													
Alpine	13	2yr		427.00			2.04			0.18		4476.42	4475.03	4476.49	93.30	0.24
Alpine	13	5yr		1691.00			3.12			0.32		4479.98	4476.34	4480.13	93.99	0.23
Alpine	13	10yr		3674.17	0.83		4.20	0.08		0.51	0.01	4483.51	4477.80	4483.78	200.44	0.24
Alpine	13	25yr		5325.14	464.86		4.89	0.56		0.64	0.14	4485.75	4479.09	4486.09	500.38	0.25
Alpine	13	50yr		6322.80	1227.20		5.02	0.77		0.65	0.21	4487.56	4480.04	4487.89	536.20	0.24
Alpine	13	100yr		9552.91	1142.09		8.37	1.07		1.85	0.47	4486.32	4481.57	4487.29	513.66	0.42

HEC-RAS Plan: Revised FIS River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	13	500yr		14198.21	2707.79		11.32	1.72		3.30	1.07	4487.50	4485.58	4489.18	537.46	0.55
Alpine	13.25*	2yr		427.00		6.37				2.17		4476.38	4476.38	4477.01	54.18	1.01
Alpine	13.25*	5yr		1691.00		4.98				0.94		4479.95	4480.33	4480.33	96.38	0.47
Alpine	13.25*	10yr		3678.00	0.00	5.24		0.02		0.85	0.00	4483.50	4483.50	4483.92	115.75	0.35
Alpine	13.25*	25yr		5261.86	534.14	5.62		0.67		0.89	0.21	4485.76	4486.21	4486.21	500.53	0.33
Alpine	13.25*	50yr	0.04	6208.98	1348.98	5.52	0.06	0.87	0.00	0.81	0.29	4487.58	4487.58	4487.97	553.02	0.30
Alpine	13.25*	100yr		9392.84	1311.16	9.40		1.26		2.45	0.70	4486.36	4487.57	4487.57	514.69	0.53
Alpine	13.25*	500yr	0.29	13857.10	3058.60	12.26		1.94	0.03	4.00	1.46	4487.63	4489.55	4489.55	561.96	0.66
Alpine	13.5	2yr		427.00		5.75				1.69		4477.55	4477.55	4478.06	52.21	0.85
Alpine	13.5	5yr		1691.00		7.82				2.42		4479.86	4480.81	4480.81	69.98	0.78
Alpine	13.5	10yr		3678.00		7.25				1.74		4483.37	4484.18	4484.18	96.05	0.56
Alpine	13.5	25yr		5142.91	653.09	6.85		0.88		1.42	0.40	4485.73	4486.37	4486.37	495.42	0.46
Alpine	13.5	50yr	2.19	5973.28	1582.53	6.23	0.22	1.06	0.05	1.10	0.47	4487.59	4488.07	4488.07	567.08	0.38
Alpine	13.5	100yr		9131.26	1572.74	11.21		1.62		3.73	1.25	4486.31	4487.98	4487.98	511.23	0.73
Alpine	13.5	500yr	8.28	13253.67	3654.05	13.57		2.33	0.26	5.17	2.24	4487.75	4489.79	4490.01	575.62	0.81
Alpine	13.75*	2yr		427.00		6.88				2.20		4478.29	4478.07	4479.02	32.09	0.87
Alpine	13.75*	5yr		1691.00		9.95				3.94		4480.77	4480.77	4482.30	55.66	1.00
Alpine	13.75*	10yr		3678.00		10.61				4.03		4483.29	4483.29	4485.04	82.88	0.91
Alpine	13.75*	25yr		5795.00		10.70				3.77		4485.42	4485.42	4487.19	100.44	0.81
Alpine	13.75*	50yr		7533.84	24.16	10.35		0.37		3.31	0.14	4487.17	4485.64	4488.83	365.60	0.71
Alpine	13.75*	100yr		10400.43	303.57	12.72		0.99		4.87	0.64	4487.96	4487.96	4490.40	453.07	0.84
Alpine	13.75*	500yr	3.89	15042.96	1869.15	14.63		1.91	0.19	5.98	1.71	4489.79	4489.79	4492.76	545.54	0.86
Alpine	14	2yr		427.00		4.85				1.00		4479.24	4479.24	4479.60	34.64	0.54
Alpine	14	5yr		1691.00		8.13				2.40		4482.05	4482.05	4483.08	50.29	0.70
Alpine	14	10yr		3678.00		12.07				4.99		4483.77	4483.60	4486.03	62.26	0.96
Alpine	14	25yr		5795.00		13.60				6.02		4485.55	4485.55	4488.42	74.75	1.00
Alpine	14	50yr		7558.00		13.89				6.08		4487.01	4486.85	4490.01	86.26	0.97
Alpine	14	100yr		10704.00		15.30				7.13		4488.69	4488.69	4492.32	99.40	1.02
Alpine	14	500yr	18.74	15491.10	1406.16	13.89		1.61	0.24	5.33	1.28	4492.41	4492.41	4495.15	610.92	0.79
Alpine	14.3															
Alpine	14.5	2yr		427.00		4.16				0.72		4479.64	4479.64	4479.91	37.07	0.44
Alpine	14.5	5yr		1691.00		6.43				1.45		4483.07	4480.99	4483.72	57.38	0.53
Alpine	14.5	10yr		3681.00		8.16				2.15		4485.87	4483.60	4486.91	77.33	0.60
Alpine	14.5	25yr		5806.00		8.93				2.45		4488.18	4485.53	4489.42	95.43	0.60
Alpine	14.5	50yr		7443.30	126.70	7.95		0.49		1.85	0.17	4490.88	4486.83	4491.84	482.31	0.49
Alpine	14.5	100yr		10544.18	174.82	11.29		0.69		3.72	0.34	4490.66	4488.70	4492.81	478.80	0.70
Alpine	14.5	500yr	642.98	13087.51	3199.52	8.92		1.54	0.33	2.01	0.88	4495.42	4492.40	4496.38	928.76	0.44
Alpine	14.6566*	2yr		427.00		5.84				1.50		4479.93	4479.93	4480.46	32.19	0.68

HFC-RAS Plan: Revised FIS River, Alpine Creek, Reach, Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	CW.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	14.6666*	5yr	1691.00			7.59				2.10		4483.37		4484.27	55.44	0.67
Alpine	14.6666*	10yr	3681.00			8.83				2.61		4486.24		4487.45	79.32	0.68
Alpine	14.6666*	25yr	5806.00			9.42				2.77		4488.53		4489.91	94.81	0.65
Alpine	14.6666*	50yr	794.31		794.31	0.48	7.60	0.77	0.15	1.62	0.32	4491.31		4492.11	790.87	0.44
Alpine	14.6666*	100yr	128.35		2007.66	0.65	8.53	1.11	0.25	1.96	0.56	4492.51		4493.42	915.21	0.47
Alpine	14.6666*	500yr	1128.28		5727.78	0.81	7.41	1.37	0.29	1.33	0.65	4496.13		4496.64	1234.50	0.35
Alpine	14.8333*	2yr		427.00		6.89				2.18		4480.66		4481.39	30.81	0.86
Alpine	14.8333*	5yr		1691.00		8.26				2.59		4483.90		4484.96	57.74	0.77
Alpine	14.8333*	10yr		3681.00		9.31				2.91		4486.70		4488.05	76.82	0.72
Alpine	14.8333*	25yr	21.31		502.29	0.68	8.93	1.10	0.24	2.37	0.31	4489.20		4490.32	602.59	0.57
Alpine	14.8333*	50yr	172.97		2895.58	0.61	5.54	1.17	0.15	0.82	0.24	4491.99		4492.28	1088.61	0.30
Alpine	14.8333*	100yr	370.85		5055.70	0.65	5.76	1.37	0.16	0.85	0.30	4493.34		4493.60	1278.46	0.30
Alpine	14.8333*	500yr	1270.89		9886.34	0.67	4.91	1.48	0.14	0.57	0.29	4496.59		4496.74	1551.33	0.22
Alpine	15	2yr		427.00		5.96				1.63		4481.84		4482.39	35.86	0.74
Alpine	15	5yr		1691.00		8.41				2.66		4484.64		4485.74	55.39	0.78
Alpine	15	10yr	26.97		3228.30	0.83	8.65	1.20	0.34	2.35	0.37	4487.54		4488.57	470.36	0.61
Alpine	15	25yr	180.91		2412.98	0.84	5.98	1.15	0.26	1.00	0.26	4490.27		4490.59	1088.00	0.35
Alpine	15	50yr	297.60		4350.69	0.59	4.46	1.07	0.12	0.52	0.19	4492.23		4492.36	1320.71	0.24
Alpine	15	100yr	506.84		6752.30	0.59	4.72	1.23	0.12	0.56	0.23	4493.55		4493.68	1532.74	0.24
Alpine	15	500yr	1310.14		11788.52	0.58	4.17	1.27	0.10	0.41	0.21	4496.70		4496.78	1855.00	0.19
Alpine	15.1666*	2yr		419.00		5.36				1.29		4483.22		4483.66	36.71	0.65
Alpine	15.1666*	5yr		1699.00		8.16				2.49		4485.99		4487.02	56.32	0.75
Alpine	15.1666*	10yr	0.72		3724.98	0.57	11.69	1.42	0.21	4.57	0.59	4487.83	4487.83	4489.91	158.94	0.90
Alpine	15.1666*	25yr	74.94		4762.06	1.18	10.42	1.67	0.53	3.22	0.63	4490.09	4490.09	4491.41	667.37	0.67
Alpine	15.1666*	50yr	224.38		4403.47	1.01	7.58	1.48	0.33	1.57	0.42	4492.11		4492.62	1110.52	0.43
Alpine	15.1666*	100yr	416.84		4800.01	0.96	7.20	1.65	0.29	1.36	0.46	4493.50		4493.87	1284.70	0.39
Alpine	15.1666*	500yr	1230.21		4831.69	0.84	5.60	1.57	0.19	0.75	0.34	4496.71		4496.87	1652.42	0.26
Alpine	15.3333*	2yr		419.00		5.56				1.39		4484.33		4484.81	35.48	0.67
Alpine	15.3333*	5yr		1699.00		8.12				2.47		4487.22		4488.24	56.60	0.74
Alpine	15.3333*	10yr	0.77		3725.15	0.54	10.46	0.95	0.18	3.55	0.54	4489.63	4488.93	4491.29	175.27	0.77
Alpine	15.3333*	25yr	48.50		5323.20	1.10	11.16	1.14	0.49	3.67	0.66	4491.56	4491.56	4493.23	623.64	0.71
Alpine	15.3333*	50yr	130.00		6209.25	1.35	11.61	1.36	0.66	3.82	0.84	4492.48	4492.48	4494.11	810.05	0.70
Alpine	15.3333*	100yr	304.42		7416.24	1.47	12.13	1.58	0.73	3.99	1.03	4493.70	4493.70	4495.22	1102.84	0.68
Alpine	15.3333*	500yr	1022.68		7925.76	1.33	10.11	1.69	0.53	2.55	0.95	4496.45		4497.20	1489.03	0.50
Alpine	15.5	2yr		419.00		5.58				1.39		4485.51		4485.99	34.87	0.67
Alpine	15.5	5yr		1699.00		8.11				2.47		4488.44		4489.46	56.79	0.74
Alpine	15.5	10yr		3766.09		10.70		0.85		3.76	0.46	4490.75	4490.11	4492.51	145.98	0.80
Alpine	15.5	25yr	4.14		5885.88	0.95	13.86	1.40	0.46	5.94	1.04	4491.69	4491.63	4494.75	236.36	0.95
Alpine	15.5	50yr	70.19		6886.05	1.21	12.41	1.35	0.58	4.39	0.86	4493.67	4493.67	4495.68	700.62	0.75
Alpine	15.5	100yr	256.20		7752.65	1.37	12.16	1.53	0.65	3.99	0.97	4495.22	4495.22	4496.81	1085.69	0.68

HEC-RAS Plan: Revised FIS River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cntl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt. W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Friction # CH
Alpine	17.05*	5yr		1699.00			6.63			1.25		4492.38		4493.06	61.23	0.57
Alpine	17.05*	10yr		3776.88	34.12	7.79	7.79	0.64		1.48	0.21	4495.71		4496.65	130.97	0.53
Alpine	17.05*	25yr	34.85	5824.29	486.06	0.60	8.45	0.70	0.15	1.57	0.22	4498.18		4499.20	703.47	0.49
Alpine	17.05*	50yr	112.26	6759.17	1135.58	0.82	9.24	0.88	0.24	1.82	0.32	4499.08		4500.20	995.82	0.52
Alpine	17.05*	100yr	334.66	8104.96	2800.38	1.05	9.77	1.16	0.34	1.95	0.48	4500.42		4501.49	1150.92	0.51
Alpine	17.05*	500yr	747.07	10548.24	6151.69	1.10	11.23	1.59	0.38	2.47	0.79	4501.92		4503.12	1411.59	0.55
Alpine	17.1*	2yr		419.00			6.39			1.53		4489.75		4490.39	36.53	0.84
Alpine	17.1*	5yr		1699.00			7.64			1.74		4492.96		4493.87	62.12	0.71
Alpine	17.1*	10yr		3805.75	5.25		8.55	0.47		1.86	0.13	4496.10		4497.24	105.11	0.82
Alpine	17.1*	25yr	7.90	6001.92	135.18	0.52	9.64	0.67	0.13	2.13	0.22	4498.38		4499.79	365.14	0.80
Alpine	17.1*	50yr	44.69	7542.74	419.58	0.80	11.00	0.89	0.26	2.69	0.34	4499.19		4500.96	579.81	0.85
Alpine	17.1*	100yr	194.86	9677.29	1367.85	1.18	12.47	1.22	0.47	3.31	0.56	4500.34		4502.43	884.41	0.70
Alpine	17.1*	500yr	643.06	12729.17	4074.77	1.62	14.26	1.77	0.77	4.13	1.00	4501.84		4504.15	1136.52	0.74
Alpine	17.15*	2yr		419.00			5.87			1.30		4491.33		4491.87	40.55	0.78
Alpine	17.15*	5yr		1699.00			8.19			2.08		4493.93		4494.97	65.94	0.81
Alpine	17.15*	10yr		3811.00			9.26			2.28		4496.70		4498.04	80.96	0.72
Alpine	17.15*	25yr	2.28	6058.24	84.48	0.54	10.29	1.07	0.14	2.52	0.42	4498.85		4500.47	162.00	0.68
Alpine	17.15*	50yr	18.34	7856.65	132.01	0.77	12.01	0.84	0.25	3.31	0.31	4499.64	4498.54	4501.84	344.08	0.75
Alpine	17.15*	100yr	198.81	10038.33	1002.87	1.23	12.62	1.24	0.49	3.43	0.53	4501.34	4501.34	4503.55	769.61	0.72
Alpine	17.15*	500yr	798.64	12710.27	3938.09	1.61	13.25	1.76	0.70	4.35	0.86	4503.31	4503.31	4505.31	1128.21	0.69
Alpine	17.2	2yr		419.00			5.92			1.36		4492.76		4493.30	43.56	0.82
Alpine	17.2	5yr		1699.00			8.06			2.05		4495.21		4496.21	70.35	0.82
Alpine	17.2	10yr		3811.00			9.74			2.59		4497.55		4499.02	83.55	0.79
Alpine	17.2	25yr	1.14	6107.32	36.54	0.57	10.91	0.99	0.16	2.93	0.37	4499.49		4501.33	141.34	0.76
Alpine	17.2	50yr	12.46	7862.88	131.86	0.79	12.23	1.42	0.26	3.52	0.64	4500.43	4499.61	4502.71	189.75	0.80
Alpine	17.2	100yr	209.61	10323.87	706.53	1.28	12.66	1.21	0.51	3.49	0.47	4502.39	4502.39	4504.68	688.55	0.73
Alpine	17.2	500yr	875.48	13162.73	3408.79	1.66	13.20	1.79	0.72	3.54	0.81	4504.46	4504.46	4506.51	1083.30	0.69
Alpine	17.3		Bridge													
Alpine	17.4214	2yr		419.00			3.83			0.65		4493.58	4492.52	4493.81	50.97	0.46
Alpine	17.4214	5yr		1699.00			5.95			1.31		4496.23	4494.78	4496.78	76.11	0.54
Alpine	17.4214	10yr	0.01	3801.22	9.77	0.17	7.46	0.70	0.02	1.79	0.13	4496.92	4496.79	4499.79	121.65	0.55
Alpine	17.4214	25yr	15.06	5978.89	151.05	0.88	9.25	1.58	0.19	2.54	0.46	4500.47	4498.45	4501.77	192.89	0.60
Alpine	17.4214	50yr	1099.71	3355.52	3551.77	0.56	2.55	0.73	0.04	1.15	0.06	4508.06	4499.69	4508.10	1461.86	0.12
Alpine	17.4214	100yr	906.67	6799.30	3534.02	1.23	6.36	1.39	0.22	1.02	0.27	4505.27	4502.52	4505.66	1182.71	0.32
Alpine	17.4214	500yr	1829.73	8432.85	7184.43	1.27	6.90	1.80	0.24	1.15	0.40	4507.00	4504.26	4507.38	1461.86	0.33
Alpine	17.5371*	2yr		419.00			4.17			0.79		4494.33		4494.60	49.00	0.51
Alpine	17.5371*	5yr		1699.00			6.14			1.44		4497.08		4497.66	79.93	0.58
Alpine	17.5371*	10yr		3810.82	0.18		7.54	0.28		1.89	0.03	4499.67		4500.55	102.68	0.58
Alpine	17.5371*	25yr	6.23	6065.45	73.32	0.80	9.14	1.38	0.17	2.54	0.39	4501.31		4502.59	166.48	0.62

HEC-RAS Plan, Revised EIS, River, Alpine Creek, Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Crt
Alpine	17.5371*	50yr	790.87	4437.72	2778.41	0.60	3.37	0.83	0.05	0.27	0.09	4508.06		4508.16	1395.17	0.16
Alpine	17.5371*	100yr	679.21	8688.58	1872.20	1.50	8.27	1.44	0.36	1.78	0.33	4505.31		4506.13	964.88	0.44
Alpine	17.5371*	500yr	1636.27	10814.99	4995.74	1.76	8.87	1.96	0.45	1.95	0.53	4507.05		4507.83	1192.14	0.44
Alpine	17.6528*	2yr		419.00			4.23			0.81		4495.22		4495.50	48.95	0.52
Alpine	17.6528*	5yr		1699.00			6.24			1.48		4498.03		4498.63	78.99	0.59
Alpine	17.6528*	10yr		3811.00			7.61			1.96		4500.52		4501.42	101.21	0.60
Alpine	17.6528*	25yr	2.00	6111.44	31.56	0.65	9.02	1.16	0.13	2.52	0.30	4502.21		4503.47	151.54	0.63
Alpine	17.6528*	50yr	733.01	5531.08	1742.91	0.84	4.27	0.88	0.10	0.46	0.11	4508.05		4508.25	1109.72	0.22
Alpine	17.6528*	100yr	395.79	10240.06	604.15	1.63	10.14	1.35	0.47	2.79	0.35	4505.35		4506.81	641.75	0.58
Alpine	17.6528*	500yr	1199.16	13755.46	2492.39	2.19	11.74	2.02	0.75	3.56	0.66	4506.89		4508.59	955.88	0.62
Alpine	17.7685*	2yr		419.00			4.23			0.81		4496.13		4496.41	49.20	0.52
Alpine	17.7685*	5yr		1699.00			6.25			1.46		4498.97		4499.58	74.33	0.58
Alpine	17.7685*	10yr		3811.00			7.65			2.01		4501.45		4502.35	105.04	0.62
Alpine	17.7685*	25yr	0.15	6133.48	11.37	0.32	8.90	0.93	0.05	2.51	0.22	4503.16		4504.39	142.41	0.64
Alpine	17.7685*	50yr	538.04	6885.42	783.54	1.00	5.36	0.85	0.16	0.75	0.12	4508.04		4508.42	877.90	0.29
Alpine	17.7685*	100yr	241.92	10758.45	239.64	1.57	10.72	1.45	0.47	3.21	0.41	4505.92		4507.63	386.75	0.64
Alpine	17.7685*	500yr	808.40	15712.63	925.98	2.37	13.76	1.85	0.94	5.06	0.65	4507.13		4509.78	699.37	0.77
Alpine	17.8842*	2yr		419.00			4.20			0.81		4497.05		4497.32	49.43	0.52
Alpine	17.8842*	5yr		1699.00			6.26			1.45		4499.87		4500.48	72.58	0.57
Alpine	17.8842*	10yr		3811.00			7.67			2.03		4502.42		4503.33	106.47	0.63
Alpine	17.8842*	25yr		6141.62	3.38		8.80	0.73		2.49	0.15	4504.17		4505.37	135.62	0.65
Alpine	17.8842*	50yr	319.43	7486.88	200.69	1.07	6.34	0.74	0.20	1.09	0.11	4508.09		4508.67	574.85	0.36
Alpine	17.8842*	100yr	168.79	10877.76	193.44	1.48	10.67	1.91	0.43	3.24	0.64	4506.77		4508.49	291.22	0.65
Alpine	17.8842*	500yr	873.80	15889.67	683.53	2.27	12.84	1.66	0.85	4.40	0.53	4508.55		4510.88	672.76	0.71
Alpine	18	2yr		419.00			4.20			0.80		4497.95		4498.23	48.88	0.52
Alpine	18	5yr		1699.00			6.26			1.46		4500.76		4501.37	72.80	0.57
Alpine	18	10yr		3811.00			7.67			2.00		4503.39		4504.30	102.70	0.61
Alpine	18	25yr		6144.39	0.61		8.71	0.50		2.47	0.09	4505.19		4506.37	133.23	0.65
Alpine	18	50yr	152.60	7733.26	121.15	1.02	6.94	1.25	0.20	1.36	0.27	4508.30		4509.02	312.80	0.42
Alpine	18	100yr	119.08	11000.34	120.58	1.40	10.64	1.84	0.41	3.28	0.61	4507.69		4509.41	266.05	0.67
Alpine	18	500yr	762.69	16281.63	402.68	2.22	12.74	1.81	0.83	4.38	0.48	4509.54		4511.90	534.40	0.72
Alpine	18.2*	2yr		419.00			5.50			1.44		4502.14		4502.61	43.46	0.73
Alpine	18.2*	5yr		1699.00			7.92			2.43		4504.66		4505.63	65.32	0.77
Alpine	18.2*	10yr		3811.00			9.35			3.04		4507.18		4508.54	89.04	0.77
Alpine	18.2*	25yr		6143.03	1.97		10.40	0.71		3.53	0.16	4509.04		4510.72	118.38	0.78
Alpine	18.2*	50yr	5.31	11039.31	195.38	0.83	12.98	2.22	0.21	5.04	0.92	4511.31	4509.14	4511.93	135.66	0.89
Alpine	18.2*	100yr	440.63	15217.98	1788.39	1.93	13.04	2.28	0.67	4.58	0.87	4513.98	4510.79	4513.88	208.53	0.85
Alpine	18.2*	500yr		419.00			4.53			0.94		4507.18	4513.98	4516.29	708.12	0.73
Alpine	18.4*	2yr		419.00			4.53			0.94		4507.18		4507.50	47.23	0.57

HEC-RAS Plan: Revised FIS River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Cut W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Crd.
Alpine	18.4*	5yr		1699.00			6.92			1.82		4509.81		4510.56	70.27	0.65
Alpine	18.4*	10yr		3811.00			8.90			2.70		4512.14		4513.37	87.72	0.71
Alpine	18.4*	25yr		6084.48	60.52		10.42	1.42		3.43	0.45	4513.83		4515.50	151.27	0.75
Alpine	18.4*	50yr		7688.20	318.80		10.67	1.41		3.43	0.43	4515.20		4516.90	388.66	0.71
Alpine	18.4*	100yr	9.14	9743.78	1487.08	0.83	11.28	2.12	0.19	3.64	0.77	4516.57		4518.29	546.24	0.69
Alpine	18.4*	500yr	117.50	13506.43	3823.07	1.52	13.48	2.89	0.48	4.95	1.27	4517.88		4520.09	744.61	0.77
Alpine	18.6*	2yr		419.00			5.05			1.21		4511.61		4512.01	46.32	0.67
Alpine	18.6*	5yr		1699.00			7.40			2.09		4514.22		4515.07	66.65	0.70
Alpine	18.6*	10yr		3802.84	8.16		9.45	0.74		3.00	0.17	4516.58		4517.97	117.87	0.74
Alpine	18.6*	25yr		5668.36	476.64		10.48	1.59		3.42	0.52	4518.29		4519.86	399.93	0.73
Alpine	18.6*	50yr		6635.72	1371.28		10.65	2.10		3.41	0.78	4519.25		4520.72	501.20	0.70
Alpine	18.6*	100yr		8116.19	3123.81		11.24	2.69		3.66	1.11	4520.36		4521.81	586.34	0.70
Alpine	18.6*	500yr	33.18	10247.94	7165.88	1.11	11.49	3.19	0.28	3.58	1.36	4522.22		4523.49	762.79	0.65
Alpine	18.8*	2yr		419.00			4.68			1.01		4516.35		4516.69	45.47	0.59
Alpine	18.8*	5yr		1699.00			7.33			2.02		4518.87		4519.70	62.87	0.67
Alpine	18.8*	10yr		3382.77	425.23		8.87	1.44		2.59	0.44	4521.11		4522.20	403.95	0.67
Alpine	18.8*	25yr		4339.78	1805.22		9.04	2.10		2.52	0.73	4522.51		4523.43	536.83	0.62
Alpine	18.8*	50yr		5096.43	2910.57		9.67	2.49		2.82	0.95	4523.15		4524.11	578.97	0.64
Alpine	18.8*	100yr		6328.54	4911.46		10.57	2.90		3.26	1.21	4524.12		4525.16	675.19	0.66
Alpine	18.8*	500yr		8280.80	9166.20		11.93	3.66		4.00	1.76	4525.37		4526.53	748.36	0.70
Alpine	19	2yr		419.00			4.28			1.27		4521.03	4520.20	4521.31	50.11	0.54
Alpine	19	5yr		1506.26	192.74		6.37	1.11		2.22	0.31	4523.59	4522.38	4524.15	383.15	0.56
Alpine	19	10yr		2167.51	1643.49		6.56	2.04		2.12	0.71	4525.19	4524.51	4525.60	524.28	0.49
Alpine	19	25yr		2871.91	3273.09		7.49	2.63		2.66	1.06	4526.07	4525.22	4526.53	586.75	0.52
Alpine	19	50yr		3306.72	4700.28		7.81	2.93		2.81	1.24	4526.73	4525.72	4527.20	626.31	0.52
Alpine	19	100yr		4099.61	7140.39		8.42	3.18		3.14	1.40	4527.76	4526.35	4528.26	758.53	0.53
Alpine	19	500yr		5135.11	12311.89		8.97	3.83		3.40	1.82	4529.12	4527.20	4529.65	789.50	0.53

HFC-RAS Plan: Opt A River: Alpine Creek Reach: Alpine

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	Chl
Alpine	1	2yr		448.00		1.47	5.81		0.53	1.47		4404.48	4403.86	4405.00	32.84		0.67
Alpine	1	5yr	167.82	1552.18		3.08	8.63		1.61	2.67		4407.22	4407.11	4408.26	181.99		0.73
Alpine	1	10yr	1214.13	2666.87		4.00	10.32		2.38	3.49		4409.02	4408.80	4410.20	204.43		0.76
Alpine	1	25yr	2369.28	3636.89	28.83	4.50	11.52	0.75	2.84	4.11	0.15	4410.26	4409.74	4411.59	380.51		0.78
Alpine	1	50yr	3195.85	4324.30	324.85	4.50	12.34	1.95	2.84	4.56	0.61	4410.99	4410.79	4412.42	386.29		0.80
Alpine	1	100yr	4596.94	5426.79	1158.27	5.17	13.51	3.19	3.50	5.22	1.29	4412.08	4411.77	4413.64	394.87		0.81
Alpine	1	500yr	7322.23	7477.60	3275.17	6.15	15.35	4.62	4.19	6.32	2.25	4413.90	4413.32	4415.71	434.96		0.84
Alpine	1.33333*	2yr		445.00			5.14			1.18		4405.84		4406.25	39.75		0.61
Alpine	1.33333*	5yr		1687.00			8.08			2.39		4408.55		4409.56	51.70		0.71
Alpine	1.33333*	10yr		3695.00			12.85			5.60		4410.24		4412.81	59.65		1.01
Alpine	1.33333*	25yr		5112.38		2.01	11.31		0.83	3.95		4412.60	4412.60	4414.41	259.08		0.76
Alpine	1.33333*	50yr	522.62	6532.40		2.97	12.53		1.52	4.65		4413.64	4413.64	4415.68	262.97		0.79
Alpine	1.33333*	100yr	1377.60	8530.18	1.70	4.01	14.20	0.52	2.43	5.72	0.09	4414.89	4414.83	4417.25	292.58		0.83
Alpine	1.33333*	500yr	2808.12	11878.42	659.90	5.33	16.37	2.77	3.75	7.14	1.07	4416.71	4416.71	4419.55	432.96		0.87
Alpine	1.66666*	2yr		445.00			4.87			1.08		4407.01		4407.38	44.46		0.60
Alpine	1.66666*	5yr		1687.00			7.08			1.80		4409.93		4410.71	55.86		0.60
Alpine	1.66666*	10yr		3695.00			8.30			2.19		4413.45		4414.51	75.98		0.59
Alpine	1.66666*	25yr		5635.00			11.30			4.02		4413.82		4415.81	78.06		0.79
Alpine	1.66666*	50yr		7910.00			13.88			5.92		4414.71		4417.70	82.97		0.93
Alpine	1.66666*	100yr	640.68	10699.32		2.02	13.42		0.84	5.08		4417.36	4417.36	4420.01	314.31		0.78
Alpine	1.66666*	500yr	3137.33	15154.26	3.40	3.72	15.31	0.67	2.09	6.18	0.12	4419.60	4419.60	4422.65	354.81		0.80
Alpine	2	2yr		445.00			4.73			1.04		4408.17		4408.52	50.14		0.61
Alpine	2	5yr		1687.00			6.75			1.66		4410.92		4411.62	61.23		0.59
Alpine	2	10yr		3695.00			8.26			2.16		4414.22		4415.28	74.21		0.58
Alpine	2	25yr		5635.00			9.64			2.86		4415.64		4417.08	85.36		0.65
Alpine	2	50yr		7910.00			10.21			3.06		4417.71		4419.33	98.13		0.64
Alpine	2	100yr		11340.00			13.09			4.94		4418.62		4421.28	103.75		0.80
Alpine	2	500yr		18295.00			17.65			8.59		4420.23		4425.06	192.15		0.99
Alpine	2.3		Bridge														
Alpine	2.5	2yr		445.00			3.63			0.57		4408.72		4408.93	53.03		0.42
Alpine	2.5	5yr		1687.00			5.71			1.14		4411.65		4412.16	62.92		0.46
Alpine	2.5	10yr		3695.00			7.18			1.60		4415.14		4415.94	81.58		0.49
Alpine	2.5	25yr		5635.00			8.02			1.92		4416.96		4417.95	93.47		0.52
Alpine	2.5	50yr		7910.00			8.66			2.14		4419.07		4420.23	105.92		0.52
Alpine	2.5	100yr		11340.00			9.93			2.65		4421.22		4422.75	298.59		0.53
Alpine	2.5	500yr	3377.08	14822.47	95.45	1.84	9.00	1.00	0.51	1.94	0.16	4425.98	4420.15	4427.01	704.05		0.40
Alpine	3	2yr		445.00			4.84			1.12		4408.89		4409.25	53.46		0.65
Alpine	3	5yr		1687.00			2.29			0.18		4412.28		4412.36	269.17		0.24
Alpine	3	10yr		3697.13	197.87		2.03	0.70		0.11	0.06	4416.13		4416.19	375.04		0.14

HEC-RAS Plan: Out A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	3	25yr	5.44	5263.70	365.86	0.23	2.17	0.77	0.01	0.11	0.06	4418.19		4418.26	428.93	0.13
Alpine	3	50yr	66.38	7239.67	603.95	0.43	2.33	0.83	0.02	0.12	0.07	4420.50		4420.58	496.71	0.13
Alpine	3	100yr	261.65	10086.20	992.15	0.64	2.60	0.91	0.04	0.14	0.08	4423.11		4423.20	548.13	0.13
Alpine	3	500yr	827.98	15582.05	1884.97	0.99	3.07	1.07	0.08	0.18	0.10	4427.17		4427.30	587.22	0.13
Alpine	3.16666*	2yr		445.00			4.25			0.89		4411.91		4412.20	66.65	0.60
Alpine	3.16666*	5yr		1687.00			5.35			0.67		4413.37	4413.37	4413.81	354.09	1.00
Alpine	3.16666*	10yr		3893.55	1.45		2.84	0.15		0.25	0.01	4416.23		4416.35	459.97	0.26
Alpine	3.16666*	25yr		5517.82	117.18		2.55	0.68		0.18	0.07	4418.26		4418.36	478.61	0.19
Alpine	3.16666*	50yr		7607.21	302.79		2.47	0.80		0.15	0.07	4420.65		4420.65	507.03	0.16
Alpine	3.16666*	100yr		10749.21	590.79		2.59	0.86		0.15	0.08	4423.16		4423.26	550.94	0.14
Alpine	3.16666*	500yr	67.37	16946.45	1281.18	0.56	2.89	0.97	0.04	0.17	0.09	4427.23		4427.35	637.54	0.14
Alpine	3.33333*	2yr		445.00			4.13			0.88		4414.81		4415.07	78.09	0.62
Alpine	3.33333*	5yr		1687.00			4.38			0.47		4416.42		4416.72	405.93	0.79
Alpine	3.33333*	10yr		3895.00			6.82			1.45		4416.88	4416.88	4417.60	408.61	1.02
Alpine	3.33333*	25yr		5635.00			4.60			0.69		4418.44		4418.76	427.49	0.48
Alpine	3.33333*	50yr		7864.79	45.21		3.59	0.60		0.36	0.07	4420.65		4420.85	527.51	0.28
Alpine	3.33333*	100yr		11049.96	290.04		3.30	0.94		0.27	0.11	4423.22		4423.39	560.69	0.21
Alpine	3.33333*	500yr	1.63	17412.86	880.51	0.19	3.32	1.03	0.01	0.24	0.11	4427.28		4427.44	662.91	0.18
Alpine	3.5*	2yr		445.00			3.71			0.73		4417.77		4417.98	95.29	0.58
Alpine	3.5*	5yr		1687.00			5.20			0.48		4419.19	4419.19	4419.61	431.05	1.06
Alpine	3.5*	10yr		3895.00			4.81			0.78		4420.30		4420.66	443.80	0.63
Alpine	3.5*	25yr		5635.00			7.50			1.82		4420.17	4420.17	4421.04	436.66	1.01
Alpine	3.5*	50yr		7910.00			6.91			1.58		4421.05		4421.79	450.52	0.76
Alpine	3.5*	100yr		11339.39	0.61		5.12	0.14		0.75	0.01	4423.38		4423.78	549.71	0.42
Alpine	3.5*	500yr		17833.67	461.33		4.32	1.13		0.44	0.16	4427.35		4427.63	625.52	0.26
Alpine	3.66666*	2yr		445.00			3.44			0.78		4420.67		4420.86	102.88	0.54
Alpine	3.66666*	5yr		1687.00			4.91			0.62		4422.21		4422.59	335.13	0.85
Alpine	3.66666*	10yr		3895.00			6.58			1.56		4422.95		4423.62	339.19	0.88
Alpine	3.66666*	25yr		5635.00			6.03			1.36		4423.94		4424.50	353.77	0.65
Alpine	3.66666*	50yr		7910.00			7.68			2.17		4424.20		4425.12	356.10	0.80
Alpine	3.66666*	100yr		11340.00			10.11			3.70		4424.46	4424.46	4426.05	358.30	1.01
Alpine	3.66666*	500yr		18270.01	24.99		8.38	0.75		2.13	0.14	4427.32		4428.41	468.76	0.62
Alpine	3.83333*	2yr		445.00			3.27			0.71		4423.56		4423.72	110.11	0.52
Alpine	3.83333*	5yr		1687.00			5.39			1.08		4425.06		4425.51	175.56	0.71
Alpine	3.83333*	10yr		3895.00			6.87			1.84		4426.45		4427.18	189.47	0.70
Alpine	3.83333*	25yr		5635.00			9.01			3.12		4426.75		4428.01	192.52	0.88
Alpine	3.83333*	50yr		7910.00			9.78			3.47		4427.68		4429.17	201.83	0.86
Alpine	3.83333*	100yr		11340.00			10.87			3.86		4428.90		4430.67	214.02	0.84
Alpine	3.83333*	500yr	2.60	18292.40		0.84	13.80		0.20	6.06		4430.10	4430.10	4433.06	241.13	1.00

HEC-RAS Plan: Opt A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	4	2yr		445.00		3.24				0.71		4426.40		4426.56	117.40	0.53
Alpine	4	5yr		1687.00		5.19				1.41		4427.92		4428.34	129.49	0.58
Alpine	4	10yr		3895.00		6.69				1.77		4429.36		4430.05	188.58	0.67
Alpine	4	25yr		5635.00		7.12				1.88		4430.44		4431.22	199.37	0.63
Alpine	4	50yr		7910.00		8.16				2.34		4431.31		4432.34	208.12	0.67
Alpine	4	100yr		11340.00		9.40				2.92		4432.42		4433.79	219.20	0.71
Alpine	4	500yr	150.93	18119.46	24.61	10.64	2.01	0.66	0.59	3.41	0.12	4434.62		4436.36	426.26	0.69
Alpine	4.25*	2yr		430.00		3.41				0.78		4429.30		4429.48	108.45	0.56
Alpine	4.25*	5yr		1688.00		4.58				0.84		4430.65		4430.98	256.49	0.67
Alpine	4.25*	10yr		3624.00		5.24				1.07		4431.88		4432.31	268.81	0.58
Alpine	4.25*	25yr		5657.00		6.18				1.40		4432.70		4433.29	276.99	0.60
Alpine	4.25*	50yr		7379.00		6.27				1.34		4433.63		4434.24	286.27	0.55
Alpine	4.25*	100yr		10490.00		6.78				1.45		4434.89		4435.60	298.90	0.53
Alpine	4.25*	500yr		16703.00		7.54				1.61		4437.05		4437.93	320.46	0.51
Alpine	4.5*	2yr		430.00		3.57				0.81		4432.13		4432.33	86.37	0.53
Alpine	4.5*	5yr		1688.00		6.40				2.14		4433.62		4434.26	105.63	0.71
Alpine	4.5*	10yr		3624.00		7.28				1.64		4434.64	4434.64	4435.46	306.38	1.01
Alpine	4.5*	25yr		5657.00		8.19				2.30		4435.26	4435.20	4436.30	312.82	0.97
Alpine	4.5*	50yr		7379.00		9.04				2.83		4435.66	4435.62	4436.93	316.60	0.99
Alpine	4.5*	100yr		10490.00		9.61				3.11		4436.52		4437.95	325.18	0.92
Alpine	4.5*	500yr		16703.00		10.05				3.11		4438.23		4439.80	342.26	0.80
Alpine	4.75*	2yr		430.00		3.87				0.93		4434.84		4435.07	74.34	0.56
Alpine	4.75*	5yr		1688.00		6.00				1.76		4436.89		4437.45	91.85	0.60
Alpine	4.75*	10yr		3624.00		6.70				1.49		4438.21		4438.91	212.11	0.74
Alpine	4.75*	25yr		5657.00		7.90				2.09		4439.02		4439.99	220.21	0.77
Alpine	4.75*	50yr		7379.00		8.71				2.50		4439.61		4440.79	226.08	0.79
Alpine	4.75*	100yr		10490.00		10.44				3.50		4440.29		4441.99	232.93	0.89
Alpine	4.75*	500yr		16703.00		13.08				5.21		4441.44	4441.44	4444.09	244.35	1.01
Alpine	5	2yr		430.00		4.03				0.98		4437.60		4437.85	65.40	0.56
Alpine	5	5yr		1688.00		5.69				2.15		4439.63		4440.33	78.00	0.66
Alpine	5	10yr		3624.00		6.76				4.17		4441.07		4442.55	86.95	0.83
Alpine	5	25yr		5657.00		12.21				6.22		4442.09	4441.96	4444.41	93.28	0.97
Alpine	5	50yr		7379.00		13.42				7.24		4443.00	4443.00	4445.79	98.87	1.00
Alpine	5	100yr		10490.00		14.65				8.16		4444.60	4444.60	4447.93	108.79	1.01
Alpine	5	500yr		16703.00		16.35				9.47		4447.21	4447.21	4451.36	125.00	1.01
Alpine	5.33333*	2yr		428.00		6.27				2.61		4441.15	4441.15	4441.76	56.47	1.00
Alpine	5.33333*	5yr		1690.00		9.26				4.39		4442.97	4442.97	4444.30	68.73	1.00
Alpine	5.33333*	10yr		3655.00		11.36				5.80		4444.83	4444.83	4446.83	81.20	1.01
Alpine	5.33333*	25yr		5736.00		12.70				6.74		4446.33	4446.33	4448.84	91.31	1.01
Alpine	5.33333*	50yr		7481.00		13.53				7.33		4447.40	4447.40	4450.24	98.49	1.01

HEC-RAS Plan: Qat A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LDB (lb/sq ft)	Shear Chant (lb/sq ft)	Shear ROB (lb/sq ft)	WS Elev (ft)	Chl W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Proude # Chl
Alpine	5.33333*	100yr	1353.68	9164.25	94.07	1.60	9.72	1.07	0.45	3.40	0.25	4450.93	4450.93	4452.21	1121.97	0.61
Alpine	5.33333*	500yr	4535.62	11674.85	613.53	2.41	10.79	1.98	0.93	3.99	0.64	4452.09	4452.09	4453.37	1261.24	0.63
Alpine	5.66666*	2yr		428.00			6.47			2.73		4445.26	4445.26	4445.91	51.32	1.01
Alpine	5.66666*	5yr		1690.00			9.42			4.51		4447.19	4447.19	4448.57	65.79	1.00
Alpine	5.66666*	10yr		3655.00			11.38			5.80		4449.13	4449.13	4451.14	80.30	1.00
Alpine	5.66666*	25yr	1007.51	4673.48	55.01	1.50	8.24	0.86	0.47	2.72	0.19	4451.85	4451.85	4452.72	97.92	0.61
Alpine	5.66666*	50yr	1936.98	5337.12	206.90	1.91	8.70	1.35	0.63	2.98	0.37	4452.30	4452.30	4453.16	114.92	0.63
Alpine	5.66666*	100yr	3647.00	6387.63	577.37	2.33	9.42	1.94	0.93	3.41	0.63	4452.92	4452.92	4453.78	129.74	0.66
Alpine	5.66666*	500yr	7058.96	8453.13	1311.91	3.21	11.26	2.68	1.60	4.72	1.11	4453.59	4453.59	4454.66	139.73	0.75
Alpine	6	2yr		428.00			6.58			2.75		4449.39	4449.39	4450.06	46.79	0.98
Alpine	6	5yr		1690.00			9.38			4.44		4451.45	4451.45	4452.82	64.79	0.99
Alpine	6	10yr		3655.00			11.20			5.62		4453.44	4453.44	4455.39	115.26	0.99
Alpine	6	25yr	2897.95	2322.50	515.56	1.93	6.19	1.51	0.65	1.67	0.45	4454.02	4454.02	4454.29	129.84	0.53
Alpine	6	50yr	3779.56	3029.05	672.40	2.51	8.07	1.97	1.11	2.85	0.76	4454.02	4454.02	4454.48	129.84	0.69
Alpine	6	100yr	5562.48	3882.84	1166.67	3.05	9.57	2.60	1.72	3.94	1.24	4454.36	4454.22	4454.97	135.85	0.80
Alpine	6	500yr	9701.72	4686.76	2435.52	3.47	9.38	3.00	1.94	3.58	1.44	4455.37	4454.73	4455.88	146.66	0.72
Alpine	6.125*	2yr		428.00			3.24			0.57		4451.25	4450.06	4451.42	60.65	0.39
Alpine	6.125*	5yr		1690.00			5.13			1.20		4453.92	4452.01	4454.33	64.78	0.47
Alpine	6.125*	10yr	1523.43	1549.45	582.12	0.88	2.93	0.86	0.14	0.36	0.13	4455.96	4453.92	4456.03	140.49	0.23
Alpine	6.125*	25yr	2076.38	2852.30	807.33	1.56	5.94	1.59	0.49	1.50	0.46	4455.51	4455.51	4455.80	1347.08	0.48
Alpine	6.125*	50yr	2708.05	3720.02	1052.93	2.04	7.74	2.08	0.83	2.55	0.79	4455.51	4455.51	4456.00	1347.08	0.63
Alpine	6.125*	100yr	4508.95	4360.51	1742.54	2.46	8.07	2.42	1.09	2.70	0.98	4456.07	4455.75	4456.54	142.58	0.63
Alpine	6.125*	500yr	7891.00	5770.80	3162.20	3.15	9.33	3.09	1.63	3.45	1.46	4456.80	4456.26	4457.36	146.60	0.69
Alpine	6.25*	2yr		428.00			3.14			0.54		4451.87	4450.71	4452.02	63.82	0.38
Alpine	6.25*	5yr		1690.00			4.85			1.07		4454.66	4452.56	4455.03	203.35	0.44
Alpine	6.25*	10yr		3655.00			8.21			2.94		4455.66	4454.48	4456.71	883.24	0.70
Alpine	6.25*	25yr	1668.97	5736.00			11.93			6.13		4456.00	4456.00	4458.21	1144.87	0.99
Alpine	6.25*	50yr	2076.38	4578.58	1233.45	1.74	8.11	2.05	0.66	2.76	0.85	4456.74	4456.74	4457.39	1356.40	0.65
Alpine	6.25*	100yr	3143.20	5427.96	2040.85	2.26	8.67	2.48	0.99	3.08	1.14	4457.26	4457.08	4457.90	1406.70	0.67
Alpine	6.25*	500yr	6201.07	6964.54	3658.39	2.92	9.56	3.04	1.45	3.57	1.55	4458.11	4457.70	4458.77	1471.85	0.69
Alpine	6.375*	2yr		428.00			3.04			0.51		4452.46	4451.31	4452.60	66.84	0.37
Alpine	6.375*	5yr		1690.00			4.70			0.98		4455.29	4453.09	4455.64	109.58	0.41
Alpine	6.375*	10yr		3655.00			6.44			1.75		4457.32	4454.91	4457.96	1021.59	0.52
Alpine	6.375*	25yr	1480.26	2823.79	1431.95	0.92	3.47	1.11	0.15	0.47	0.20	4459.21	4456.48	4459.31	1458.86	0.25
Alpine	6.375*	50yr	871.45	5158.61	1452.95	1.38	7.94	2.05	0.46	2.61	0.83	4457.98	4457.90	4458.67	1301.76	0.62
Alpine	6.375*	100yr	2032.96	6133.04	2446.01	1.88	8.45	2.50	0.73	2.89	1.13	4458.56	4458.39	4459.23	1412.30	0.64
Alpine	6.375*	500yr	4609.44	7943.88	4270.68	2.60	9.45	3.07	1.20	3.45	1.54	4459.41	4459.04	4460.13	1472.73	0.67
Alpine	6.5	2yr		428.00			2.95			0.48		4453.02	4451.90	4453.16	70.15	0.36
Alpine	6.5	5yr		1690.00			4.55			0.92		4455.86	4453.60	4456.18	89.70	0.39

HEC-RAS Plan: Oot A River-Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.O. Elev (ft)	Top Width (ft)	Found #	Ch
Alpine	7.8*	100yr	3478.90	5087.69	2045.41	1.92	9.65	1.65	0.90	3.56	1.06	4465.03	4465.01	4465.75	1865.95		0.67
Alpine	7.8*	500yr	7279.44	5688.19	3856.37	2.28	9.13	1.88	1.06	3.01	1.18	4466.21	4465.63	4466.70	1976.79		0.58
Alpine	8	2yr		428.00			5.02			1.41		4460.22	4459.59	4460.61	41.96		0.62
Alpine	8	5yr		1690.00			8.14			3.03		4462.75	4461.92	4463.78	138.92		0.74
Alpine	8	10yr	864.99	2611.48	178.53	1.59	8.04	0.70	0.65	2.69	0.29	4464.71	4464.71	4465.44	1018.72		0.63
Alpine	8	25yr	1840.04	3202.86	693.10	1.80	8.72	1.10	0.57	3.04	0.57	4465.38	4465.38	4466.05	1661.34		0.64
Alpine	8	50yr	2500.48	3753.55	1226.98	1.69	9.54	1.39	0.75	3.56	0.93	4465.79	4465.59	4466.51	1890.72		0.68
Alpine	8	100yr	4504.37	4048.04	2059.59	1.99	9.31	1.56	0.92	3.27	0.94	4466.43	4466.27	4466.98	1997.45		0.63
Alpine	8	500yr	8161.59	4948.32	3714.09	2.51	10.20	1.96	1.31	3.79	1.34	4467.22	4466.82	4467.75	2082.11		0.65
Alpine	8.33333*	2yr		428.00			3.96			0.87		4461.12	4460.14	4461.36	50.54		0.48
Alpine	8.33333*	5yr		1690.00			6.23			1.69		4463.99	4462.27	4464.59	74.14		0.52
Alpine	8.33333*	10yr		3655.00			11.13			5.14		4464.90	4464.35	4466.83	367.63		0.86
Alpine	8.33333*	25yr	1363.43	3446.23	926.34	1.20	7.88	0.95	0.40	2.38	0.42	4466.58	4466.58	4467.16	2021.68		0.54
Alpine	8.33333*	50yr	2134.21	3917.23	1429.55	1.48	8.58	1.15	0.56	2.78	0.57	4466.87	4466.87	4467.48	2071.91		0.57
Alpine	8.33333*	100yr	3547.90	4715.80	2348.30	1.89	9.78	1.47	0.85	3.55	0.86	4467.25	4467.25	4467.94	2137.70		0.64
Alpine	8.33333*	500yr	6490.17	6084.33	4249.50	2.56	11.70	1.97	1.43	4.95	1.43	4467.83	4467.83	4468.65	2230.96		0.73
Alpine	8.66666*	2yr		428.00			3.43			0.65		4461.69		4461.87	57.96		0.41
Alpine	8.66666*	5yr		1690.00			5.59			1.34		4464.61		4465.10	63.39		0.45
Alpine	8.66666*	10yr	656.44	2437.26	561.30	0.69	4.96	0.52	0.14	0.92	0.13	4467.48		4467.74	2159.21		0.32
Alpine	8.66666*	25yr	1042.73	3801.07	892.20	1.09	7.72	0.82	0.33	2.24	0.32	4467.50		4468.11	2162.21		0.51
Alpine	8.66666*	50yr	1631.49	4436.72	1412.79	1.37	8.73	1.03	0.50	2.83	0.48	4467.73		4468.45	2212.62		0.56
Alpine	8.66666*	100yr	2403.88	6119.06	2089.06	1.92	11.94	1.45	0.96	5.28	0.93	4467.80		4469.09	2223.55		0.77
Alpine	8.66666*	500yr	5245.03	6906.79	4672.17	2.46	12.09	1.88	1.35	5.22	1.35	4468.66		4469.64	2372.13		0.74
Alpine	9	2yr		428.00			3.38			0.70		4462.21		4462.39	80.50		0.48
Alpine	9	5yr		1690.00			4.06			0.75		4465.25		4465.51	110.02		0.37
Alpine	9	10yr	55.00	3477.65	122.36	0.37	4.94	0.38	0.06	0.98	0.09	4467.65		4468.01	1217.90		0.37
Alpine	9	25yr	197.99	5190.60	347.41	0.66	7.02	0.66	0.16	1.95	0.17	4467.93		4468.62	1830.56		0.51
Alpine	9	50yr	502.75	6290.91	687.34	0.96	8.07	0.74	0.29	2.54	0.30	4468.24		4469.09	2200.92		0.57
Alpine	9	100yr	2012.18	5959.38	2640.44	1.23	6.34	0.97	0.36	1.48	0.37	4469.51		4469.86	2589.56		0.41
Alpine	9	500yr	3412.15	8988.76	4453.09	1.87	9.29	1.49	0.81	3.15	0.84	4469.69		4470.43	2632.03		0.59
Alpine	9.3																
Alpine	9.5	2yr		428.00			2.48			0.35		4462.76		4462.86	85.87		0.31
Alpine	9.5	5yr		1690.00			3.62			0.58		4465.70		4465.90	114.35		0.32
Alpine	9.5	10yr	239.95	3098.50	327.55	0.47	3.99	0.36	0.07	0.82	0.07	4468.22		4468.43	2193.16		0.28
Alpine	9.5	25yr	892.16	3677.20	1195.64	0.72	4.15	0.57	0.13	0.64	0.14	4469.09		4469.26	2482.02		0.28
Alpine	9.5	50yr	1451.61	4164.16	1901.23	0.86	4.40	0.68	0.17	0.71	0.18	4469.55		4469.72	2595.20		0.28
Alpine	9.5	100yr	2428.99	5064.44	3162.57	1.08	4.97	0.87	0.25	0.88	0.27	4470.12		4470.31	2699.24		0.31
Alpine	9.5	500yr	4353.63	6808.87	5704.50	1.46	6.15	1.20	0.43	1.32	0.48	4470.82		4471.07	2768.50		0.37

HEC-RAS Plan: Oat A River, Alpine Creek Reach, Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	9.56666*	2yr		428.00			3.80			0.86		4463.23		4463.45	65.97	0.51
Alpine	9.56666*	5yr		1690.00			5.52			1.35		4465.97		4466.44	73.69	0.48
Alpine	9.56666*	10yr		3569.64	96.36		7.45	0.49		2.18	0.15	4468.25		4469.09	559.29	0.53
Alpine	9.56666*	25yr	2.99	5227.83	534.18	0.34	9.93	0.96	0.07	3.78	0.47	4468.85		4470.24	868.57	0.68
Alpine	9.56666*	50yr	224.65	5377.30	1915.05	0.96	8.89	1.08	0.29	2.91	0.52	4469.84	4469.84	4470.72	1010.67	0.57
Alpine	9.56666*	100yr	269.74	7890.17	2496.10	1.35	13.23	1.54	0.60	6.47	1.08	4469.73		4471.76	1777.19	0.85
Alpine	9.56666*	500yr	1127.22	9367.25	6372.53	1.96	13.96	2.16	1.03	6.93	1.76	4470.67		4472.38	2047.72	0.85
Alpine	9.63333*	2yr		428.00			4.74			1.10		4464.63		4464.63	55.90	0.66
Alpine	9.63333*	5yr		1690.00			6.69			1.75		4466.64		4467.34	79.53	0.66
Alpine	9.63333*	10yr		3542.83	123.17		7.99	0.61		2.14	0.22	4468.94		4469.90	471.74	0.62
Alpine	9.63333*	25yr	4.85	4861.03	899.11	0.45	8.75	0.86	0.09	2.42	0.37	4470.21		4471.22	1294.97	0.62
Alpine	9.63333*	50yr	12.47	6125.64	1378.89	0.65	10.77	1.13	0.18	3.64	0.61	4470.36		4471.83	1351.53	0.75
Alpine	9.63333*	100yr	305.68	5738.03	4612.29	1.03	7.87	1.26	0.28	1.79	0.56	4472.14		4472.67	1831.44	0.49
Alpine	9.63333*	500yr	642.36	8273.99	7950.64	1.52	10.73	1.82	0.58	3.27	1.12	4472.61		4473.51	1931.91	0.65
Alpine	9.7	2yr		428.00			4.78			1.10		4465.57		4465.93	53.08	0.65
Alpine	9.7	5yr		1690.00			7.36			2.14		4467.76		4468.60	74.80	0.74
Alpine	9.7	10yr		3886.11	279.89		8.34	0.92		2.45	0.44	4469.87		4470.87	488.24	0.70
Alpine	9.7	25yr	0.21	4511.61	1253.19	0.26	8.62	1.23	0.04	2.48	0.46	4471.08		4471.98	1202.06	0.66
Alpine	9.7	50yr	27.07	4840.19	2649.74	0.75	7.73	1.17	0.19	1.88	0.54	4472.10		4472.71	1446.15	0.54
Alpine	9.7	100yr	66.93	6329.90	4259.17	1.06	9.53	1.54	0.34	2.79	0.89	4472.49		4473.34	1524.21	0.65
Alpine	9.7	500yr	232.03	8556.57	8078.40	1.56	11.41	2.04	0.64	3.85	1.42	4473.34		4474.40	1699.32	0.73
Alpine	9.8*	2yr		428.00			3.77			0.64		4466.57		4466.79	54.86	0.46
Alpine	9.8*	5yr		1669.15	20.85		6.08	0.39		1.38	0.11	4469.04		4469.61	264.24	0.56
Alpine	9.8*	10yr	0.44	2835.03	830.52	0.25	6.32	0.74	0.04	1.34	0.26	4471.16		4471.65	1254.89	0.49
Alpine	9.8*	25yr	29.44	3330.33	2405.22	0.64	6.12	0.97	0.13	1.18	0.37	4472.25		4472.59	1476.34	0.43
Alpine	9.8*	50yr	76.67	3807.72	3632.62	0.81	6.38	1.11	0.18	1.24	0.44	4472.85		4473.18	1598.19	0.43
Alpine	9.8*	100yr	183.26	4726.84	5745.91	1.03	7.17	1.33	0.28	1.52	0.60	4473.56		4473.93	1743.65	0.46
Alpine	9.8*	500yr	484.20	6175.63	10207.17	1.35	8.16	1.68	0.42	1.88	0.87	4474.66		4475.07	1862.11	0.49
Alpine	9.9*	2yr		428.00			3.78			0.63		4467.15		4467.37	51.40	0.45
Alpine	9.9*	5yr		1507.64	182.36		5.49	0.63		1.10	0.21	4469.83		4470.25	457.20	0.48
Alpine	9.9*	10yr	7.20	2180.43	1478.37	0.35	5.19	0.78	0.08	0.88	0.25	4471.81		4472.06	1384.60	0.39
Alpine	9.9*	25yr	42.94	2721.89	3000.17	0.53	5.58	0.97	0.14	0.97	0.35	4472.69		4472.93	1564.30	0.39
Alpine	9.9*	50yr	89.85	3141.69	4285.46	0.64	5.92	1.10	0.19	1.06	0.42	4473.27		4473.51	1682.05	0.39
Alpine	9.9*	100yr	195.56	3878.17	6582.27	0.80	6.59	1.30	0.26	1.27	0.55	4474.02		4474.28	1823.08	0.42
Alpine	9.9*	500yr	467.42	5056.00	11343.57	1.01	7.49	1.65	0.38	1.57	0.80	4475.16		4475.45	1884.11	0.44
Alpine	10	2yr		428.00			3.94			0.67		4467.70	4466.58	4467.94	46.08	0.45
Alpine	10	5yr		1690.00			6.91			1.73		4470.28	4468.86	4471.02	555.47	0.60
Alpine	10	10yr	16.12	1750.17	1899.71	0.40	4.81	0.79	0.09	0.75	0.25	4472.17	4471.29	4472.35	1489.62	0.36
Alpine	10	25yr	63.31	2196.67	3505.02	0.56	5.24	0.96	0.15	0.85	0.33	4473.03	4471.73	4473.20	1684.05	0.36
Alpine	10	50yr	119.75	2536.16	4861.09	0.65	5.56	1.07	0.18	0.94	0.39	4473.61	4472.07	4473.78	1814.87	0.37

HEC-RAS Plan: Opt A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	10	100yr	244.47	3119.76	7291.77	0.80	6.17	1.25	0.25	1.11	0.49	4474.39	4472.59	4474.58	1984.80	0.39
Alpine	10	500yr	544.32	4027.37	12295.31	0.99	6.94	1.56	0.35	1.34	0.70	4475.56	4473.34	4475.76	2048.53	0.41
Alpine	10-3333*	2yr		428.00			3.52			0.53		4468.18	4468.87	4468.37	49.60	0.40
Alpine	10-3333*	5yr		1690.00			5.98			1.25		4471.07	4469.06	4471.63	271.85	0.45
Alpine	10-3333*	10yr		3666.00			12.35			5.26		4471.31	4471.31	4473.67	352.14	1.00
Alpine	10-3333*	25yr	0.16	3771.83	1993.02	0.17	8.85	1.24	0.03	2.56	0.66	4473.17	4473.17	4473.98	1255.78	0.66
Alpine	10-3333*	50yr	5.32	4427.15	3084.53	0.43	9.73	1.50	0.14	3.03	0.90	4473.55	4473.55	4474.43	1340.93	0.70
Alpine	10-3333*	100yr	64.49	5134.57	5456.94	0.75	9.88	1.74	0.31	2.99	1.08	4474.40	4474.10	4475.16	1535.65	0.67
Alpine	10-3333*	500yr	354.12	6477.55	10035.33	1.19	10.58	2.06	0.60	3.25	1.37	4475.62	4474.93	4476.33	1776.55	0.66
Alpine	10-6666*	2yr		428.00			3.16			0.43		4468.57	4467.19	4468.72	55.44	0.36
Alpine	10-6666*	5yr		1690.00			5.35			0.97		4471.62	4469.20	4472.07	62.70	0.42
Alpine	10-6666*	10yr		3666.00			7.52			1.78		4474.14	4471.28	4475.02	1035.26	0.53
Alpine	10-6666*	25yr		7517.00			13.48			5.81		4473.31	4473.12	4476.13	810.38	0.96
Alpine	10-6666*	50yr					14.39			6.52		4474.57	4474.57	4477.79	1115.06	1.00
Alpine	10-6666*	100yr	4.06	6491.71	4160.23	0.32	10.79	1.75	0.09	3.58	1.15	4475.49	4475.49	4476.61	1306.84	0.73
Alpine	10-6666*	500yr	173.71	8657.45	8035.84	1.01	12.68	2.32	0.52	4.74	1.82	4476.42	4476.42	4477.74	1530.61	0.80
Alpine	11	2yr		428.00			2.95			0.38		4468.89	4467.54	4469.02	61.94	0.34
Alpine	11	5yr		1690.00			4.63			0.79		4472.04	4469.40	4472.40	68.03	0.38
Alpine	11	10yr		3666.00			6.75			1.38		4474.78	4471.34	4475.48	570.86	0.44
Alpine	11	25yr	0.43	3882.79	1881.77	0.09	5.32	0.85	0.01	0.85	0.27	4477.05	4472.98	4477.35	1201.59	0.35
Alpine	11	50yr	198.98	3851.21	3466.81	0.45	4.24	0.83	0.09	0.51	0.21	4478.83	4474.18	4478.98	1590.97	0.25
Alpine	11	100yr	0.31	7236.69	3419.00	0.14	9.97	1.57	0.02	3.00	0.92	4477.01	4477.01	4478.07	1173.23	0.65
Alpine	11	500yr	131.32	10003.27	6732.41	0.82	12.39	2.21	0.38	4.49	1.66	4477.83	4477.83	4479.27	1455.08	0.77
Alpine	11.3	Bridge														
Alpine	11.4	2yr		427.00			2.70			0.31		4469.10	4467.54	4469.21	62.34	0.30
Alpine	11.4	5yr		1691.00			4.57			0.70		4472.33	4469.40	4472.66	68.59	0.35
Alpine	11.4	10yr		3670.00			5.77			0.98		4476.00	4471.33	4476.51	997.37	0.36
Alpine	11.4	25yr	15.24	3623.13	2138.63	0.20	4.69	0.80	0.03	0.65	0.23	4477.48	4472.99	4477.69	1409.80	0.30
Alpine	11.4	50yr	225.04	3769.51	3539.45	0.45	4.07	0.80	0.06	0.46	0.20	4479.01	4474.20	4479.14	1617.97	0.24
Alpine	11.4	100yr	193.52	5807.44	4674.03	0.62	6.72	1.26	0.18	1.29	0.52	4478.40	4477.01	4478.79	1534.97	0.40
Alpine	11.4	500yr	708.31	7806.11	8372.58	0.99	7.89	1.61	0.37	1.70	0.77	4479.65	4477.83	4480.12	1704.95	0.44
Alpine	11-4333*	2yr		427.00			3.32			0.51		4469.22	4468.33	4469.39	68.20	0.43
Alpine	11-4333*	5yr		1691.00			4.66			0.75		4472.45	4470.01	4472.79	76.84	0.38
Alpine	11-4333*	10yr		3670.00			5.43			0.90		4476.19	4471.81	4476.65	938.91	0.36
Alpine	11-4333*	25yr	0.60	4115.56	1660.84	0.09	5.05	0.79	0.01	0.76	0.23	4477.53	4473.95	4477.81	1170.81	0.33
Alpine	11-4333*	50yr	155.03	4334.24	3044.73	0.43	4.42	0.83	0.08	0.55	0.22	4479.04	4474.50	4479.21	1488.93	0.26
Alpine	11-4333*	100yr	116.21	6605.34	3953.46	0.54	7.17	1.28	0.15	1.47	0.54	4478.49	4476.52	4478.99	1421.28	0.44
Alpine	11-4333*	500yr	569.30	8909.13	7408.57	0.97	8.40	1.65	0.37	1.93	0.83	4479.75	4478.18	4480.35	1577.46	0.48

HEC-RAS Plan: Owl A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	O Left (cfs)	O Channel (cfs)	O Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	11.4666*	2yr		427.00			4.35			0.98		4469.50	4469.15	4469.79	72.70	0.66
Alpine	11.4666*	5yr		1691.00			4.91			0.88		4472.59	4470.71	4472.96	85.63	0.43
Alpine	11.4666*	10yr		3670.00			5.22			0.85		4476.34	4472.39	4476.77	864.86	0.36
Alpine	11.4666*	25yr		4540.46	1236.54		5.38	0.76		0.87	0.23	4477.57	4473.82	4477.93	1011.23	0.36
Alpine	11.4666*	50yr	94.06	4866.19	2573.74	0.39	4.76	0.86	0.07	0.64	0.24	4479.06	4474.92	4479.29	1356.57	0.29
Alpine	11.4666*	100yr	54.48	7930.87	3289.65	0.44	7.61	1.30	0.11	1.67	0.58	4478.57	4476.58	4479.20	1301.86	0.47
Alpine	11.4666*	500yr	438.94	9962.21	6485.85	0.94	8.92	1.71	0.37	2.19	0.91	4479.84	4478.51	4480.59	1444.83	0.52
Alpine	11.5	2yr		427.00			4.67			1.20		4470.21	4470.01	4470.55	79.70	0.77
Alpine	11.5	5yr		1691.00			5.33			1.10		4472.77	4471.47	4473.22	96.16	0.52
Alpine	11.5	10yr		3670.00			5.11			0.83		4476.48	4473.04	4476.89	777.78	0.37
Alpine	11.5	25yr		5777.00			6.91			1.46		4477.45	4474.37	4478.19	889.74	0.47
Alpine	11.5	50yr	42.62	5577.10	1914.28	0.32	5.33	0.80	0.06	0.82	0.29	4479.07	4475.32	4479.40	1221.52	0.33
Alpine	11.5	100yr	9.16	8282.51	2383.34	0.24	8.38	1.19	0.05	2.07	0.67	4478.62	4476.77	4479.47	1175.40	0.54
Alpine	11.5	500yr	298.50	11563.66	5024.84	0.91	10.08	1.64	0.40	2.84	1.13	4479.84	4478.92	4480.93	1301.38	0.60
Alpine	11.5666*	2yr		427.00			3.23			0.49		4471.37	4471.37	4471.54	73.06	0.42
Alpine	11.5666*	5yr		1691.00			5.63			1.21		4473.45	4473.45	4473.94	88.78	0.54
Alpine	11.5666*	10yr		3670.00			5.92			1.12		4476.72	4476.72	4477.26	105.24	0.43
Alpine	11.5666*	25yr		5695.51	81.49		7.72	0.43		1.82	0.12	4477.83	4477.83	4478.74	536.89	0.52
Alpine	11.5666*	50yr	0.19	6779.55	754.26	0.13	7.87	0.72	0.02	1.80	0.30	4478.98	4479.85	4479.85	940.50	0.49
Alpine	11.5666*	100yr	0.10	9661.47	1013.44	0.14	11.30	1.01	0.03	3.72	0.60	4478.92	4478.92	4480.72	931.60	0.71
Alpine	11.5666*	500yr	136.31	12929.48	3821.21	0.93	12.66	1.64	0.45	4.40	1.25	4480.47	4480.47	4482.39	1170.60	0.72
Alpine	11.6333*	2yr		427.00			3.43			0.55		4471.94	4471.94	4472.13	66.77	0.44
Alpine	11.6333*	5yr		1691.00			5.69			1.30		4474.17	4474.17	4474.70	79.29	0.55
Alpine	11.6333*	10yr		3670.00			7.03			1.57		4477.07	4477.07	4477.83	82.65	0.49
Alpine	11.6333*	25yr		5756.19	20.81		9.25	0.34		2.58	0.11	4478.27	4476.03	4479.59	291.17	0.60
Alpine	11.6333*	50yr	0.13	7276.72	257.16	0.19	10.39	0.75	0.04	3.14	0.37	4479.21	4479.79	4480.82	470.29	0.63
Alpine	11.6333*	100yr	6.17	9984.49	684.34	0.58	13.33	1.17	0.24	5.04	0.80	4479.79	4479.79	4482.37	559.35	0.78
Alpine	11.6333*	500yr	241.21	12463.82	4181.97	1.28	13.01	1.58	0.71	4.43	1.14	4482.28	4482.28	4484.23	1179.25	0.68
Alpine	11.7	2yr		427.00			3.55			0.57		4472.51	4471.51	4472.71	55.71	0.43
Alpine	11.7	5yr		1691.00			6.68			1.60		4474.86	4473.40	4475.56	57.54	0.56
Alpine	11.7	10yr		3670.00			9.01			2.57		4477.50	4475.49	4478.76	59.59	0.61
Alpine	11.7	25yr		5770.75	6.25		11.88	0.52		4.26	0.24	4478.60	4477.26	4480.99	182.08	0.74
Alpine	11.7	50yr	0.41	7483.99	49.60	0.40	14.03	1.11	0.15	5.76	0.78	4479.60	4478.65	4482.63	339.31	0.83
Alpine	11.7	100yr	52.77	9065.98	1556.26	1.20	13.73	1.52	0.69	5.14	1.16	4481.71	4481.71	4484.20	584.90	0.73
Alpine	11.7	500yr	318.93	10867.26	5700.82	1.63	13.16	1.68	0.99	4.38	1.21	4484.47	4484.47	4486.22	1191.74	0.63
Alpine	11.9	Bridge														
Alpine	12	2yr		427.00			2.79			0.32		4473.10	4471.51	4473.22	56.17	0.30
Alpine	12	5yr		1691.00			4.98			0.82		4476.35	4473.40	4476.74	58.70	0.36
Alpine	12	10yr	6.19	3352.93	310.88	0.37	5.57	0.52	0.08	0.87	0.15	4480.75	4475.47	4481.19	483.44	0.31

HEC-RAS Plan: Oot A River, Alpine Creek Reach, Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chnl (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.O. Elev (ft)	Top Width (ft)	Friction # Cfd
Alpine	12	25yr	45.70	4668.31	1062.99	0.65	6.68	0.77	0.19	1.19	0.26	4482.35	4477.26	4482.92	760.48	0.34
Alpine	12	50yr	106.13	5558.48	1869.39	0.82	7.25	0.79	0.27	1.36	0.30	4483.49	4478.65	4484.09	1124.29	0.36
Alpine	12	100yr	218.79	6546.95	3909.26	0.98	7.73	1.04	0.35	1.50	0.45	4484.82	4481.88	4485.40	1197.80	0.36
Alpine	12	500yr	406.30	8447.79	8032.91	0.95	8.89	1.43	0.34	1.91	0.75	4486.55	4484.41	4487.18	1301.46	0.39
Alpine	12.5	2yr		427.00			7.72			2.78		4474.16	4474.16	4475.08	28.96	0.98
Alpine	12.5	5yr		1691.00			10.99			4.51		4476.96	4476.96	4478.83	40.52	0.99
Alpine	12.5	10yr		3675.00			12.73			5.34		4479.90	4479.90	4482.42	180.50	0.94
Alpine	12.5	25yr		5790.00			14.94			6.89		4481.76	4481.76	4485.23	401.93	0.99
Alpine	12.5	50yr		5333.79	2216.21		10.65	1.40		3.43	0.90	4483.63	4483.63	4484.89	954.49	0.68
Alpine	12.5	100yr	14.40	6038.19	4642.41	0.68	10.37	1.69	0.18	3.17	1.15	4484.80	4484.53	4485.76	1165.68	0.64
Alpine	12.5	500yr	284.75	7131.49	9489.75	1.60	9.93	2.01	0.58	2.72	1.36	4486.69	4485.51	4487.37	1210.38	0.55
Alpine	12.5666*	2yr		427.00			4.19			0.76		4475.61	4474.53	4475.88	43.47	0.48
Alpine	12.5666*	5yr		1691.00			5.94			1.23		4479.03	4476.95	4479.58	61.62	0.49
Alpine	12.5666*	10yr		3675.00			6.99			1.52		4482.36	4479.19	4483.12	374.19	0.48
Alpine	12.5666*	25yr	0.20	4146.83	1642.98	0.12	5.36	0.79	0.01	0.80	0.25	4485.49	4481.17	4485.81	868.79	0.30
Alpine	12.5666*	50yr		6208.40	1341.60		9.13	1.10		2.42	0.56	4484.31	4482.28	4485.38	768.02	0.55
Alpine	12.5666*	100yr		8113.96	2581.04		11.08	1.53		3.49	0.98	4484.97	4484.68	4486.43	808.17	0.64
Alpine	12.5666*	500yr	45.19	11070.36	5790.45	1.00	13.11	2.05	0.33	4.66	1.58	4486.38	4485.87	4488.15	1033.23	0.71
Alpine	12.6333*	2yr		427.00			3.31			0.49		4476.08	4474.91	4476.25	62.06	0.40
Alpine	12.6333*	5yr		1691.00			4.14			0.59		4479.62	4476.89	4479.89	85.99	0.34
Alpine	12.6333*	10yr		3675.00			5.26			0.82		4482.99	4478.69	4483.42	334.31	0.33
Alpine	12.6333*	25yr		4884.08	905.92		5.29	0.69		0.76	0.20	4485.57	4480.08	4485.94	638.97	0.29
Alpine	12.6333*	50yr		6689.30	860.70		7.71	0.89		1.66	0.36	4484.92	4481.08	4485.74	605.16	0.43
Alpine	12.6333*	100yr		8896.96	1798.03		9.47	1.27		2.44	0.66	4485.75	4482.56	4486.91	645.23	0.51
Alpine	12.6333*	500yr	3.27	12866.36	4036.37	0.40	12.39	1.95	0.08	4.05	1.39	4486.89	4486.17	4488.71	718.40	0.63
Alpine	12.7	2yr		427.00			2.08			0.19		4476.38		4476.45	93.29	0.25
Alpine	12.7	5yr		1691.00			3.18			0.33		4479.87		4480.03	93.97	0.24
Alpine	12.7	10yr		3675.00			4.31			0.54		4483.27		4483.56	94.64	0.25
Alpine	12.7	25yr		5344.35	445.65		4.94	0.55		0.66	0.14	4485.68		4486.03	498.72	0.26
Alpine	12.7	50yr		7101.59	448.41		6.79	0.69		1.25	0.22	4485.30		4485.98	489.89	0.36
Alpine	12.7	100yr		9603.06	1091.94		8.48	1.07		1.91	0.47	4486.22		4487.22	511.30	0.43
Alpine	12.7	500yr		14216.74	2689.26		11.36	1.72		3.32	1.07	4487.48		4489.17	537.12	0.55
Alpine	12.9															
Alpine	13	2yr		427.00			2.04			0.18		4476.42	4475.03	4476.49	93.30	0.24
Alpine	13	5yr		1691.00			3.12			0.32		4479.98	4476.34	4480.13	93.99	0.23
Alpine	13	10yr		3674.31	0.69		4.20	0.07		0.51	0.01	4483.49	4477.80	4483.77	187.59	0.24
Alpine	13	25yr		5334.81	455.19		4.92	0.56		0.65	0.14	4485.72	4479.09	4486.06	499.54	0.26
Alpine	13	50yr		7058.76	491.24		6.68	0.70		1.21	0.23	4485.43	4480.04	4486.07	492.76	0.35
Alpine	13	100yr		9554.60	1140.40		8.37	1.07		1.86	0.47	4486.32	4481.57	4487.29	513.58	0.43

HEC-RAS Plan: Out A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	13	500yr		14199.29	2706.71		11.32	1.72		3.30	1.07	4487.50	4485.58	4489.18	537.44	0.55
Alpine	13.25*	2yr		427.00			6.37			2.17		4476.38	4476.38	4477.01	54.18	1.01
Alpine	13.25*	5yr		1691.00			4.99			0.94		4479.94	4476.38	4480.33	96.35	0.47
Alpine	13.25*	10yr		3678.00			5.25			0.85		4483.46	4483.91	4483.91	103.33	0.36
Alpine	13.25*	25yr		5272.66	523.34		5.65	0.67		0.90	0.21	4485.72	4486.18	4486.18	499.68	0.33
Alpine	13.25*	50yr		6988.20	569.80		7.74	0.85		1.71	0.36	4485.44	4486.30	4486.30	492.94	0.46
Alpine	13.25*	100yr		9394.63	1309.37		9.41	1.26		2.45	0.70	4486.36	4487.57	4487.57	514.61	0.53
Alpine	13.25*	500yr	0.29	13858.16	3057.55	0.17	12.26	1.94	0.03	4.00	1.46	4487.63	4489.55	4489.55	561.72	0.66
Alpine	13.5	2yr		427.00			5.75			1.69		4477.55	4477.35	4478.06	52.21	0.85
Alpine	13.5	5yr		1691.00			7.83			2.42		4479.86	4479.32	4480.81	69.94	0.79
Alpine	13.5	10yr		3678.00			7.27			1.75		4483.35	4481.28	4484.17	95.93	0.56
Alpine	13.5	25yr		5156.53	639.47		6.90	0.88		1.44	0.40	4485.69	4482.84	4486.35	494.38	0.46
Alpine	13.5	50yr		6907.71	650.29		9.79	1.13		2.95	0.70	4485.30	4483.97	4486.67	483.93	0.67
Alpine	13.5	100yr		9133.60	1570.40		11.22	1.62		3.73	1.25	4486.30	4485.84	4487.98	511.12	0.73
Alpine	13.5	500yr	8.21	13255.75	3652.04	0.56	13.57	2.33	0.26	5.18	2.24	4487.75	4487.53	4490.01	575.47	0.81
Alpine	13.75*	2yr		427.00			6.88			2.20		4478.29	4478.07	4479.02	32.09	0.87
Alpine	13.75*	5yr		1691.00			9.90			3.90		4480.78	4480.78	4482.30	55.79	1.00
Alpine	13.75*	10yr		3678.00			10.65			4.07		4483.27	4482.98	4485.03	82.74	0.92
Alpine	13.75*	25yr		5796.00			10.78			3.83		4485.38	4484.55	4487.18	100.12	0.82
Alpine	13.75*	50yr		7558.00			13.28			5.75		4485.69	4485.69	4486.42	102.68	0.99
Alpine	13.75*	100yr		10704.00			14.50			6.49		4487.26	4487.26	4490.52	380.22	1.00
Alpine	13.75*	500yr	6.76	14959.09	1950.14	0.50	14.34	1.89	0.23	5.72	1.66	4489.93	4489.93	4492.75	562.05	0.84
Alpine	14	2yr		427.00			4.85			1.00		4479.24	4478.11	4479.60	34.64	0.54
Alpine	14	5yr		1691.00			8.15			2.41		4482.04	4480.99	4483.07	50.23	0.71
Alpine	14	10yr		3678.00			12.09			5.01		4483.76	4483.58	4486.03	62.20	0.96
Alpine	14	25yr		5796.00			13.67			6.08		4485.52	4485.52	4488.42	74.53	1.01
Alpine	14	50yr		7558.00			14.12			6.31		4486.91	4486.91	4490.00	85.43	0.99
Alpine	14	100yr		10704.00			15.02			6.86		4488.82	4488.82	4492.32	100.41	0.99
Alpine	14	500yr	23.31	15429.70	1462.99	0.55	13.73	1.62	0.26	5.20	1.28	4492.48	4492.48	4495.15	619.00	0.78
Alpine	14.3															
			Bridge													
Alpine	14.5	2yr		427.00			4.16			0.72		4479.64	4478.11	4479.91	37.07	0.44
Alpine	14.5	5yr		1691.00			6.44			1.45		4483.07	4480.97	4483.71	57.35	0.53
Alpine	14.5	10yr		3681.00			8.16			2.15		4485.87	4483.58	4486.91	77.30	0.60
Alpine	14.5	25yr		5806.00			8.93			2.45		4488.18	4485.53	4489.42	95.42	0.60
Alpine	14.5	50yr		7570.00			8.12			1.93		4490.84	4486.64	4491.86	473.65	0.51
Alpine	14.5	100yr		10719.00			11.62			3.95		4490.76	4488.78	4492.85	454.23	0.73
Alpine	14.5	500yr	633.62	13108.80	3187.58	0.81	8.96	1.54	0.33	2.02	0.88	4495.39	4492.41	4496.36	926.12	0.45
Alpine	14.6666*	2yr		427.00			5.84			1.50		4479.93		4480.46	32.19	0.68

HEC-RAS Plan: Oot A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	14.6666*	5yr		1691.00			7.59			2.10		4484.37		4484.26	55.43	0.67
Alpine	14.6666*	10yr		3681.00			8.84			2.61		4486.23		4487.45	79.30	0.68
Alpine	14.6666*	25yr		5806.00			9.42			2.77		4486.53		4489.91	94.80	0.65
Alpine	14.6666*	50yr	33.03	6702.84	834.13	0.48	7.49	0.77	0.16	1.57	0.32	4491.39		4492.16	800.00	0.44
Alpine	14.6666*	100yr	145.89	8444.49	2128.82	0.64	8.25	1.10	0.24	1.82	0.54	4492.69		4493.53	930.74	0.45
Alpine	14.6666*	500yr	1121.58	10088.74	5719.68	0.81	7.43	1.37	0.30	1.34	0.65	4496.11		4496.63	1233.09	0.35
Alpine	14.8333*	2yr		427.00			6.89			2.18		4480.66		4481.39	30.81	0.86
Alpine	14.8333*	5yr		1691.00			8.27			2.60		4483.90		4484.96	57.73	0.77
Alpine	14.8333*	10yr		3681.00			9.31			2.92		4486.70		4488.05	76.80	0.72
Alpine	14.8333*	25yr	21.28	5282.98	501.73	0.68	8.93	1.10	0.24	2.37	0.31	4489.20		4490.32	602.36	0.57
Alpine	14.8333*	50yr	176.18	4466.76	2927.06	0.60	5.47	1.16	0.14	0.80	0.24	4492.04		4492.33	1095.51	0.30
Alpine	14.8333*	100yr	382.16	5211.64	5125.20	0.64	5.62	1.36	0.15	0.81	0.29	4493.44		4493.70	1288.88	0.29
Alpine	14.8333*	500yr	1270.76	5779.96	9879.28	0.67	4.92	1.48	0.14	0.57	0.29	4496.58		4496.73	1547.48	0.22
Alpine	15	2yr		427.00			5.96			1.63		4481.84		4482.39	35.86	0.74
Alpine	15	5yr		1691.00			8.41			2.66		4484.64		4485.74	55.38	0.78
Alpine	15	10yr	26.91	3228.46	425.63	0.83	8.65	1.20	0.34	2.36	0.37	4487.54		4488.56	468.86	0.61
Alpine	15	25yr	180.88	3212.33	2412.79	0.84	5.98	1.15	0.26	1.00	0.26	4490.27		4490.59	1087.82	0.35
Alpine	15	50yr	298.22	2902.85	4368.92	0.58	4.42	1.07	0.12	0.51	0.18	4492.28		4492.40	1327.77	0.24
Alpine	15	100yr	515.92	3420.58	6782.50	0.58	4.63	1.21	0.12	0.54	0.22	4493.65		4493.77	1547.65	0.23
Alpine	15	500yr	1305.24	3857.55	11767.21	0.58	4.18	1.28	0.10	0.41	0.21	4496.69		4496.77	1855.00	0.19
Alpine	15.1666*	2yr		419.00			5.36			1.29		4483.22		4483.66	36.71	0.65
Alpine	15.1666*	5yr		1699.00			8.16			2.49		4485.99		4487.02	56.32	0.75
Alpine	15.1666*	10yr	0.72	3724.98	85.31	0.57	11.69	1.42	0.21	4.57	0.59	4487.83	4487.83	4489.91	158.94	0.90
Alpine	15.1666*	25yr	74.94	4782.06	1308.00	1.18	10.42	1.67	0.53	3.22	0.63	4490.09	4490.09	4491.41	667.37	0.67
Alpine	15.1666*	50yr	226.36	4357.93	3422.71	0.99	7.46	1.47	0.32	1.52	0.41	4492.16		4492.65	1116.89	0.43
Alpine	15.1666*	100yr	422.86	4727.18	6089.96	0.94	7.03	1.63	0.27	1.29	0.44	4493.60		4493.95	1299.63	0.37
Alpine	15.1666*	500yr	1226.83	4840.84	11379.33	0.84	5.62	1.58	0.19	0.76	0.35	4496.69		4496.85	1651.58	0.26
Alpine	15.3333*	2yr		419.00			5.56			1.39		4484.33		4484.81	35.48	0.67
Alpine	15.3333*	5yr		1699.00			8.12			2.47		4487.22		4488.24	56.60	0.74
Alpine	15.3333*	10yr	0.77	3725.15	85.09	0.54	10.46	0.95	0.18	3.55	0.54	4489.63	4488.93	4491.29	175.27	0.77
Alpine	15.3333*	25yr	48.50	5323.20	773.29	1.10	11.16	1.14	0.49	3.67	0.66	4491.56	4491.56	4493.23	623.64	0.71
Alpine	15.3333*	50yr	130.00	6209.25	1667.75	1.35	11.61	1.36	0.66	3.82	0.84	4492.48	4492.48	4494.11	810.05	0.70
Alpine	15.3333*	100yr	304.32	7417.38	3518.30	1.47	12.13	1.58	0.73	3.99	1.03	4493.70	4493.70	4495.22	1102.71	0.68
Alpine	15.3333*	500yr	1020.42	7941.67	8484.91	1.34	10.15	1.69	0.54	2.57	0.96	4496.43		4497.19	1485.11	0.51
Alpine	15.5	2yr		419.00			5.58			1.39		4485.51		4485.99	34.87	0.67
Alpine	15.5	5yr		1699.00			8.11			2.47		4488.44		4489.46	56.79	0.74
Alpine	15.5	10yr		3766.09	44.91		10.70	0.85		3.76	0.46	4490.75	4490.11	4492.51	145.98	0.80
Alpine	15.5	25yr	4.14	5885.88	254.98	0.95	13.86	1.40	0.46	5.94	1.04	4491.89	4491.63	4494.75	236.36	0.95
Alpine	15.5	50yr	70.19	6686.05	1250.76	1.21	12.41	1.35	0.58	4.39	0.86	4493.67	4493.67	4495.68	700.62	0.75
Alpine	15.5	100yr	256.20	7752.65	3231.14	1.37	12.16	1.53	0.65	3.99	0.97	4495.22	4495.22	4496.81	1085.69	0.68

HEC-RAS Plan: Prof A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	Chl
Alpine	15.5	500yr	487.06	11234.70	5725.25	1.97	16.83	2.25	1.31	7.53	2.02	4495.68		4498.54	1151.31		0.92
Alpine	15.75*	2yr		419.00			4.05			0.69		4486.74		4486.99	39.97		0.44
Alpine	15.75*	5yr		1699.00			6.29			1.40		4489.99		4490.61	61.55		0.53
Alpine	15.75*	10yr	1.09	3679.82	130.09	0.48	8.36	0.84	0.13	2.14	0.38	4492.66		4493.70	206.66		0.57
Alpine	15.75*	25yr	70.83	4936.56	1137.61	0.81	8.30	0.91	0.26	1.91	0.38	4495.02		4495.89	859.36		0.48
Alpine	15.75*	50yr	132.79	6033.35	1840.86	0.99	9.59	1.10	0.36	2.50	0.53	4495.56		4496.64	1013.19		0.54
Alpine	15.75*	100yr	294.45	7445.52	3500.04	1.23	10.84	1.41	0.52	3.11	0.80	4496.45		4497.66	1150.87		0.59
Alpine	15.75*	500yr	913.40	8481.63	8051.97	1.26	10.13	1.66	0.46	2.54	0.93	4498.76	4497.28	4499.55	1467.95		0.50
Alpine	16.*	2yr		419.00			3.89			0.50		4487.30		4487.54	39.84		0.42
Alpine	16.*	5yr		1699.00			6.05			1.01		4490.70		4491.27	61.62		0.50
Alpine	16.*	10yr	0.16	3724.12	86.72	0.26	8.24	0.71	0.05	1.64	0.27	4493.36		4494.39	132.07		0.56
Alpine	16.*	25yr	35.41	5380.60	728.98	0.70	9.23	0.81	0.21	1.89	0.33	4495.34		4496.50	739.60		0.55
Alpine	16.*	50yr	80.38	6816.56	1310.06	0.88	10.63	1.01	0.31	2.46	0.47	4495.93		4497.38	901.06		0.61
Alpine	16.*	100yr	207.23	8358.11	2674.65	1.16	12.30	1.32	0.48	3.19	0.73	4496.80		4498.55	1084.89		0.68
Alpine	16.*	500yr	724.34	9958.84	6763.81	1.35	12.18	1.65	0.57	2.94	0.96	4498.89		4500.22	1362.16		0.61
Alpine	16.25*	2yr		419.00			3.88			0.49		4487.75		4487.99	39.10		0.41
Alpine	16.25*	5yr		1699.00			6.01			0.99		4491.25		4491.81	60.71		0.49
Alpine	16.25*	10yr		3747.03	63.97		8.19	0.71		1.62	0.27	4493.97		4494.99	150.15		0.55
Alpine	16.25*	25yr	18.60	5579.95	546.45	0.60	9.57	0.80	0.17	2.05	0.32	4495.83		4497.12	634.61		0.57
Alpine	16.25*	50yr	60.06	6845.94	1101.00	0.83	10.86	0.98	0.28	2.57	0.46	4496.53		4498.10	846.53		0.63
Alpine	16.25*	100yr	188.71	8580.89	2470.40	1.13	12.31	1.28	0.46	3.19	0.70	4497.53		4499.33	1077.75		0.67
Alpine	16.25*	500yr	661.89	10536.31	6248.80	1.45	12.83	1.67	0.65	3.29	1.01	4499.37		4500.93	1309.53		0.65
Alpine	16.5	2yr		419.00			3.88			0.49		4488.19		4488.43	38.40		0.41
Alpine	16.5	5yr		1699.00			5.99			0.98		4491.78		4492.34	59.37		0.48
Alpine	16.5	10yr		3766.51	44.49		8.15	0.67		1.60	0.25	4494.56		4495.58	133.68		0.55
Alpine	16.5	25yr	8.44	5745.03	391.54	0.49	9.80	0.74	0.13	2.16	0.29	4496.38		4497.78	578.82		0.59
Alpine	16.5	50yr	45.41	7033.23	928.36	0.77	10.98	0.94	0.25	2.63	0.43	4497.18		4498.83	808.54		0.63
Alpine	16.5	100yr	172.22	8795.87	2271.91	1.11	12.32	1.23	0.45	3.19	0.66	4498.26		4500.10	1071.27		0.67
Alpine	16.5	500yr	596.11	10981.74	5869.14	1.45	13.23	1.69	0.54	3.50	1.05	4499.95		4501.68	1301.08		0.67
Alpine	16.7		Bridge														
Alpine	17	2yr		419.00			3.62			0.42		4488.39		4488.59	39.55		0.37
Alpine	17	5yr		1699.00			5.67			0.87		4492.05		4492.55	60.92		0.45
Alpine	17	10yr	0.06	3734.79	76.15	0.15	7.16	0.41	0.02	1.20	0.11	4495.44		4496.22	352.06		0.46
Alpine	17	25yr	88.45	4862.09	1194.46	0.61	8.87	0.68	0.14	1.00	0.20	4498.16		4498.75	1054.67		0.38
Alpine	17	50yr	197.15	5800.44	2209.41	0.74	7.24	0.83	0.18	1.07	0.27	4499.12		4499.69	1176.40		0.38
Alpine	17	100yr	405.78	6701.72	4132.50	0.73	7.76	1.04	0.18	1.19	0.38	4500.45		4501.01	1397.47		0.38
Alpine	17	500yr	1180.09	8649.45	7617.46	1.17	8.95	1.38	0.37	1.52	0.61	4501.95		4502.58	1401.80		0.42
Alpine	17.05*	2yr		419.00			5.36			1.01		4488.71		4489.16	36.13		0.64

HEC-RAS Plan: Oof A River, Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chnl (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	C/N
Alpine	17.05*	5yr		1699.00			6.63			1.25		4492.38		4493.06	61.23		0.57
Alpine	17.05*	10yr		3776.88	34.12		7.79	0.64		1.48	0.21	4495.71		4496.65	130.97		0.53
Alpine	17.05*	25yr	34.65	5624.29	486.06	0.60	8.45	0.70	0.15	1.57	0.22	4498.18		4499.20	703.47		0.49
Alpine	17.05*	50yr	112.26	6759.17	1135.58	0.82	9.24	0.88	0.24	1.82	0.32	4499.08		4500.20	935.82		0.52
Alpine	17.05*	100yr	334.66	8104.96	2800.38	1.05	9.77	1.16	0.34	1.95	0.48	4500.42		4501.49	1150.92		0.51
Alpine	17.05*	500yr	744.39	10556.59	6146.02	1.10	11.24	1.59	0.38	2.48	0.79	4501.92		4503.12	1411.59		0.55
Alpine	17.1*	2yr		419.00			6.50			1.59		4489.72		4490.38	36.33		0.86
Alpine	17.1*	5yr		1699.00			7.76			1.80		4492.91		4493.84	61.67		0.73
Alpine	17.1*	10yr		3806.46	4.54		8.62	0.46		1.89	0.13	4496.06		4497.21	103.14		0.63
Alpine	17.1*	25yr	5.98	6026.92	112.10	0.50	9.82	0.65	0.13	2.22	0.21	4498.27		4499.74	349.71		0.62
Alpine	17.1*	50yr	31.80	7649.55	325.65	0.77	11.46	0.87	0.25	2.94	0.34	4498.96		4500.91	527.54		0.69
Alpine	17.1*	100yr	112.53	10236.15	891.32	1.18	14.12	1.25	0.51	4.35	0.63	4499.69		4502.51	719.85		0.82
Alpine	17.1*	500yr	712.00	12321.10	4413.91	1.57	13.47	1.73	0.71	3.66	0.93	4502.12	4502.12	4504.12	1171.48		0.69
Alpine	17.15*	2yr		419.00			5.80			1.26		4491.35		4491.88	40.71		0.77
Alpine	17.15*	5yr		1699.00			8.23			2.10		4493.92		4494.97	65.77		0.82
Alpine	17.15*	10yr		3811.00			9.32			2.31		4496.67		4498.02	80.80		0.73
Alpine	17.15*	25yr	1.91	6064.34	78.75	0.55	10.41	1.07	0.15	2.59	0.43	4498.77		4500.44	158.04		0.69
Alpine	17.15*	50yr	14.88	7816.77	175.35	0.75	12.11	1.28	0.24	3.38	0.38	4499.54	4498.54	4501.76	279.46		0.77
Alpine	17.15*	100yr	198.81	10038.33	1002.87	1.23	12.82	1.24	0.49	3.43	0.53	4501.34	4501.34	4503.55	769.61		0.72
Alpine	17.15*	500yr	798.64	12710.27	3938.09	1.61	13.25	1.76	0.70	3.55	0.86	4503.31	4503.31	4505.31	1128.21		0.69
Alpine	17.2	2yr		419.00			5.93			1.36		4492.76		4493.30	43.54		0.82
Alpine	17.2	5yr		1699.00			8.03			2.03		4495.21		4496.22	70.40		0.82
Alpine	17.2	10yr		3811.00			9.77			2.60		4497.54		4499.02	83.47		0.80
Alpine	17.2	25yr	0.96	6109.98	34.07	0.55	10.99	0.98	0.15	2.98	0.36	4499.44		4501.31	139.78		0.77
Alpine	17.2	50yr	10.40	7873.77	122.82	0.78	12.40	1.43	0.26	3.64	0.65	4500.34	4499.61	4502.69	183.24		0.81
Alpine	17.2	100yr	209.61	10323.87	706.53	1.28	12.66	1.21	0.51	3.49	0.47	4502.39	4502.39	4504.68	688.55		0.73
Alpine	17.2	500yr	875.48	13162.73	3408.79	1.66	13.20	1.79	0.72	3.54	0.81	4504.46	4504.46	4506.51	1083.30		0.69
Alpine	17.3			Bridge													
Alpine	17.4214	2yr		419.00			3.83			0.65		4493.58	4492.52	4493.81	50.97		0.46
Alpine	17.4214	5yr		1699.00			5.94			1.31		4496.23	4494.78	4496.78	76.11		0.54
Alpine	17.4214	10yr	0.01	3801.56	9.43	0.15	7.47	0.70	0.01	1.80	0.13	4498.91	4496.79	4499.78	121.26		0.55
Alpine	17.4214	25yr	14.94	5979.45	150.61	0.88	9.25	1.58	0.19	2.54	0.47	4500.47	4498.45	4501.77	192.61		0.60
Alpine	17.4214	50yr	1099.71	3551.77	3551.77	0.56	2.55	0.73	0.04	0.15	0.06	4508.06	4499.69	4508.10	1461.86		0.12
Alpine	17.4214	100yr	906.67	6799.30	3534.02	1.23	6.36	1.39	0.22	1.02	0.27	4505.27	4502.52	4505.66	1182.71		0.32
Alpine	17.4214	500yr	1829.73	8432.85	7184.43	1.27	6.90	1.80	0.24	1.15	0.40	4507.00	4504.26	4507.38	1461.86		0.33
Alpine	17.5371*	2yr		419.00			4.17			0.79		4494.33		4494.60	49.00		0.51
Alpine	17.5371*	5yr		1699.00			6.14			1.44		4497.08		4497.66	79.93		0.58
Alpine	17.5371*	10yr		3810.83	0.17		7.55	0.27		1.89	0.03	4499.66		4500.55	102.43		0.58
Alpine	17.5371*	25yr	6.20	6065.63	73.17	0.80	9.14	1.38	0.17	2.54	0.39	4501.31		4502.59	166.39		0.62

HEC-RAS Plan: Out A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	O Left (cfs)	Q Channel (cfs)	O Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Chl W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froutde # Crl.
Alpine	17.5371*	50yr	790.87	4437.72	2778.41	0.60	3.37	0.83	0.05	0.27	0.09	4508.06		4508.16	1395.17	0.16
Alpine	17.5371*	100yr	679.21	8688.58	1872.20	1.50	8.27	1.44	0.36	1.78	0.33	4505.31		4506.13	964.88	0.44
Alpine	17.5371*	500yr	1636.27	10814.99	4995.74	1.76	8.87	1.96	0.45	1.95	0.53	4507.05		4507.83	1192.14	0.44
Alpine	17.6528*	2yr		419.00			4.23			0.81		4495.22		4495.50	48.95	0.52
Alpine	17.6528*	5yr		1699.00			6.24			1.48		4498.03		4498.63	78.99	0.59
Alpine	17.6528*	10yr		3811.00			7.61			1.96		4500.52		4501.42	101.19	0.60
Alpine	17.6528*	25yr	2.00	6111.47	31.54	0.65	9.02	1.16	0.13	2.52	0.30	4502.21		4503.47	151.52	0.63
Alpine	17.6528*	50yr	733.01	5531.08	1742.91	0.84	4.27	0.88	0.10	0.46	0.11	4508.05		4508.25	1109.72	0.22
Alpine	17.6528*	100yr	395.79	10240.06	604.15	1.63	10.14	1.35	0.47	2.79	0.35	4505.35		4506.81	641.75	0.58
Alpine	17.6528*	500yr	1199.16	13755.46	2492.39	2.19	11.74	2.02	0.75	3.56	0.66	4506.89		4508.59	955.88	0.62
Alpine	17.7685*	2yr		419.00			4.23			0.81		4496.13		4496.41	49.20	0.52
Alpine	17.7685*	5yr		1699.00			6.25			1.46		4498.97		4499.58	74.33	0.58
Alpine	17.7685*	10yr		3811.00			7.65			2.01		4501.44		4502.35	105.03	0.62
Alpine	17.7685*	25yr	0.15	6133.50	11.36	0.32	8.90	0.93	0.05	2.51	0.22	4503.16		4504.39	142.40	0.64
Alpine	17.7685*	50yr	538.04	6685.42	783.54	1.00	5.36	0.85	0.16	0.75	0.12	4508.04		4508.42	877.90	0.29
Alpine	17.7685*	100yr	241.92	10758.45	239.64	1.57	10.72	1.45	0.47	3.21	0.41	4505.92		4507.63	386.75	0.64
Alpine	17.7685*	500yr	808.40	15712.63	925.98	2.37	13.76	1.85	0.94	5.06	0.65	4507.13		4509.78	699.37	0.77
Alpine	17.8842*	2yr		419.00			4.20			0.81		4497.05		4497.32	49.43	0.52
Alpine	17.8842*	5yr		1699.00			6.26			1.45		4499.87		4500.48	72.58	0.57
Alpine	17.8842*	10yr		3811.00			7.67			2.03		4502.42		4503.33	106.46	0.63
Alpine	17.8842*	25yr		6141.63	3.38		8.80	0.73		2.49	0.15	4504.17		4505.37	135.61	0.65
Alpine	17.8842*	50yr	319.43	7486.98	200.69	1.07	6.34	0.74	0.20	1.09	0.11	4508.09		4508.67	574.85	0.36
Alpine	17.8842*	100yr	168.79	10877.76	193.44	1.48	10.67	1.91	0.43	3.24	0.64	4506.77		4508.49	291.22	0.65
Alpine	17.8842*	500yr	873.80	15689.67	683.53	2.27	12.84	1.66	0.85	4.40	0.53	4508.55		4510.88	672.76	0.71
Alpine	18	2yr		419.00			4.20			0.80		4497.95		4498.23	48.88	0.52
Alpine	18	5yr		1699.00			6.26			1.46		4500.76		4501.37	72.80	0.57
Alpine	18	10yr		3811.00			7.67			2.00		4503.39		4504.30	102.69	0.61
Alpine	18	25yr		6144.39	0.61		8.71	0.50		2.47	0.09	4505.19		4506.37	133.24	0.65
Alpine	18	50yr	152.60	7733.26	121.15	1.02	6.94	1.25	0.20	1.36	0.27	4508.30		4509.02	312.80	0.42
Alpine	18	100yr	119.08	11000.34	120.58	1.40	10.64	1.84	0.41	3.28	0.61	4507.69		4509.41	266.05	0.67
Alpine	18	500yr	762.69	16281.63	402.68	2.22	12.74	1.81	0.83	4.38	0.48	4509.54		4511.90	534.40	0.72
Alpine	18.2*	2yr		419.00			5.50			1.44		4502.14		4502.61	43.46	0.73
Alpine	18.2*	5yr		1699.00			7.92			2.43		4504.66		4505.63	65.32	0.77
Alpine	18.2*	10yr		3811.00			9.35			3.04		4507.18		4508.54	89.04	0.77
Alpine	18.2*	25yr		6143.04	1.96		10.40	0.71		3.53	0.16	4509.04		4510.72	118.36	0.78
Alpine	18.2*	50yr		7989.28	17.72		12.20	1.33		4.75	0.45	4509.62	4509.14	4511.93	135.66	0.89
Alpine	18.2*	100yr	5.31	11039.31	195.38	0.83	12.98	2.22	0.21	5.04	0.92	4511.31	4510.79	4513.88	208.53	0.85
Alpine	18.2*	500yr	440.63	15217.98	1788.39	1.93	13.04	2.28	0.67	4.58	0.87	4513.98	4513.98	4516.29	708.12	0.73
Alpine	18.4*	2yr		419.00			4.53			0.94		4507.18		4507.50	47.23	0.57

HEC-RAS Plan_Out A River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froutd # Chl
Alpine	18.4*	5yr		1699.00			6.92			1.82		4509.81		4510.56	70.27	0.65
Alpine	18.4*	10yr		3811.00			8.90			2.70		4512.14		4513.37	87.72	0.71
Alpine	18.4*	25yr		6084.44	60.56		10.42	1.42		3.43	0.45	4513.83		4515.50	151.29	0.74
Alpine	18.4*	50yr		7688.20	318.80		10.67	1.41		3.43	0.43	4515.20		4516.90	368.66	0.71
Alpine	18.4*	100yr	9.14	9743.78	1487.08	0.83	11.28	2.12	0.19	3.64	0.77	4516.57		4518.29	546.24	0.69
Alpine	18.4*	500yr	117.50	13506.43	3823.07	1.52	13.48	2.89	0.48	4.95	1.27	4517.88		4520.09	744.61	0.77
Alpine	18.6*	2yr		419.00			5.05			1.21		4511.61		4512.01	46.32	0.67
Alpine	18.6*	5yr		1699.00			7.40			2.09		4514.22		4515.07	66.65	0.70
Alpine	18.6*	10yr		3802.84	8.16		9.45	0.74		3.00	0.17	4516.58		4517.97	117.87	0.74
Alpine	18.6*	25yr		5668.64	476.36		10.48	1.59		3.42	0.52	4518.29		4519.86	399.88	0.73
Alpine	18.6*	50yr		6635.72	1371.28		10.65	2.10		3.41	0.78	4519.25		4520.72	501.20	0.70
Alpine	18.6*	100yr		8116.19	3123.81		11.24	2.69		3.66	1.11	4520.36		4521.81	566.34	0.70
Alpine	18.6*	500yr	33.18	10247.94	7165.88	1.11	11.49	3.19	0.28	3.58	1.36	4522.22		4523.49	762.79	0.65
Alpine	18.8*	2yr		419.00			4.68			1.01		4516.35		4516.69	45.47	0.59
Alpine	18.8*	5yr		1699.00			7.33			2.02		4518.87		4519.70	62.87	0.67
Alpine	18.8*	10yr		3382.77	428.23		8.87	1.44		2.59	0.44	4521.11		4522.20	403.95	0.67
Alpine	18.8*	25yr		4339.78	1805.22		9.04	2.10		2.52	0.73	4522.51		4523.43	536.83	0.62
Alpine	18.8*	50yr		5096.43	2910.57		9.87	2.49		2.82	0.95	4523.15		4524.11	578.97	0.64
Alpine	18.8*	100yr		6328.54	4911.46		10.57	2.90		3.26	1.21	4524.12		4525.16	675.19	0.66
Alpine	18.8*	500yr		8280.80	9166.20		11.93	3.66		4.00	1.76	4525.37		4526.53	748.36	0.70
Alpine	19	2yr		419.00			4.28			1.27		4521.03	4520.20	4521.31	50.11	0.54
Alpine	19	5yr		1506.26	192.74		6.37	1.11		2.22	0.31	4523.59	4522.38	4524.15	383.15	0.56
Alpine	19	10yr		2167.51	1643.49		6.56	2.04		2.12	0.71	4525.19	4524.51	4525.60	524.28	0.49
Alpine	19	25yr		2871.91	3273.09		7.49	2.63		2.66	1.06	4526.07	4525.22	4526.53	586.75	0.52
Alpine	19	50yr		3306.72	4700.28		7.81	2.93		2.81	1.24	4526.73	4525.72	4527.20	626.31	0.52
Alpine	19	100yr		4099.61	7140.39		8.42	3.18		3.14	1.40	4527.76	4526.35	4528.26	758.53	0.53
Alpine	19	500yr		5135.11	12311.89		8.97	3.83		3.40	1.82	4529.12	4527.20	4529.65	789.50	0.53

HEC-RAS Plan: Opt B River: Alpine Creek Reach: Alpine

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Val Left (ft/s)	Val Cnnl (ft/s)	Val Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	1		448.00			5.81			1.47		4404.48	4403.86	4405.00	32.84	0.67
Alpine	1	167.82	1552.18		1.47	8.63		0.53	2.67		4407.22	4407.11	4408.26	181.99	0.73
Alpine	1	1214.13	2666.87		3.08	10.32		1.61	3.49		4409.02	4408.80	4410.20	204.43	0.76
Alpine	1	2369.28	3636.89	28.83	4.00	11.52	0.75	2.38	4.11	0.15	4410.26	4409.74	4411.59	380.51	0.78
Alpine	1	3195.85	4324.30	324.85	4.50	12.34	1.95	2.84	4.56	0.61	4410.99	4410.79	4412.42	386.29	0.80
Alpine	1	4596.94	5426.79	1158.27	5.17	13.51	3.19	3.50	5.22	1.29	4412.08	4411.77	4413.64	394.87	0.81
Alpine	1	7322.23	7477.60	3275.17	6.15	15.35	4.62	4.19	6.32	2.25	4413.90	4413.32	4415.71	434.96	0.84
Alpine	1.33333*		445.00			5.14			1.18		4405.84		4406.25	39.75	0.61
Alpine	1.33333*		1687.00			8.08			2.39		4408.55		4409.56	51.70	0.71
Alpine	1.33333*		3895.00			12.85			5.60		4410.24		4412.81	59.65	1.01
Alpine	1.33333*	522.62	5112.38		2.01	11.31	0.83		3.95		4412.60	4410.24	4414.41	259.08	0.76
Alpine	1.33333*	1377.60	6532.40		2.97	12.53	1.52		4.65		4413.64	4412.60	4415.68	262.97	0.79
Alpine	1.33333*	2808.12	8530.18	1.70	4.01	14.20	0.52	2.43	5.72	0.09	4414.83	4414.83	4417.25	292.58	0.83
Alpine	1.33333*	5756.68	11878.42	659.90	5.33	16.37	2.77	3.75	7.14	1.07	4416.71	4416.71	4419.55	432.96	0.87
Alpine	1.66666*		445.00			4.87			1.08		4407.01		4407.38	44.46	0.60
Alpine	1.66666*		1687.00			7.08			1.80		4409.93		4410.71	55.86	0.60
Alpine	1.66666*		3895.00			8.30			2.19		4413.45		4414.51	75.98	0.59
Alpine	1.66666*		5635.00			11.30			4.02		4413.82		4415.81	78.06	0.79
Alpine	1.66666*		7910.00			13.88			5.92		4414.71		4417.70	82.97	0.93
Alpine	1.66666*	640.68	10699.32		2.02	13.42	0.84		5.08		4417.36	4417.36	4420.01	314.31	0.78
Alpine	1.66666*	3137.33	15154.26	3.40	3.72	15.31	0.67	2.09	6.18	0.12	4419.60	4419.60	4422.65	354.81	0.80
Alpine	2		445.00			4.73			1.04		4408.17		4408.52	50.14	0.61
Alpine	2		1687.00			6.75			1.66		4410.92		4411.62	61.23	0.59
Alpine	2		3895.00			8.26			2.16		4414.22		4415.28	7.21	0.58
Alpine	2		5635.00			9.64			2.86		4415.64		4417.08	85.36	0.65
Alpine	2		7910.00			10.21			3.06		4417.71		4419.33	98.13	0.64
Alpine	2		11340.00			13.09			4.94		4418.62		4421.28	103.75	0.80
Alpine	2		18295.00			17.65			8.59		4420.23		4425.06	192.15	0.99
Alpine	2.3	Bridge													
Alpine	2.5		445.00			3.63			0.57		4408.72		4408.93	53.03	0.42
Alpine	2.5		1687.00			5.71			1.14		4411.65		4412.16	62.92	0.46
Alpine	2.5		3895.00			7.18			1.60		4415.14		4415.94	81.58	0.49
Alpine	2.5		5635.00			8.02			1.92		4416.96		4417.95	93.47	0.52
Alpine	2.5		7910.00			8.66			2.14		4419.07		4420.23	105.92	0.52
Alpine	2.5		11340.00			9.93			2.65		4421.22		4422.75	298.39	0.53
Alpine	2.5	3377.08	14822.47	95.45	1.84	9.00	1.00	0.51	1.94	0.16	4425.98	4420.15	4427.01	704.05	0.40

HEC-RAS Plan: Opt B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Cht
Alpine	3		445.00			4.84			1.12		4408.89		4409.25	53.46	0.65
Alpine	3		1687.00		2.29				0.18		4412.28		4412.36	269.17	0.24
Alpine	3		3697.13	197.87	2.03				0.11	0.06	4416.13		4416.19	375.04	0.14
Alpine	3	5.44	5263.70	365.86	2.17	0.23	0.70	0.01	0.11	0.06	4418.19		4418.26	428.93	0.13
Alpine	3	66.38	7239.67	603.95	2.33	0.43	0.83	0.02	0.12	0.07	4420.50		4420.58	496.71	0.13
Alpine	3	261.65	10086.20	992.15	2.60	0.64	0.91	0.04	0.14	0.08	4423.11		4423.20	548.13	0.13
Alpine	3	827.98	15582.05	1884.97	3.07	0.99	1.07	0.08	0.18	0.10	4427.17		4427.30	587.22	0.13
Alpine	3.16666*		445.00			4.25			0.89		4411.91		4412.20	66.65	0.60
Alpine	3.16666*		1687.00		5.35				0.67		4413.37	4413.37	4413.81	354.09	1.00
Alpine	3.16666*		3893.55	1.45	2.84	0.15			0.25	0.01	4416.23		4416.35	459.97	0.26
Alpine	3.16666*		5517.82	117.18	2.55	0.68			0.18	0.07	4418.26		4418.36	478.61	0.19
Alpine	3.16666*		7607.21	302.79	2.47	0.80			0.15	0.07	4420.56		4420.65	507.03	0.16
Alpine	3.16666*		10749.21	590.79	2.59	0.86			0.15	0.08	4423.16		4423.26	550.94	0.14
Alpine	3.16666*	67.37	16946.45	1281.18	2.89	0.97	0.97	0.04	0.17	0.09	4427.23		4427.35	637.54	0.14
Alpine	3.33333*		445.00			4.13			0.88		4414.81		4415.07	78.09	0.62
Alpine	3.33333*		1687.00		4.38				0.47		4416.42		4416.72	405.93	0.79
Alpine	3.33333*		3895.00	1.45	6.82				1.45		4416.88	4416.88	4417.60	408.61	1.02
Alpine	3.33333*		5635.00		4.60				0.69		4418.44		4418.76	427.49	0.48
Alpine	3.33333*		7864.79	45.21	3.59	0.60			0.36	0.07	4420.65		4420.85	527.51	0.28
Alpine	3.33333*		11049.96	290.04	3.30	0.94			0.27	0.11	4423.22		4423.39	560.69	0.21
Alpine	3.33333*	1.63	17412.86	880.51	3.32	1.03	1.03	0.01	0.24	0.11	4427.28		4427.44	687.91	0.18
Alpine	3.5*		445.00			3.71			0.73		4417.77		4417.98	95.29	0.58
Alpine	3.5*		1687.00		5.20				0.48		4419.19	4419.19	4419.61	431.05	1.06
Alpine	3.5*		3895.00		4.81				0.78		4420.30		4420.66	443.80	0.63
Alpine	3.5*		5635.00		7.50				1.82		4420.17	4420.17	4421.04	436.66	1.01
Alpine	3.5*		7910.00		6.91				1.58		4421.05		4421.79	450.52	0.76
Alpine	3.5*		11339.39	0.61	5.12	0.14			0.75	0.01	4423.38		4423.78	549.71	0.42
Alpine	3.5*		17833.67	461.33	4.32	1.13			0.44	0.16	4427.35		4427.63	625.52	0.26
Alpine	3.66666*		445.00			3.44			0.78		4420.67		4420.86	102.68	0.54
Alpine	3.66666*		1687.00		4.91				0.62		4422.21		4422.59	335.13	0.85
Alpine	3.66666*		3895.00		6.58				1.56		4423.95		4423.62	339.19	0.88
Alpine	3.66666*		5635.00		6.03				1.36		4423.94		4424.50	353.77	0.65
Alpine	3.66666*		7910.00		7.68				2.17		4424.20		4425.12	356.10	0.80
Alpine	3.66666*		11340.00		10.11				3.70		4424.46	4424.46	4426.05	358.30	1.01
Alpine	3.66666*		18270.01	24.99	8.38	0.75			2.13	0.14	4427.32		4428.41	468.76	0.62
Alpine	3.83333*		445.00			3.27			0.71		4423.56		4423.72	110.11	0.52
Alpine	3.83333*		1687.00		5.39				1.08		4425.06		4425.51	175.56	0.71

HEC-RAS Plan: Opt.B. River: Alpine_Creek_Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Cnl
Alpine	3.83333*		3895.00			6.87			1.84		4426.45		4427.18	189.47	0.70
Alpine	3.83333*		5635.00			9.01			3.12		4426.75		4428.01	192.52	0.88
Alpine	3.83333*		7910.00			9.76			3.47		4427.68		4429.17	201.83	0.86
Alpine	3.83333*		11340.00			10.67			3.86		4428.90		4430.67	214.02	0.84
Alpine	3.83333*	2.60	18292.40		0.84	13.80		0.20	6.06		4430.10	4430.10	4433.06	241.13	1.00
Alpine	4		445.00			3.24			0.71		4426.40		4426.56	117.40	0.53
Alpine	4		1687.00			5.19			1.41		4427.92		4428.34	129.49	0.58
Alpine	4		3895.00			6.69			1.77		4429.36		4430.05	188.58	0.67
Alpine	4		5635.00			7.12			1.88		4430.44		4431.22	199.37	0.63
Alpine	4		7910.00			8.16			2.34		4431.31		4432.34	208.12	0.67
Alpine	4		11340.00			9.40			2.92		4432.42		4433.79	219.20	0.71
Alpine	4	150.93	18119.46	24.61	2.01	10.64	0.66	0.59	3.41	0.12	4434.62		4436.36	426.26	0.69
Alpine	4.25*		430.00			3.41			0.78		4429.30		4429.48	103.45	0.56
Alpine	4.25*		1688.00			5.78			1.76		4430.76		4431.28	118.27	0.65
Alpine	4.25*		3624.00			6.01			1.29		4432.10		4432.67	261.04	0.70
Alpine	4.25*		5657.00			7.01			1.76		4432.87		4433.64	268.74	0.71
Alpine	4.25*		7379.00			7.00			1.68		4433.78		4434.54	277.79	0.63
Alpine	4.25*		10490.00			7.47			1.79		4435.01		4435.88	290.11	0.60
Alpine	4.25*		16703.00			8.24			1.97		4437.09		4438.14	310.86	0.57
Alpine	4.5*		430.00			3.57			0.81		4432.13		4432.33	86.37	0.53
Alpine	4.5*		1688.00			5.82			1.73		4433.87		4434.39	108.77	0.63
Alpine	4.5*		3624.00			6.27			1.29		4434.90		4435.51	308.98	0.81
Alpine	4.5*		5657.00			6.87			1.63		4435.68		4436.42	316.83	0.75
Alpine	4.5*		7379.00			7.64			2.00		4436.13		4437.04	321.29	0.78
Alpine	4.5*		10490.00			8.40			2.32		4437.00		4438.09	329.98	0.76
Alpine	4.5*		16703.00			9.26			2.59		4438.64		4439.97	346.38	0.72
Alpine	4.75*		430.00			3.87			0.93		4434.84		4435.07	74.34	0.56
Alpine	4.75*		1688.00			6.24			1.92		4436.77		4437.38	90.87	0.64
Alpine	4.75*		3624.00			7.31			1.74		4438.00		4438.83	209.97	0.84
Alpine	4.75*		5657.00			8.75			2.57		4438.70		4439.89	217.03	0.89
Alpine	4.75*		7379.00			9.60			3.08		4439.26		4440.69	222.57	0.91
Alpine	4.75*		10490.00			11.34			4.19		4439.95	4439.92	4441.95	229.49	1.00
Alpine	4.75*		16703.00			13.08			5.21		4441.44	4441.44	4444.09	244.35	1.01
Alpine	5		430.00			3.99			0.96		4437.58		4437.83	65.25	0.55
Alpine	5		1688.00			6.58			2.07		4439.66		4440.33	78.15	0.64
Alpine	5		3624.00			9.28			3.74		4441.26		4442.60	88.12	0.78
Alpine	5		5657.00			11.35			5.29		4442.44		4444.44	95.42	0.88

HEC-RAS Plan: Opt B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Critl W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	Chr
Alpine	5		7379.00			13.02			6.77		4443.14	4442.96	4445.77	99.77		0.96
Alpine	5		10490.00			14.64			8.16		4444.58	4444.58	4447.91	106.68		1.01
Alpine	5		16703.00			16.35			9.47		4447.19	4447.19	4451.34	124.91		1.01
Alpine	5.33333*		428.00			5.31			1.49		4438.59		4439.03	41.97		0.67
Alpine	5.33333*		1690.00			9.53			3.90		4440.69		4442.10	53.41		0.92
Alpine	5.33333*		3655.00			12.08			5.80		4442.77	4442.77	4445.03	67.34		1.00
Alpine	5.33333*		5736.00			13.31			6.69		4444.52	4444.52	4447.27	79.12		1.01
Alpine	5.33333*		7481.00			14.03			7.21		4445.75	4445.75	4448.81	87.38		1.00
Alpine	5.33333*		10612.00			15.11			8.03		4447.56	4447.56	4451.10	89.53		1.00
Alpine	5.33333*	3454.53	12942.12	427.35	2.11	10.93	1.70	0.74	3.81	0.49	4451.83	4451.83	4453.27	1237.96		0.61
Alpine	5.66		428.00			4.65			1.09		4439.77		4440.10	42.24		0.56
Alpine	5.66		1690.00			7.95			2.27		4442.53		4443.51	45.00		0.64
Alpine	5.66		3655.00			11.92			4.50		4444.56		4446.76	49.23		0.84
Alpine	5.66		5736.00			14.52			6.64		4446.22	4446.11	4449.50	58.52		0.99
Alpine	5.66		7481.00			15.13			7.32		4447.77	4447.77	4451.32	70.08		1.00
Alpine	5.66		10612.00			16.10			8.28		4449.88	4449.88	4453.90	85.88		1.02
Alpine	5.66	4884.68	11069.86	869.46	2.43	11.00	2.01	0.93	3.71	0.64	4453.40	4453.40	4454.67	1340.72		0.63
Alpine	5.75	Bridge														
Alpine	6		428.00			3.27			0.56		4440.59	4439.61	4440.76	62.14		0.40
Alpine	6		1690.00			4.74			0.80		4444.12	4441.32	4444.47	65.67		0.36
Alpine	6		3655.00			5.13			0.69		4449.35	4443.23	4449.75	70.90		0.28
Alpine	6		5736.00			6.60			1.05		4451.50	4444.88	4452.18	73.05		0.34
Alpine	6		7481.00			7.70			1.40		4452.89	4446.10	4453.81	970.82		0.38
Alpine	6	2936.34	6980.15	695.51	1.16	6.00	0.98	0.22	0.89	0.16	4455.11	4448.05	4455.48	1452.07		0.30
Alpine	6	4235.20	11608.37	980.43	1.86	10.20	1.61	0.60	2.60	0.44	4454.83	4451.38	4455.96	1417.11		0.52
Alpine	6.125*		428.00			4.17			1.00		4441.46	4440.92	4441.73	61.69		0.57
Alpine	6.125*		1690.00			5.68			1.23		4444.54	4442.65	4445.04	64.77		0.47
Alpine	6.125*		3655.00			5.78			0.93		4449.52	4444.56	4450.04	69.75		0.34
Alpine	6.125*		5736.00			7.27			1.35		4451.72	4446.20	4452.54	73.21		0.39
Alpine	6.125*		7481.00			8.31			1.75		4453.18	4447.44	4454.25	79.88		0.44
Alpine	6.125*	1073.59	9146.74	391.67	1.11	8.53	1.07	0.24	1.95	0.23	4455.10	4449.38	4456.08	1293.15		0.46
Alpine	6.125*		16824.00			17.27			7.78		4454.06	4452.99	4458.69	922.02		0.92
Alpine	6.25*		428.00			4.05			0.93		4442.83	4442.25	4443.08	61.74		0.54
Alpine	6.25*		1690.00			6.53			1.72		4445.26	4443.97	4445.92	64.17		0.57
Alpine	6.25*		3655.00			6.56			1.27		4449.75	4445.88	4450.42	68.65		0.41
Alpine	6.25*		5736.00			7.92			1.76		4452.03	4447.53	4453.01	78.30		0.46

HEC-RAS Plan_Opt.B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Friction # Cht
Alpine	7.4*		7481.00			10.55			3.28		4457.42	4454.67	4459.15	81.48	0.63
Alpine	7.4*		10612.00			11.24			3.66		4460.11	4456.67	4462.07	315.19	0.64
Alpine	7.4*	1997.50	14531.59	294.91	1.36	11.85	0.22	0.65	4.01	0.94	4462.67	4462.67	4464.56	1661.05	0.64
Alpine	7.6*		428.00			4.62			1.18		4450.03	4449.52	4450.36	51.82	0.61
Alpine	7.6*		1690.00			8.26			2.78		4452.15	4451.45	4453.21	53.93	0.75
Alpine	7.6*		3655.00			10.79			3.84		4454.58	4453.59	4456.39	56.36	0.78
Alpine	7.6*		5736.00			12.54			4.75		4456.61	4455.42	4459.05	61.73	0.81
Alpine	7.6*		7481.00			13.96			5.72		4457.84	4456.92	4460.87	65.93	0.86
Alpine	7.6*		10612.00			14.72			6.24		4460.44	4459.11	4463.80	79.59	0.86
Alpine	7.6*	3650.44	10823.22	2350.34	1.62	9.91	1.41	0.58	2.72	0.70	4464.43	4464.11	4465.42	1828.10	0.52
Alpine	7.8		428.00			5.05			1.33		4451.59	4451.03	4451.96	42.07	0.63
Alpine	7.8		1690.00			9.11			3.15		4453.92	4453.26	4455.21	44.40	0.79
Alpine	7.8		3655.00			12.73			5.11		4456.15	4455.71	4458.67	46.63	0.90
Alpine	7.8		5736.00			15.16			6.57		4458.06	4457.87	4461.63	50.03	0.97
Alpine	7.8		7481.00			16.42			7.51		4459.53	4459.53	4463.72	54.84	1.00
Alpine	7.8		10612.00			17.13			8.50		4462.13	4462.13	4466.69	156.45	1.03
Alpine	7.8	4557.83	9801.76	2464.41	1.83	10.95	1.50	0.73	3.27	0.81	4465.63	4465.63	4466.73	1942.06	0.58
Alpine	7.9		428.00			5.18			0.80		4452.30	4451.80	4452.71	42.01	0.65
Alpine	7.9		1690.00			8.67			1.79		4454.89	4454.02	4456.06	44.60	0.73
Alpine	7.9		3655.00			11.18			2.59		4457.75	4456.48	4459.69	48.07	0.76
Alpine	7.9		5736.00			12.45			2.95		4460.40	4458.62	4462.81	52.94	0.74
Alpine	7.9		7481.00			13.11			3.32		4462.36	4460.17	4465.03	128.71	0.75
Alpine	7.9	4071.39	4581.27	1959.34	0.85	4.76	0.69	0.13	0.43	0.15	4466.00	4462.63	4468.15	2110.00	0.23
Alpine	7.9	4757.56	9750.91	2315.53	1.65	11.38	1.31	0.58	2.52	0.61	4466.52	4466.52	4467.70	2020.42	0.58
Alpine	7.95														
		Bridge													
Alpine	8		428.00			4.83			1.19		4452.99	4452.34	4453.35	42.16	0.59
Alpine	8		1690.00			8.16			2.42		4455.71	4454.57	4456.74	44.88	0.67
Alpine	8		3655.00			7.69			1.48		4461.34	4457.02	4462.25	50.51	0.44
Alpine	8	882.17	4490.21	363.62	0.77	6.27	0.52	0.11	0.98	0.12	4465.50	4459.12	4465.98	1761.06	0.33
Alpine	8	1125.59	5924.17	431.24	1.07	8.34	0.66	0.20	1.74	0.21	4465.41	4460.65	4466.27	1681.64	0.44
Alpine	8	4237.05	4431.72	1943.22	0.95	5.01	0.76	0.17	0.58	0.18	4468.13	4466.05	4468.30	2140.82	0.24
Alpine	8	6431.35	7445.98	2946.67	1.57	8.59	1.25	0.48	1.72	0.51	4467.86	4466.98	4468.38	2123.64	0.41
Alpine	8.33333*		428.00			4.74			1.14		4453.82	4453.15	4454.17	42.19	0.57
Alpine	8.33333*		1690.00			8.08			2.36		4456.55	4455.37	4457.57	44.92	0.66
Alpine	8.33333*		3655.00			8.12			1.81		4461.60	4457.82	4462.63	54.15	0.50
Alpine	8.33333*	205.41	5530.59		0.69	8.14		0.15	1.78		4465.44	4459.94	4466.43	1058.75	0.44

HCC-RAS Plan: Out B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	O Left (cfs)	O Channel (cfs)	O Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	8.33333*	204.23	7276.77		0.83	10.84		0.23	3.17		4465.31	4461.70	4467.09	907.77	0.59
Alpine	8.33333*	3080.26	5493.47	2038.27	1.06	6.41	0.82	0.24	1.03	0.24	4468.14	4464.12	4468.48	2257.36	0.31
Alpine	8.33333*	4580.41	9237.00	3006.59	1.74	10.96	1.34	0.65	3.04	0.65	4467.92	4467.92	4468.96	2239.73	0.54
Alpine	8.66666*		428.00			4.75			1.15		4454.62		4454.97	42.19	0.57
Alpine	8.66666*		1690.00			8.07			2.36		4457.36		4458.37	44.92	0.66
Alpine	8.66666*		3655.00			8.32			2.08		4461.99		4463.06	58.51	0.54
Alpine	8.66666*	0.00	5736.00		0.03	8.58		0.00	2.08		4465.68	4461.05	4466.83	72.23	0.47
Alpine	8.66666*	0.83	7480.17		0.19	11.07		0.03	3.46		4465.79	4462.49	4467.70	130.64	0.61
Alpine	8.66666*	1755.08	7312.79	1544.14	1.14	8.82	0.87	0.32	2.10	0.31	4468.08		4468.92	2273.68	0.44
Alpine	8.66666*	3657.09	9909.69	3257.22	1.72	11.42	1.32	0.66	3.47	0.66	4468.65	4468.65	4469.86	2370.40	0.56
Alpine	9		428.00			4.75			1.15		4455.42		4455.77	42.19	0.57
Alpine	9		1690.00			8.07			2.35		4458.16		4459.17	44.93	0.66
Alpine	9		3655.00			7.91			2.21		4462.66		4463.63	84.85	0.60
Alpine	9		5736.00			6.55			1.44		4466.63		4467.30	122.76	0.43
Alpine	9	68.05	7284.36	148.59	0.44	7.23	0.45	0.08	1.71	0.12	4467.67		4468.45	1235.23	0.45
Alpine	9	525.71	9361.66	724.63	0.87	8.58	0.68	0.23	2.36	0.24	4468.34		4469.35	2243.05	0.52
Alpine	9	2331.83	11427.58	3064.59	1.46	9.28	1.16	0.51	2.65	0.53	4469.46		4470.37	2578.67	0.52
Alpine	9.3	Bridge													
Alpine	9.5		428.00			3.38			0.51		4456.93	4455.39	4457.11	43.05	0.35
Alpine	9.5		1690.00			5.99			1.14		4460.40	4457.62	4460.96	46.52	0.43
Alpine	9.5		3666.00			6.17			1.35		4464.41	4460.09	4465.00	101.83	0.45
Alpine	9.5	9.97	5724.50	30.53	0.25	6.14	0.23	0.03	1.26	0.04	4467.34	4462.84	4467.92	937.45	0.40
Alpine	9.5	760.33	5725.91	1030.76	0.68	5.04	0.55	0.12	0.81	0.13	4468.94	4463.98	4469.24	2444.06	0.30
Alpine	9.5	1751.22	6625.35	2279.43	0.92	5.34	0.73	0.19	0.88	0.20	4469.77	4465.73	4470.05	2644.18	0.30
Alpine	9.5	3613.96	8518.43	4734.61	1.26	6.26	1.03	0.32	1.18	0.36	4470.72	4469.21	4471.03	2758.17	0.34
Alpine	9.56666*		428.00			4.30			0.91		4457.39		4457.68	42.41	0.49
Alpine	9.56666*		1690.00			6.72			1.51		4460.84		4461.54	45.85	0.51
Alpine	9.56666*		3666.00			7.43			1.80		4464.80		4465.66	71.21	0.50
Alpine	9.56666*		5765.00			8.30			2.10		4467.52		4468.59	76.56	0.49
Alpine	9.56666*	0.65	7197.98	318.37	0.17	9.09	0.63	0.02	2.45	0.21	4468.77		4470.00	812.62	0.51
Alpine	9.56666*	49.97	9729.45	876.57	0.62	11.68	0.85	0.15	3.99	0.37	4469.29		4471.23	1556.56	0.64
Alpine	9.56666*	994.94	10843.56	5028.50	1.34	11.19	1.46	0.46	3.50	0.77	4471.00	4471.00	4472.26	2141.65	0.57
Alpine	9.63333*		428.00			4.72			1.13		4458.29		4458.64	42.20	0.57
Alpine	9.63333*		1690.00			7.35			1.88		4461.48		4462.31	45.38	0.58
Alpine	9.63333*		3666.00			8.13			1.99		4465.33		4466.36	67.38	0.55
Alpine	9.63333*		5765.00			8.72			2.18		4468.03		4469.21	83.63	0.55

HEC-RAS Plan: Opt.B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Friction # Cht
Alpine	9.63333*		7280.68	236.32	9.45	9.45	0.67		2.48	0.24	4469.30		4470.64	571.75	0.56
Alpine	9.63333*	56.78	8628.34	1970.88	0.70	9.35	0.97	0.16	2.31	0.39	4471.01		4472.11	1571.16	0.51
Alpine	9.63333*	141.80	12996.92	3728.28	1.15	13.70	1.53	0.41	4.92	0.93	4471.29		4473.55	1649.43	0.74
Alpine	9.7		428.00			4.75			1.15		4459.39		4459.74	42.19	0.57
Alpine	9.7		1690.00			7.75			2.13		4462.32		4463.25	45.12	0.62
Alpine	9.7		3666.00			8.56			2.25		4466.00		4467.13	63.09	0.60
Alpine	9.7		5764.98	0.02		9.28	0.04		2.48	0.00	4468.61		4469.95	150.15	0.59
Alpine	9.7		7257.45	259.55		9.86	0.79		2.76	0.32	4469.93		4471.39	501.70	0.62
Alpine	9.7	3.15	9221.65	1431.19	0.47	10.46	1.01	0.10	3.01	0.46	4471.42		4472.89	1305.65	0.62
Alpine	9.7	233.02	10157.86	6476.12	1.10	9.06	1.39	0.30	2.09	0.64	4473.80		4474.58	1795.13	0.48
Alpine	9.73														
Alpine	9.75		428.00			3.76			0.65		4459.95		4460.17	42.75	0.41
Alpine	9.75		1690.00			4.76			0.73		4464.88		4465.23	63.39	0.35
Alpine	9.75		3666.00			6.15			1.09		4468.30		4468.89	79.30	0.39
Alpine	9.75		5331.79	433.21		6.66	0.66		1.26	0.20	4470.60		4471.24	678.78	0.41
Alpine	9.75	9.93	6076.60	1430.46	0.43	6.56	0.73	0.07	1.17	0.22	4471.86		4472.40	1395.46	0.38
Alpine	9.75	90.80	7050.07	3515.13	0.71	6.68	0.95	0.14	1.16	0.32	4473.15		4473.62	1660.69	0.36
Alpine	9.75	356.88	8968.09	7542.03	1.02	7.46	1.27	0.24	1.38	0.49	4474.63		4475.10	1865.31	0.38
Alpine	9.8*		428.00			5.34			1.52		4460.27		4460.71	41.95	0.68
Alpine	9.8*		1690.00			5.68			1.08		4464.98		4465.48	57.06	0.44
Alpine	9.8*		3666.00			7.12			1.48		4468.39		4469.18	69.61	0.46
Alpine	9.8*		5202.01	562.99		7.48	0.77		1.60	0.27	4470.71		4471.50	697.07	0.46
Alpine	9.8*	15.00	5734.90	1767.09	0.52	7.11	0.84	0.09	1.38	0.28	4471.98		4472.58	1420.48	0.41
Alpine	9.8*	111.30	6496.86	4047.84	0.79	7.06	1.04	0.17	1.30	0.37	4473.27		4473.75	1684.95	0.38
Alpine	9.8*	413.14	8040.18	8413.68	1.08	7.63	1.34	0.27	1.46	0.55	4474.79		4475.23	1868.69	0.39
Alpine	9.9*		428.00			4.65			1.09		4461.66		4461.99	42.24	0.56
Alpine	9.9*		1690.00			6.45			1.44		4465.41		4466.06	52.19	0.51
Alpine	9.9*		3664.03	1.97		8.05	0.18		1.91	0.03	4468.75		4469.75	163.54	0.52
Alpine	9.9*	0.18	5019.78	745.05	0.16	8.12	0.70	0.03	1.89	0.24	4471.11		4472.00	1241.81	0.50
Alpine	9.9*	26.63	5033.06	2457.32	0.48	7.03	0.92	0.12	1.35	0.33	4472.39		4472.90	1501.88	0.40
Alpine	9.9*	120.32	5694.55	4841.13	0.66	7.05	1.10	0.19	1.30	0.41	4473.60		4474.02	1749.90	0.38
Alpine	9.9*	387.83	6949.46	9529.71	0.86	7.53	1.40	0.28	1.43	0.58	4475.11		4475.49	1881.29	0.38
Alpine	10		428.00			4.74			1.14		4462.72		4463.07	42.20	0.57
Alpine	10		1690.00			7.15			1.80		4466.02		4466.82	48.31	0.57
Alpine	10		3666.00			9.05			2.44		4469.22		4470.49	295.66	0.59
Alpine	10	10.01	4026.42	1728.56	0.40	7.10	0.84	0.09	1.41	0.29	4471.91		4472.46	1429.70	0.42

HEC-RAS Plan_Opt B River: Alpine_Creek_Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Cnl
Alpine	10	48.70	4284.69	3183.61	0.55	6.87	0.97	0.15	1.28	0.34	4472.79	4470.39	4473.21	1628.63	0.39
Alpine	10	160.95	4828.82	5866.22	0.70	6.93	1.12	0.20	1.26	0.41	4473.93	4472.43	4474.28	1889.31	0.37
Alpine	10	457.59	5796.31	10613.10	0.88	7.31	1.38	0.28	1.34	0.56	4475.43	4473.42	4475.73	2041.62	0.37
Alpine	10.3333*		428.00			4.75			1.15		4463.69	4463.02	4464.04	42.19	0.57
Alpine	10.3333*		1690.00			7.37			1.99		4466.75	4465.29	4467.60	49.74	0.61
Alpine	10.3333*		3666.00			9.24			2.64		4469.90	4467.71	4471.22	58.47	0.62
Alpine	10.3333*		5765.00			12.07			4.30		4471.25	4469.79	4473.51	331.45	0.76
Alpine	10.3333*		7517.00			15.69			7.27		4471.27	4471.27	4475.09	338.79	0.99
Alpine	10.3333*	16.47	7065.46	3574.07	0.52	10.65	1.46	0.18	3.22	0.82	4473.86	4473.86	4475.04	1410.58	0.64
Alpine	10.3333*	235.11	8548.67	8083.22	1.01	11.07	1.84	0.45	3.30	1.12	4475.30	4474.88	4476.29	1716.44	0.61
Alpine	10.6666*		428.00			4.75			1.15		4464.67	4463.99	4465.02	42.19	0.57
Alpine	10.6666*		1690.00			7.24			1.96		4467.63	4466.30	4468.44	53.08	0.61
Alpine	10.6666*		3666.00			8.89			2.55		4470.77	4468.56	4472.00	60.67	0.60
Alpine	10.6666*		5765.00			10.51			3.37		4472.90	4470.47	4474.62	248.63	0.66
Alpine	10.6666*	53.17	4482.47	2981.36	0.37	5.46	0.90	0.07	0.86	0.28	4476.29	4471.85	4476.57	1510.86	0.32
Alpine	10.6666*		10656.00			16.19			7.88		4474.41	4474.41	4478.48	1085.82	0.99
Alpine	10.6666*	114.81	10092.30	6659.89	0.82	12.33	2.03	0.36	4.37	1.42	4476.26	4476.26	4477.70	1507.74	0.71
Alpine	11		428.00			3.88			0.78		4465.62	4464.76	4465.85	52.16	0.47
Alpine	11		1690.00			5.86			1.30		4468.65	4466.74	4469.18	61.76	0.48
Alpine	11		3666.00			7.42			1.78		4471.83	4468.75	4472.69	67.62	0.48
Alpine	11		5765.00			8.72			2.29		4474.22	4470.49	4475.40	246.52	0.51
Alpine	11		7517.00			9.45			2.59		4476.01	4471.76	4477.40	998.69	0.53
Alpine	11	420.83	5410.06	4825.12	0.56	4.68	0.91	0.12	0.60	0.25	4479.73	4473.78	4479.91	1712.54	0.24
Alpine	11	59.08	11389.34	5418.59	0.58	12.09	1.94	0.22	4.27	1.31	4477.59	4477.59	4479.14	1423.24	0.69
Alpine	11.3	Bridge													
Alpine	11.4		427.00			3.16			0.49		4466.50	4465.23	4466.66	58.45	0.37
Alpine	11.4		1691.00			5.26			1.02		4469.58	4467.16	4470.01	63.28	0.41
Alpine	11.4		3670.00			6.79			1.48		4472.87	4469.17	4473.58	69.62	0.43
Alpine	11.4		5777.00			8.35			2.11		4474.98	4470.90	4476.06	785.78	0.48
Alpine	11.4	222.51	4035.87	3275.62	0.41	3.77	0.72	0.07	0.40	0.16	4479.14	4472.17	4479.26	1635.21	0.20
Alpine	11.4	466.26	5198.51	5010.23	0.57	4.52	0.90	0.12	0.56	0.24	4479.93	4474.16	4480.09	1742.81	0.23
Alpine	11.4	618.48	8616.91	7651.61	0.92	7.75	1.52	0.32	1.68	0.69	4479.53	4477.62	4480.02	1688.64	0.41
Alpine	11.4333*		427.00			3.64			0.67		4466.70	4465.71	4466.91	52.30	0.43
Alpine	11.4333*		1691.00			5.49			1.16		4469.77	4467.71	4470.24	69.67	0.46
Alpine	11.4333*		3670.00			6.61			1.43		4473.10	4469.76	4473.78	78.58	0.44
Alpine	11.4333*		5777.00			7.78			1.86		4475.38	4471.37	4476.32	752.08	0.47

HEC-RAS Plan: Opt.B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	Chl
Alpine	11.4333*	154.75	4589.32	2789.93	0.39	4.04	0.73	0.07	0.46	0.17	4479.16	4472.56	4479.31	1503.77		0.22
Alpine	11.4333*	366.49	5926.45	4382.06	0.56	4.84	0.93	0.12	0.65	0.26	4479.95	4474.41	4480.16	1602.44		0.26
Alpine	11.4333*	482.02	9735.79	6669.19	0.89	8.20	1.54	0.32	1.88	0.72	4479.82	4477.89	4480.24	1561.10		0.44
Alpine	11.4666*		427.00			3.99			0.83		4466.99	4466.19	4467.23	52.09		0.49
Alpine	11.4666*		1691.00			5.69			1.28		4470.01	4468.21	4470.51	75.60		0.51
Alpine	11.4666*		3670.00			6.44			1.38		4473.33	4470.26	4473.98	88.53		0.45
Alpine	11.4666*		5777.00			7.24			1.63		4475.72	4471.80	4476.54	694.71		0.46
Alpine	11.4666*	95.03	5134.02	2304.95	0.35	4.29	0.74	0.06	0.52	0.18	4479.17	4472.91	4479.37	1369.38		0.24
Alpine	11.4666*	271.96	6662.36	3740.69	0.54	5.15	0.95	0.12	0.73	0.28	4479.97	4474.71	4480.24	1460.00		0.28
Alpine	11.4666*	352.70	10857.67	5676.63	0.84	8.62	1.56	0.30	2.07	0.76	4479.70	4478.17	4480.45	1428.43		0.47
Alpine	11.5		427.00			4.22			0.95		4467.36	4466.68	4467.64	51.98		0.53
Alpine	11.5		1691.00			5.86			1.39		4470.31	4468.77	4470.84	80.35		0.54
Alpine	11.5		3670.00			6.27			1.34		4473.57	4470.76	4474.18	101.29		0.46
Alpine	11.5		5777.00			6.78			1.44		4476.02	4472.27	4476.73	450.14		0.44
Alpine	11.5	45.40	5839.51	1649.09	0.28	4.67	0.66	0.05	0.62	0.20	4479.18	4473.30	4479.44	1232.99		0.27
Alpine	11.5	183.77	7691.07	2800.16	0.50	5.68	0.88	0.12	0.90	0.32	4479.97	4474.92	4480.34	1315.12		0.31
Alpine	11.5	221.84	12468.22	4196.95	0.76	9.46	1.43	0.29	2.50	0.87	4479.70	4478.34	4480.73	1287.14		0.53
Alpine	11.5666*		427.00			4.38			1.04		4468.45		4468.75	51.91		0.56
Alpine	11.5666*		1691.00			6.53			1.75		4471.14		4471.80	71.28		0.60
Alpine	11.5666*		3670.00			7.41			1.94		4474.02		4474.87	91.88		0.56
Alpine	11.5666*		5777.00			7.99			2.06		4476.34		4477.33	104.52		0.54
Alpine	11.5666*	0.70	6831.52	701.78	0.15	6.71	0.61	0.02	1.32	0.21	4479.11		4479.74	961.05		0.38
Alpine	11.5666*	23.15	9022.53	1629.32	0.40	8.22	0.91	0.10	1.93	0.42	4479.85		4480.74	1090.81		0.45
Alpine	11.5666*	48.22	14103.26	2735.52	0.65	12.69	1.45	0.27	4.58	1.03	4479.97	4479.97	4482.07	1113.62		0.70
Alpine	11.6333*		427.00			4.37			1.03		4469.63		4469.92	51.92		0.56
Alpine	11.6333*		1691.00			6.86			1.94		4472.20		4472.93	68.24		0.64
Alpine	11.6333*		3670.00			8.34			2.48		4474.77		4475.85	79.99		0.63
Alpine	11.6333*		5777.00			9.44			2.89		4476.89		4478.27	82.44		0.61
Alpine	11.6333*	0.11	7317.16	216.73	0.16	9.09	0.63	0.03	2.47	0.26	4479.20		4480.45	470.15		0.52
Alpine	11.6333*	6.64	10047.87	620.49	0.52	11.68	1.01	0.19	4.00	0.59	4479.86		4481.86	578.46		0.64
Alpine	11.6333*	165.12	13429.17	3292.71	1.16	13.08	1.47	0.62	4.72	1.04	4481.85	4481.85	4483.97	1127.72		0.66
Alpine	11.7		427.00			4.99			1.33		4470.90	4470.41	4471.29	45.48		0.64
Alpine	11.7		1691.00			7.77			2.49		4473.38	4472.52	4474.32	56.39		0.70
Alpine	11.7		3670.00			10.52			3.99		4475.67	4474.60	4477.39	58.17		0.76
Alpine	11.7		5777.00			12.82			5.32		4477.52	4476.41	4479.99	59.61		0.80
Alpine	11.7	0.02	7503.94	30.04	0.19	13.23	0.89	0.05	5.48	0.55	4479.35	4477.75	4482.05	299.63		0.76
Alpine	11.7	38.19	9348.14	1288.67	1.12	13.52	1.46	0.62	5.37	1.09	4481.41	4481.41	4483.90	550.18		0.70

HEC-RAS Plan: Opt.B. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Friction # Chl
Alpine	12.7		14547.61	2358.39		11.18	1.63		3.35	0.99	4487.21		4488.88	533.41	0.53
Alpine	12.9														
Alpine	13		427.00			6.94			2.83		4474.00	4474.00	4474.75	41.51	1.01
Alpine	13		1691.00			4.52			0.80		4477.63	4475.78	4477.94	93.53	0.40
Alpine	13		3675.00			4.83			0.74		4481.75	4477.24	4482.11	94.34	0.30
Alpine	13		5692.41	97.59		5.67	0.36		0.94	0.08	4484.32	4478.53	4484.81	466.82	0.31
Alpine	13		7230.45	319.55		6.78	0.61		1.32	0.19	4484.97	4479.48	4485.65	482.02	0.36
Alpine	13		9800.59	894.41		8.50	1.01		2.02	0.44	4485.89	4481.01	4486.92	503.55	0.43
Alpine	13		14496.27	2409.73		11.35	1.67		3.50	1.04	4487.20	4485.18	4488.92	533.23	0.55
Alpine	13.25*		427.00			4.53			1.03		4475.19		4475.51	42.29	0.53
Alpine	13.25*		1691.00			7.38			2.24		4477.63		4478.47	69.92	0.72
Alpine	13.25*		3678.00			6.05			1.23		4481.75		4482.32	102.60	0.44
Alpine	13.25*		5691.70	104.30		6.52	0.41		1.27	0.12	4484.33		4484.98	467.06	0.40
Alpine	13.25*		7202.90	355.10		7.64	0.71		1.71	0.28	4485.00		4485.87	482.68	0.45
Alpine	13.25*		9708.02	995.98		9.32	1.14		2.47	0.60	4485.96		4487.18	505.19	0.52
Alpine	13.25*		14257.93	2658.07		12.00	1.82		3.94	1.32	4487.36		4489.26	535.61	0.63
Alpine	13.5		427.00			4.66			1.10		4475.55	4474.83	4475.89	42.23	0.56
Alpine	13.5		1691.00			8.11			2.58		4478.04	4477.17	4479.06	56.43	0.74
Alpine	13.5		3678.00			7.94			2.13		4481.68	4479.59	4482.66	83.52	0.59
Alpine	13.5		5796.00			8.30			2.16		4484.21	4481.37	4485.28	444.43	0.56
Alpine	13.5		7184.78	373.22		9.32	0.87		2.66	0.45	4484.91	4482.59	4486.19	473.19	0.61
Alpine	13.5		9573.19	1130.81		10.89	1.39		3.52	0.97	4485.91	4485.20	4487.57	500.54	0.68
Alpine	13.5		13830.92	3082.22	0.41	13.12	2.12	0.16	4.86	1.90	4487.48	4487.05	4489.68	561.21	0.76
Alpine	13.75*		427.00			4.70			1.12		4475.94	4475.24	4476.28	42.21	0.57
Alpine	13.75*		1691.00			7.75			2.31		4478.64	4477.53	4479.58	53.01	0.67
Alpine	13.75*		3678.00			8.93			2.60		4481.87	4479.94	4483.11	68.72	0.64
Alpine	13.75*		5796.00			9.49			2.81		4484.32	4481.95	4485.72	91.43	0.65
Alpine	13.75*		7558.00			11.38			4.00		4484.90	4483.40	4486.91	96.15	0.76
Alpine	13.75*		10704.00			14.72			6.60		4485.53	4485.32	4488.90	101.40	0.97
Alpine	13.75*		15872.21	1043.79		14.24	1.51	1.18	5.60	1.18	4489.03	4489.03	4491.99	483.16	0.81
Alpine	14		427.00			4.35			1.04		4476.40	4475.65	4476.69	48.51	0.54
Alpine	14		1691.00			6.38			1.71		4479.40	4477.77	4480.04	62.34	0.55
Alpine	14		3678.00			7.66			2.11		4482.59	4479.93	4483.50	72.79	0.53
Alpine	14		5796.00			8.89			2.64		4484.84	4481.69	4486.07	80.16	0.55
Alpine	14		7558.00			10.50			3.60		4485.67	4482.94	4487.38	82.34	0.63
Alpine	14		10704.00			12.53			4.95		4487.27	4484.90	4489.71	88.29	0.71

HEC-RAS Plan: Opt B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	14		16916.00			16.81			8.68		4488.88	4488.27	4493.27	100.89	0.94
Alpine	14.3		Bridge												
Alpine	14.5		427.00			4.95			1.05		4479.18	4479.56	4479.56	34.29	0.55
Alpine	14.5		1691.00			6.94			1.70		4482.73	4480.99	4483.48	54.99	0.58
Alpine	14.5		3681.00			7.49			1.79		4486.39	4483.59	4487.26	81.34	0.54
Alpine	14.5		5806.00			8.79			2.38		4488.28	4485.56	4489.48	96.24	0.59
Alpine	14.5		7570.00			8.12			1.93		4490.84	4486.86	4491.86	473.65	0.51
Alpine	14.5		10719.00			11.61			3.95		4490.77	4488.75	4492.86	455.98	0.72
Alpine	14.5	472.46	13515.16	2942.38	0.81	9.65	1.59	0.36	2.38	0.97	4494.85	4492.41	4496.01	867.90	0.49
Alpine	14.6666*		427.00			6.57			1.94		4479.66		4480.33	30.33	0.79
Alpine	14.6666*		1691.00			8.11			2.43		4483.11		4484.13	53.56	0.72
Alpine	14.6666*		3681.00			8.15			2.19		4486.67		4487.70	62.23	0.61
Alpine	14.6666*		5806.00			9.30			2.69		4488.62		4489.96	95.40	0.64
Alpine	14.6666*	33.03	6702.84	834.13	0.48	7.49	0.77	0.16	1.57	0.32	4491.39		4492.16	800.00	0.44
Alpine	14.6666*	146.24	8441.84	2130.92	0.64	8.25	1.10	0.24	1.82	0.54	4492.69		4493.53	931.04	0.45
Alpine	14.6666*	1002.95	10359.00	5565.05	0.83	7.93	1.42	0.31	1.50	0.70	4495.74		4496.34	1208.16	0.38
Alpine	14.8333*		427.00			6.88			2.17		4480.66		4481.39	30.82	0.86
Alpine	14.8333*		1691.00			8.59			2.82		4483.77		4484.91	56.54	0.81
Alpine	14.8333*		3681.00	0.00		8.77	0.03		2.56		4487.02		4488.21	79.16	0.67
Alpine	14.8333*	24.64	5219.57	561.79	0.68	8.70	1.11	0.24	2.24	0.31	4489.30		4490.36	626.01	0.56
Alpine	14.8333*	176.18	4466.76	2927.06	0.60	5.47	1.16	0.14	0.80	0.24	4492.04		4492.33	1095.51	0.30
Alpine	14.8333*	382.37	5210.19	5126.43	0.64	5.62	1.36	0.15	0.81	0.29	4493.45		4493.70	1289.07	0.29
Alpine	14.8333*	1249.97	5918.13	9761.90	0.71	5.14	1.52	0.16	0.63	0.31	4496.29		4496.45	1498.10	0.24
Alpine	15		427.00			5.96			1.63		4481.84		4482.39	35.86	0.74
Alpine	15		1691.00			8.47			2.70		4484.62		4485.73	55.23	0.78
Alpine	15	34.70	3124.32	521.99	0.82	8.05	1.14	0.32	2.01	0.33	4487.79		4488.65	553.71	0.56
Alpine	15	182.22	3199.94	2423.84	0.83	5.94	1.14	0.25	0.98	0.25	4490.30		4490.61	1097.85	0.35
Alpine	15	298.22	2902.85	4368.92	0.58	4.42	1.07	0.12	0.51	0.18	4492.28		4492.40	1327.77	0.24
Alpine	15	516.11	3419.77	6783.12	0.58	4.63	1.21	0.12	0.54	0.22	4493.65		4493.77	1547.97	0.23
Alpine	15	1352.66	3935.26	11642.08	0.65	4.35	1.31	0.12	0.44	0.22	4496.41		4496.50	1763.78	0.20
Alpine	15.1666*		419.00			5.36			1.29		4483.22		4483.66	36.71	0.65
Alpine	15.1666*		1699.00			8.15			2.49		4485.99		4487.03	56.35	0.75
Alpine	15.1666*	0.72	3724.98	85.31	0.57	11.69	1.42	0.21	4.57	0.59	4487.83	4487.83	4489.91	158.94	0.90
Alpine	15.1666*	74.94	4762.06	1308.00	1.18	10.42	1.67	0.53	3.22	0.63	4490.09	4490.09	4491.41	667.37	0.67
Alpine	15.1668*	226.36	4357.93	3422.71	0.99	7.46	1.47	0.32	1.52	0.41	4492.16		4492.65	1116.89	0.43
Alpine	15.1668*	423.02	4725.38	6091.60	0.94	7.03	1.62	0.27	1.29	0.44	4493.60		4493.95	1300.00	0.37

HEC-RAS Plan: Opt B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froutde # Chl
Alpine	15.1666*	1166.84	5008.21	11271.95	0.87	5.93	1.64	0.21	0.85	0.38	4496.41		4496.59	1636.98	0.28
Alpine	15.3333*		419.00			5.56		1.39			4484.33		4484.81	35.48	0.67
Alpine	15.3333*		1699.00			8.12		2.47			4487.22		4488.24	56.60	0.74
Alpine	15.3333*		3725.15	85.09	0.54	10.46	0.95	3.55		0.54	4489.63	4488.93	4491.29	175.27	0.77
Alpine	15.3333*	48.50	5323.20	773.29	1.10	11.16	1.14	3.67		0.66	4491.56	4491.56	4493.23	623.64	0.71
Alpine	15.3333*	130.00	6209.25	1667.75	1.35	11.61	1.36	3.82		0.84	4492.48	4492.48	4494.11	810.05	0.70
Alpine	15.3333*	304.37	7416.81	3518.82	1.47	12.13	1.58	3.99		1.03	4493.70	4493.70	4495.22	1102.77	0.68
Alpine	15.3333*	945.90	8260.51	8240.58	1.42	10.85	1.77	2.97		1.08	4496.10		4496.99	1432.28	0.55
Alpine	15.5		419.00			5.58		1.39			4485.51		4485.99	34.87	0.67
Alpine	15.5		1699.00			8.11		2.47			4488.44		4489.46	56.79	0.74
Alpine	15.5		3766.09	44.91		10.70	0.85	3.76		0.46	4490.75	4490.11	4492.51	145.98	0.80
Alpine	15.5	4.14	5885.88	254.98	0.95	13.86	1.40	5.94		1.04	4491.89	4491.63	4494.75	236.36	0.95
Alpine	15.5	70.19	6886.05	1250.76	1.21	12.41	1.35	4.39		0.86	4493.67	4493.67	4495.68	700.62	0.75
Alpine	15.5	256.20	7752.65	3231.14	1.37	12.16	1.53	3.99		0.97	4495.22	4495.22	4496.81	1085.69	0.68
Alpine	15.5	652.73	9998.13	6796.13	1.69	13.89	2.03	4.99		1.53	4496.51	4496.51	4498.25	1267.17	0.73
Alpine	15.75*		419.00			4.05		0.69			4486.74		4486.99	39.37	0.44
Alpine	15.75*		1699.00			6.29		1.40			4489.99		4490.61	61.55	0.53
Alpine	15.75*	1.09	3679.82	130.09	0.48	8.36	0.84	2.14		0.38	4492.66		4493.70	206.66	0.57
Alpine	15.75*	70.83	4936.56	1137.61	0.81	8.30	0.91	1.91		0.38	4495.02		4495.89	859.36	0.48
Alpine	15.75*	132.79	6033.35	1840.86	0.99	9.59	1.10	2.50		0.53	4495.56		4496.64	1013.19	0.54
Alpine	15.75*	294.45	7445.52	3500.04	1.23	10.84	1.41	3.11		0.80	4496.45		4497.66	1150.87	0.59
Alpine	15.75*	775.04	9480.44	7191.53	1.54	12.13	1.83	3.73		1.20	4497.89		4499.16	1344.10	0.62
Alpine	16.*		419.00			3.89		0.50			4487.30		4487.54	39.84	0.42
Alpine	16.*		1699.00			6.05		1.01			4490.70		4491.27	61.62	0.50
Alpine	16.*	0.16	3724.12	86.72	0.26	8.24	0.71	1.64		0.27	4493.36		4494.39	182.07	0.56
Alpine	16.*	35.41	5380.60	728.98	0.70	9.23	0.81	1.89		0.33	4495.34		4496.50	739.60	0.55
Alpine	16.*	80.38	6616.56	1310.06	0.88	10.63	1.01	2.46		0.47	4495.93		4497.38	901.06	0.61
Alpine	16.*	207.23	8358.11	2674.65	1.16	12.30	1.32	3.19		0.73	4496.80		4498.55	1084.89	0.68
Alpine	16.*	605.37	10795.88	6045.76	1.52	13.95	1.78	3.94		1.17	4498.22		4500.11	1278.62	0.72
Alpine	16.25*		419.00			3.88		0.49			4487.75		4487.99	39.10	0.41
Alpine	16.25*		1699.00			6.01		0.99			4491.25		4491.81	60.71	0.49
Alpine	16.25*		3747.03	63.97		8.19	0.71	1.62		0.27	4493.97		4494.99	150.15	0.55
Alpine	16.25*	18.60	5579.95	546.45	0.60	9.57	0.80	2.05		0.32	4495.83		4497.12	634.61	0.57
Alpine	16.25*	60.06	6845.94	1101.00	0.83	10.86	0.98	2.57		0.46	4496.53		4497.10	846.53	0.63
Alpine	16.25*	188.71	8580.89	2470.40	1.13	12.31	1.28	3.19		0.70	4497.53		4499.33	1077.75	0.67
Alpine	16.25*	586.61	11037.42	5822.98	1.52	13.86	1.73	3.87		1.12	4499.01		4500.91	1277.27	0.71

HEC-RAS Plan: Oot B River, Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	O Left (cfs)	O Channel (cfs)	O Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chnl
Alpine	16.5		419.00			3.88			0.49		4488.19		4488.43	38.40	0.41
Alpine	16.5		1699.00			5.99			0.98		4491.78		4492.34	59.37	0.48
Alpine	16.5		3766.51	44.49		8.15	0.67		1.60	0.25	4494.56		4495.58	133.68	0.55
Alpine	16.5	8.44	5745.03	391.54	0.49	9.80	0.74	0.13	2.16	0.29	4496.38		4497.78	578.82	0.59
Alpine	16.5	45.41	7033.23	928.36	0.77	10.98	0.94	0.25	2.63	0.43	4497.18		4498.83	808.54	0.63
Alpine	16.5	172.22	8795.87	2271.91	1.11	12.32	1.23	0.45	3.19	0.66	4498.26		4500.10	1071.27	0.67
Alpine	16.5	563.69	11190.00	5693.32	1.50	13.65	1.72	0.60	3.74	1.09	4499.80		4501.67	1270.31	0.69
Alpine	16.7	Bridge													
Alpine	17		419.00			3.62			0.42		4488.39	4486.59	4488.59	39.55	0.37
Alpine	17		1699.00			5.67			0.87		4492.05	4489.42	4492.55	60.92	0.45
Alpine	17	0.06	3734.79	76.15	0.15	7.16	0.41	0.02	1.20	0.11	4495.44	4492.07	4496.22	352.06	0.46
Alpine	17	88.45	4862.09	1194.46	0.61	6.87	0.68	0.14	1.00	0.20	4498.16	4494.14	4498.75	1054.67	0.38
Alpine	17	197.15	5600.44	2209.41	0.74	7.24	0.83	0.18	1.07	0.27	4499.12	4496.45	4499.69	1176.40	0.36
Alpine	17	405.78	6701.72	4132.50	0.73	7.76	1.04	0.18	1.19	0.38	4500.45	4498.28	4501.01	1397.47	0.36
Alpine	17	1193.86	8608.80	7644.34	1.17	8.88	1.38	0.37	1.50	0.60	4501.99	4499.63	4502.61	1401.90	0.42
Alpine	17.05*		419.00			5.36			1.01		4488.71		4489.16	36.13	0.64
Alpine	17.05*		1699.00			6.63			1.25		4492.38		4493.06	61.23	0.57
Alpine	17.05*		3776.88	34.12		7.79	0.64		1.48	0.21	4495.71		4496.65	130.97	0.53
Alpine	17.05*	34.65	5624.29	486.06	0.60	8.45	0.70	0.15	1.57	0.22	4498.18		4499.20	703.47	0.49
Alpine	17.05*	112.26	6759.17	1135.58	0.82	9.24	0.88	0.24	1.82	0.32	4499.08		4500.20	935.82	0.52
Alpine	17.05*	334.66	8104.96	2800.38	1.05	9.77	1.16	0.34	1.95	0.48	4500.42		4501.49	1150.92	0.51
Alpine	17.05*	765.59	10490.82	6190.60	1.11	11.13	1.59	0.38	2.42	0.78	4501.96		4503.14	1411.59	0.55
Alpine	17.1*		419.00			6.50			1.59		4489.72		4490.38	36.33	0.86
Alpine	17.1*		1699.00			7.76			1.80		4492.91		4493.84	61.67	0.73
Alpine	17.1*	5.98	3806.46	4.54		8.62	0.46		1.89	0.13	4496.06		4497.21	103.14	0.63
Alpine	17.1*	31.80	6026.92	112.10	0.50	9.82	0.65	0.13	2.22	0.21	4498.27		4499.74	349.71	0.62
Alpine	17.1*	112.53	7649.55	325.65	0.77	11.46	0.87	0.25	2.94	0.34	4498.96		4500.91	527.54	0.69
Alpine	17.1*	712.00	10236.15	891.32	1.18	14.12	1.25	0.51	4.35	0.63	4499.69		4502.51	719.85	0.82
Alpine	17.1*		12321.10	4413.91	1.57	13.47	1.73	0.71	3.66	0.93	4502.12	4502.12	4504.12	1171.48	0.69
Alpine	17.15*		419.00			5.80			1.26		4491.35		4491.88	40.71	0.77
Alpine	17.15*		1699.00			8.23			2.10		4493.92		4494.97	65.77	0.82
Alpine	17.15*		3811.00			9.32			2.31		4496.67		4498.02	80.80	0.73
Alpine	17.15*	1.91	6064.34	78.75	0.55	10.41	1.07	0.15	2.59	0.43	4498.77		4500.44	158.04	0.69
Alpine	17.15*	14.88	7816.77	175.35	0.75	12.11	1.28	0.24	3.38	0.38	4499.54	4498.54	4501.76	279.46	0.77
Alpine	17.15*	198.81	10038.33	1002.87	1.23	12.62	1.24	0.49	3.43	0.53	4501.34	4501.34	4503.55	769.61	0.72
Alpine	17.15*	798.64	12710.27	3938.09	1.61	13.25	1.76	0.70	3.55	0.86	4503.31	4503.31	4505.31	1128.21	0.69

HEC-RAS Plan: Opt.B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Cr1 W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Frout# # Chl
Alpine	17.2		419.00			5.93			1.36		4493.76		4493.30	43.54	0.82
Alpine	17.2		1699.00			8.03			2.03		4495.21		4496.22	70.40	0.82
Alpine	17.2		3811.00			9.77			2.60		4497.54		4499.02	83.47	0.80
Alpine	17.2	0.96	6109.98	34.07	0.55	10.99	0.98	0.15	2.98	0.36	4499.44		4501.31	139.78	0.77
Alpine	17.2	10.40	7873.77	122.82	0.78	12.40	1.43	0.26	3.64	0.65	4500.34	4499.61	4502.69	183.24	0.81
Alpine	17.2	209.61	10323.87	706.53	1.28	12.66	1.21	0.51	3.49	0.47	4502.39	4502.39	4504.68	688.55	0.73
Alpine	17.2	875.48	13162.73	3408.79	1.66	13.20	1.79	0.72	3.54	0.81	4504.46	4504.46	4506.51	1083.30	0.69
Alpine	17.3	Bridge													
Alpine	17.4214		419.00			3.83			0.65		4493.58	4492.52	4493.81	50.97	0.46
Alpine	17.4214		1699.00			5.94			1.31		4496.23	4494.78	4496.78	76.11	0.54
Alpine	17.4214	0.01	3801.56	9.43	0.15	7.47	0.70	0.01	1.80	0.13	4498.91	4496.79	4499.78	121.26	0.55
Alpine	17.4214	14.94	5979.45	150.61	0.88	9.25	1.58	0.19	2.54	0.47	4500.47	4498.45	4501.77	192.61	0.60
Alpine	17.4214	1099.71	3355.52	3551.77	0.56	2.55	0.73	0.04	0.15	0.06	4508.06	4499.69	4508.10	1461.86	0.12
Alpine	17.4214	906.67	6799.30	3534.02	1.23	6.36	1.39	0.22	1.02	0.27	4505.27	4502.52	4505.66	1182.71	0.32
Alpine	17.4214	1829.73	8432.85	7184.43	1.27	6.90	1.80	0.24	1.15	0.40	4507.00	4504.26	4507.38	1461.86	0.33
Alpine	17.5371*		419.00			4.17			0.79		4494.33		4494.60	49.00	0.51
Alpine	17.5371*		1699.00			6.14			1.44		4497.08		4497.66	79.93	0.58
Alpine	17.5371*		3810.83	0.17		7.55			1.89		4499.66		4500.55	102.43	0.58
Alpine	17.5371*	6.20	6065.63	73.17	0.80	9.14	1.38	0.17	2.54	0.39	4501.31		4502.59	166.39	0.62
Alpine	17.5371*	790.87	4437.72	2778.41	0.80	3.37	0.83	0.05	0.78	0.09	4508.06		4508.16	1395.17	0.16
Alpine	17.5371*	679.21	8688.58	1872.20	1.50	8.27	1.44	0.36	1.78	0.33	4505.31		4506.13	964.88	0.44
Alpine	17.5371*	1636.27	10814.99	4995.74	1.76	8.87	1.96	0.45	1.95	0.53	4507.05		4507.83	1192.14	0.44
Alpine	17.6528*		419.00			4.23			0.81		4495.22		4495.50	48.95	0.52
Alpine	17.6528*		1699.00			6.24			1.48		4498.03		4498.63	79.99	0.59
Alpine	17.6528*		3811.00			7.61			1.96		4500.52		4501.42	101.19	0.60
Alpine	17.6528*	2.00	6111.47	31.54	0.65	9.02	1.16	0.13	2.52	0.30	4502.21		4503.47	151.52	0.63
Alpine	17.6528*	733.01	5531.08	1742.91	0.84	4.27	0.88	0.10	0.46	0.11	4508.05		4508.25	1109.72	0.22
Alpine	17.6528*	395.79	10240.06	604.15	1.63	10.14	1.35	0.47	2.79	0.35	4505.35		4506.81	641.75	0.58
Alpine	17.6528*	1199.16	13755.46	2492.39	2.19	11.74	2.02	0.75	3.56	0.66	4506.89		4508.59	955.88	0.62
Alpine	17.7685*		419.00			4.23			0.81		4496.13		4496.41	49.20	0.52
Alpine	17.7685*		1699.00			6.25			1.46		4498.97		4499.58	74.33	0.58
Alpine	17.7685*		3811.00			7.65			2.01		4501.44		4502.35	105.03	0.62
Alpine	17.7685*	0.15	6133.50	11.36	0.32	8.90	0.93	0.05	2.51	0.22	4503.16		4504.39	142.40	0.64
Alpine	17.7685*	538.04	6685.42	783.54	1.00	5.36	0.85	0.16	0.75	0.12	4508.04		4508.42	877.90	0.29
Alpine	17.7685*	241.92	10758.45	239.64	1.57	10.72	1.45	0.47	3.21	0.41	4505.92		4507.63	386.75	0.64
Alpine	17.7685*	808.40	15712.63	925.98	2.37	13.76	1.85	0.94	5.06	0.65	4507.13		4509.78	699.37	0.77

HEC-RAS Plan: Opt.B River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Flowde # Chl
Alpine	18.8*		3382.77	428.23		8.87	1.44		2.59	0.44	4521.11		4522.20	403.95	0.67
Alpine	18.8*		4339.78	1805.22		9.04	2.10		2.52	0.73	4522.51		4523.43	536.83	0.62
Alpine	18.8*		5096.43	2910.57		9.67	2.49		2.82	0.95	4523.15		4524.11	578.97	0.64
Alpine	18.8*		6328.54	4911.46		10.57	2.90		3.26	1.21	4524.12		4525.16	675.19	0.66
Alpine	18.8*		8280.80	9166.20		11.93	3.66		4.00	1.76	4525.37		4526.53	748.36	0.70
Alpine	19		419.00			4.28			1.27		4521.03	4520.20	4521.31	50.11	0.54
Alpine	19		1506.26	192.74		6.37	1.11		2.22	0.31	4523.59	4522.38	4524.15	383.15	0.56
Alpine	19		2167.51	1843.49		6.56	2.04		2.12	0.71	4525.19	4524.51	4525.60	524.28	0.49
Alpine	19		2871.91	3273.09		7.49	2.63		2.66	1.06	4526.07	4525.22	4526.53	586.75	0.52
Alpine	19		3306.72	4700.28		7.81	2.93		2.81	1.24	4526.73	4525.72	4527.20	626.31	0.52
Alpine	19		4099.61	7140.39		8.42	3.18		3.14	1.40	4527.76	4526.35	4528.26	758.53	0.53
Alpine	19		5135.11	12311.89		8.97	3.83		3.40	1.82	4529.12	4527.20	4529.65	789.50	0.53

HEC-RAS Plan: Opt C River: Alpine Creek Reach: Alpine

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Crl
Alpine	1	2yr		445.00			5.81			1.47		4404.48	4403.86	4405.00	32.84	0.67
Alpine	1	5yr	167.82	1552.18		1.47	8.63		0.53	2.39		4407.22	4407.11	4408.26	181.99	0.73
Alpine	1	10yr	1214.13	2666.87		3.08	10.32		1.61	3.49		4408.02	4408.00	4410.20	204.43	0.76
Alpine	1	25yr	2369.28	3636.89	28.83	4.00	11.52	0.75	2.38	4.11	0.15	4410.26	4409.74	4411.59	380.51	0.78
Alpine	1	50yr	3195.85	4324.30	324.85	4.50	12.34	1.95	2.84	4.56	0.61	4410.99	4410.79	4412.42	386.29	0.80
Alpine	1	100yr	4596.94	5426.79	1158.27	5.17	13.51	3.19	3.50	5.22	1.29	4412.08	4411.77	4413.64	394.87	0.81
Alpine	1	500yr	7322.23	7477.60	3275.17	6.15	15.35	4.62	4.19	6.32	2.25	4413.90	4413.32	4415.71	434.96	0.84
Alpine	1.33333*	2yr		445.00			5.14			1.18		4405.84		4406.25	39.75	0.61
Alpine	1.33333*	5yr		1687.00			8.08			2.39		4408.55		4409.56	51.70	0.71
Alpine	1.33333*	10yr		3895.00			12.85			5.60		4410.24		4412.81	59.65	1.01
Alpine	1.33333*	25yr	522.62	5112.38		2.01	11.31		0.83	3.95		4412.60	4412.24	4414.41	259.08	0.76
Alpine	1.33333*	50yr	1377.60	6532.40		2.97	12.53		1.52	4.65		4413.64	4413.64	4415.68	262.97	0.79
Alpine	1.33333*	100yr	2808.12	8530.18	1.70	4.01	14.20	0.52	2.43	5.72	0.09	4414.83	4414.83	4417.25	292.58	0.83
Alpine	1.33333*	500yr	5756.68	11878.42	659.90	5.33	16.37	2.77	3.75	7.14	1.07	4416.71	4416.71	4419.55	432.96	0.87
Alpine	1.66666*	2yr		445.00			4.87			1.08		4407.01		4407.38	44.46	0.60
Alpine	1.66666*	5yr		1687.00			7.08			1.80		4409.93		4410.71	55.86	0.60
Alpine	1.66666*	10yr		3895.00			8.30			2.19		4413.45		4414.51	75.98	0.59
Alpine	1.66666*	25yr		5635.00			11.30			4.02		4413.82		4415.81	78.06	0.79
Alpine	1.66666*	50yr		7910.00			13.88			5.92		4414.71		4417.70	86.97	0.93
Alpine	1.66666*	100yr	640.68	10699.32		2.02	13.42		0.84	5.08		4417.36	4417.36	4420.01	314.31	0.78
Alpine	1.66666*	500yr	3137.33	15154.26	3.40	3.72	15.31	0.67	2.09	6.18	0.12	4419.60	4419.60	4422.65	354.81	0.80
Alpine	2	2yr		445.00			4.73			1.04		4408.17		4408.52	50.14	0.61
Alpine	2	5yr		1687.00			6.75			1.66		4410.92		4411.62	61.23	0.59
Alpine	2	10yr		3895.00			8.26			2.16		4414.22		4415.28	74.21	0.58
Alpine	2	25yr		5635.00			9.64			2.86		4415.64		4417.08	85.36	0.65
Alpine	2	50yr		7910.00			10.21			3.06		4417.71		4419.33	98.13	0.64
Alpine	2	100yr		11340.00			13.09			4.94		4418.62		4421.28	103.75	0.80
Alpine	2	500yr		18295.00			17.65			8.59		4420.23		4425.06	192.15	0.99
Alpine	2.3		Bridge													
Alpine	2.5	2yr		445.00			3.63			0.57		4408.72		4408.93	59.03	0.42
Alpine	2.5	5yr		1687.00			5.71			1.14		4411.65		4412.16	62.92	0.46
Alpine	2.5	10yr		3895.00			7.18			1.60		4415.14		4415.94	81.58	0.49
Alpine	2.5	25yr		5635.00			8.02			1.92		4416.96		4417.95	93.47	0.52
Alpine	2.5	50yr		7910.00			8.66			2.14		4419.07		4420.23	105.92	0.52
Alpine	2.5	100yr		11340.00			9.93			2.65		4421.22		4422.75	298.39	0.53
Alpine	2.5	500yr	3377.08	14822.47	95.45	1.84	9.00	1.00	0.51	1.94	0.16	4425.98	4420.15	4427.01	704.05	0.40
Alpine	3	2yr		445.00			4.84			1.12		4408.89		4409.25	53.46	0.65
Alpine	3	5yr		1687.00			2.29			0.18		4412.98		4412.36	269.17	0.24
Alpine	3	10yr		3697.13	197.87		2.03	0.70		0.11	0.06	4416.13		4416.19	375.04	0.14

HEC-RAS Plan: Oat C. River-Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Off W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch1
Alpine	3	25yr	5.44	5263.70	365.86	0.23	2.17	0.77	0.01	0.11	0.06	4418.19		4418.26	428.93	0.13
Alpine	3	50yr	66.98	7239.67	603.95	0.43	2.33	0.83	0.02	0.12	0.07	4420.50		4420.58	496.71	0.13
Alpine	3	100yr	261.65	10086.20	992.15	0.64	2.60	0.91	0.04	0.14	0.08	4423.11		4423.20	548.13	0.13
Alpine	3	500yr	827.98	15582.05	1884.97	0.99	3.07	1.07	0.08	0.18	0.10	4427.17		4427.30	587.22	0.13
Alpine	3.16666*	2yr		445.00			4.25			0.89		4411.91		4412.20	66.65	0.60
Alpine	3.16666*	5yr		1687.00			5.35			0.67		4413.37	4413.37	4413.81	354.09	1.00
Alpine	3.16666*	10yr		3893.55	1.45		2.84	0.15		0.25	0.01	4416.23		4416.35	459.97	0.26
Alpine	3.16666*	25yr		5517.82	117.18		2.55	0.88		0.18	0.07	4418.26		4418.36	478.61	0.19
Alpine	3.16666*	50yr		7607.21	302.79		2.47	0.80		0.15	0.07	4420.56		4420.65	507.03	0.16
Alpine	3.16666*	100yr		10749.21	590.79		2.59	0.86		0.15	0.08	4423.16		4423.26	550.94	0.14
Alpine	3.16666*	500yr	67.37	16946.45	1281.18	0.56	2.89	0.97	0.04	0.17	0.09	4427.23		4427.35	637.54	0.14
Alpine	3.83333*	2yr		445.00			4.13			0.88		4414.81		4415.07	78.09	0.62
Alpine	3.83333*	5yr		1687.00			4.38			0.47		4416.42		4416.72	405.93	0.79
Alpine	3.83333*	10yr		3895.00			6.82			1.45		4416.88	4416.88	4417.60	408.61	1.02
Alpine	3.83333*	25yr		5635.00			4.60			0.69		4418.44		4418.76	427.49	0.48
Alpine	3.83333*	50yr		7864.79	45.21		3.59	0.60		0.36	0.07	4420.65		4420.85	527.51	0.28
Alpine	3.83333*	100yr		11049.96	290.04		3.30	0.94		0.27	0.11	4423.22		4423.39	560.69	0.21
Alpine	3.83333*	500yr	1.63	17412.86	880.51	0.19	3.32	1.03	0.01	0.24	0.11	4427.28		4427.44	662.91	0.18
Alpine	3.5*	2yr		445.00			3.71			0.73		4417.77		4417.98	95.29	0.58
Alpine	3.5*	5yr		1687.00			5.20			0.48		4419.19	4419.19	4419.61	431.05	1.06
Alpine	3.5*	10yr		3895.00			4.81			0.78		4420.30		4420.66	443.80	0.63
Alpine	3.5*	25yr		5635.00			7.50			1.82		4420.17	4420.17	4421.04	436.66	1.01
Alpine	3.5*	50yr		7910.00			6.91			1.58		4421.05		4421.79	450.52	0.76
Alpine	3.5*	100yr		11339.39	0.61		5.12	0.14		0.75	0.01	4423.38		4423.78	549.71	0.42
Alpine	3.5*	500yr		17833.67	461.33		4.32	1.13		0.44	0.16	4427.35		4427.63	625.52	0.26
Alpine	3.66666*	2yr		445.00			3.44			0.78		4420.67		4420.86	102.68	0.54
Alpine	3.66666*	5yr		1687.00			4.91			0.62		4422.21		4422.59	335.13	0.85
Alpine	3.66666*	10yr		3895.00			6.58			1.56		4422.95		4423.62	339.19	0.88
Alpine	3.66666*	25yr		5635.00			6.03			1.36		4423.94		4424.50	353.77	0.65
Alpine	3.66666*	50yr		7910.00			7.68			2.17		4424.20		4425.12	356.10	0.80
Alpine	3.66666*	100yr		11340.00			10.11			3.70		4424.46	4424.46	4426.05	358.30	1.01
Alpine	3.66666*	500yr		18270.01	24.99		6.38	0.75		2.13	0.14	4427.32		4428.41	468.76	0.62
Alpine	3.83333*	2yr		445.00			3.27			0.71		4423.56		4423.72	110.11	0.52
Alpine	3.83333*	5yr		1687.00			5.39			1.08		4425.06		4425.51	175.56	0.71
Alpine	3.83333*	10yr		3895.00			6.87			1.84		4426.45		4427.18	189.47	0.70
Alpine	3.83333*	25yr		5635.00			9.01			3.12		4426.75		4428.01	192.52	0.88
Alpine	3.83333*	50yr		7910.00			9.78			3.47		4427.68		4429.17	201.83	0.86
Alpine	3.83333*	100yr		11340.00			10.87			3.86		4428.90		4430.67	214.02	0.84
Alpine	3.83333*	500yr	2.60	18292.40		0.84	13.80		0.20	6.06		4430.10	4430.10	4433.06	241.13	1.00

HEC-RAS Plan: Out C. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # CNI
Alpine	4	2yr		445.00			3.24			0.71		4426.40		4426.56	117.40	0.53
Alpine	4	5yr		1687.00			5.19			1.41		4427.92		4428.34	129.49	0.58
Alpine	4	10yr		3695.00			6.69			1.77		4429.36		4430.05	188.58	0.67
Alpine	4	25yr		5635.00			7.12			1.88		4430.44		4431.22	199.37	0.63
Alpine	4	50yr		7910.00			8.16			2.34		4431.31		4432.34	208.12	0.67
Alpine	4	100yr		11340.00			9.40			2.92		4432.42		4433.79	219.20	0.71
Alpine	4	500yr	150.93	18119.46	24.61	2.01	10.64	0.66	0.59	3.41	0.12	4434.62		4436.36	426.26	0.69
Alpine	4.25*	2yr		430.00			3.41			0.78		4429.30		4429.48	108.45	0.56
Alpine	4.25*	5yr		1688.00			5.78			1.76		4430.76		4431.28	118.27	0.65
Alpine	4.25*	10yr		3624.00			6.01			1.29		4432.10		4432.67	261.04	0.70
Alpine	4.25*	25yr		5657.00			7.01			1.76		4432.87		4433.64	268.74	0.71
Alpine	4.25*	50yr		7379.00			7.00			1.68		4433.78		4434.54	277.79	0.63
Alpine	4.25*	100yr		10490.00			7.47			1.79		4435.01		4435.88	290.11	0.60
Alpine	4.25*	500yr		16703.00			8.24			1.97		4437.09		4438.14	310.86	0.57
Alpine	4.5*	2yr		430.00			3.57			0.81		4432.13		4432.33	86.37	0.53
Alpine	4.5*	5yr		1688.00			5.82			1.73		4433.87		4434.39	108.77	0.63
Alpine	4.5*	10yr		3624.00			6.27			1.29		4434.90		4435.51	308.98	0.81
Alpine	4.5*	25yr		5657.00			6.87			1.63		4435.68		4436.42	316.83	0.75
Alpine	4.5*	50yr		7379.00			7.64			2.00		4436.13		4437.04	321.28	0.78
Alpine	4.5*	100yr		10490.00			8.40			2.32		4437.00		4438.09	329.98	0.76
Alpine	4.5*	500yr		16703.00			9.26			2.59		4438.64		4439.97	346.38	0.72
Alpine	4.75*	2yr		430.00			3.87			0.93		4434.84		4435.07	74.34	0.56
Alpine	4.75*	5yr		1688.00			6.24			1.92		4436.77		4437.38	90.87	0.64
Alpine	4.75*	10yr		3624.00			7.31			1.74		4438.00		4438.83	209.97	0.84
Alpine	4.75*	25yr		5657.00			8.75			2.57		4438.70		4439.89	217.03	0.89
Alpine	4.75*	50yr		7379.00			9.60			3.08		4439.26		4440.69	222.57	0.91
Alpine	4.75*	100yr		10490.00			11.34			4.19		4439.95	4439.92	4441.95	229.49	1.00
Alpine	4.75*	500yr		16703.00			13.08			5.21		4441.44	4441.44	4444.09	244.35	1.01
Alpine	5	2yr		430.00			3.99			0.96		4437.58		4437.83	65.25	0.55
Alpine	5	5yr		1688.00			6.58			2.07		4439.66		4440.33	78.15	0.64
Alpine	5	10yr		3624.00			9.28			3.74		4441.26		4442.60	88.12	0.78
Alpine	5	25yr		5657.00			11.35			5.29		4442.44		4444.44	95.42	0.88
Alpine	5	50yr		7379.00			13.02			6.77		4443.14	4442.96	4445.77	99.77	0.96
Alpine	5	100yr		10490.00			14.64			8.16		4444.58	4444.58	4447.91	108.68	1.01
Alpine	5	500yr		16703.00			16.35			9.47		4447.19	4447.19	4451.34	124.91	1.01
Alpine	5.33333*	2yr		428.00			5.31			1.49		4438.59		4439.03	41.97	0.67
Alpine	5.33333*	5yr		1690.00			9.53			3.90		4440.69		4442.10	53.41	0.92
Alpine	5.33333*	10yr		3655.00			12.08			5.80		4442.77	4442.77	4445.03	67.34	1.00
Alpine	5.33333*	25yr		5736.00			13.31			6.69		4444.52	4444.52	4447.27	79.12	1.01
Alpine	5.33333*	50yr		7481.00			14.03			7.21		4445.75	4445.75	4448.81	87.38	1.00

HEC-RAS Plan: Oot C. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cmt. (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.O. Elev (ft)	Top Width (ft)	Fronda # Ch
Alpine	5.33333*	100yr		10612.00			15.11			8.03		4447.56	4447.56	4451.10	99.53	1.00
Alpine	5.33333*	500yr	3454.53	12942.12	427.35	2.11	10.93	1.70	0.74	3.81	0.49	4451.83	4451.83	4453.27	1237.96	0.61
Alpine	5.66	2yr		428.00			4.65			1.09		4439.77		4440.10	42.24	0.56
Alpine	5.66	5yr		1690.00			7.95			2.27		4442.53		4443.51	45.00	0.64
Alpine	5.66	10yr		3655.00			11.92			4.50		4444.56		4446.76	49.23	0.84
Alpine	5.66	25yr		5736.00			14.52			6.64		4446.22	4446.11	4449.50	58.52	0.99
Alpine	5.66	50yr		7481.00			15.13			7.32		4447.77	4447.77	4451.32	70.08	1.00
Alpine	5.66	100yr		10612.00			16.10			8.28		4449.88	4449.88	4453.90	85.88	1.02
Alpine	5.66	500yr	4884.68	11069.86	869.46	2.43	11.00	2.01	0.93	3.71	0.64	4453.40	4453.40	4454.67	1340.72	0.63
Alpine	5.75															
			Bridge													
Alpine	6	2yr		428.00			3.27			0.56		4440.59	4439.61	4440.76	62.14	0.40
Alpine	6	5yr		1690.00			4.74			0.80		4444.12	4441.32	4444.47	65.67	0.36
Alpine	6	10yr		3655.00			5.13			0.69		4449.35	4443.23	4449.75	70.90	0.28
Alpine	6	25yr		5736.00			6.60			1.05		4451.50	4444.88	4452.18	73.05	0.34
Alpine	6	50yr		7481.00			7.70			1.40		4452.89	4446.10	4453.81	970.82	0.38
Alpine	6	100yr	2936.34	6980.15	695.51	1.16	6.00	0.98	0.22	0.89	0.16	4455.11	4448.05	4455.48	1452.07	0.30
Alpine	6	500yr	4235.20	11608.37	980.43	1.86	10.20	1.61	0.60	2.60	0.44	4454.83	4451.38	4455.96	1417.11	0.52
Alpine	6.125*	2yr		428.00			4.17			1.00		4441.46	4440.92	4441.73	61.69	0.57
Alpine	6.125*	5yr		1690.00			5.68			1.23		4444.54	4442.65	4445.04	64.77	0.47
Alpine	6.125*	10yr		3655.00			5.78			0.93		4449.52	4444.56	4450.04	69.75	0.34
Alpine	6.125*	25yr		5736.00			7.27			1.35		4451.72	4446.20	4452.54	73.21	0.39
Alpine	6.125*	50yr		7481.00			8.31			1.75		4453.18	4447.44	4454.25	79.88	0.44
Alpine	6.125*	100yr	1073.59	9146.74	391.67	1.11	8.53	1.07	0.24	1.95	0.23	4455.10	4449.38	4456.08	1293.15	0.46
Alpine	6.125*	500yr		16824.00			17.27			7.78		4454.06	4452.99	4458.69	922.02	0.92
Alpine	6.25*	2yr		428.00			4.05			0.93		4442.83	4442.25	4443.08	61.74	0.54
Alpine	6.25*	5yr		1690.00			6.53			1.72		4445.26	4443.97	4445.92	64.17	0.57
Alpine	6.25*	10yr		3655.00			6.56			1.27		4449.75	4445.88	4450.42	68.65	0.41
Alpine	6.25*	25yr		5736.00			7.92			1.76		4452.03	4447.53	4453.01	78.30	0.46
Alpine	6.25*	50yr		7481.00			8.80			2.12		4453.58	4448.74	4454.78	84.84	0.49
Alpine	6.25*	100yr		10612.00			10.71			3.17		4455.16	4450.85	4456.94	422.00	0.59
Alpine	6.25*	500yr	4795.67	9257.24	2771.09	1.51	6.32	1.59	0.35	1.08	0.37	4459.26	4454.34	4459.62	1505.20	0.32
Alpine	6.375*	2yr		428.00			4.08			0.95		4444.13	4443.57	4444.39	61.72	0.55
Alpine	6.375*	5yr		1690.00			6.88			1.95		4446.38	4445.29	4447.11	63.96	0.62
Alpine	6.375*	10yr		3655.00			7.39			1.69		4450.15	4447.20	4451.00	67.74	0.48
Alpine	6.375*	25yr		5736.00			8.40			2.13		4452.56	4448.85	4453.66	84.30	0.52
Alpine	6.375*	50yr		7481.00			9.09			2.40		4454.16	4450.05	4455.44	90.66	0.53
Alpine	6.375*	100yr		10612.00			10.65			3.17		4456.01	4452.29	4457.77	250.98	0.59
Alpine	6.375*	500yr	2763.24	11498.05	2562.71	1.56	8.15	1.84	0.43	1.92	0.56	4459.40	4455.43	4460.12	1472.38	0.44

HEC-RAS Plan: Oat C. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Crnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch1
Alpine	6.5	2yr		428.00			4.62			1.18		4445.54	4445.03	4445.87	51.82	0.61
Alpine	6.5	5yr		1690.00			8.16			2.70		4447.71	4446.95	4448.74	53.99	0.73
Alpine	6.5	10yr		3655.00			9.77			3.14		4450.71	4449.10	4452.19	61.14	0.70
Alpine	6.5	25yr		5736.00			9.95			3.23		4453.25	4451.50	4454.78	85.85	0.68
Alpine	6.5	50yr		7481.00			10.43			3.37		4454.83	4452.61	4456.52	91.83	0.66
Alpine	6.5	100yr		10612.00			11.74			4.05		4456.79	4454.41	4458.93	237.74	0.69
Alpine	6.5	500yr		13634.75	2392.15	1.14	10.89	2.25	0.51	3.72	1.01	4459.69	4457.34	4461.20	1315.09	0.66
Alpine	6.7	Bridge														
Alpine	7	2yr		428.00			3.40			0.57		4446.73	4445.58	4446.91	52.46	0.39
Alpine	7	5yr		1690.00			6.27			1.43		4449.40	4447.51	4450.01	55.12	0.50
Alpine	7	10yr		3655.00			7.47			1.93		4452.59	4449.65	4453.45	83.09	0.54
Alpine	7	25yr		5736.00			8.36			2.21		4454.84	4451.90	4455.93	91.60	0.54
Alpine	7	50yr		7481.00			9.47			2.75		4455.95	4453.03	4457.34	95.78	0.58
Alpine	7	100yr		9548.05	1063.95		8.48	1.44	0.46	2.27		4459.03	4454.78	4460.04	1092.29	0.52
Alpine	7	500yr		10320.11	3936.43	1.18	6.85	1.87	0.41	1.40		4461.62	4459.79	4462.09	1501.66	0.38
Alpine	7.2*	2yr		428.00			3.76			0.78		4447.46	4446.75	4447.68	61.87	0.49
Alpine	7.2*	5yr		1690.00			5.83			1.31		4450.24	4448.47	4450.77	64.66	0.48
Alpine	7.2*	10yr		3655.00			7.16			1.71		4453.43	4450.38	4454.22	79.12	0.50
Alpine	7.2*	25yr		5736.00			8.32			2.14		4455.58	4451.99	4456.66	87.03	0.52
Alpine	7.2*	50yr		7481.00			9.37			2.62		4456.81	4453.49	4458.17	91.52	0.56
Alpine	7.2*	100yr		10612.00			9.93			2.95		4459.51	4455.34	4461.05	697.77	0.58
Alpine	7.2*	500yr		14688.52	319.57	1.34	11.07	0.23	0.62	3.61	0.98	4461.55	4458.46	4463.22	1557.80	0.61
Alpine	7.4*	2yr		428.00			4.14			0.98		4448.60	4448.05	4448.86	61.70	0.56
Alpine	7.4*	5yr		1690.00			6.61			1.77		4451.02	4449.78	4451.70	64.12	0.58
Alpine	7.4*	10yr		3655.00			8.09			2.10		4454.01	4451.69	4455.03	67.11	0.55
Alpine	7.4*	25yr		5736.00			9.43			2.71		4456.15	4453.33	4457.53	76.98	0.59
Alpine	7.4*	50yr		7481.00			10.55			3.28		4457.42	4454.67	4459.15	81.48	0.63
Alpine	7.4*	100yr		10612.00			11.24			3.66		4460.11	4456.67	4462.07	315.19	0.64
Alpine	7.4*	500yr		14531.59	294.91	1.36	11.85	0.22	0.65	4.01	0.94	4462.67	4462.67	4464.56	1661.05	0.64
Alpine	7.6*	2yr		428.00			4.62			1.18		4450.03	4449.52	4450.36	51.82	0.61
Alpine	7.6*	5yr		1690.00			8.26			2.78		4452.15	4451.45	4453.21	53.93	0.75
Alpine	7.6*	10yr		3655.00			10.79			3.84		4454.58	4453.59	4456.39	56.36	0.78
Alpine	7.6*	25yr		5736.00			12.54			4.75		4456.61	4455.42	4459.05	61.73	0.81
Alpine	7.6*	50yr		7481.00			13.96			5.72		4457.84	4456.92	4460.87	65.93	0.86
Alpine	7.6*	100yr		10612.00			14.72			6.24		4460.44	4459.11	4463.80	79.59	0.86
Alpine	7.6*	500yr		10823.22	2350.34	1.62	9.91	1.41	0.58	2.72	0.70	4464.43	4464.11	4465.42	1828.10	0.52
Alpine	7.8	2yr		428.00			5.05			1.33		4451.59	4451.03	4451.98	42.07	0.63
Alpine	7.8	5yr		1690.00			9.11			3.15		4453.92	4453.26	4455.21	44.40	0.79
Alpine	7.8	10yr		3655.00			12.73			5.11		4456.15	4455.71	4458.67	46.63	0.90

HEC-RAS Plan: 001 C. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cntl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chen (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ctl
Alpine	7.8	25yr		5736.00			15.16			6.57		4458.06	4457.87	4461.63	50.03	0.97
Alpine	7.8	50yr		7481.00			16.42			7.51		4459.53	4459.53	4463.72	54.84	1.00
Alpine	7.8	100yr		10612.00			17.13			8.50		4462.13	4462.13	4466.69	156.45	1.03
Alpine	7.8	500yr		4553.91	2462.53	1.83	10.96	1.50	0.73	3.27	0.81	4465.63	4465.63	4466.73	1941.92	0.58
Alpine	7.9	2yr		428.00			5.18			0.80		4452.30	4451.80	4452.71	42.01	0.65
Alpine	7.9	5yr		1690.00			8.67			1.79		4454.89	4454.02	4456.06	44.60	0.73
Alpine	7.9	10yr		3655.00			11.18			2.59		4457.75	4456.48	4459.69	48.07	0.76
Alpine	7.9	25yr		5736.00			12.45			2.95		4460.40	4458.62	4462.81	52.94	0.74
Alpine	7.9	50yr		7481.00			13.11			3.32		4462.36	4460.17	4465.03	128.71	0.75
Alpine	7.9	100yr		4071.39	1959.34	0.85	4.76	0.69	0.13	0.43	0.15	4468.00	4462.89	4468.15	2110.00	0.23
Alpine	7.9	500yr		4671.01	2273.52	1.66	11.58	1.32	0.59	2.62	0.62	4466.46	4466.46	4467.70	2016.60	0.59
Alpine	7.95		Bridge													
Alpine	8	2yr		428.00			4.83			1.19		4452.99	4452.34	4453.35	42.16	0.59
Alpine	8	5yr		1690.00			8.16			2.42		4455.71	4454.57	4456.74	44.88	0.67
Alpine	8	10yr		3655.00			7.89			1.48		4461.34	4457.02	4462.25	50.51	0.44
Alpine	8	25yr		882.17	4490.21	0.77	6.27	0.52	0.11	0.98	0.12	4465.50	4459.12	4465.98	1761.06	0.33
Alpine	8	50yr		1123.10	5928.27	1.07	8.35	0.66	0.20	1.74	0.21	4465.41	4460.65	4466.27	1679.86	0.44
Alpine	8	100yr		4237.05	1943.22	0.95	5.01	0.76	0.17	0.58	0.18	4468.13	4466.05	4468.30	2140.82	0.24
Alpine	8	500yr		6458.02	7406.73	1.57	8.53	1.25	0.48	1.70	0.50	4467.88	4466.95	4468.40	2125.17	0.41
Alpine	8.33333*	2yr		428.00			4.74			1.14		4453.82	4453.15	4454.17	42.19	0.57
Alpine	8.33333*	5yr		1690.00			8.08			2.36		4456.55	4455.37	4457.57	44.92	0.66
Alpine	8.33333*	10yr		3655.00			8.12			1.81		4461.60	4457.82	4462.63	54.15	0.50
Alpine	8.33333*	25yr		205.41	5530.59	0.69	8.14		0.15	1.78		4465.44	4459.94	4466.43	1058.75	0.44
Alpine	8.33333*	50yr		7481.00			11.23			3.40		4465.23	4461.70	4467.19	623.61	0.62
Alpine	8.33333*	100yr		3080.26	5493.47	1.06	6.41	0.82	0.24	1.03	0.24	4468.14	4464.13	4468.48	2257.36	0.31
Alpine	8.33333*	500yr		4581.77	9234.62	1.74	10.96	1.34	0.65	3.04	0.65	4467.92	4467.92	4468.96	2239.80	0.54
Alpine	8.66666*	2yr		428.00			4.75			1.15		4454.62	4454.62	4454.97	42.19	0.57
Alpine	8.66666*	5yr		1690.00			8.07			2.36		4457.36	4457.36	4458.37	44.92	0.66
Alpine	8.66666*	10yr		3655.00			8.32			2.08		4461.99	4461.99	4463.06	58.51	0.54
Alpine	8.66666*	25yr		0.00	5736.00	0.03	8.58		0.00	2.08		4465.68	4461.05	4466.83	72.23	0.47
Alpine	8.66666*	50yr		5.22	7475.78	0.34	10.92		0.05	3.36		4465.93	4462.49	4467.78	184.47	0.60
Alpine	8.66666*	100yr		1755.08	7312.79	1.14	8.82	0.87	0.32	2.10	0.31	4468.08	4468.92	4468.92	2273.68	0.44
Alpine	8.66666*	500yr		3657.09	9909.69	1.72	11.42	1.32	0.66	3.47	0.66	4468.65	4468.65	4469.86	2370.40	0.56
Alpine	9	2yr		428.00			4.75			1.15		4455.42	4455.42	4455.77	42.19	0.57
Alpine	9	5yr		1690.00			8.07			2.35		4458.16	4459.17	4459.17	44.93	0.66
Alpine	9	10yr		3655.00			7.91			2.21		4462.66	4463.63	4463.63	84.85	0.60
Alpine	9	25yr		5736.00			6.55			1.44		4466.63	4467.30	4467.30	122.76	0.43
Alpine	9	50yr		96.50	7192.90	0.47	7.07	0.48	0.08	1.63	0.13	4467.77	4468.51	4468.51	1327.68	0.44
Alpine	9	100yr		525.71	724.63	0.87	8.58	0.68	0.23	2.36	0.24	4468.34	4469.35	4469.35	2243.05	0.52

HEC-RAS Plan: Oot C. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cntrl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/ft ²)	Shear Chan (lb/ft ²)	Shear ROB (lb/ft ²)	W.S. Elev (ft)	Crit.W.S. (ft)	E.Q. Elev (ft)	Top Width (ft)	Fraude # Cnl
Alpine	9	500yr	2331.83	11427.58	3064.59	1.46	9.28	1.16	0.51	2.65	0.53	4469.46		4470.37	2578.67	0.52
Alpine	9.3	Bridge														
Alpine	9.5	2yr		428.00			3.38			0.51		4458.93	4455.39	4457.11	43.05	0.35
Alpine	9.5	5yr		1690.00			5.99			1.14		4460.40	4457.62	4460.96	46.52	0.43
Alpine	9.5	10yr		3666.00			6.17			1.35		4464.41	4460.09	4465.00	101.83	0.45
Alpine	9.5	25yr		5724.50	30.53	0.25	6.14	0.23	0.03	1.26	0.04	4467.34	4463.98	4467.92	937.45	0.40
Alpine	9.5	50yr		5699.51	1045.27	0.89	5.01	0.55	0.12	0.80	0.13	4468.95	4463.98	4469.25	2448.73	0.30
Alpine	9.5	100yr		6625.35	2279.43	0.92	5.34	0.73	0.19	0.88	0.20	4469.77	4465.73	4470.05	2644.18	0.30
Alpine	9.5	500yr		8518.43	4734.61	1.26	6.26	1.03	0.32	1.18	0.36	4470.72	4469.21	4471.03	2758.17	0.34
Alpine	9.56866*	2yr		428.00			4.30			0.91		4457.39		4457.68	42.41	0.49
Alpine	9.56866*	5yr		1690.00			6.72			1.51		4460.84		4461.54	45.85	0.51
Alpine	9.56866*	10yr		3666.00			7.43			1.80		4464.80		4465.66	71.21	0.50
Alpine	9.56866*	25yr		5765.00			8.30			2.10		4467.52		4468.59	76.56	0.49
Alpine	9.56866*	50yr		7188.85	327.28	0.19	9.06	0.64	0.02	2.43	0.21	4468.79		4470.01	824.58	0.50
Alpine	9.56866*	100yr		9729.45	876.57	0.82	11.68	0.85	0.15	3.99	0.37	4469.29		4471.23	1556.56	0.64
Alpine	9.56866*	500yr		10843.56	5028.50	1.34	11.19	1.46	0.46	3.50	0.77	4471.00	4471.00	4472.26	2141.65	0.57
Alpine	9.63333*	2yr		428.00			4.72			1.13		4458.29		4458.64	42.20	0.57
Alpine	9.63333*	5yr		1690.00			7.35			1.88		4461.48		4462.31	45.38	0.58
Alpine	9.63333*	10yr		3666.00			8.13			1.99		4465.33		4466.36	67.38	0.55
Alpine	9.63333*	25yr		5765.00			8.72			2.18		4468.03		4469.21	83.63	0.55
Alpine	9.63333*	50yr		7276.09	240.91		9.43	0.67		2.47	0.24	4469.31		4470.65	575.25	0.56
Alpine	9.63333*	100yr		8628.34	1970.88	0.70	9.35	0.97	0.16	2.31	0.39	4471.01		4472.11	1571.16	0.51
Alpine	9.63333*	500yr		12996.92	3728.28	1.15	13.70	1.53	0.41	4.92	0.93	4471.29		4473.55	1649.43	0.74
Alpine	9.7	2yr		428.00			4.75			1.15		4459.39		4459.74	42.19	0.57
Alpine	9.7	5yr		1690.00			7.75			2.13		4462.32		4463.25	45.12	0.62
Alpine	9.7	10yr		3666.00			8.56			2.25		4466.00		4467.13	68.09	0.60
Alpine	9.7	25yr		5764.98	0.02		9.28	0.04		2.48	0.00	4468.61		4469.95	150.15	0.59
Alpine	9.7	50yr		7254.16	262.84		9.84	0.79		2.76	0.32	4469.94		4471.39	503.50	0.62
Alpine	9.7	100yr		9221.65	1431.19	0.47	10.46	1.01	0.10	3.01	0.46	4471.42		4472.89	1305.65	0.62
Alpine	9.7	500yr		10157.86	6476.12	1.10	9.06	1.39	0.30	2.09	0.64	4473.60		4474.58	1795.13	0.48
Alpine	9.73	Bridge														
Alpine	9.75	2yr		428.00			3.76			0.65		4459.95	4458.72	4460.17	42.75	0.41
Alpine	9.75	5yr		1690.00			4.76			0.73		4464.88	4460.94	4465.23	63.39	0.35
Alpine	9.75	10yr		3666.00			6.15			1.09		4468.30	4463.81	4468.89	79.30	0.39
Alpine	9.75	25yr		5331.79	433.21		6.66	0.66		1.26	0.20	4470.60	4465.70	4471.24	678.78	0.41
Alpine	9.75	50yr		6079.86	1427.29	0.43	6.57	0.73	0.07	1.17	0.22	4471.85	4467.03	4472.40	1394.77	0.38
Alpine	9.75	100yr		7050.07	3515.13	0.71	6.68	0.95	0.14	1.16	0.32	4473.15	4470.68	4473.62	1660.69	0.36
Alpine	9.75	500yr		8968.09	7542.03	1.02	7.46	1.27	0.24	1.38	0.49	4474.63	4472.68	4475.10	1865.31	0.38

HEC-RAS Plan: Oot C. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Cut W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	9.8*	2yr		428.00			5.34			1.52		4460.27		4460.71	41.95	0.68
Alpine	9.8*	5yr		1690.00			5.68			1.06		4464.98		4465.48	57.06	0.44
Alpine	9.8*	10yr		3666.00			7.12			1.48		4468.39		4469.18	69.61	0.46
Alpine	9.8*	25yr		5202.01	562.99		7.48	0.77		1.60	0.27	4470.71		4471.50	697.07	0.46
Alpine	9.8*	50yr	14.89	5738.44	1763.67	0.52	7.11	0.84	0.09	1.36	0.28	4471.98		4472.58	1419.78	0.41
Alpine	9.8*	100yr	111.30	6496.86	4047.84	0.79	7.06	1.04	0.17	1.30	0.37	4473.27		4473.75	1684.95	0.38
Alpine	9.8*	500yr	413.14	8040.18	8413.68	1.08	7.63	1.34	0.27	1.46	0.55	4474.79		4475.23	1868.69	0.39
Alpine	9.9*	2yr		428.00			4.65			1.09		4461.66		4461.99	42.24	0.56
Alpine	9.9*	5yr		1690.00			6.45			1.44		4465.41		4466.06	52.19	0.51
Alpine	9.9*	10yr		3664.03	1.97		8.05	0.18		1.91	0.03	4468.75		4469.75	163.54	0.52
Alpine	9.9*	25yr	0.18	5019.78	745.05	0.16	8.12	0.70	0.03	1.89	0.24	4471.11		4472.00	1241.81	0.50
Alpine	9.9*	50yr	26.54	5035.51	2454.95	0.48	7.04	0.92	0.12	1.35	0.33	4472.38		4472.90	1501.39	0.40
Alpine	9.9*	100yr	120.32	5694.55	4841.13	0.66	7.05	1.10	0.19	1.30	0.41	4473.60		4474.02	1749.90	0.38
Alpine	9.9*	500yr	387.83	6949.46	9529.71	0.86	7.53	1.40	0.28	1.43	0.58	4475.11		4475.49	1881.29	0.38
Alpine	10	2yr		428.00			4.74			1.14		4462.72	4462.04	4463.07	42.20	0.57
Alpine	10	5yr		1690.00			7.15			1.80		4466.02	4464.27	4466.82	48.31	0.57
Alpine	10	10yr		3666.00			9.05			2.44		4469.22	4468.86	4470.49	295.66	0.59
Alpine	10	25yr	10.01	4026.42	1728.56	0.40	7.10	0.84	0.09	1.41	0.29	4471.91	4468.80	4472.46	1429.70	0.42
Alpine	10	50yr	48.63	4286.06	3182.31	0.55	6.87	0.97	0.15	1.28	0.34	4472.79	4470.39	4473.21	1628.30	0.39
Alpine	10	100yr	160.95	4828.82	5666.22	0.70	6.93	1.12	0.20	1.26	0.41	4473.93	4472.43	4474.28	1889.31	0.37
Alpine	10	500yr	457.59	5796.31	10613.10	0.88	7.31	1.38	0.28	1.34	0.56	4475.43	4473.42	4475.73	2041.62	0.37
Alpine	10.3333*	2yr		428.00			4.75			1.15		4463.69	4463.02	4464.04	42.19	0.57
Alpine	10.3333*	5yr		1690.00			7.37			1.99		4467.75	4465.29	4467.60	49.74	0.61
Alpine	10.3333*	10yr		3666.00			9.24			2.64		4469.90	4467.71	4471.22	58.47	0.62
Alpine	10.3333*	25yr		5765.00			12.07			4.30		4471.25	4469.79	4473.51	331.45	0.76
Alpine	10.3333*	50yr		7517.00			15.69			7.27		4471.27	4471.27	4475.09	338.79	0.99
Alpine	10.3333*	100yr	16.47	7065.46	3574.07	0.52	10.65	1.46	0.18	3.22	0.82	4473.86	4473.86	4475.04	1410.58	0.64
Alpine	10.3333*	500yr	235.11	8548.67	8083.22	1.01	11.07	1.84	0.45	3.30	1.12	4475.30	4474.88	4476.29	1716.44	0.61
Alpine	10.6666*	2yr		428.00			4.75			1.15		4464.67	4463.99	4465.02	42.19	0.57
Alpine	10.6666*	5yr		1690.00			7.24			1.96		4467.63	4466.30	4468.44	53.08	0.61
Alpine	10.6666*	10yr		3666.00			8.89			2.55		4470.77	4468.56	4472.00	60.67	0.60
Alpine	10.6666*	25yr		5765.00			10.51			3.37		4472.90	4470.47	4474.62	248.63	0.66
Alpine	10.6666*	50yr	53.17	4482.47	2981.36	0.37	5.46	0.90	0.07	0.86	0.28	4476.29	4471.85	4476.57	1510.86	0.32
Alpine	10.6666*	100yr		10656.00			16.19			7.88		4474.41	4474.41	4478.48	1085.82	0.99
Alpine	10.6666*	500yr	114.81	10092.30	6659.89	0.82	12.33	2.03	0.36	4.37	1.42	4476.26	4476.26	4477.70	1507.74	0.71
Alpine	11	2yr		428.00			3.88			0.78		4465.62	4464.76	4465.85	52.16	0.47
Alpine	11	5yr		1690.00			5.86			1.30		4468.65	4466.74	4469.18	61.76	0.48
Alpine	11	10yr		3666.00			7.42			1.78		4471.83	4468.75	4472.69	67.62	0.48
Alpine	11	25yr		5765.00			8.72			2.29		4474.22	4470.49	4475.40	246.52	0.51

HEC-RAS Plan: Oat C. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	11.6333*	2yr		427.00		4.37				1.03		4469.63		4469.92	51.92	0.56
Alpine	11.6333*	5yr		1691.00		6.86				1.94		4472.20		4472.93	68.24	0.64
Alpine	11.6333*	10yr		3670.00		8.34				2.48		4474.77		4475.85	79.99	0.63
Alpine	11.6333*	25yr		5777.00		9.44				2.89		4476.89		4478.27	82.44	0.61
Alpine	11.6333*	50yr	0.11	7317.16	216.73	0.16			0.63	2.47	0.26	4479.20		4480.45	470.15	0.52
Alpine	11.6333*	100yr	6.64	10047.87	620.49	0.52			1.01	4.00	0.59	4479.86		4481.86	578.46	0.64
Alpine	11.6333*	500yr	165.12	13429.17	3292.71	1.16			1.47	4.72	1.04	4481.85	4481.85	4483.97	1127.72	0.66
Alpine	11.7	2yr		427.00		4.99				1.33		4470.90	4470.41	4471.29	45.48	0.64
Alpine	11.7	5yr		1691.00		7.77				2.49		4473.38	4472.52	4474.32	56.39	0.70
Alpine	11.7	10yr		3670.00		10.52				3.99		4475.67	4474.60	4477.39	58.17	0.76
Alpine	11.7	25yr		5777.00		12.62				5.32		4477.52	4476.41	4479.99	59.61	0.80
Alpine	11.7	50yr	0.02	7503.94	30.04	0.19			0.89	5.48	0.55	4479.35	4477.75	4482.05	299.63	0.76
Alpine	11.7	100yr	38.19	9348.14	1288.67	1.12			1.46	5.37	1.09	4481.41	4481.41	4483.90	550.18	0.70
Alpine	11.7	500yr	299.84	11238.23	5348.93	1.62			1.65	4.59	1.19	4484.32	4484.32	4486.08	1189.20	0.60
Alpine	11.9		Bridge													
Alpine	12	2yr		427.00		2.78				0.36		4472.65	4470.91	4472.77	55.82	0.29
Alpine	12	5yr		1691.00		5.04				0.94		4475.83	4472.94	4476.23	58.29	0.37
Alpine	12	10yr	3.80	3422.45	243.76	0.34			0.50	0.97	0.15	4480.47	4475.01	4480.92	455.21	0.31
Alpine	12	25yr	7.199	4427.58	1277.43	0.65			0.62	0.93	0.19	4483.17	4476.81	4483.56	1087.88	0.28
Alpine	12	50yr	81.52	6022.36	1430.11	0.87			0.81	1.83	0.34	4482.85	4478.12	4483.64	1029.02	0.40
Alpine	12	100yr	206.54	6774.76	3693.70	1.02			1.06	1.73	0.48	4484.55	4481.59	4485.17	1193.09	0.37
Alpine	12	500yr	402.48	8483.25	8001.27	0.98			1.46	2.02	0.78	4486.44	4484.32	4487.06	1292.28	0.38
Alpine	12.5	2yr		427.00		3.59				0.59		4472.75	4471.39	4472.95	42.87	0.38
Alpine	12.5	5yr		1691.00		6.34				1.40		4475.90	4473.64	4476.53	51.35	0.49
Alpine	12.5	10yr		3675.00		7.06				1.40		4480.42	4476.14	4481.20	260.95	0.42
Alpine	12.5	25yr		5790.00		8.62				1.92		4482.90	4478.17	4484.05	679.55	0.46
Alpine	12.5	50yr		7550.00		11.80				3.65		4482.38	4479.59	4484.54	489.40	0.65
Alpine	12.5	100yr	2.17	7862.11	3010.72	0.33			1.25	2.53	0.66	4484.47	4481.80	4485.57	1147.54	0.53
Alpine	12.5	500yr	205.30	9094.52	7606.18	1.29			1.69	2.38	0.97	4486.48	4485.24	4487.31	1209.66	0.49
Alpine	12.5666*	2yr		427.00		4.16				0.84		4473.05	4472.07	4473.32	42.48	0.47
Alpine	12.5666*	5yr		1691.00		6.52				1.54		4476.28	4474.37	4476.94	55.35	0.53
Alpine	12.5666*	10yr		3675.00		6.82				1.41		4480.73	4476.77	4481.45	74.33	0.45
Alpine	12.5666*	25yr		5211.45	578.55	6.77			0.70	1.28	0.24	4483.68	4478.67	4484.32	617.90	0.38
Alpine	12.5666*	50yr		6614.34	935.66	8.23			0.87	1.87	0.36	4484.10	4480.12	4485.02	739.50	0.46
Alpine	12.5666*	100yr		8920.89	1774.11	10.58			1.25	3.05	0.69	4484.60	4482.24	4486.05	787.37	0.57
Alpine	12.5666*	500yr	25.88	12157.64	4722.47	0.80			1.78	4.10	1.22	4486.19	4485.65	4487.96	1024.47	0.63
Alpine	12.6333*	2yr		427.00		4.54				1.03		4473.53	4472.76	4473.85	42.28	0.54
Alpine	12.6333*	5yr		1691.00		6.17				1.47		4476.82	4475.10	4477.41	69.47	0.55

HEC-RAS Plan: Oot C. River, Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	G Left (cfs)	G Channel (cfs)	G Right (cfs)	Vel Left (ft/s)	Vel Chrtl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # C/N
Alpine	12.6333*	10yr		3675.00		5.72				1.03		4481.23	4477.43	4481.74	86.38	0.37
Alpine	12.6333*	25yr		5561.54	228.46	6.36		0.49		1.17	0.14	4483.90	4478.95	4484.51	557.80	0.35
Alpine	12.6333*	50yr		7002.47	547.53	7.59		0.75		1.63	0.27	4484.46	4479.94	4485.29	583.32	0.41
Alpine	12.6333*	100yr		9391.56	1303.44	9.46		1.14		2.48	0.56	4485.26	4481.56	4486.48	622.74	0.40
Alpine	12.6333*	500yr	0.18	13429.59	3476.23	12.07		1.81	0.02	3.91	1.22	4486.64	4485.66	4488.44	684.91	0.60
Alpine	12.7	2yr		427.00		4.63				1.11		4474.18		4474.51	47.00	0.58
Alpine	12.7	5yr		1691.00		4.36				0.73		4477.53		4477.82	93.51	0.38
Alpine	12.7	10yr		3675.00		4.79				0.72		4481.58		4481.93	94.30	0.30
Alpine	12.7	25yr		5718.21	71.79	5.63		0.31		0.92	0.06	4484.20		4484.68	464.00	0.30
Alpine	12.7	50yr		7280.71	269.29	6.76		0.57		1.30	0.17	4484.84		4485.53	479.04	0.35
Alpine	12.7	100yr		9878.82	816.18	8.47		0.97		1.99	0.41	4485.78		4486.81	501.03	0.43
Alpine	12.7	500yr		14547.61	2358.99	11.18		1.63		3.35	0.99	4487.21		4488.88	533.41	0.53
Alpine	12.9															
			Culvert													
Alpine	13	2yr		427.00		6.94				2.83		4474.00	4474.00	4474.75	41.51	1.01
Alpine	13	5yr		1691.00		4.52				0.80		4477.63	4475.78	4477.94	93.53	0.40
Alpine	13	10yr		3675.00		4.83				0.74		4481.75	4477.24	4482.11	94.34	0.30
Alpine	13	25yr		5692.41	97.59	5.67		0.36		0.94	0.08	4484.32	4478.53	4484.81	466.82	0.31
Alpine	13	50yr		7230.45	319.55	6.78		0.61		1.32	0.19	4484.97	4479.48	4485.65	482.02	0.36
Alpine	13	100yr		9800.59	894.41	8.50		1.01		2.02	0.44	4485.89	4481.01	4486.92	503.55	0.43
Alpine	13	500yr		14496.27	2409.73	11.35		1.67		3.50	1.04	4487.20	4485.18	4488.92	533.23	0.55
Alpine	13.25*	2yr		427.00		4.53				1.03		4475.19		4475.51	42.29	0.53
Alpine	13.25*	5yr		1691.00		7.38				2.24		4477.63		4478.47	69.92	0.72
Alpine	13.25*	10yr		3678.00		6.05				1.23		4481.75		4482.32	102.60	0.44
Alpine	13.25*	25yr		5691.70	104.30	6.52		0.41		1.27	0.12	4484.33		4484.98	467.06	0.40
Alpine	13.25*	50yr		7202.90	355.10	7.64		0.71		1.71	0.28	4485.00		4485.87	482.68	0.45
Alpine	13.25*	100yr		9708.02	995.98	9.32		1.14		2.47	0.60	4485.96		4487.18	505.19	0.52
Alpine	13.25*	500yr		14257.93	2658.07	12.00		1.82		3.94	1.32	4487.36		4489.26	535.61	0.63
Alpine	13.5	2yr		427.00		4.66				1.10		4475.55	4474.83	4475.99	42.23	0.56
Alpine	13.5	5yr		1691.00		8.11				2.58		4476.04	4477.17	4479.06	56.43	0.74
Alpine	13.5	10yr		3678.00		7.94				2.13		4481.68	4479.59	4482.66	83.52	0.59
Alpine	13.5	25yr		5796.00		8.30				2.16		4484.21	4481.37	4485.28	444.43	0.56
Alpine	13.5	50yr		7184.78	373.22	9.32		0.67		2.66	0.45	4484.91	4482.59	4486.19	473.19	0.61
Alpine	13.5	100yr		9573.19	1130.81	10.89		1.39		3.52	0.97	4485.91	4485.20	4487.57	500.54	0.68
Alpine	13.5	500yr	2.86	13830.92	3082.22	13.12		2.12	0.16	4.86	1.90	4487.48	4487.05	4489.68	561.21	0.76
Alpine	13.75*	2yr		427.00		4.70				1.12		4475.94	4475.24	4476.28	42.21	0.57
Alpine	13.75*	5yr		1691.00		7.75				2.31		4478.64	4477.53	4479.58	53.01	0.67
Alpine	13.75*	10yr		3678.00		8.93				2.60		4481.87	4479.94	4483.11	68.72	0.64
Alpine	13.75*	25yr		5796.00		9.49				2.81		4484.32	4481.95	4485.72	91.43	0.65
Alpine	13.75*	50yr		7558.00		11.38				4.00		4484.90	4483.40	4486.91	96.15	0.76

HEC-RAS Plan: Ont C River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cntl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ctl
Alpine	13.75*	100yr		10704.00		14.72				6.60		4485.53	4485.32	4488.90	101.40	0.97
Alpine	13.75*	500yr		15872.21	1043.79	14.24		1.51		5.60	1.18	4489.03	4489.03	4491.99	483.16	0.81
Alpine	14	2yr		427.00		4.37				1.00		4476.38	4476.65	4476.68	48.46	0.54
Alpine	14	5yr		1691.00		6.42				1.58		4479.38	4477.77	4480.02	62.25	0.55
Alpine	14	10yr		3678.00		7.69				1.89		4482.56	4479.93	4483.48	72.70	0.53
Alpine	14	25yr		5796.00		8.92				2.33		4484.81	4481.69	4486.04	80.06	0.55
Alpine	14	50yr		7558.00		10.56				3.17		4485.62	4482.94	4487.35	82.30	0.63
Alpine	14	100yr		10704.00		12.67				4.39		4487.17	4484.90	4489.66	87.47	0.72
Alpine	14	500yr		16916.00		16.90				7.74		4488.83	4488.27	4493.26	100.51	0.94
Alpine	14.3															
				Bridge												
Alpine	14.5	2yr		427.00		3.60				0.64		4477.02	4475.88	4477.22	51.25	0.42
Alpine	14.5	5yr		1691.00		5.70				1.21		4480.08	4477.97	4480.58	64.42	0.47
Alpine	14.5	10yr		3681.00		7.09				1.58		4483.27	4480.12	4484.05	74.90	0.47
Alpine	14.5	25yr		5806.00		8.25				1.95		4485.62	4481.87	4486.68	82.17	0.50
Alpine	14.5	50yr		7570.00		9.41				2.45		4486.83	4483.12	4488.20	84.83	0.54
Alpine	14.5	100yr		10562.02	156.98	8.60		0.50		1.98	0.17	4491.02	4485.08	4492.15	495.65	0.47
Alpine	14.5	500yr		16930.00		14.12				5.36		4490.76	4488.44	4493.86	455.52	0.77
Alpine	14.6666*	2yr		427.00		4.33				0.92		4477.32	4477.32	4477.61	42.39	0.50
Alpine	14.6666*	5yr		1691.00		6.95				1.80		4480.31	4480.31	4481.06	55.14	0.58
Alpine	14.6666*	10yr		3681.00		8.54				2.30		4483.41	4483.41	4484.54	65.86	0.59
Alpine	14.6666*	25yr		5806.00		9.79				2.80		4485.72	4485.72	4487.21	75.84	0.62
Alpine	14.6666*	50yr		7570.00		10.95				3.45		4486.96	4486.96	4488.82	84.17	0.67
Alpine	14.6666*	100yr		9917.47	774.47	9.06		0.80		2.14	0.34	4491.21	4491.21	4492.39	779.38	0.48
Alpine	14.6666*	500yr		13205.08	3405.41	9.99		1.37		2.45	0.77	4493.53	4493.53	4494.75	1008.65	0.48
Alpine	14.8333*	2yr		427.00		4.50				1.01		4477.77	4477.77	4478.08	42.31	0.53
Alpine	14.8333*	5yr		1691.00		7.56				2.02		4480.71	4480.71	4481.59	46.15	0.60
Alpine	14.8333*	10yr		3681.00		9.71				2.90		4483.70	4483.70	4485.16	57.33	0.67
Alpine	14.8333*	25yr		5806.00		10.95				3.57		4486.01	4486.01	4487.88	72.89	0.72
Alpine	14.8333*	50yr		7568.39	1.61	12.05		0.42		4.21	0.09	4487.30	4487.30	4489.55	105.76	0.75
Alpine	14.8333*	100yr		6855.51	3635.64	6.70		1.33		1.11	0.31	4492.30	4492.30	4492.75	1128.79	0.33
Alpine	14.8333*	500yr		7993.02	8238.76	6.47		1.63		0.97	0.39	4494.81	4494.81	4495.13	1416.92	0.29
Alpine	15	2yr		427.00		4.24				1.78		4478.43	4478.43	4478.71	42.44	0.49
Alpine	15	5yr		1691.00		7.03				5.81		4481.61	4481.61	4482.37	45.62	0.54
Alpine	15	10yr		3681.00		9.53				9.95		4484.62	4484.62	4486.03	55.22	0.63
Alpine	15	25yr		4733.99	1005.27	8.07		1.82		5.99	0.81	4487.99	4487.99	4488.82	596.24	0.45
Alpine	15	50yr		3662.71	3448.88	5.34		1.65		2.45	0.53	4490.27	4490.27	4490.51	1085.82	0.27
Alpine	15	100yr		491.84	3137.67	3.57		1.50		1.02	0.35	4492.87	4492.87	4492.95	1423.28	0.16
Alpine	15	500yr		1228.12	3457.13	3.39		1.64		0.88	0.38	4495.21	4495.21	4495.27	1700.70	0.14

HEC-RAS Plan: Out C. River, Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Flight (ft/s)	Shear LOB (ft/sq ft)	Shear Chan (ft/sq ft)	Shear ROB (ft/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	15.05	Bridge														
Alpine	15.1	2yr		419.00			2.19			0.18		4480.51	4477.48	4480.59	44.53	0.19
Alpine	15.1	5yr		1699.00			4.65			0.64		4484.23	4479.75	4484.56	52.66	0.31
Alpine	15.1	10yr		3546.61	249.17	0.48	6.36	0.72	0.12	1.09	0.13	4487.51	4482.36	4488.10	446.64	0.37
Alpine	15.1	25yr		4703.17	1350.69	0.76	7.18	1.11	0.23	1.32	0.26	4489.13	4484.97	4489.75	797.51	0.38
Alpine	15.1	50yr		197.77	5101.24	0.84	6.94	1.19	0.26	1.19	0.27	4490.47	4488.26	4490.95	1113.80	0.35
Alpine	15.1	100yr		414.22	4869.88	0.62	5.53	1.25	0.14	0.71	0.24	4492.90	4489.46	4493.12	1428.06	0.25
Alpine	15.1	500yr		1079.81	5626.70	0.71	5.51	1.44	0.16	0.67	0.29	4495.22	4491.04	4495.39	1701.42	0.24
Alpine	15.1666*	2yr		419.00			2.76			0.31		4480.55		4480.66	43.63	0.26
Alpine	15.1666*	5yr		1699.00			5.28			0.83		4484.28		4484.71	47.36	0.36
Alpine	15.1666*	10yr		3790.35	20.64	0.13	7.59	0.61	0.02	1.62	0.12	4487.50		4488.39	129.14	0.47
Alpine	15.1666*	25yr		5892.63	242.26	0.66	10.13	0.99	0.21	2.74	0.27	4488.85		4490.38	389.23	0.56
Alpine	15.1666*	50yr		64.71	6820.07	0.97	10.31	1.38	0.36	2.72	0.43	4490.15		4491.56	677.15	0.55
Alpine	15.1666*	100yr		288.25	6591.46	0.93	8.01	1.49	0.28	1.53	0.40	4492.78		4493.38	1192.10	0.39
Alpine	15.1666*	500yr		788.89	7269.91	0.90	7.50	1.72	0.24	1.27	0.45	4495.17		4495.56	1535.40	0.33
Alpine	15.3333*	2yr		419.00			3.44			0.53		4480.76		4480.94	42.94	0.36
Alpine	15.3333*	5yr		1699.00			5.84			1.07		4484.53		4485.06	46.71	0.41
Alpine	15.3333*	10yr		3811.00			8.23			1.92		4487.88		4488.93	60.44	0.52
Alpine	15.3333*	25yr		6102.72	42.18	0.28	11.02	0.69	0.06	3.30	0.30	4489.35		4491.22	155.64	0.65
Alpine	15.3333*	50yr		4.88	7857.74	0.71	12.86	0.80	0.26	4.35	0.39	4490.26	4488.54	4492.78	317.12	0.73
Alpine	15.3333*	100yr		102.41	9776.91	1.24	13.27	1.25	0.57	4.35	0.73	4492.27		4494.65	771.82	0.68
Alpine	15.3333*	500yr		512.91	11542.42	1.42	12.93	1.66	0.65	3.87	1.03	4494.76		4496.49	1244.13	0.60
Alpine	15.5	2yr		419.00			4.14			0.84		4481.19		4481.46	42.45	0.47
Alpine	15.5	5yr		1699.00			6.42			1.34		4484.89		4485.53	46.15	0.47
Alpine	15.5	10yr		3811.00			8.77			2.16		4488.36		4489.56	56.33	0.56
Alpine	15.5	25yr		6136.99	8.01		11.38	0.51		3.53	0.20	4490.09		4492.10	101.94	0.68
Alpine	15.5	50yr		0.23	7922.70	0.40	13.04	0.92	0.11	4.48	0.49	4491.17	4489.38	4493.78	172.18	0.75
Alpine	15.5	100yr		45.90	10288.04	1.03	13.70	1.17	0.44	4.62	0.67	4493.40	4493.40	4496.07	650.48	0.70
Alpine	15.5	500yr		399.55	12508.60	1.39	13.70	1.63	0.65	4.32	1.03	4495.94		4498.04	1190.65	0.64
Alpine	15.55	Bridge														
Alpine	15.6	2yr		419.00			1.73			0.10		4484.39		4484.44	45.65	0.13
Alpine	15.6	5yr		1699.00			4.73			0.64		4486.89		4487.24	48.15	0.31
Alpine	15.6	10yr		3797.20	13.80		6.72	0.39		1.22	0.10	4490.50		4491.20	122.45	0.40
Alpine	15.6	25yr		5756.61	372.18	0.54	7.90	0.62	0.13	1.55	0.20	4493.06		4493.97	586.25	0.41
Alpine	15.6	50yr		111.49	6435.01	0.71	7.57	0.78	0.18	1.35	0.26	4494.96	4489.38	4495.68	1047.00	0.37
Alpine	15.6	100yr		333.82	7470.07	0.84	7.83	1.00	0.22	1.39	0.37	4496.58	4493.40	4497.22	1275.85	0.36
Alpine	15.6	500yr		878.81	9421.48	1.02	8.82	1.34	0.31	1.70	0.59	4498.36	4495.94	4499.03	1494.13	0.38
Alpine	15.75*	2yr		419.00			2.24			0.19		4484.42		4484.50	44.43	0.19

HEC-RAS Plan...Oat C. River...Alpine Creek Reach: Alpine (Continued)

Reach	Profile	River Sta.	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cnt (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	15.75*	5yr		1699.00			5.56			0.95		4487.01		4487.49	47.02	0.38
Alpine	15.75*	10yr		3808.77	2.23		7.51	0.29		1.59	0.07	4490.69		4491.56	88.13	0.47
Alpine	15.75*	50yr	3.59	5957.07	184.35	0.46	8.91	0.61	0.11	2.07	0.21	4493.19		4494.39	413.67	0.49
Alpine	15.75*	100yr	63.91	6911.34	1031.76	0.74	8.78	0.83	0.21	1.90	0.32	4495.01		4496.04	854.02	0.45
Alpine	15.75*	500yr	246.00	8150.67	2843.34	0.93	9.15	1.08	0.29	1.98	0.46	4496.61		4497.56	1176.34	0.44
Alpine	15.75*	500yr	722.32	10198.76	6525.92	1.15	10.11	1.45	0.40	2.32	0.73	4498.42		4499.36	1414.98	0.45
Alpine	16.*	2yr		419.00			3.03			0.40		4484.57		4484.71	43.32	0.30
Alpine	16.*	5yr		1699.00			6.39			1.33		4487.42		4488.05	46.17	0.47
Alpine	16.*	10yr		3810.61	0.39		8.11	0.21		1.83	0.05	4491.20		4492.22	74.65	0.52
Alpine	16.*	25yr	0.79	6050.50	93.71	0.41	9.61	0.53	0.10	2.36	0.18	4493.66		4495.07	350.39	0.55
Alpine	16.*	50yr	33.50	7262.15	711.35	0.71	9.86	0.83	0.22	2.36	0.34	4495.27		4496.64	726.89	0.52
Alpine	16.*	100yr	173.56	8817.91	2248.52	0.99	10.54	1.12	0.35	2.58	0.53	4496.78		4498.14	1081.79	0.52
Alpine	16.*	500yr	625.34	10995.65	5826.01	1.31	11.48	1.53	0.53	2.92	0.84	4498.62		4499.93	1333.85	0.53
Alpine	16.25*	2yr		419.00			4.05			0.79		4485.00		4485.26	42.51	0.46
Alpine	16.25*	5yr		1699.00			7.07			1.71		4488.11		4488.89	46.67	0.55
Alpine	16.25*	10yr		3810.86	0.14		8.56	0.18		2.11	0.04	4491.89		4493.03	70.28	0.57
Alpine	16.25*	25yr	0.07	6038.98	105.95	0.23	9.97	0.81	0.04	2.61	0.24	4494.34		4495.86	249.52	0.59
Alpine	16.25*	50yr	19.47	7402.42	585.11	0.66	10.51	0.87	0.20	2.76	0.39	4495.80		4497.39	629.58	0.57
Alpine	16.25*	100yr	139.29	9153.16	1947.54	1.02	11.42	1.15	0.39	3.12	0.59	4497.25		4498.90	1031.02	0.58
Alpine	16.25*	500yr	562.94	11372.95	5511.12	1.40	12.29	1.60	0.62	3.45	0.95	4498.09		4500.63	1288.42	0.58
Alpine	16.5	2yr		419.00			4.56			1.00		4485.96		4486.28	42.21	0.54
Alpine	16.5	5yr		1699.00			7.40			1.87		4489.06		4489.91	48.28	0.60
Alpine	16.5	10yr		3810.83	0.17		8.84	0.20		2.23	0.05	4492.71		4493.92	70.76	0.60
Alpine	16.5	25yr		6040.75	104.25		10.23	0.89		2.73	0.27	4495.12		4496.72	220.59	0.61
Alpine	16.5	50yr	12.20	7498.91	495.90	0.59	10.98	0.87	0.17	3.00	0.39	4496.48		4498.23	597.89	0.61
Alpine	16.5	100yr	121.73	9345.34	1772.93	1.04	11.99	1.16	0.41	3.42	0.61	4497.89		4499.75	1004.66	0.63
Alpine	16.5	500yr	519.23	11596.81	5330.96	1.46	12.85	1.66	0.67	3.74	1.03	4499.69		4501.41	1226.44	0.62
Alpine	16.7		Bridge													
Alpine	17	2yr		419.00			4.42			0.89		4486.44	4485.62	4486.74	42.19	0.52
Alpine	17	5yr		1699.00			7.31			1.75		4489.49	4487.92	4490.32	49.34	0.59
Alpine	17	10yr		3807.82	3.18		8.56	0.40		2.02	0.12	4493.21	4490.54	4494.35	85.95	0.58
Alpine	17	25yr	0.04	6021.50	123.46	0.19	10.21	0.72	0.03	2.65	0.22	4495.39	4492.86	4496.98	340.38	0.61
Alpine	17	50yr	136.45	6173.14	1697.41	0.74	7.69	0.82	0.20	1.36	0.29	4498.50	4494.47	4499.21	1115.55	0.40
Alpine	17	100yr	305.73	7115.82	3818.45	0.68	7.80	1.05	0.17	1.34	0.40	4500.11	4497.83	4500.71	1381.56	0.38
Alpine	17	500yr	1083.95	9010.45	7352.60	1.16	8.82	1.40	0.38	1.65	0.63	4501.70	4499.55	4502.34	1401.80	0.40
Alpine	17.05*	2yr		419.00			4.81			1.16		4487.31		4487.66	42.12	0.59
Alpine	17.05*	5yr		1699.00			7.73			2.12		4490.28		4491.21	48.78	0.64
Alpine	17.05*	10yr		3811.00			8.89			2.35		4493.83		4495.06	69.07	0.63
Alpine	17.05*	25yr		6076.05	68.95		10.39	0.95		2.93	0.43	4496.02		4497.68	141.45	0.65

HEC-RAS Plan: Out C. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	17.05*	50yr	65.74	7149.94	791.32	0.77	9.29	0.86	0.23	2.14	0.33	4498.55		4499.75	789.18	0.50
Alpine	17.05*	100yr	285.23	8495.65	2459.12	1.05	9.60	1.14	0.35	2.18	0.48	4500.12		4501.21	1119.73	0.49
Alpine	17.05*	500yr	640.07	10946.40	5860.53	1.06	10.93	1.60	0.37	2.71	0.82	4501.71		4502.89	1411.59	0.52
Alpine	17.1*	2yr		419.00			4.60			1.07		4488.35		4488.68	42.22	0.55
Alpine	17.1*	5yr		1699.00			7.75			2.18		4491.23		4492.17	48.37	0.64
Alpine	17.1*	10yr		3811.00			8.98			2.47		4494.60		4495.85	71.74	0.65
Alpine	17.1*	25yr		6114.09	30.91		10.39	0.83	0.33	3.00	0.33	4496.77		4498.44	126.62	0.67
Alpine	17.1*	50yr	19.17	7736.86	250.97	0.67	10.44	0.85	0.20	2.81	0.32	4498.72		4500.36	422.20	0.60
Alpine	17.1*	100yr	129.87	10124.36	985.77	1.11	12.14	1.17	0.44	3.65	0.54	4499.92		4501.98	771.42	0.65
Alpine	17.1*	500yr	439.63	14116.35	2891.02	1.69	15.30	1.76	0.89	5.62	1.08	4501.04		4504.00	1026.92	0.79
Alpine	17.15*	2yr		419.00			4.58			1.06		4489.30		4489.62	42.23	0.55
Alpine	17.15*	5yr		1699.00			7.75			2.16		4492.19		4493.13	47.67	0.64
Alpine	17.15*	10yr		3811.00			9.00			2.49		4495.44		4496.70	74.24	0.66
Alpine	17.15*	25yr		6135.46	9.54		10.32	0.63	0.20	2.98	0.20	4497.59		4499.25	115.98	0.68
Alpine	17.15*	50yr	7.36	7865.42	134.23	0.61	10.70	1.20	0.17	2.98	0.50	4499.29		4501.04	191.39	0.63
Alpine	17.15*	100yr	77.24	10746.16	416.60	1.07	12.92	1.08	0.42	4.18	0.46	4500.45	4498.93	4502.93	547.49	0.72
Alpine	17.15*	500yr	368.59	15256.42	1822.00	1.74	16.26	1.74	0.93	6.36	1.00	4501.73		4505.33	867.53	0.85
Alpine	17.2	2yr		419.00			4.58			1.06		4490.23		4490.56	42.22	0.55
Alpine	17.2	5yr		1699.00			7.77			2.16		4493.14		4494.08	46.74	0.63
Alpine	17.2	10yr		3811.00			9.01			2.50		4496.31		4497.57	76.58	0.68
Alpine	17.2	25yr		6144.26	0.74		10.25	0.33	0.07	2.95	0.07	4498.45		4500.08	102.10	0.69
Alpine	17.2	50yr	3.97	7934.07	68.96	0.65	10.84	1.12	0.19	3.10	0.42	4499.96		4501.77	160.36	0.66
Alpine	17.2	100yr	57.49	10972.41	210.10	1.04	12.97	1.08	0.39	4.22	0.42	4501.26	4499.92	4503.81	377.09	0.74
Alpine	17.2	500yr	1134.90	11901.02	4411.08	1.36	9.68	1.56	0.45	2.08	0.55	4505.61	4503.95	4506.61	1215.35	0.46
Alpine	17.3			Bridge												
Alpine	17.4214	2yr		419.00			4.40			0.97		4490.82		4491.12	42.31	0.52
Alpine	17.4214	5yr		1699.00			7.22			1.96		4493.91		4492.26	56.01	0.62
Alpine	17.4214	10yr		3809.20	1.80		6.46	0.37	0.05	1.32	0.05	4498.59		4495.15	109.25	0.44
Alpine	17.4214	25yr	3.27	6077.03	64.70	0.73	8.71	1.20	0.14	2.28	0.30	4499.82		4500.99	153.66	0.55
Alpine	17.4214	50yr	18.39	7819.71	168.89	0.94	10.27	1.67	0.22	3.07	0.52	4500.55		4502.15	198.17	0.62
Alpine	17.4214	100yr	895.19	6862.20	3482.61	1.10	5.72	1.26	0.18	4.22	0.22	4505.53	4500.25	4505.85	1208.11	0.27
Alpine	17.4214	500yr	1600.03	9153.14	6693.63	1.21	6.99	1.76	0.22	1.19	0.39	4506.77	4503.91	4507.19	1456.52	0.32
Alpine	17.5371*	2yr		419.00			4.58			1.06		4491.90		4492.23	42.22	0.55
Alpine	17.5371*	5yr		1699.00			7.17			1.93		4495.05		4495.85	54.85	0.61
Alpine	17.5371*	10yr		3811.00			6.93			1.58		4499.10		4499.84	92.80	0.50
Alpine	17.5371*	25yr	0.29	6125.72	16.99	0.42	8.89	0.94	0.06	2.45	0.22	4500.55		4501.77	135.37	0.59
Alpine	17.5371*	50yr	9.19	7905.48	92.32	0.86	10.17	1.51	0.19	3.08	0.45	4501.46		4503.04	175.98	0.63
Alpine	17.5371*	100yr	672.93	8641.37	1925.70	1.32	7.36	1.31	0.27	1.41	0.27	4505.55	4506.21	4506.21	1000.26	0.37
Alpine	17.5371*	500yr	1467.54	11502.02	4477.44	1.72	8.87	1.89	0.43	1.98	0.50	4506.82	4503.91	4507.64	1165.85	0.43

HEC-RAS Plan_Oot C River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Friction # Cft
Alpine	17.6528*	2yr		419.00			4.58			1.06		4493.08		4493.40	42.22	0.55
Alpine	17.6528*	5yr		1699.00			7.11			1.91		4496.17		4496.95	56.66	0.61
Alpine	17.6528*	10yr		3811.00			7.40			1.86		4499.75		4500.60	95.55	0.56
Alpine	17.6528*	25yr		6141.65	3.36		8.99	0.64		2.58	0.13	4501.41		4502.66	122.60	0.62
Alpine	17.6528*	50yr	4.43	7954.43	48.14	0.75	10.05	1.33	0.16	3.07	0.38	4502.44		4503.99	162.55	0.65
Alpine	17.6528*	100yr	405.03	10187.40	647.57	1.46	9.09	1.21	0.37	2.23	0.28	4505.56		4506.72	697.81	0.49
Alpine	17.6528*	500yr	1041.94	14331.87	2073.19	2.09	11.56	1.88	0.69	3.50	0.59	4506.68		4508.39	929.00	0.59
Alpine	17.7685*	2yr		419.00			4.58			1.06		4494.24		4494.57	42.22	0.55
Alpine	17.7685*	5yr		1699.00			7.01			1.86		4497.29		4498.06	58.67	0.61
Alpine	17.7685*	10yr		3811.00			7.75			2.09		4500.59		4501.52	97.62	0.61
Alpine	17.7685*	25yr		6144.73	0.27		9.02	0.37		2.64	0.06	4502.39		4503.65	117.89	0.64
Alpine	17.7685*	50yr	1.69	7981.29	24.02	0.61	9.91	1.17	0.12	3.04	0.32	4503.47		4505.00	154.70	0.66
Alpine	17.7685*	100yr	221.04	10800.34	218.62	1.43	9.95	1.32	0.39	2.78	0.34	4505.92		4507.40	387.47	0.57
Alpine	17.7685*	500yr	696.85	15998.32	751.83	2.22	13.27	1.70	0.83	4.76	0.56	4506.98		4509.49	670.81	0.72
Alpine	17.8842*	2yr		419.00			4.58			1.06		4495.41		4495.74	42.23	0.55
Alpine	17.8842*	5yr		1699.00			6.90			1.82		4498.41		4499.15	60.65	0.60
Alpine	17.8842*	10yr		3811.00			7.92			2.17		4501.55		4502.53	93.86	0.62
Alpine	17.8842*	25yr		6145.00			8.98			2.66		4503.45		4504.71	117.85	0.66
Alpine	17.8842*	50yr	0.31	7994.97	11.71	0.37	9.77	1.02	0.06	3.01	0.26	4504.56		4506.04	150.99	0.67
Alpine	17.8842*	100yr	130.08	10948.28	161.64	1.35	10.24	1.79	0.37	3.03	0.56	4506.60		4508.18	276.64	0.61
Alpine	17.8842*	500yr	635.54	16417.27	394.19	2.19	13.16	1.53	0.82	4.75	0.48	4508.04	4506.98	4510.58	559.73	0.73
Alpine	18	2yr		419.00			4.57			1.04		4496.58		4496.90	42.77	0.55
Alpine	18	5yr		1699.00			6.79			1.76		4499.52		4500.24	62.97	0.60
Alpine	18	10yr		3811.00			7.99			2.18		4502.54		4503.53	90.28	0.61
Alpine	18	25yr		6145.00			8.93			2.63		4504.55		4505.78	119.55	0.66
Alpine	18	50yr		8001.36	5.64		9.61	0.90		2.94	0.22	4505.69		4507.13	145.93	0.67
Alpine	18	100yr	79.69	11068.99	91.31	1.28	10.44	1.71	0.35	3.21	0.54	4507.41		4509.08	247.02	0.65
Alpine	18	500yr	659.07	16440.39	347.55	2.12	12.48	1.81	0.76	4.25	0.60	4509.37		4511.65	455.78	0.70
Alpine	18.2*	2yr		419.00			6.01			1.75		4501.99	4501.74	4502.55	41.67	0.82
Alpine	18.2*	5yr		1699.00			8.71			3.00		4504.36		4505.53	63.01	0.87
Alpine	18.2*	10yr		3811.00			10.31			3.75		4506.75		4508.40	84.29	0.87
Alpine	18.2*	25yr		6144.80	0.20		10.98	0.42		3.98	0.08	4508.75		4510.62	109.83	0.84
Alpine	18.2*	50yr		7980.37	26.63		11.78	1.42		4.40	0.48	4509.83		4511.98	141.62	0.85
Alpine	18.2*	100yr	1.05	11079.22	159.73	0.58	13.55	2.26	0.13	5.56	0.99	4511.03	4510.79	4513.84	188.92	0.91
Alpine	18.2*	500yr	440.63	15217.98	1788.39	1.93	13.04	2.28	0.87	4.58	0.87	4513.98	4513.98	4516.29	708.12	0.73
Alpine	18.4*	2yr		419.00			4.32			0.85		4507.28		4507.57	48.13	0.54
Alpine	18.4*	5yr		1699.00			6.59			1.63		4509.99		4510.66	71.71	0.61
Alpine	18.4*	10yr		3810.98	0.02		8.50	0.19		2.44	0.02	4512.36		4513.49	92.22	0.67
Alpine	18.4*	25yr		6070.88	74.12		10.12	1.42		3.22	0.44	4513.99		4515.56	160.67	0.72

HEC-RAS Plan Out C_River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Chl W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	18.4*	50yr		7738.91	268.09		10.93	1.37		3.62	0.42	4515.08	4513.86	4516.87	352.39	0.73
Alpine	18.4*	100yr	14.02	9603.94	1622.04	0.89	10.90	2.11	0.20	3.38	0.75	4516.73		4518.32	564.28	0.66
Alpine	18.4*	500yr	117.50	13506.43	3823.07	1.52	13.48	2.89	0.48	4.95	1.27	4517.88		4520.09	744.61	0.77
Alpine	18.6*	2yr		419.00			5.26			1.32		4511.54		4511.97	45.64	0.70
Alpine	18.6*	5yr		1699.00			7.58			2.21		4514.14		4515.03	66.23	0.73
Alpine	18.6*	10yr		3805.39	5.61		9.61	0.69		3.11	0.15	4516.50		4517.94	112.17	0.75
Alpine	18.6*	25yr		5707.74	437.26		10.67	1.57		3.55	0.52	4518.22		4519.86	392.26	0.74
Alpine	18.6*	50yr		6574.99	1432.01		10.44	2.09		3.27	0.76	4519.32		4520.73	509.13	0.69
Alpine	18.6*	100yr		8265.77	2974.23		11.67	2.74		3.97	1.17	4520.21		4521.80	575.57	0.73
Alpine	18.6*	500yr	33.18	10247.94	7165.88	1.11	11.49	3.19	0.28	3.58	1.36	4522.22		4523.49	762.79	0.65
Alpine	18.8*	2yr		419.00			4.58			0.96		4516.99		4516.72	45.70	0.57
Alpine	18.8*	5yr		1699.00			7.24			1.96		4518.92		4519.73	63.07	0.66
Alpine	18.8*	10yr		3365.05	445.95		8.78	1.44		2.53	0.44	4521.14		4522.20	407.11	0.66
Alpine	18.8*	25yr		4307.21	1837.79		8.91	2.09		2.45	0.72	4522.55		4523.44	539.75	0.61
Alpine	18.8*	50yr		5139.64	2867.36		9.83	2.51		2.92	0.98	4523.10		4524.10	575.38	0.65
Alpine	18.8*	100yr		6277.34	4962.66		10.34	2.82		3.11	1.15	4524.23		4525.21	698.58	0.64
Alpine	18.8*	500yr		8280.80	9166.20		11.93	3.66		4.00	1.76	4525.37		4526.53	748.36	0.70
Alpine	19	2yr		419.00			4.36			1.33		4520.99	4520.21	4521.29	49.99	0.55
Alpine	19	5yr		1514.13	184.87		6.43	1.10		2.26	0.31	4523.57	4522.38	4524.14	381.63	0.56
Alpine	19	10yr		2177.29	1633.71		6.61	2.05		2.16	0.72	4525.17	4524.51	4525.59	522.53	0.49
Alpine	19	25yr		2886.59	3258.41		7.56	2.65		2.71	1.08	4526.04	4525.21	4526.52	585.26	0.53
Alpine	19	50yr		3291.04	4715.96		7.74	2.91		2.75	1.22	4526.76	4525.72	4527.22	627.97	0.52
Alpine	19	100yr		4114.82	7125.18		8.47	3.19		3.18	1.41	4527.74	4526.35	4528.25	758.09	0.53
Alpine	19	500yr		5135.11	12311.89		8.97	3.83		3.40	1.82	4529.12	4527.20	4529.65	789.50	0.53

HEC-RAS Plan: Opt D River: Alpine Creek Reach: Alpine

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	Chl
Alpine	1	2yr		448.00			5.81			1.47		4404.48	4403.86	4405.00	32.84		0.67
Alpine	1	5yr	167.82	1552.18		1.47	8.63		0.53			4407.22	4407.11	4408.26	181.99		0.73
Alpine	1	10yr	1214.13	2666.87		3.08	10.32		1.61	3.49		4409.02	4408.80	4410.20	204.43		0.76
Alpine	1	25yr	2369.28	3636.89	28.83	4.00	11.52	0.75	2.38	4.11	0.15	4410.26	4409.74	4411.59	380.51		0.78
Alpine	1	50yr	3195.85	4324.30	324.85	4.50	12.34	1.95	2.84	4.56	0.61	4410.99	4410.79	4412.42	386.29		0.80
Alpine	1	100yr	4596.94	5426.79	1158.27	5.17	13.51	3.19	3.50	5.22	1.29	4412.08	4411.77	4413.64	394.87		0.81
Alpine	1	500yr	7322.23	7477.60	3275.17	6.15	15.35	4.62	4.19	6.32	2.25	4413.90	4413.32	4415.71	434.96		0.84
Alpine	1.33333*	2yr		445.00			5.14			1.18		4405.84		4406.25	39.75		0.61
Alpine	1.33333*	5yr		1687.00			8.08			2.39		4408.55		4409.56	51.70		0.71
Alpine	1.33333*	10yr		3895.00			12.85			5.60		4410.24	4410.24	4412.81	59.65		1.01
Alpine	1.33333*	25yr	522.82	5112.38		2.01	11.31	0.83		3.95		4412.60	4412.60	4414.41	259.08		0.76
Alpine	1.33333*	50yr	1377.60	6532.40		2.97	12.53	1.52		4.85		4413.64	4413.64	4415.68	262.97		0.79
Alpine	1.33333*	100yr	2808.12	8530.18	1.70	4.01	14.20	0.52	2.43	5.72	0.09	4414.83	4414.83	4417.25	282.58		0.83
Alpine	1.33333*	500yr	5756.68	11878.42	659.90	5.33	16.37	2.77	3.75	7.14	1.07	4416.71	4416.71	4419.55	432.96		0.87
Alpine	1.66666*	2yr		445.00			4.87			1.08		4407.01		4407.38	44.46		0.60
Alpine	1.66666*	5yr		1687.00			7.08			1.80		4409.93		4410.71	55.86		0.60
Alpine	1.66666*	10yr		3895.00			8.30			2.19		4413.45		4414.51	75.98		0.59
Alpine	1.66666*	25yr		5635.00			11.30			4.02		4413.82		4415.81	78.06		0.79
Alpine	1.66666*	50yr		7910.00			13.88			5.92		4414.71		4417.70	82.97		0.93
Alpine	1.66666*	100yr	640.68	10699.32		2.02	13.42	0.84		5.08		4417.36		4420.01	314.31		0.78
Alpine	1.66666*	500yr	3137.33	15154.26	3.40	3.72	15.31	0.67	2.09	6.18	0.12	4419.60	4419.60	4422.65	354.81		0.80
Alpine	2	2yr		445.00			4.72			1.04		4408.17		4408.52	50.14		0.61
Alpine	2	5yr		1687.00			6.75			1.66		4410.92	4409.61	4411.62	61.23		0.59
Alpine	2	10yr		3895.00			8.26			2.16		4414.22	4411.88	4415.28	74.21		0.58
Alpine	2	25yr		5635.00			9.64			2.86		4415.64	4413.38	4417.08	85.36		0.65
Alpine	2	50yr		7910.00			10.21			3.06		4417.71	4415.09	4419.33	98.13		0.64
Alpine	2	100yr		11340.00			13.09			4.94		4418.62	4417.14	4421.28	103.75		0.80
Alpine	2	500yr		18295.00			17.65			8.59		4420.23	4420.15	4425.06	192.15		0.99
Alpine	2.3		Bridge														
Alpine	2.5	2yr		445.00			3.63			0.57		4408.72	4407.57	4408.93	53.03		0.42
Alpine	2.5	5yr		1687.00			5.71			1.14		4411.65	4409.59	4412.16	62.92		0.46
Alpine	2.5	10yr		3895.00			7.18			1.60		4415.14	4411.88	4415.94	81.58		0.49
Alpine	2.5	25yr		5635.00			8.02			1.92		4416.96	4413.38	4417.95	93.47		0.52
Alpine	2.5	50yr		7910.00			8.66			2.14		4419.07	4415.09	4420.23	105.92		0.52
Alpine	2.5	100yr		11340.00			9.93			2.65		4421.22	4417.14	4422.75	298.39		0.53
Alpine	2.5	500yr	3377.08	14822.47	95.45	1.84	9.00	1.00	0.51	1.94	0.16	4425.98	4420.15	4427.01	704.05		0.40
Alpine	3	2yr		445.00			4.84			1.12		4408.89		4409.25	53.46		0.65
Alpine	3	5yr		1687.00			2.29			0.18		4412.28		4412.36	269.17		0.24
Alpine	3	10yr		3697.13	197.87		2.03	0.70		0.11	0.06	4416.13		4416.19	375.04		0.14

HCR-RAS Plan: Qat D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Cut W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	3	25yr	5.44	5263.70	365.86	0.23	2.17	0.77	0.01	0.11	0.06	4418.19		4418.26	428.93	0.13
Alpine	3	50yr	66.38	7239.67	603.95	0.43	2.33	0.83	0.02	0.12	0.07	4420.50		4420.58	496.71	0.13
Alpine	3	100yr	261.65	10086.20	992.15	0.64	2.60	0.91	0.04	0.14	0.08	4423.11		4423.20	548.13	0.13
Alpine	3	500yr	827.98	15582.05	1884.97	0.99	3.07	1.07	0.08	0.18	0.10	4427.17		4427.30	587.22	0.13
Alpine	3.16666*	2yr		445.00			4.25			0.89		4411.91		4412.20	66.65	0.60
Alpine	3.16666*	5yr		1687.00			5.95			0.87		4413.37	4413.37	4413.81	354.09	1.00
Alpine	3.16666*	10yr		3893.55	1.45		2.84	0.15		0.25	0.01	4416.23		4416.35	459.97	0.26
Alpine	3.16666*	25yr		5517.82	117.18		2.55	0.68		0.18	0.07	4418.26		4418.36	478.61	0.19
Alpine	3.16666*	50yr		7607.21	302.79		2.47	0.80		0.15	0.07	4420.56		4420.65	507.03	0.16
Alpine	3.16666*	100yr		10749.21	590.79		2.59	0.86		0.15	0.08	4423.16		4423.26	550.94	0.14
Alpine	3.16666*	500yr	67.37	16946.45	1281.18	0.56	2.89	0.97	0.04	0.17	0.09	4427.23		4427.35	637.54	0.14
Alpine	3.33333*	2yr		445.00			4.13			0.88		4414.81		4415.07	78.09	0.62
Alpine	3.33333*	5yr		1687.00			4.38			0.47		4416.42		4416.72	405.93	0.79
Alpine	3.33333*	10yr		3895.00			6.82			1.45		4416.88	4416.88	4417.60	408.61	1.02
Alpine	3.33333*	25yr		5635.00			4.60			0.69		4418.44		4418.76	427.49	0.48
Alpine	3.33333*	50yr		7864.79	45.21		3.99	0.60		0.36	0.07	4420.65		4420.85	527.51	0.28
Alpine	3.33333*	100yr		11049.96	290.04		3.30	0.94		0.27	0.11	4423.22		4423.39	560.69	0.21
Alpine	3.33333*	500yr	1.63	17412.86	860.51	0.19	3.32	1.03	0.01	0.24	0.11	4427.28		4427.44	662.91	0.18
Alpine	3.5*	2yr		445.00			3.71			0.73		4417.77		4417.98	95.29	0.58
Alpine	3.5*	5yr		1687.00			5.20			0.48		4419.19	4419.19	4419.61	431.05	1.06
Alpine	3.5*	10yr		3895.00			4.81			0.78		4420.30		4420.66	443.80	0.63
Alpine	3.5*	25yr		5635.00			7.50			1.82		4420.17	4420.17	4421.04	436.66	1.01
Alpine	3.5*	50yr		7910.00			6.91			1.58		4421.05		4421.79	450.52	0.76
Alpine	3.5*	100yr		11339.99	0.61		5.12	0.14		0.75	0.01	4423.38		4423.78	549.71	0.42
Alpine	3.5*	500yr		17833.67	461.33		4.32	1.13		0.44	0.16	4427.35		4427.63	625.52	0.26
Alpine	3.66666*	2yr		445.00			3.44			0.78		4420.67		4420.86	102.68	0.54
Alpine	3.66666*	5yr		1687.00			4.91			0.62		4422.21		4422.59	335.13	0.85
Alpine	3.66666*	10yr		3895.00			6.58			1.56		4422.95		4423.62	339.19	0.88
Alpine	3.66666*	25yr		5635.00			6.03			1.36		4423.94		4424.50	353.77	0.65
Alpine	3.66666*	50yr		7910.00			7.68			2.17		4424.20		4425.12	356.10	0.80
Alpine	3.66666*	100yr		11340.00			10.11			3.70		4424.46	4424.46	4426.05	358.30	1.01
Alpine	3.66666*	500yr		18270.01	24.99		8.38	0.75		2.13	0.14	4427.32		4428.41	468.76	0.62
Alpine	3.83333*	2yr		445.00			3.27			0.71		4423.56		4423.72	110.11	0.52
Alpine	3.83333*	5yr		1687.00			5.39			1.08		4425.06		4425.51	175.56	0.71
Alpine	3.83333*	10yr		3895.00			6.87			1.84		4426.45		4427.18	189.47	0.70
Alpine	3.83333*	25yr		5635.00			9.01			3.12		4426.75		4428.01	192.52	0.88
Alpine	3.83333*	50yr		7910.00			9.78			3.47		4427.68		4429.17	201.83	0.86
Alpine	3.83333*	100yr		11340.00			10.67			3.86		4428.90		4430.67	214.02	0.84
Alpine	3.83333*	500yr	2.60	18292.40		0.84	13.80		0.20	6.06		4430.10	4430.10	4433.06	241.13	1.00

HEC-RAS Plan: Oot D River, Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	4	2yr		445.00			3.24			0.71		4426.40		4426.56	117.40	0.53
Alpine	4	5yr		1687.00			5.19			1.41		4427.92		4428.34	129.49	0.58
Alpine	4	10yr		3895.00			6.69			1.77		4429.36		4430.05	188.58	0.67
Alpine	4	25yr		5635.00			7.12			1.88		4430.44		4431.22	199.37	0.63
Alpine	4	50yr		7910.00			8.16			2.34		4431.31		4432.34	208.12	0.67
Alpine	4	100yr		11340.00			9.40			2.92		4432.42		4433.79	219.20	0.71
Alpine	4	500yr	150.93	18119.46	24.61	2.01	10.64	0.66	0.59	3.41	0.12	4434.62		4436.36	426.26	0.69
Alpine	4.25*	2yr		430.00			3.41			0.78		4429.30		4429.48	108.45	0.56
Alpine	4.25*	5yr		1688.00			5.78			1.76		4430.76		4431.28	118.27	0.65
Alpine	4.25*	10yr		3624.00			6.01			1.29		4432.10		4432.67	261.04	0.70
Alpine	4.25*	25yr		5657.00			7.01			1.76		4432.87		4433.64	268.74	0.71
Alpine	4.25*	50yr		7379.00			7.00			1.68		4433.78		4434.54	277.79	0.63
Alpine	4.25*	100yr		10490.00			7.47			1.79		4435.01		4435.88	290.11	0.60
Alpine	4.25*	500yr		16703.00			8.24			1.97		4437.09		4438.14	310.86	0.57
Alpine	4.5*	2yr		430.00			3.57			0.81		4432.13		4432.33	86.37	0.53
Alpine	4.5*	5yr		1688.00			5.82			1.73		4433.67		4434.39	108.77	0.63
Alpine	4.5*	10yr		3624.00			6.27			1.29		4434.90		4435.51	308.98	0.81
Alpine	4.5*	25yr		5657.00			6.87			1.63		4435.68		4436.42	316.83	0.75
Alpine	4.5*	50yr		7379.00			7.64			2.00		4436.13		4437.04	321.28	0.78
Alpine	4.5*	100yr		10490.00			8.40			2.32		4437.00		4438.09	329.98	0.76
Alpine	4.5*	500yr		16703.00			9.26			2.59		4438.64		4439.97	346.38	0.72
Alpine	4.75*	2yr		430.00			3.87			0.93		4434.84		4435.07	74.34	0.56
Alpine	4.75*	5yr		1688.00			6.24			1.92		4436.77		4437.38	90.87	0.64
Alpine	4.75*	10yr		3624.00			7.31			1.74		4438.00		4438.83	209.97	0.84
Alpine	4.75*	25yr		5657.00			8.75			2.57		4438.70		4439.89	217.03	0.89
Alpine	4.75*	50yr		7379.00			9.60			3.08		4439.26		4440.69	222.57	0.91
Alpine	4.75*	100yr		10490.00			11.34			4.19		4439.95	4439.92	4441.95	229.49	1.00
Alpine	4.75*	500yr		16703.00			13.08			5.21		4441.44	4441.44	4444.09	244.35	1.01
Alpine	5	2yr		430.00			3.99			0.96		4437.58		4437.83	65.25	0.55
Alpine	5	5yr		1688.00			6.58			2.07		4439.66		4440.33	78.15	0.64
Alpine	5	10yr		3624.00			9.28			3.74		4441.26		4442.60	88.12	0.78
Alpine	5	25yr		5657.00			11.35			5.29		4442.44		4444.44	95.42	0.88
Alpine	5	50yr		7379.00			13.02			6.77		4443.14	4442.96	4445.77	99.77	0.96
Alpine	5	100yr		10490.00			14.64			8.16		4444.58	4444.58	4447.91	108.68	1.01
Alpine	5	500yr		16703.00			16.35			9.47		4447.19	4447.19	4451.34	124.91	1.01
Alpine	5.33333*	2yr		428.00			5.17			1.41		4438.56		4438.97	42.02	0.65
Alpine	5.33333*	5yr		1690.00			9.37			3.74		4440.68		4442.05	53.35	0.90
Alpine	5.33333*	10yr		3655.00			12.11			5.80		4442.71	4442.71	4444.98	66.93	1.00
Alpine	5.33333*	25yr		5736.00			13.34			6.69		4444.47	4444.47	4447.23	78.76	1.01
Alpine	5.33333*	50yr		7481.00			14.04			7.20		4445.70	4445.70	4448.77	87.07	1.00

HEC-RAS Plan: Out D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chnl (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froutde # Chl
Alpine	5.33333*	100yr		10612.00			15.17			8.08		4447.50	4447.50	4451.07	99.11	1.01
Alpine	5.33333*	500yr	3428.05	12972.79	423.16	2.10	10.93	1.69	0.74	3.80	0.49	4451.82	4451.82	4453.27	1237.23	0.61
Alpine	5.6	2yr		428.00			3.76			0.72		4439.61		4439.83	52.23	0.45
Alpine	5.6	5yr		1690.00			6.20			1.39		4442.56		4443.16	55.18	0.49
Alpine	5.6	10yr		3655.00			8.72			2.29		4445.16		4446.34	57.77	0.57
Alpine	5.6	25yr		5736.00			11.06			3.52		4446.82		4448.72	63.16	0.68
Alpine	5.6	50yr		7481.00			12.78			4.78		4447.82		4450.35	70.45	0.78
Alpine	5.6	100yr		10612.00			15.48			7.11		4449.15		4452.87	80.38	0.93
Alpine	5.6	500yr	4103.68	12022.80	697.52	2.23	11.19	1.84	0.81	3.67	0.55	4453.22	4453.22	4454.63	1323.58	0.62
Alpine	5.8															
			Bridge													
Alpine	6	2yr		428.00			3.98			0.83		4440.34	4439.53	4440.58	52.11	0.49
Alpine	6	5yr		1690.00			6.45			1.53		4443.22	4441.48	4443.87	54.99	0.52
Alpine	6	10yr		3655.00			6.60			1.16		4448.29	4443.61	4448.97	60.06	0.38
Alpine	6	25yr		5736.00			8.23			1.63		4450.63	4445.47	4451.68	62.40	0.43
Alpine	6	50yr		7481.00			9.33			2.14		4452.23	4446.83	4453.58	56.71	0.49
Alpine	6	100yr	4325.03	4990.54	1296.44	1.07	4.21	1.01	0.17	0.44	0.14	4456.61	4448.97	4456.75	1495.02	0.21
Alpine	6	500yr	4838.93	10861.64	1123.43	2.11	10.65	1.83	0.77	2.99	0.56	4454.85	4453.12	4456.01	1419.50	0.57
Alpine	6.125*	2yr		428.00			4.27			0.98		4441.40	4440.75	4441.69	51.96	0.54
Alpine	6.125*	5yr		1690.00			6.94			1.83		4444.09	4442.68	4444.84	54.65	0.58
Alpine	6.125*	10yr		3655.00			7.29			1.48		4448.62	4444.82	4449.45	59.18	0.44
Alpine	6.125*	25yr		5736.00			8.85			2.02		4451.03	4446.66	4452.24	65.20	0.49
Alpine	6.125*	50yr		7481.00			9.72			2.48		4452.77	4448.01	4454.24	75.82	0.54
Alpine	6.125*	100yr	2918.50	6539.81	1153.68	1.23	5.75	1.20	0.25	0.91	0.22	4456.66	4450.23	4456.98	1465.67	0.31
Alpine	6.125*	500yr	3637.77	11794.22	1392.01	2.06	11.07	2.02	0.78	3.45	0.69	4455.99	4455.99	4457.35	1406.96	0.62
Alpine	6.25*	2yr		428.00			4.26			0.97		4442.62	4441.96	4442.90	51.97	0.54
Alpine	6.25*	5yr		1690.00			7.17			1.98		4445.16	4443.89	4445.96	54.51	0.61
Alpine	6.25*	10yr		3655.00			8.02			1.87		4449.05	4446.03	4450.05	58.40	0.51
Alpine	6.25*	25yr		5736.00			9.26			2.42		4451.60	4447.87	4452.93	71.71	0.56
Alpine	6.25*	50yr		7481.00			9.84			2.66		4453.46	4449.22	4454.96	79.56	0.56
Alpine	6.25*	100yr		10612.00			10.58			3.26		4456.07	4451.78	4457.81	1223.79	0.61
Alpine	6.25*	500yr		16824.00			17.19			8.58		4455.85	4455.85	4460.44	1031.09	1.00
Alpine	6.375*	2yr		428.00			4.26			0.97		4443.83	4443.17	4444.11	51.97	0.54
Alpine	6.375*	5yr		1690.00			7.24			2.02		4446.33	4445.10	4447.14	54.47	0.62
Alpine	6.375*	10yr		3655.00			8.64			2.24		4449.70	4447.24	4450.86	57.84	0.56
Alpine	6.375*	25yr		5736.00			9.34			2.63		4452.41	4449.07	4453.77	78.99	0.59
Alpine	6.375*	50yr		7481.00			9.73			2.73		4454.29	4450.93	4455.76	86.44	0.57
Alpine	6.375*	100yr		10612.00			10.12			3.04		4457.17	4452.92	4458.76	938.04	0.59
Alpine	6.375*	500yr	5110.80	7844.97	3868.22	1.30	4.67	1.45	0.23	0.59	0.28	4461.92	4456.23	4462.09	1536.26	0.23

HEC-RAS Plan: Oot D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	Ch
Alpine	6.5	2yr		428.00			4.26			0.97		4445.04	4444.37	4445.32	51.97		0.54
Alpine	6.5	5yr		1690.00			7.26			2.04		4447.53	4446.31	4448.35	54.46		0.62
Alpine	6.5	10yr		3655.00			9.11			2.55		4450.54	4448.45	4451.82	57.47		0.61
Alpine	6.5	25yr		5736.00			9.11			2.62		4453.42	4450.26	4454.71	66.83		0.60
Alpine	6.5	50yr		7481.00			9.45			2.67		4455.22	4452.13	4456.60	93.62		0.57
Alpine	6.5	100yr		10612.00			9.79			2.82		4458.13	4453.92	4459.62	573.66		0.57
Alpine	6.5	500yr	2703.27	10180.58	3940.15	1.10	6.24	1.71	0.34	1.11	0.47	4461.98	4456.88	4462.36	1512.02		0.33
Alpine	6.7																
Alpine	7	2yr		428.00			3.34			0.54		4446.07	4444.88	4446.25	52.50		0.38
Alpine	7	5yr		1690.00			6.07			1.32		4448.86	4446.81	4449.43	55.28		0.48
Alpine	7	10yr		3655.00			7.47			1.89		4452.10	4448.95	4452.96	81.60		0.54
Alpine	7	25yr		5736.00			8.03			1.99		4454.70	4451.36	4455.70	91.42		0.51
Alpine	7	50yr		7481.00			8.96			2.40		4455.99	4452.50	4457.23	96.26		0.54
Alpine	7	100yr	765.81	8060.78	1785.41	0.73	6.04	1.36	0.19	1.12	0.35	4460.18	4454.29	4460.62	1419.81		0.36
Alpine	7	500yr	3033.78	9578.38	4211.84	1.08	5.75	1.66	0.32	0.95	0.43	4462.40	4457.27	4462.71	1524.18		0.30
Alpine	7.2*	2yr		428.00			4.19			0.94		4446.78	4446.09	4447.06	52.00		0.53
Alpine	7.2*	5yr		1690.00			6.72			1.69		4449.58	4448.02	4450.28	54.80		0.55
Alpine	7.2*	10yr		3655.00			8.23			2.24		4452.88	4450.16	4453.93	72.53		0.59
Alpine	7.2*	25yr		5736.00			9.09			2.52		4455.31	4451.93	4456.59	81.43		0.58
Alpine	7.2*	50yr		7481.00			10.09			3.00		4456.63	4453.72	4458.21	86.27		0.61
Alpine	7.2*	100yr		10517.68	94.32		9.56	0.14		2.78	0.47	4460.18	4455.64	4461.58	1225.07		0.57
Alpine	7.2*	500yr	2962.61	13439.98	421.41	1.46	9.74	0.23	0.66	2.75	0.91	4462.31	4461.24	4463.50	1606.06		0.53
Alpine	7.4*	2yr		428.00			4.26			0.97		4447.95	4447.28	4448.23	51.97		0.54
Alpine	7.4*	5yr		1690.00			7.08			1.92		4450.54	4449.22	4451.32	54.56		0.60
Alpine	7.4*	10yr		3655.00			8.81			2.35		4453.68	4451.36	4454.89	57.70		0.58
Alpine	7.4*	25yr		5736.00			10.03			2.99		4456.03	4453.19	4457.59	72.00		0.63
Alpine	7.4*	50yr		7481.00			11.13			3.56		4457.38	4454.84	4459.30	76.79		0.66
Alpine	7.4*	100yr		10612.00			10.94			3.53		4460.75	4456.94	4462.61	894.80		0.64
Alpine	7.4*	500yr	2286.13	14214.08	323.79	1.44	11.84	0.23	0.71	4.01	1.01	4462.79	4462.79	4464.64	1672.46		0.65
Alpine	7.6*	2yr		428.00			5.05			1.33		4449.25	4448.70	4449.65	42.06		0.63
Alpine	7.6*	5yr		1690.00			9.03			3.09		4451.62	4450.94	4452.89	44.43		0.78
Alpine	7.6*	10yr		3655.00			12.01			4.43		4454.19	4453.38	4456.43	47.00		0.83
Alpine	7.6*	25yr		5736.00			13.65			5.44		4456.47	4455.75	4459.36	56.76		0.88
Alpine	7.6*	50yr		7481.00			15.12			6.50		4457.73	4457.30	4461.29	61.09		0.94
Alpine	7.6*	100yr		10612.00			14.37			6.07		4461.14	4459.89	4464.34	212.21		0.86
Alpine	7.6*	500yr	4104.99	10129.00	2590.01	1.66	9.44	1.44	0.59	2.47	0.70	4464.64	4464.19	4465.49	1836.68		0.50
Alpine	7.8*	2yr		428.00			4.53			1.03		4450.68	4449.91	4451.00	42.29		0.53
Alpine	7.8*	5yr		1690.00			7.76			2.14		4453.51	4452.13	4454.44	45.12		0.62
Alpine	7.8*	10yr		3655.00			10.42			3.13		4456.37	4454.58	4458.05	47.98		0.66

HEC-RAS Plan: Oat D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chnl (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Friction # Ch
Alpine	7.8*	25yr		5736.00		12.14				3.89		4458.81	4456.69	4461.10	53.06	0.72
Alpine	7.8*	50yr		7481.00		13.00				4.49		4460.63	4458.30	4463.25	61.55	0.75
Alpine	7.8*	100yr		10612.00		14.56				5.86		4462.86	4461.17	4466.15	664.15	0.83
Alpine	7.8*	500yr		4155.83	2257.53	11.01	1.73	1.42	0.66	3.18	0.73	4465.55	4465.55	4466.73	1935.87	0.57
Alpine	7.9	2yr		428.00		5.52				1.64		4451.48	4451.10	4451.96	41.90	0.71
Alpine	7.9	5yr		1690.00		8.69				2.81		4454.19	4453.33	4455.36	44.60	0.73
Alpine	7.9	10yr		3655.00		11.29				3.81		4457.00	4455.78	4458.98	47.41	0.76
Alpine	7.9	25yr		5736.00		13.01				4.40		4459.40	4457.87	4462.03	49.81	0.77
Alpine	7.9	50yr		7481.00		14.09				4.74		4461.18	4459.41	4464.27	51.59	0.77
Alpine	7.9	100yr		10612.00		16.35				6.25		4463.39	4461.84	4467.54	200.46	0.86
Alpine	7.9	500yr	4868.58	9753.51	2201.91	11.16	1.67	1.29	0.60	2.81	0.60	4466.96	4466.96	4468.10	2083.56	0.53
Alpine	7.95	Bridge														
Alpine	8	2yr		428.00		3.86				0.70		4452.27	4451.10	4452.51	42.68	0.42
Alpine	8	5yr		1690.00		6.92				1.62		4455.29	4453.34	4456.03	45.70	0.53
Alpine	8	10yr		3655.00		7.92				1.59		4459.82	4455.78	4460.79	50.23	0.46
Alpine	8	25yr	471.26	5151.86	112.88	6.99	0.79	0.37	0.14	1.17	0.08	4464.81	4457.88	4465.50	1130.58	0.36
Alpine	8	50yr	1934.96	4672.73	873.31	5.47	0.76	0.59	0.13	0.68	0.13	4466.65	4459.41	4466.95	2032.94	0.28
Alpine	8	100yr	4380.15	4222.93	2008.92	4.27	0.83	0.67	0.12	0.40	0.13	4468.75	4461.84	4468.87	2179.70	0.19
Alpine	8	500yr	6552.71	7265.19	3006.11	7.56	1.39	1.12	0.36	1.25	0.39	4468.31	4466.84	4468.71	2152.21	0.34
Alpine	8.33333*	2yr		428.00		4.33				0.92		4452.73	4451.84	4453.02	42.40	0.50
Alpine	8.33333*	5yr		1690.00		7.26				1.82		4455.78	4454.07	4456.60	45.45	0.57
Alpine	8.33333*	10yr		3655.00		8.34				1.81		4460.10	4456.52	4461.18	49.76	0.50
Alpine	8.33333*	25yr		5736.00		8.11				1.67		4464.86	4458.61	4465.88	328.33	0.43
Alpine	8.33333*	50yr	820.55	6102.82	557.64	7.45	0.73	0.57	0.15	1.38	0.15	4466.57	4460.15	4467.28	2021.00	0.37
Alpine	8.33333*	100yr	3332.79	5047.63	2231.57	5.24	0.91	0.72	0.16	0.64	0.17	4468.77	4462.86	4468.98	2302.33	0.24
Alpine	8.33333*	500yr	4797.56	8835.52	3190.92	9.45	1.53	1.20	0.48	2.12	0.50	4468.33	4467.84	4469.07	2271.79	0.44
Alpine	8.66666*	2yr		428.00		4.54				1.03		4453.35		4453.67	42.29	0.54
Alpine	8.66666*	5yr		1690.00		7.49				1.96		4456.35		4457.22	45.29	0.59
Alpine	8.66666*	10yr		3655.00		8.72				2.05		4460.43		4461.62	50.37	0.53
Alpine	8.66666*	25yr		5736.00		8.21				1.80		4465.12		4466.17	64.33	0.44
Alpine	8.66666*	50yr	132.43	7282.84	65.73	9.21	0.60	0.34	0.13	2.24	0.08	4466.53	4461.23	4467.81	1047.22	0.47
Alpine	8.66666*	100yr	2226.27	6400.25	1985.48	6.80	1.00	0.76	0.22	1.16	0.22	4468.75		4469.19	2388.17	0.32
Alpine	8.66666*	500yr	2339.59	12435.04	2049.37	14.00	1.65	1.25	0.68	5.03	0.67	4467.97		4470.23	2253.10	0.68
Alpine	9	2yr		428.00		4.62				1.07		4454.05		4454.38	42.25	0.55
Alpine	9	5yr		1690.00		7.65				2.07		4456.98		4457.89	45.18	0.61
Alpine	9	10yr		3655.00		9.09				2.24		4460.83		4462.11	49.03	0.56
Alpine	9	25yr		5736.00		6.72				1.47		4465.86		4466.57	115.99	0.44
Alpine	9	50yr	35.93	7355.75	89.32	6.95	0.35	0.36	0.05	1.52	0.08	4467.54		4468.28	1120.12	0.42
Alpine	9	100yr	890.96	8504.14	1216.89	6.95	0.86	0.69	0.20	1.46	0.21	4468.85		4469.46	2426.52	0.39

HEC-RAS Plan, Q=1 D River, Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	O Left (cfs)	O Right (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cntrl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Cnt.
Alpine	9	500yr	3419.62	8913.49	4490.89	1.17	6.08	0.96	0.26	1.06	0.31	4470.76	4469.11	4471.08	2762.88	0.32	
Alpine	9.3	Bridge															
Alpine	9.5	2yr		428.00			3.36			0.50		4455.46	4453.90	4455.63	43.06	0.34	
Alpine	9.5	5yr		1690.00			5.93			1.11		4459.97	4456.13	4459.52	46.58	0.42	
Alpine	9.5	10yr		3666.00			6.92			1.62		4462.98	4458.59	4463.72	87.98	0.50	
Alpine	9.5	25yr		5765.00			6.31			1.31		4466.61	4460.66	4467.23	122.65	0.41	
Alpine	9.5	50yr		6320.14	695.83	0.61	5.43	0.49	0.11	0.91	0.11	4468.60	4463.07	4468.99	2346.70	0.32	
Alpine	9.5	100yr		6942.41	2101.45	0.87	5.32	0.69	0.17	0.85	0.18	4469.72	4464.91	4470.01	2632.01	0.29	
Alpine	9.5	500yr		8124.56	4937.65	1.13	5.45	0.93	0.25	0.85	0.28	4471.18	4469.20	4471.41	2788.40	0.28	
Alpine	9.56666*	2yr		428.00			4.17			0.84		4455.90	4453.90	4456.17	42.49	0.47	
Alpine	9.56666*	5yr		1690.00			6.57			1.43		4459.39	4456.13	4460.06	45.99	0.49	
Alpine	9.56666*	10yr		3666.00			7.70			1.84		4463.48	4460.06	4464.40	68.25	0.51	
Alpine	9.56666*	25yr		5765.00			8.04			1.87		4466.82	4463.48	4467.83	75.27	0.46	
Alpine	9.56666*	50yr		7348.01	168.99		8.67	0.49		2.12	0.14	4468.53	4466.82	4469.67	671.93	0.46	
Alpine	9.56666*	100yr		9776.04	826.44	0.57	10.71	0.75	0.13	3.18	0.29	4469.35	4469.35	4470.98	1597.13	0.56	
Alpine	9.56666*	500yr		11562.33	4452.52	1.24	11.16	1.35	0.40	3.32	0.67	4470.89	4470.89	4472.23	2112.21	0.55	
Alpine	9.63333*	2yr		428.00			4.56			1.04		4456.70	4456.70	4457.02	42.28	0.54	
Alpine	9.63333*	5yr		1690.00			7.10			1.72		4459.98	4459.98	4460.77	45.57	0.55	
Alpine	9.63333*	10yr		3666.00			8.20			1.95		4464.03	4464.03	4465.07	63.63	0.55	
Alpine	9.63333*	25yr		5765.00			8.49			1.98		4467.25	4467.25	4468.38	81.34	0.52	
Alpine	9.63333*	50yr		7418.66	98.34		9.04	0.48		2.16	0.14	4468.95	4468.95	4470.20	473.61	0.52	
Alpine	9.63333*	100yr		10030.82	624.80	0.23	11.05	0.84	0.03	3.17	0.28	4469.94	4469.94	4471.73	1014.81	0.61	
Alpine	9.63333*	500yr		13828.04	2945.67	1.00	13.67	1.37	0.32	4.69	0.77	4471.09	4471.09	4473.48	1601.46	0.72	
Alpine	9.7	2yr		428.00			4.63			1.08		4457.69	4457.69	4458.02	42.25	0.55	
Alpine	9.7	5yr		1690.00			7.48			1.96		4460.74	4460.74	4461.61	45.29	0.59	
Alpine	9.7	10yr		3666.00			8.63			2.20		4464.65	4464.65	4465.81	63.33	0.59	
Alpine	9.7	25yr		5765.00			9.02			2.17		4467.74	4467.74	4469.00	74.63	0.54	
Alpine	9.7	50yr		7435.21	81.79		9.55	0.53		2.45	0.17	4469.44	4469.44	4470.84	391.50	0.57	
Alpine	9.7	100yr		9803.83	852.17		10.77	1.06		3.09	0.45	4470.84	4470.84	4472.50	796.78	0.63	
Alpine	9.7	500yr		10875.46	5796.83	1.02	9.13	1.31	0.27	2.03	0.57	4473.65	4473.65	4474.50	1763.66	0.47	
Alpine	9.73	Bridge															
Alpine	9.75	2yr		428.00			3.73			0.64		4458.21	4458.21	4458.43	42.77	0.40	
Alpine	9.75	5yr		1690.00			6.58			1.43		4461.41	4459.18	4462.09	45.97	0.49	
Alpine	9.75	10yr		3666.00			6.21			1.06		4467.07	4461.64	4467.67	73.49	0.39	
Alpine	9.75	25yr		5683.30	81.70		7.21	0.43		1.39	0.11	4469.55	4466.22	4470.35	419.72	0.43	
Alpine	9.75	50yr		6803.72	712.68	0.23	7.17	0.60	0.03	1.35	0.17	4471.22	4465.67	4471.95	1266.62	0.41	
Alpine	9.75	100yr		7790.92	2809.89	0.65	7.07	0.90	0.12	1.25	0.30	4472.75	4467.68	4473.32	1577.38	0.38	
Alpine	9.75	500yr		9601.94	6946.34	0.96	7.51	1.20	0.22	1.34	0.45	4474.52	4472.49	4475.03	1859.66	0.37	

HEC-RAS Plan: Out D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	9.8*	2yr		428.00			5.08			1.35		4458.51		4458.91	42.05	0.63
Alpine	9.8*	5yr		1690.00			7.63			2.05		4461.66		4462.56	45.20	0.61
Alpine	9.8*	10yr		3666.00			7.03			1.38		4467.16		4467.93	66.61	0.44
Alpine	9.8*	25yr		5651.13	113.87		8.10	0.51		1.76	0.15	4469.65		4470.65	430.18	0.48
Alpine	9.8*	50yr	1.49	6592.06	923.45	0.31	7.84	0.69	0.04	1.62	0.22	4471.34		4472.18	1290.97	0.45
Alpine	9.8*	100yr	69.10	7339.07	3247.83	0.72	7.53	0.98	0.15	1.42	0.35	4472.86		4473.47	1600.48	0.40
Alpine	9.8*	500yr	363.59	8805.11	7698.31	1.02	7.78	1.28	0.24	1.44	0.50	4474.65		4475.15	1861.29	0.38
Alpine	9.9*	2yr		428.00			4.58			1.05		4459.75		4460.08	42.27	0.54
Alpine	9.9*	5yr		1690.00			7.77			2.15		4462.59		4463.53	45.12	0.62
Alpine	9.9*	10yr		3666.00			7.77			1.70		4467.49		4468.43	60.54	0.49
Alpine	9.9*	25yr		5512.79	252.21		8.70	0.67		2.02	0.23	4470.04		4471.16	507.78	0.51
Alpine	9.9*	50yr	7.50	5956.63	1552.88	0.37	7.79	0.82	0.08	1.57	0.28	4471.80		4472.55	1383.71	0.43
Alpine	9.9*	100yr	80.06	6800.36	3975.58	0.61	7.58	1.04	0.17	1.43	0.38	4473.20		4473.76	1667.48	0.39
Alpine	9.9*	500yr	340.04	7816.16	8710.81	0.82	7.79	1.33	0.26	1.44	0.53	4474.94		4475.39	1872.04	0.38
Alpine	10	2yr		428.00			4.62			1.07		4460.74	4460.01	4461.07	42.25	0.55
Alpine	10	5yr		1690.00			7.81			2.18		4463.57	4462.23	4464.52	45.08	0.63
Alpine	10	10yr		3666.00			8.54			2.05		4467.90	4464.70	4469.04	54.51	0.54
Alpine	10	25yr		5765.00			10.25			2.75		4470.28	4466.98	4471.91	556.00	0.59
Alpine	10	50yr	21.06	5255.16	2240.78	0.46	7.84	0.89	0.11	1.48	0.31	4472.26	4468.44	4472.90	1509.01	0.41
Alpine	10	100yr	113.11	5805.99	4736.89	0.65	7.55	1.07	0.18	1.38	0.39	4473.54	4472.27	4474.03	1799.94	0.38
Alpine	10	500yr	401.52	6766.05	9699.43	0.84	7.70	1.32	0.26	1.38	0.51	4475.24	4473.36	4475.63	2031.25	0.37
Alpine	10.3333*	2yr		428.00			4.64			1.08		4461.63	4460.91	4461.97	42.24	0.55
Alpine	10.3333*	5yr		1690.00			7.84			2.19		4464.46	4463.14	4465.41	45.06	0.63
Alpine	10.3333*	10yr		3666.00			8.89			2.29		4468.41	4465.67	4469.63	54.30	0.57
Alpine	10.3333*	25yr		5765.00			10.38			2.88		4470.88	4467.77	4472.55	206.99	0.61
Alpine	10.3333*	50yr		7517.00			12.78			4.33		4471.41	4469.33	4473.94	384.64	0.74
Alpine	10.3333*	100yr		10656.00			17.42			8.07		4471.77	4471.77	4476.48	518.91	1.01
Alpine	10.3333*	500yr	148.03	9978.49	6740.48	0.87	11.80	1.74	0.37	3.50	1.02	4474.94	4474.76	4476.24	1649.91	0.62
Alpine	10.6666*	2yr		428.00			4.63			1.08		4462.54	4461.80	4462.87	42.25	0.55
Alpine	10.6666*	5yr		1690.00			7.85			2.20		4465.35	4464.03	4466.31	45.06	0.63
Alpine	10.6666*	10yr		3666.00			8.93			2.38		4469.03	4466.62	4470.27	56.54	0.58
Alpine	10.6666*	25yr		5765.00			10.25			2.94		4471.59	4468.57	4473.22	62.62	0.60
Alpine	10.6666*	50yr		7517.00			11.71			3.78		4472.81	4470.03	4474.94	189.70	0.67
Alpine	10.6666*	100yr	303.47	5449.05	4903.48	0.55	5.13	0.91	0.12	0.67	0.25	4477.90	4472.40	4478.11	1756.57	0.26
Alpine	10.6666*	500yr	84.27	11020.62	5762.11	0.69	12.11	1.82	0.27	3.91	1.15	4476.17	4476.17	4477.68	1493.92	0.66
Alpine	11	2yr		428.00			4.63			1.08		4463.44	4462.70	4463.77	42.25	0.55
Alpine	11	5yr		1690.00			7.51			2.10		4466.39	4464.93	4467.27	54.66	0.65
Alpine	11	10yr		3666.00			8.57			2.30		4469.83	4467.49	4470.97	63.76	0.58
Alpine	11	25yr		5765.00			9.52			2.62		4472.50	4469.39	4473.91	68.92	0.57

HEC-RAS Plan: Oot D River: Albine Creek Reach: Albine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	11	50yr		7517.00			10.52			3.08		4474.06	4470.71	4475.77	177.45	0.59
Alpine	11	100yr	78.66	7140.39	3436.95	0.43	6.87	1.09	0.10	1.28	0.40	4477.91	4472.78	4478.41	1467.08	0.38
Alpine	11	500yr	38.23	11973.92	4854.85	0.48	12.00	1.80	0.16	3.97	1.14	4477.50	4477.50	4479.10	1411.04	0.67
Alpine	11.3		Bridge													
Alpine	11.4	2yr		427.00			3.54			0.57		4464.52	4463.12	4464.71	42.91	0.37
Alpine	11.4	5yr		1691.00			5.80			1.16		4467.93	4465.35	4468.45	56.66	0.45
Alpine	11.4	10yr		3670.00			7.34			1.64		4471.23	4467.82	4472.07	66.47	0.47
Alpine	11.4	25yr		5777.00			8.66			2.14		4473.66	4469.73	4474.83	71.16	0.50
Alpine	11.4	50yr		7534.00			9.70			2.60		4475.17	4471.03	4476.63	875.97	0.53
Alpine	11.4	100yr	171.92	6570.87	3932.21	0.52	6.11	1.04	0.12	1.01	0.35	4478.46	4473.08	4478.82	1543.32	0.33
Alpine	11.4	500yr	550.97	9209.61	7126.42	0.87	7.86	1.45	0.29	1.63	0.63	4479.42	4477.54	4479.96	1673.73	0.41
Alpine	11.4333*	2yr		427.00			3.09			0.45		4464.75	4463.37	4464.90	52.69	0.34
Alpine	11.4333*	5yr		1691.00			5.02			0.87		4468.28	4465.30	4468.67	62.51	0.38
Alpine	11.4333*	10yr		3670.00			6.39			1.26		4471.68	4467.59	4472.31	74.77	0.41
Alpine	11.4333*	25yr		5777.00			7.46			1.59		4474.25	4469.44	4475.11	81.63	0.43
Alpine	11.4333*	50yr		7534.00			8.18			1.89		4475.94	4470.68	4476.97	900.31	0.46
Alpine	11.4333*	100yr	94.16	7492.11	3088.73	0.43	6.28	0.99	0.09	1.07	0.32	4478.52	4472.66	4478.95	1424.66	0.34
Alpine	11.4333*	500yr	402.30	10572.15	5912.54	0.80	8.12	1.41	0.26	1.74	0.61	4479.50	4476.21	4480.15	1546.26	0.42
Alpine	11.4666*	2yr		427.00			3.47			0.60		4464.91	4463.82	4465.10	52.40	0.40
Alpine	11.4666*	5yr		1691.00			5.38			1.04		4468.42	4465.75	4468.87	65.91	0.43
Alpine	11.4666*	10yr		3670.00			6.41			1.30		4471.84	4467.86	4472.48	82.73	0.43
Alpine	11.4666*	25yr		5777.00			7.18			1.52		4474.48	4470.00	4475.28	94.76	0.43
Alpine	11.4666*	50yr		7534.00			7.65			1.67		4476.26	4471.18	4477.17	853.80	0.45
Alpine	11.4666*	100yr	39.36	8181.88	2453.76	0.33	6.53	0.97	0.06	1.16	0.32	4478.56	4473.06	4479.07	1300.17	0.36
Alpine	11.4666*	500yr	282.10	11639.76	4965.14	0.74	8.47	1.42	0.24	1.90	0.63	4479.56	4476.26	4480.34	1413.04	0.44
Alpine	11.5	2yr		427.00			3.81			0.75		4465.15	4464.26	4465.38	52.19	0.46
Alpine	11.5	5yr		1691.00			5.66			1.16		4468.61	4466.20	4469.10	64.34	0.46
Alpine	11.5	10yr		3670.00			6.45			1.35		4472.03	4468.30	4472.67	91.37	0.46
Alpine	11.5	25yr		5777.00			6.89			1.43		4474.72	4470.50	4475.46	108.64	0.44
Alpine	11.5	50yr		7534.00			7.20			1.49		4476.54	4471.68	4477.34	784.18	0.43
Alpine	11.5	100yr	5.01	9009.98	1660.01	0.16	6.90	0.84	0.02	1.31	0.33	4478.59	4473.46	4479.22	1166.05	0.39
Alpine	11.5	500yr	165.96	13125.51	3595.53	0.65	9.16	1.28	0.22	2.23	0.70	4479.56	4476.28	4480.58	1272.74	0.49
Alpine	11.5666*	2yr		427.00			4.24			0.96		4466.00	4466.00	4466.27	51.96	0.54
Alpine	11.5666*	5yr		1691.00			6.28			1.44		4469.14	4469.14	4469.75	56.02	0.50
Alpine	11.5666*	10yr		3670.00			7.42			1.82		4472.44	4473.30	4473.30	81.27	0.53
Alpine	11.5666*	25yr		5777.00			7.94			1.93		4475.03	4475.03	4476.01	97.39	0.51
Alpine	11.5666*	50yr		7534.00			8.31			2.02		4476.79	4477.86	4477.86	105.36	0.50
Alpine	11.5666*	100yr		10317.13	357.87		9.51	0.57		2.52	0.22	4478.46	4479.81	4479.81	893.28	0.53
Alpine	11.5666*	500yr	0.31	15735.60	1151.09	0.20	13.79	1.09	0.05	5.20	0.70	4478.96	4481.73	4481.73	941.05	0.75

HEC-RAS Plan, Out D River, Alpine Creek Reach, Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E. O. Elev (ft)	Top Width (ft)	Froude # CN
Alpine	11.6333*	2yr		427.00			4.25			0.97		4467.06		4467.34	51.97	0.54
Alpine	11.6333*	5yr		1691.00			6.78			1.73		4469.85		4470.56	54.76	0.56
Alpine	11.6333*	10yr		3670.00			8.13			2.17		4473.08		4474.10	73.28	0.58
Alpine	11.6333*	25yr		5777.00			8.98			2.44		4475.52		4476.78	80.86	0.56
Alpine	11.6333*	50yr		7534.00			9.67			2.69		4477.19		4478.84	82.78	0.56
Alpine	11.6333*	100yr		10565.40	109.60		11.60	0.58		3.71	0.25	4478.76	4475.69	4480.83	391.80	0.62
Alpine	11.6333*	500yr		14829.57	1978.11	0.94	13.30	1.20	0.44	4.56	0.75	4481.21	4481.21	4483.62	1046.69	0.64
Alpine	11.7	2yr		427.00			5.04			1.32		4468.22	4467.67	4468.62	42.06	0.63
Alpine	11.7	5yr		1691.00			8.67			2.86		4470.75	4469.91	4471.92	46.63	0.75
Alpine	11.7	10yr		3670.00			10.28			3.50		4473.78	4472.50	4475.42	56.69	0.72
Alpine	11.7	25yr		5777.00			11.94			4.37		4475.98	4474.34	4478.19	58.41	0.73
Alpine	11.7	50yr		7534.00			13.15			5.09		4477.49	4475.68	4480.17	59.58	0.75
Alpine	11.7	100yr		10864.49	10.51		16.20	0.67		7.45	0.38	4478.91	4477.84	4482.98	211.33	0.86
Alpine	11.7	500yr		13555	2833.81	1.50	15.63	1.67	0.96	6.27	1.03	4482.78	4482.78	4485.92	999.98	0.72
Alpine	11.9															
				Bridge												
Alpine	12	2yr		427.00			3.00			0.88		4470.07	4468.17	4470.21	43.41	0.29
Alpine	12	5yr		1691.00			4.94			0.83		4473.90	4470.45	4474.28	56.79	0.35
Alpine	12	10yr		3670.00			6.76			1.38		4477.36	4472.88	4478.07	59.48	0.39
Alpine	12	25yr		5090.06	664.48	0.51	6.34	0.65	0.13	1.08	0.21	4481.70	4474.72	4482.25	583.89	0.31
Alpine	12	50yr		5823.85	1618.09	0.69	6.36	0.66	0.19	1.04	0.21	4483.56	4476.10	4484.05	1138.16	0.29
Alpine	12	100yr		7828.83	2693.63	0.94	8.32	0.93	0.34	1.76	0.39	4484.00	4478.24	4484.79	1183.63	0.37
Alpine	12	500yr		9104.80	7405.02	0.85	8.28	1.30	0.28	1.65	0.61	4486.64	4483.99	4487.23	1309.47	0.34
Alpine	12.5	2yr		427.00			3.32			0.49		4470.18	4468.58	4470.35	43.10	0.34
Alpine	12.5	5yr		1691.00			5.64			0.98		4473.98	4470.82	4474.48	46.91	0.39
Alpine	12.5	10yr		3675.00			7.68			1.60		4477.42	4473.29	4478.33	56.03	0.46
Alpine	12.5	25yr		5790.00			7.94			1.51		4481.59	4475.53	4482.57	391.75	0.41
Alpine	12.5	50yr		6522.28	1027.72		7.67	0.70		1.36	0.23	4483.50	4477.07	4484.29	925.89	0.38
Alpine	12.5	100yr		8871.61	1823.39		10.13	1.01		2.38	0.46	4483.88	4479.46	4485.20	1007.10	0.50
Alpine	12.5	500yr		9885.12	6819.40	1.15	9.20	1.46	0.30	1.88	0.71	4486.65	4484.93	4487.44	1210.26	0.42
Alpine	12.5668*	2yr		427.00			3.83			0.69		4470.40	4469.22	4470.63	42.69	0.42
Alpine	12.5668*	5yr		1691.00			6.05			1.18		4474.16	4471.45	4474.74	47.39	0.44
Alpine	12.5668*	10yr		3675.00			7.74			1.71		4477.70	4473.92	4478.63	61.89	0.49
Alpine	12.5668*	25yr		5790.00			7.56			1.51		4481.90	4476.24	4482.79	313.13	0.43
Alpine	12.5668*	50yr		6983.51	566.49		7.74	0.71		1.52	0.25	4483.63	4477.76	4484.49	610.85	0.40
Alpine	12.5668*	100yr		9661.33	1033.67		10.31	0.98		2.67	0.45	4484.07	4479.99	4485.56	731.29	0.53
Alpine	12.5668*	500yr		12540.09	4329.22	0.75	11.15	1.51	0.18	2.96	0.85	4486.44	4485.06	4487.88	1035.63	0.52
Alpine	12.6333*	2yr		427.00			4.25			0.88		4470.78	4469.85	4471.06	42.44	0.49
Alpine	12.6333*	5yr		1691.00			6.40			1.38		4474.46	4472.08	4475.09	50.21	0.49

H.C.-RAS Plan: Oat D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lbsq ft)	Shear Chan (lbsq ft)	Shear ROB (lbsq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	CH
Alpine	12.6333*	10yr		3675.00		7.14				1.62		4478.21	4474.79	4479.01	85.64	0.51	
Alpine	12.6333*	25yr		5790.00		6.64				1.21		4482.36	4477.04	4483.04	190.90	0.37	
Alpine	12.6333*	50yr		7313.12	236.88	7.27		0.51		1.40	0.15	4483.90	4478.39	4484.70	557.73	0.38	
Alpine	12.6333*	100yr		9927.67	767.33	9.37		0.89		2.20	0.37	4484.71	4480.04	4485.94	594.55	0.46	
Alpine	12.6333*	500yr	0.36	13875.49	3030.15	11.11		1.56	0.02	3.06	0.90	4486.69	4484.73	4488.27	691.60	0.52	
Alpine	12.7	2yr		427.00		4.50				1.01		4471.29		4471.60	42.31	0.53	
Alpine	12.7	5yr		1691.00		5.95				1.43		4475.03		4475.58	93.02	0.60	
Alpine	12.7	10yr		3675.00		5.73				1.04		4478.65		4479.36	93.77	0.39	
Alpine	12.7	25yr		5790.00		5.76				0.92		4482.73		4483.24	94.53	0.31	
Alpine	12.7	50yr		7462.71	87.29	6.49		0.35		1.13	0.08	4484.25		4484.90	465.27	0.33	
Alpine	12.7	100yr		10229.69	465.31	8.23		0.75		1.77	0.27	4485.23		4486.23	488.07	0.40	
Alpine	12.7	500yr		14964.39	1941.61	10.58		1.41		2.82	0.75	4487.04		4488.58	530.60	0.48	
Alpine	12.9																
			Culvert														
Alpine	13	2yr		427.00		6.94				2.82		4470.99	4470.99	4471.74	41.51	1.00	
Alpine	13	5yr		1691.00		6.31				1.65		4475.10	4473.22	4475.72	93.04	0.65	
Alpine	13	10yr		3675.00		5.77				1.06		4479.05	4475.83	4479.56	93.81	0.39	
Alpine	13	25yr		5790.00		5.75				0.92		4482.98	4477.15	4483.50	94.58	0.31	
Alpine	13	50yr		7426.77	123.23	6.50		0.40		1.14	0.10	4484.41	4478.08	4485.05	468.85	0.33	
Alpine	13	100yr		10148.16	546.84	8.21		0.80		1.78	0.29	4485.39	4479.61	4486.38	491.91	0.40	
Alpine	13	500yr		14887.56	2018.44	10.66		1.45		2.89	0.79	4487.09	4482.27	4488.65	531.64	0.49	
Alpine	13.25*	2yr		427.00		4.48				1.00		4472.17		4472.49	42.32	0.53	
Alpine	13.25*	5yr		1691.00		7.19				1.78		4475.36		4476.16	45.50	0.56	
Alpine	13.25*	10yr		3678.00		7.74				1.97		4479.03		4479.95	87.60	0.59	
Alpine	13.25*	25yr		5796.00		6.66				1.28		4482.99		4483.68	103.12	0.40	
Alpine	13.25*	50yr		7429.88	128.12	7.29		0.45		1.46	0.13	4484.42		4485.24	469.12	0.41	
Alpine	13.25*	100yr		10111.94	592.06	9.00		0.89		2.16	0.39	4485.44		4486.62	492.89	0.48	
Alpine	13.25*	500yr		14753.52	2162.48	11.29		1.56		3.25	0.98	4487.20		4488.93	533.10	0.56	
Alpine	13.5	2yr		427.00		4.56				1.04		4472.52	4471.75	4472.84	42.28	0.54	
Alpine	13.5	5yr		1691.00		7.35				1.88		4475.63	4473.98	4476.47	45.38	0.58	
Alpine	13.5	10yr		3678.00		8.86				2.40		4479.12	4476.47	4480.34	64.46	0.62	
Alpine	13.5	25yr		5796.00		8.13				1.91		4482.91	4478.92	4483.94	92.64	0.52	
Alpine	13.5	50yr		7448.46	109.54	8.74		0.49		2.16	0.18	4484.33	4480.48	4485.50	457.48	0.54	
Alpine	13.5	100yr		10089.07	614.93	10.53		1.04		3.05	0.59	4485.34	4482.57	4486.97	485.00	0.62	
Alpine	13.5	500yr	0.53	14507.42	2408.06	12.44		1.79	0.07	4.07	1.39	4487.22	4486.32	4489.29	546.98	0.68	
Alpine	13.75*	2yr		427.00		4.59				1.06		4472.88	4472.13	4473.21	42.26	0.55	
Alpine	13.75*	5yr		1691.00		7.47				1.95		4475.93	4474.37	4476.79	45.31	0.59	
Alpine	13.75*	10yr		3678.00		9.18				2.51		4479.38	4476.85	4480.69	57.86	0.61	
Alpine	13.75*	25yr		5796.00		9.01				2.27		4483.01	4479.17	4484.27	80.57	0.56	
Alpine	13.75*	50yr		7558.00		9.91				2.73		4484.39	4480.70	4485.91	91.96	0.61	

H.C.-RAS Plan: Opt D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Flight (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	13.75*	100yr		10704.00			12.68			4.44		4483.24	4483.25	4487.74	99.00	0.77
Alpine	13.75*	500yr		16916.00			17.02			7.83		4486.68	4486.68	4491.18	108.74	0.99
Alpine	14	2yr		427.00			4.61			1.07		4473.25	4472.51	4473.58	42.25	0.55
Alpine	14	5yr		1691.00			7.43			2.01		4476.28	4474.75	4477.14	49.53	0.61
Alpine	14	10yr		3678.00			8.35			2.14		4479.96	4477.35	4481.04	65.73	0.57
Alpine	14	25yr		5796.00			8.43			1.93		4483.41	4479.39	4484.52	77.05	0.50
Alpine	14	50yr		7558.00			9.50			2.36		4484.78	4480.75	4486.18	81.53	0.54
Alpine	14	100yr		10704.00			12.02			3.66		4485.92	4482.84	4488.16	84.12	0.65
Alpine	14	500yr		16916.00			15.38			5.87		4488.29	4486.08	4491.96	96.32	0.80
Alpine	14.3															
			Bridge													
Alpine	14.5	2yr		427.00			3.80			0.67		4473.71	4472.51	4473.94	42.72	0.41
Alpine	14.5	5yr		1691.00			6.27			1.37		4477.10	4474.75	4477.71	53.31	0.49
Alpine	14.5	10yr		3681.00			7.45			1.65		4480.76	4477.35	4481.62	66.35	0.49
Alpine	14.5	25yr		5806.00			7.86			1.65		4484.06	4479.40	4485.02	79.18	0.45
Alpine	14.5	50yr		7570.00			8.75			1.96		4485.61	4480.74	4486.80	83.87	0.48
Alpine	14.5	100yr		10719.00			10.45			2.70		4487.49	4482.82	4489.19	90.08	0.55
Alpine	14.5	500yr		16671.97	258.03		11.83	0.70		3.44	0.31	4491.17	4486.06	4493.31	505.15	0.60
Alpine	14.6666*	2yr		427.00			4.29			0.90		4474.02		4474.31	42.41	0.49
Alpine	14.6666*	5yr		1691.00			6.85			1.58		4477.36		4478.09	45.75	0.52
Alpine	14.6666*	10yr		3681.00			8.55			2.12		4480.92		4482.06	59.00	0.56
Alpine	14.6666*	25yr		5806.00			9.09			2.18		4484.14		4485.43	69.97	0.53
Alpine	14.6666*	50yr		7570.00			10.09			2.60		4485.68		4487.26	75.55	0.56
Alpine	14.6666*	100yr		10719.00			11.81			3.56		4487.60		4489.76	88.52	0.65
Alpine	14.6666*	500yr		15665.25	1213.03	0.66	12.21	1.05	0.29	3.53	0.58	4491.50		4493.64	813.47	0.59
Alpine	14.8333*	2yr		427.00			4.62			1.07		4474.47		4474.80	42.25	0.55
Alpine	14.8333*	5yr		1691.00			7.22			1.80		4477.70		4478.51	45.48	0.56
Alpine	14.8333*	10yr		3681.00			9.23			2.34		4481.18		4482.50	49.76	0.57
Alpine	14.8333*	25yr		5806.00			10.15			2.63		4484.30		4485.90	61.03	0.58
Alpine	14.8333*	50yr		7570.00			11.19			3.23		4485.86		4487.81	72.01	0.64
Alpine	14.8333*	100yr		10694.71	24.20	0.21	12.92	0.76	0.05	4.19	0.20	4487.83	4485.05	4490.42	160.88	0.70
Alpine	14.8333*	500yr		9927.00	6496.34	0.74	7.68	1.61	0.20	1.27	0.40	4493.73		4494.28	1317.00	0.33
Alpine	15	2yr		427.00			4.76			1.15		4475.01		4475.37	42.18	0.58
Alpine	15	5yr		1691.00			7.53			1.99		4478.10		4478.98	45.27	0.60
Alpine	15	10yr		3681.00			9.56			2.53		4481.51		4482.93	48.68	0.60
Alpine	15	25yr		5806.00			10.77			2.85		4484.56		4486.36	54.84	0.61
Alpine	15	50yr		7532.64	36.72	0.36	11.92	0.83	0.10	3.43	0.22	4486.15		4488.34	149.00	0.65
Alpine	15	100yr		7821.64	2695.49	0.94	8.90	1.29	0.32	0.33	0.33	4490.26		4491.17	1084.37	0.41
Alpine	15	500yr		725.32	7328.90	0.68	6.60	1.44	0.16	0.87	0.31	4494.11		4494.42	1622.83	0.27

HEC-RAS Plan: Oot D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Crt
Alpine	15.05	Bridge														
Alpine	15.1	2yr		419.00			3.71			0.64		4475.56	4474.32	4475.77	42.73	0.40
Alpine	15.1	5yr		1699.00			4.54			0.58		4481.28	4476.58	4481.60	48.46	0.29
Alpine	15.1	10yr		3811.00			6.95			1.19		4484.73	4479.19	4485.48	55.99	0.39
Alpine	15.1	25yr	18.45	5848.76	277.79	0.53	8.14	0.74	0.14	1.53	0.15	4487.59	4481.49	4488.57	506.89	0.41
Alpine	15.1	50yr	134.58	6004.70	1867.72	0.71	6.96	1.02	0.19	1.06	0.20	4489.98	4483.11	4490.55	980.32	0.32
Alpine	15.1	100yr	260.54	7025.77	3953.69	0.76	7.47	1.28	0.21	1.18	0.29	4491.30	4488.60	4491.85	1210.64	0.33
Alpine	15.1	500yr	811.57	7302.37	9333.06	0.69	6.48	1.44	0.16	0.84	0.30	4494.40	4490.77	4494.69	1658.00	0.26
Alpine	15.1666*	2yr		419.00			5.38			1.55		4475.79		4476.24	41.90	0.69
Alpine	15.1666*	5yr		1699.00			5.23			0.82		4481.32		4481.75	47.43	0.35
Alpine	15.1666*	10yr		3811.00			7.70			1.46		4484.78		4485.70	50.89	0.44
Alpine	15.1666*	25yr	0.04	6120.46	24.50	0.17	9.38	0.65	0.02	2.12	0.13	4487.56		4488.92	133.42	0.51
Alpine	15.1666*	50yr	32.47	7384.13	590.40	0.70	9.39	0.98	0.20	2.00	0.23	4489.74		4491.00	604.07	0.46
Alpine	15.1666*	100yr	120.20	9226.15	1893.65	1.02	10.72	1.43	0.36	2.52	0.42	4490.95		4492.42	828.80	0.50
Alpine	15.1666*	500yr	561.53	9285.98	7599.49	0.92	8.72	1.70	0.26	1.55	0.46	4494.28		4494.93	1400.73	0.37
Alpine	15.3333*	2yr		419.00			4.65			1.10		4477.14		4477.48	42.20	0.56
Alpine	15.3333*	5yr		1699.00			5.93			1.11		4481.56		4482.11	46.62	0.42
Alpine	15.3333*	10yr		3811.00			8.35			1.78		4485.08		4486.16	50.13	0.49
Alpine	15.3333*	25yr		6145.00	0.00		10.08	0.06		2.48	0.01	4487.93		4489.51	63.32	0.56
Alpine	15.3333*	50yr	1.34	7924.23	81.43	0.46	10.85	0.69	0.12	2.75	0.27	4489.88		4491.69	198.34	0.56
Alpine	15.3333*	100yr	12.32	10950.54	277.14	0.77	13.96	0.85	0.28	4.44	0.41	4490.74	4488.08	4493.69	438.66	0.70
Alpine	15.3333*	500yr	255.95	14213.75	2977.31	1.37	14.82	1.44	0.64	4.68	0.67	4493.53		4496.32	1079.42	0.67
Alpine	15.5	2yr		419.00			4.78			1.18		4478.14		4478.50	42.13	0.58
Alpine	15.5	5yr		1699.00			6.67			1.48		4481.94		4482.63	45.93	0.50
Alpine	15.5	10yr		3811.00			9.00			2.14		4485.48		4486.73	49.47	0.54
Alpine	15.5	25yr		6145.00			10.71			2.76		4488.40		4490.18	56.59	0.59
Alpine	15.5	50yr		7993.75	13.25		11.58	0.52		3.19	0.19	4490.32		4492.39	113.09	0.62
Alpine	15.5	100yr	0.76	11124.17	115.07	0.53	14.63	0.97	0.17	4.96	0.52	4491.41		4494.70	187.50	0.75
Alpine	15.5	500yr	251.09	14098.44	3097.47	1.23	13.92	1.38	0.52	4.08	0.78	4495.36		4497.80	1105.43	0.62
Alpine	15.55	Bridge														
Alpine	15.6	2yr		419.00			3.73			0.65		4478.72		4478.94	42.71	0.41
Alpine	15.6	5yr		1699.00			4.62			0.60		4484.34		4484.67	48.33	0.29
Alpine	15.6	10yr		3811.00			7.01			1.17		4487.85		4488.61	52.44	0.38
Alpine	15.6	25yr	0.02	6112.36	32.83	0.13	8.37	0.47	0.02	1.65	0.13	4490.94		4492.03	157.94	0.44
Alpine	15.6	50yr	11.63	7688.65	306.72	0.51	9.02	0.61	0.12	1.82	0.20	4492.85		4494.06	527.12	0.44
Alpine	15.6	100yr	152.40	9176.81	1910.79	0.79	9.12	0.89	0.22	1.75	0.33	4495.26		4496.31	1091.05	0.41
Alpine	15.6	500yr	736.43	10548.59	6161.98	0.93	8.86	1.21	0.26	1.56	0.49	4498.14		4498.89	1475.14	0.36
Alpine	15.75*	2yr		419.00			5.66			1.75		4479.26		4479.76	41.81	0.75

HEC-RAS Plan: Qot D River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	15.75*	5yr		1699.00			5.58			0.96		4484.45		4484.93	46.99	0.39
Alpine	15.75*	10yr		3811.00			7.99			1.60		4487.99		4488.98	50.72	0.46
Alpine	15.75*	25yr		6135.35	9.65		9.30	0.43		2.13	0.13	4491.12		4492.46	107.62	0.51
Alpine	15.75*	50yr	2.12	7878.10	126.78	0.45	10.11	0.55	0.11	2.40	0.19	4492.96		4494.52	377.37	0.51
Alpine	15.75*	100yr	88.91	9826.94	1324.14	0.84	10.58	0.92	0.26	2.48	0.39	4495.26		4496.79	937.65	0.49
Alpine	15.75*	500yr	618.49	11341.14	5487.37	1.10	10.15	1.30	0.37	2.15	0.60	4498.16		4499.21	1379.27	0.43
Alpine	16*	2yr		419.00			4.53			1.03		4481.15		4481.47	42.25	0.54
Alpine	16*	5yr		1699.00			6.64			1.46		4485.54		4485.54	45.95	0.50
Alpine	16*	10yr		3811.00			8.94			2.12		4488.42		4489.66	50.42	0.54
Alpine	16*	25yr		6141.00	4.00		10.05	0.39		2.48	0.12	4491.63		4493.20	91.06	0.57
Alpine	16*	50yr	0.29	7903.72	102.99	0.32	10.84	0.78	0.07	2.74	0.33	4493.44		4495.24	190.92	0.58
Alpine	16*	100yr	51.05	10209.74	979.21	0.82	11.77	0.96	0.27	3.05	0.44	4495.54		4497.49	780.98	0.57
Alpine	16*	500yr	485.81	12159.80	4801.39	1.19	11.59	1.39	0.45	2.78	0.71	4498.28		4499.74	1286.71	0.51
Alpine	16.25*	2yr		419.00			4.81			1.19		4482.46		4482.82	42.12	0.59
Alpine	16.25*	5yr		1699.00			7.52			1.98		4486.64		4486.52	45.30	0.59
Alpine	16.25*	10yr		3811.00			9.69			2.82		4489.17		4490.62	51.17	0.62
Alpine	16.25*	25yr		6141.88	3.12		10.62	0.41		2.87	0.13	4492.36		4494.11	86.27	0.62
Alpine	16.25*	50yr	0.00	7913.26	93.73	0.07	11.39	0.89	0.42	3.14	0.42	4494.13		4496.13	157.21	0.62
Alpine	16.25*	100yr	36.59	10365.89	837.52	0.80	12.51	0.98	0.28	3.57	0.48	4496.12		4498.37	737.98	0.63
Alpine	16.25*	500yr	418.48	12611.86	4416.66	1.28	12.82	1.47	0.53	3.41	0.82	4498.66		4500.46	1229.91	0.58
Alpine	16.5	2yr		419.00			4.79			1.18		4483.92		4484.28	42.13	0.59
Alpine	16.5	5yr		1699.00			8.01			2.30		4486.78		4487.78	44.99	0.65
Alpine	16.5	10yr		3811.00			10.16			2.99		4490.17		4491.78	52.62	0.67
Alpine	16.5	25yr		6140.57	4.43		11.02	0.48		3.18	0.17	4493.27		4495.15	87.66	0.66
Alpine	16.5	50yr		7912.02	94.98		11.79	0.96		3.46	0.38	4494.98		4497.11	173.34	0.66
Alpine	16.5	100yr	33.44	10379.37	827.19	0.79	12.92	1.01	0.28	3.92	0.52	4496.92		4499.31	738.15	0.66
Alpine	16.5	500yr	384.97	12820.40	4241.63	1.36	13.34	1.54	0.61	3.93	0.93	4499.23		4501.27	1185.95	0.63
Alpine	16.7		Bridge													
Alpine	17	2yr		419.00			4.54			1.04		4484.60	4483.85	4484.92	42.24	0.54
Alpine	17	5yr		1699.00			7.70			2.09		4487.54	4486.12	4488.46	45.18	0.61
Alpine	17	10yr		3811.00			9.76			2.76		4490.96	4488.78	4492.44	54.70	0.64
Alpine	17	25yr	0.14	6038.29	106.57	0.22	8.87	0.51	0.04	1.97	0.16	4495.52	4491.18	4496.72	360.96	0.50
Alpine	17	50yr		7890.27	116.73		12.07	1.00		3.69	0.34	4495.12	4492.84	4497.35	220.76	0.69
Alpine	17	100yr	330.66	7585.45	3323.89	0.86	7.78	0.99	0.20	1.34	0.37	4499.83	4496.88	4500.47	1276.02	0.36
Alpine	17	500yr	1015.77	9477.08	6954.14	1.10	8.61	1.33	0.34	1.58	0.57	4501.66	4499.28	4502.30	1401.80	0.38
Alpine	17.05*	2yr		419.00			4.79			1.18		4485.58		4485.94	42.13	0.59
Alpine	17.05*	5yr		1699.00			8.01			2.30		4488.44		4489.44	44.99	0.65
Alpine	17.05*	10yr		3811.00			10.09			3.02		4491.79		4493.37	57.14	0.69
Alpine	17.05*	25yr		6095.21	49.79		9.30	0.76		2.23	0.29	4495.91		4497.24	137.64	0.55

HCC-RAS Plan: Qoat D. River: Alpine Creek Reach, Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/ft ²)	Shear Chan (lb/ft ²)	Shear ROB (lb/ft ²)	W.S. Elev (ft)	Crnt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Crnt
Alpine	17.05*	50yr		7939.53	67.47		12.07	1.00		3.76	0.49	4495.94		4498.19	138.80	0.71
Alpine	17.05*	100yr	218.75	9066.13	1955.12	0.96	9.63	1.04	0.31	2.12	0.41	4499.82		4500.98	1076.16	0.47
Alpine	17.05*	500yr	560.44	11533.92	5352.64	0.97	10.73	1.49	0.31	2.52	0.71	4501.64		4502.83	1411.59	0.49
Alpine	17.1*	2yr		419.00			4.77			1.17		4486.67		4487.02	42.14	0.58
Alpine	17.1*	5yr		1699.00			8.14			2.40		4489.45		4490.48	44.91	0.67
Alpine	17.1*	10yr		3811.00			10.18			3.12		4492.76		4494.37	60.42	0.72
Alpine	17.1*	25yr		6133.08	11.92		9.73	0.59		2.51	0.19	4496.38		4497.84	114.20	0.60
Alpine	17.1*	50yr		7969.30	37.70		11.94	0.91		3.71	0.39	4496.86		4499.06	129.19	0.72
Alpine	17.1*	100yr	89.82	10436.36	713.82	0.96	11.76	1.01	0.34	3.28	0.42	4499.87		4501.66	715.77	0.61
Alpine	17.1*	500yr	416.32	14304.77	2725.91	1.51	14.27	1.59	0.71	4.64	0.87	4501.14		4503.74	1042.07	0.70
Alpine	17.15*	2yr		419.00			4.79			1.18		4487.74		4488.10	42.13	0.58
Alpine	17.15*	5yr		1699.00			8.18			2.42		4490.50		4491.54	44.89	0.67
Alpine	17.15*	10yr		3811.00			10.04			3.06		4493.86		4495.43	65.21	0.73
Alpine	17.15*	25yr		6144.60	0.40		10.04	0.27		2.73	0.05	4497.00		4498.56	92.49	0.65
Alpine	17.15*	50yr		7988.55	18.45		11.76	0.79		3.63	0.29	4497.82		4499.96	122.58	0.72
Alpine	17.15*	100yr	44.77	10911.72	283.50	0.90	12.52	1.02	0.31	3.79	0.40	4500.13	4498.07	4502.50	427.60	0.68
Alpine	17.15*	500yr	281.78	15755.31	1409.91	1.57	16.01	1.58	0.79	5.95	0.84	4501.49		4505.08	806.19	0.82
Alpine	17.2	2yr		419.00			4.80			1.19		4488.83		4489.18	42.13	0.59
Alpine	17.2	5yr		1699.00			8.21			2.45		4491.58		4492.62	44.88	0.67
Alpine	17.2	10yr		3811.00			9.82			2.94		4495.02		4496.51	69.27	0.73
Alpine	17.2	25yr		6145.00			10.29			2.91		4497.74		4499.38	84.60	0.68
Alpine	17.2	50yr		8001.46	5.54		11.63	0.58		3.58	0.17	4498.78		4500.88	117.14	0.73
Alpine	17.2	100yr	27.78	11033.34	178.88	0.87	12.68	1.43	0.30	3.93	0.62	4500.85	4499.05	4503.30	225.03	0.71
Alpine	17.2	500yr	555.55	14847.61	2043.84	1.56	13.30	1.55	0.67	3.98	0.67	4503.64	4503.64	4505.99	964.48	0.66
Alpine	17.3			Bridge												
Alpine	17.4214	2yr		419.00			4.54			1.04		4489.51		4488.76	42.24	0.54
Alpine	17.4214	5yr		1699.00			7.77			2.14		4492.41		4491.03	45.14	0.62
Alpine	17.4214	10yr		3811.00			8.73			2.48		4496.05		4493.98	75.11	0.64
Alpine	17.4214	25yr	0.13	6127.46	17.41	0.35	8.87	0.85	0.05	2.32	0.18	4499.11		4496.15	128.22	0.56
Alpine	17.4214	50yr	5.48	7910.61	90.91	0.83	10.29	1.42	0.18	3.01	0.40	4500.00	4497.44	4501.62	162.30	0.61
Alpine	17.4214	100yr	730.75	7638.42	2870.83	1.14	6.35	1.27	0.20	0.99	0.23	4504.92	4499.47	4505.36	1137.72	0.30
Alpine	17.4214	500yr	1424.68	9761.03	6261.30	1.19	7.26	1.74	0.22	1.24	0.38	4506.54	4503.74	4507.01	1432.57	0.33
Alpine	17.5371*	2yr		419.00			4.81			1.19		4490.74		4491.10	42.12	0.59
Alpine	17.5371*	5yr		1699.00			8.04			2.36		4493.59		4494.59	46.33	0.66
Alpine	17.5371*	10yr		3811.00			8.86			2.84		4497.16		4498.38	60.47	0.68
Alpine	17.5371*	25yr		6143.62	1.38		9.15	0.47		2.57	0.08	4499.88		4501.18	110.79	0.61
Alpine	17.5371*	50yr	1.94	7964.00	41.06	0.71	10.35	1.23	0.15	3.16	0.34	4500.89		4502.54	147.20	0.65
Alpine	17.5371*	100yr	511.93	9375.85	1352.22	1.34	8.06	1.25	0.29	1.67	0.27	4504.95	4499.47	4505.80	904.84	0.41
Alpine	17.5371*	500yr	1327.11	12071.03	4048.86	1.70	9.14	1.85	0.43	2.06	0.48	4506.58	4503.64	4507.49	1134.54	0.44

HEC-RAS Plan, Out D River, Alpine Creek Reach, Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Cut W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Cht
Alpine	17.6528*	2yr		419.00			4.78			1.18		4492.10		4492.46	42.13	0.58
Alpine	17.6528*	5yr		1699.00			7.94			2.35		4494.95		4495.93	49.86	0.87
Alpine	17.6528*	10yr		3811.00			8.79			2.64		4498.42		4499.62	84.72	0.88
Alpine	17.6528*	25yr		6145.00			9.32			2.75		4500.80		4502.15	103.31	0.65
Alpine	17.6528*	50yr	0.39	7988.51	18.10	0.46	10.31	1.05	0.08	3.22	0.27	4501.91		4503.55	140.52	0.87
Alpine	17.6528*	100yr	2.75	10592.01	372.98	1.40	9.59	1.12	0.36	2.47	0.25	4505.03		4506.38	576.98	0.52
Alpine	17.6528*	500yr	900.97	14814.42	1731.62	2.05	11.84	1.81	0.67	3.61	0.56	4506.42		4508.27	874.78	0.61
Alpine	17.7685*	2yr		419.00			4.79			1.18		4493.45		4493.81	42.13	0.59
Alpine	17.7685*	5yr		1699.00			7.66			2.22		4496.37		4497.28	53.69	0.66
Alpine	17.7685*	10yr		3811.00			8.67			2.57		4499.68		4500.84	84.69	0.67
Alpine	17.7685*	25yr		6145.00			9.37			2.84		4501.87		4503.24	108.75	0.67
Alpine	17.7685*	50yr	0.01	7998.50	8.49	0.19	10.18	0.91	0.02	3.21	0.22	4503.03		4504.64	136.97	0.68
Alpine	17.7685*	100yr	146.85	10876.10	217.05	1.33	10.15	1.74	0.35	2.88	0.53	4505.53		4507.08	294.00	0.58
Alpine	17.7685*	500yr	599.43	16243.85	603.73	2.15	13.38	1.63	0.79	4.79	0.53	4506.78	4505.29	4509.37	621.73	0.72
Alpine	17.8842*	2yr		419.00			4.78			1.18		4494.80		4495.16	42.13	0.58
Alpine	17.8842*	5yr		1699.00			7.41			2.10		4497.74		4498.60	57.29	0.65
Alpine	17.8842*	10yr		3811.00			8.59			2.52		4500.87		4502.02	83.94	0.66
Alpine	17.8842*	25yr		6145.00			9.33			2.86		4503.03		4504.39	113.34	0.68
Alpine	17.8842*	50yr		8002.55	4.45		10.01	0.82		3.16	0.19	4504.22		4505.78	137.02	0.69
Alpine	17.8842*	100yr	82.59	11032.98	124.43	1.26	10.54	1.76	0.34	3.20	0.56	4506.23		4507.93	249.24	0.64
Alpine	17.8842*	500yr	572.84	16462.12	412.04	2.12	13.11	1.80	0.78	4.67	0.52	4507.92		4510.45	504.37	0.72
Alpine	18	2yr		419.00			4.79			1.18		4496.15		4496.51	42.13	0.59
Alpine	18	5yr		1699.00			7.19			2.01		4499.06		4499.87	60.71	0.64
Alpine	18	10yr		3811.00			8.52			2.48		4502.02		4503.15	83.27	0.65
Alpine	18	25yr		6145.00			9.25			2.82		4504.22		4505.55	114.82	0.68
Alpine	18	50yr		8004.70	2.30		9.85	0.74		3.10	0.16	4505.43		4506.94	139.28	0.69
Alpine	18	100yr	52.35	11117.06	70.59	1.20	10.71	1.65	0.33	3.41	0.53	4507.14		4508.90	229.62	0.67
Alpine	18	500yr	565.62	16572.57	308.80	2.09	12.73	1.90	0.76	4.46	0.66	4509.14		4511.53	417.05	0.71
Alpine	18.2*	2yr		419.00			5.92			1.69		4502.02	4501.74	4502.56	41.97	0.80
Alpine	18.2*	5yr		1699.00			8.60			2.92		4504.39		4505.54	63.29	0.86
Alpine	18.2*	10yr		3811.00			10.41			3.82		4506.71		4508.39	83.85	0.88
Alpine	18.2*	25yr		6144.89	0.11		11.07	0.37		4.05	0.06	4508.70		4510.60	108.52	0.85
Alpine	18.2*	50yr		7981.99	25.01		11.85	1.41		4.45	0.47	4509.79		4511.97	140.63	0.85
Alpine	18.2*	100yr	1.13	11078.09	160.78	0.59	13.53	2.26	0.13	5.54	0.98	4511.04	4510.79	4513.84	189.54	0.91
Alpine	18.2*	500yr	440.63	15217.98	1788.39	1.93	13.04	2.28	0.67	4.58	0.87	4513.98	4513.98	4516.29	708.12	0.73
Alpine	18.4*	2yr		419.00			4.35			0.86		4507.26		4507.55	47.99	0.54
Alpine	18.4*	5yr		1699.00			6.62			1.65		4509.97		4510.65	71.59	0.62
Alpine	18.4*	10yr		3810.96	0.04		8.47	0.22		2.42	0.03	4512.38		4513.50	93.06	0.67
Alpine	18.4*	25yr		6068.30	76.70		10.07	1.41		3.18	0.44	4514.02		4515.58	162.53	0.71



HEC-RAS Plan, Opt F River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	3	25yr	5.44	5263.70	365.86	0.23	2.17	0.77	0.01	0.11	0.06	4418.19	4418.19	4418.26	428.93	0.13
Alpine	3	50yr	66.38	7239.67	603.95	0.43	2.33	0.83	0.02	0.12	0.07	4420.50	4420.50	4420.58	496.71	0.13
Alpine	3	100yr	261.65	10086.20	992.15	0.64	2.60	0.91	0.04	0.14	0.08	4423.11	4423.11	4423.20	548.13	0.13
Alpine	3	500yr	827.98	15582.05	1884.97	0.99	3.07	1.07	0.08	0.18	0.10	4427.17	4427.17	4427.30	587.22	0.13
Alpine	3.16666*	2yr		445.00			4.25			0.89		4411.91	4411.91	4412.20	66.65	0.60
Alpine	3.16666*	5yr		1687.00			5.35			0.67		4413.37	4413.37	4413.81	354.09	1.00
Alpine	3.16666*	10yr		3893.55	1.45		2.84	0.15		0.25	0.01	4416.23		4416.35	459.97	0.26
Alpine	3.16666*	25yr		5517.82	117.18		2.55	0.68		0.18	0.07	4418.26		4418.36	478.61	0.19
Alpine	3.16666*	50yr		7607.21	302.79		2.47	0.80		0.15	0.07	4420.56		4420.65	507.03	0.16
Alpine	3.16666*	100yr		10749.21	590.79		2.59	0.86		0.15	0.08	4423.16		4423.26	550.94	0.14
Alpine	3.16666*	500yr	67.37	16946.45	1281.18	0.56	2.89	0.97	0.04	0.17	0.09	4427.23		4427.35	637.54	0.14
Alpine	3.33333*	2yr		445.00			4.13			0.88		4414.81		4415.07	78.09	0.62
Alpine	3.33333*	5yr		1687.00			4.38			0.47		4416.42		4416.72	405.93	0.79
Alpine	3.33333*	10yr		3895.00			6.82			1.45		4416.88	4416.88	4417.60	408.61	1.02
Alpine	3.33333*	25yr		5635.00			4.60			0.69		4418.44		4418.76	427.49	0.48
Alpine	3.33333*	50yr		7864.79	45.21		3.59	0.60		0.36	0.07	4420.65		4420.85	527.51	0.28
Alpine	3.33333*	100yr		11049.96	290.04		3.30	0.94		0.27	0.11	4423.22		4423.39	560.69	0.21
Alpine	3.33333*	500yr	1.63	17412.86	880.51	0.19	3.32	1.03	0.01	0.24	0.11	4427.28		4427.44	662.91	0.18
Alpine	3.5*	2yr		445.00			3.71			0.73		4417.77		4417.98	95.29	0.58
Alpine	3.5*	5yr		1687.00			5.20			0.48		4419.19	4419.19	4419.61	431.05	1.06
Alpine	3.5*	10yr		3895.00			4.81			0.78		4420.30		4420.66	443.80	0.83
Alpine	3.5*	25yr		5635.00			7.50			1.82		4420.17	4420.17	4421.04	436.66	1.01
Alpine	3.5*	50yr		7910.00			6.91			1.58		4421.05		4421.79	450.52	0.76
Alpine	3.5*	100yr		11339.39	0.61		5.12	0.14		0.75	0.01	4423.38		4423.78	549.71	0.42
Alpine	3.5*	500yr		17833.67	461.33		4.32	1.13		0.44	0.16	4427.35		4427.63	625.52	0.26
Alpine	3.66666*	2yr		445.00			3.44			0.78		4420.67		4420.86	102.68	0.54
Alpine	3.66666*	5yr		1687.00			4.91			0.62		4422.21		4422.59	335.13	0.85
Alpine	3.66666*	10yr		3895.00			6.58			1.56		4422.95		4423.62	339.19	0.88
Alpine	3.66666*	25yr		5635.00			6.03			1.36		4423.94		4424.50	353.77	0.65
Alpine	3.66666*	50yr		7910.00			7.68			2.17		4424.20		4425.12	356.10	0.80
Alpine	3.66666*	100yr		11340.00			10.11			3.70		4424.46	4424.46	4426.05	358.30	1.01
Alpine	3.66666*	500yr		18270.01	24.99		8.36	0.75		2.13	0.14	4427.32		4428.41	468.76	0.62
Alpine	3.83333*	2yr		445.00			3.27			0.71		4423.56		4423.72	110.11	0.52
Alpine	3.83333*	5yr		1687.00			5.39			1.08		4425.06		4425.51	175.56	0.71
Alpine	3.83333*	10yr		3895.00			6.87			1.84		4426.45		4427.18	189.47	0.70
Alpine	3.83333*	25yr		5635.00			9.01			3.12		4426.75		4428.01	192.52	0.88
Alpine	3.83333*	50yr		7910.00			9.78			3.47		4427.68		4429.17	201.83	0.86
Alpine	3.83333*	100yr		11340.00			10.67			3.86		4428.90		4430.67	214.02	0.84
Alpine	3.83333*	500yr	2.60	18292.40		0.84	13.80		0.20	6.06		4430.10	4430.10	4433.06	241.13	1.00

HEC-RAS Plan: Out F. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Flght (ft/s)	Shear LOB (lb/ft ²)	Shear Chan (lb/ft ²)	Shear ROB (lb/ft ²)	W.S. Elev (ft)	Crit.W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froutd # Crt
Alpine	4	2yr		445.00		3.24				0.71		4426.40		4426.56	117.40	0.53
Alpine	4	5yr		1687.00		5.19				1.41		4427.92		4428.34	129.49	0.58
Alpine	4	10yr		3895.00		6.69				1.77		4429.36		4430.05	188.58	0.67
Alpine	4	25yr		5635.00		7.12				1.88		4430.44		4431.22	199.37	0.63
Alpine	4	50yr		7910.00		8.16				2.34		4431.31		4432.34	208.12	0.67
Alpine	4	100yr		11340.00		9.40				2.92		4432.42		4433.79	219.20	0.71
Alpine	4	500yr	150.93	18119.46	24.61	10.64	2.01	0.66	0.59	3.41	0.12	4434.62		4436.36	426.26	0.69
Alpine	4.25*	2yr		430.00		3.41				0.78		4429.30		4429.48	108.45	0.56
Alpine	4.25*	5yr		1688.00		4.58				0.84		4430.65		4430.98	256.49	0.67
Alpine	4.25*	10yr		3624.00		5.24				1.07		4431.88		4432.31	268.81	0.58
Alpine	4.25*	25yr		5657.00		6.18				1.40		4432.70		4433.29	276.99	0.60
Alpine	4.25*	50yr		7379.00		6.27				1.34		4433.63		4434.24	286.27	0.55
Alpine	4.25*	100yr		10490.00		6.78				1.45		4434.89		4435.65	298.90	0.53
Alpine	4.25*	500yr		16703.00		7.54				1.61		4437.05		4437.93	320.46	0.51
Alpine	4.5*	2yr		430.00		3.57				0.81		4432.13		4432.33	86.37	0.53
Alpine	4.5*	5yr		1688.00		6.40				2.14		4433.62		4434.26	105.63	0.71
Alpine	4.5*	10yr		3624.00		7.28				1.64		4434.64	4434.64	4435.46	306.38	1.01
Alpine	4.5*	25yr		5657.00		8.19				2.30		4435.26	4435.20	4436.30	312.62	0.97
Alpine	4.5*	50yr		7379.00		9.04				2.83		4435.66	4435.62	4436.93	316.60	0.99
Alpine	4.5*	100yr		10490.00		9.61				3.11		4436.52		4437.95	325.18	0.92
Alpine	4.5*	500yr		16703.00		10.05				3.11		4438.23		4439.80	312.26	0.80
Alpine	4.75*	2yr		430.00		3.87				0.93		4434.84		4435.07	74.34	0.56
Alpine	4.75*	5yr		1688.00		6.00				1.76		4436.89		4437.45	91.85	0.60
Alpine	4.75*	10yr		3624.00		6.70				1.49		4438.21		4438.91	212.11	0.74
Alpine	4.75*	25yr		5657.00		7.90				2.09		4439.02		4439.99	220.21	0.77
Alpine	4.75*	50yr		7379.00		8.71				2.50		4439.61		4440.79	226.08	0.79
Alpine	4.75*	100yr		10490.00		10.44				3.50		4440.29		4441.99	232.93	0.89
Alpine	4.75*	500yr		16703.00		13.08				5.21		4441.44	4441.44	4444.09	244.35	1.01
Alpine	5	2yr		430.00		4.03				0.98		4437.60		4437.85	65.40	0.56
Alpine	5	5yr		1688.00		6.69				2.15		4439.63		4440.33	78.00	0.66
Alpine	5	10yr		3624.00		9.76				4.17		4441.07		4442.55	86.95	0.83
Alpine	5	25yr		5657.00		12.21				6.22		4442.09	4441.96	4444.41	93.28	0.97
Alpine	5	50yr		7379.00		13.42				7.24		4443.00	4443.00	4445.79	98.87	1.00
Alpine	5	100yr		10490.00		14.65				8.16		4444.60	4444.60	4447.93	108.79	1.01
Alpine	5	500yr		16703.00		16.35				9.47		4447.21	4447.21	4451.36	125.00	1.01
Alpine	5.33	2yr		428.00		6.27				2.61		4441.15	4441.15	4441.76	56.47	1.00
Alpine	5.33	5yr		1690.00		9.26				4.39		4442.97	4442.97	4444.30	68.73	1.00
Alpine	5.33	10yr		3655.00		11.36				5.80		4444.83	4444.83	4446.83	81.20	1.01
Alpine	5.33	25yr		5736.00		12.70				6.74		4446.33	4446.33	4448.84	91.31	1.01
Alpine	5.33	50yr		7481.00		13.53				7.33		4447.40	4447.40	4450.24	98.49	1.01

HEC-RAS Plan: Opt E. River: Alpine Creek Reach: Alpine

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chrt (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	1	2yr		448.00			5.81			1.47		4404.48	4403.86	4405.00	32.84	0.67
Alpine	1	5yr		1552.18		1.47	8.63		0.53	2.67		4407.22	4407.11	4408.26	181.99	0.73
Alpine	1	10yr	1214.13	2686.87		3.08	10.32		1.61	3.49		4409.02	4408.80	4410.20	204.43	0.76
Alpine	1	25yr	2369.28	3636.89	28.83	4.00	11.52	0.75	2.38	4.11	0.15	4410.26	4409.74	4411.59	380.51	0.78
Alpine	1	50yr	3195.85	4324.30	324.85	4.50	12.34	1.95	2.84	4.56	0.61	4410.99	4410.79	4412.42	386.29	0.80
Alpine	1	100yr	4596.94	5426.79	1158.27	5.17	13.51	3.19	3.50	5.22	1.29	4412.08	4411.77	4413.64	394.87	0.81
Alpine	1	500yr	7322.23	7477.60	3275.17	6.15	15.35	4.62	4.19	6.32	2.25	4413.90	4413.32	4415.71	434.96	0.84
Alpine	1.33333*	2yr		445.00			5.14			1.18		4405.84		4406.25	39.75	0.61
Alpine	1.33333*	5yr		1687.00			8.08			2.39		4408.55		4409.56	51.70	0.71
Alpine	1.33333*	10yr		3895.00			12.85			5.60		4410.24	4410.24	4412.81	59.65	1.01
Alpine	1.33333*	25yr	522.62	5112.38		2.01	11.31	0.83		3.95		4412.60	4412.60	4414.41	259.08	0.76
Alpine	1.33333*	50yr	1377.80	6532.40		2.97	12.53	1.52		4.65		4413.64	4413.64	4415.68	262.97	0.79
Alpine	1.33333*	100yr	2808.12	8530.18	1.70	4.01	14.20	0.52	2.43	5.72	0.09	4414.83	4414.83	4417.25	292.58	0.83
Alpine	1.33333*	500yr	5756.68	11878.42	659.90	5.33	16.37	2.77	3.75	7.14	1.07	4416.71	4416.71	4419.55	432.96	0.87
Alpine	1.66666*	2yr		445.00			4.87			1.08		4407.01		4407.38	44.46	0.60
Alpine	1.66666*	5yr		1687.00			7.08			1.80		4409.93		4410.71	55.86	0.60
Alpine	1.66666*	10yr		3895.00			8.30			2.19		4413.45		4414.51	75.98	0.59
Alpine	1.66666*	25yr	522.62	5635.00		2.01	11.30	4.02		4.02		4413.82		4415.81	78.06	0.79
Alpine	1.66666*	50yr	1377.80	7910.00		2.97	13.88	5.92		5.92		4414.71		4417.70	82.97	0.93
Alpine	1.66666*	100yr	2808.12	10699.32		4.01	13.42	13.42	0.84	5.08		4413.36		4420.01	314.31	0.78
Alpine	1.66666*	500yr	5756.68	15154.26	3.40	3.72	15.31	0.67	2.09	6.18	0.12	4419.60	4419.60	4422.65	354.81	0.80
Alpine	2	2yr		445.00			4.73			1.04		4408.17		4408.52	50.14	0.61
Alpine	2	5yr		1687.00			6.75			1.66		4410.92		4411.62	61.23	0.59
Alpine	2	10yr		3895.00			8.26			2.16		4414.22		4415.28	74.21	0.58
Alpine	2	25yr		5635.00			9.64			2.86		4415.64		4417.08	85.36	0.65
Alpine	2	50yr		7910.00			10.21			3.06		4417.71		4419.33	98.13	0.64
Alpine	2	100yr		11340.00			13.09			4.94		4418.62		4421.28	103.75	0.80
Alpine	2	500yr		18295.00			17.65			8.59		4420.23		4425.06	192.15	0.99
Alpine	2.3															
Alpine	2.5	2yr		445.00			3.63			0.57		4408.72		4408.93	53.03	0.42
Alpine	2.5	5yr		1687.00			5.71			1.14		4411.65		4412.16	62.92	0.46
Alpine	2.5	10yr		3895.00			7.18			1.60		4415.14		4415.94	81.58	0.49
Alpine	2.5	25yr		5635.00			8.02			1.92		4416.96		4417.95	93.47	0.52
Alpine	2.5	50yr		7910.00			8.66			2.14		4419.07		4420.23	105.92	0.52
Alpine	2.5	100yr		11340.00			9.93			2.65		4421.22		4422.75	298.39	0.53
Alpine	2.5	500yr		14822.47	95.45	1.84	9.00	1.00	0.51	1.94	0.16	4425.98	4420.15	4427.01	704.05	0.40
Alpine	3	2yr		445.00			4.84			1.12		4408.89		4409.25	53.46	0.65
Alpine	3	5yr		1687.00			2.29			0.18		4412.28		4412.36	269.17	0.24
Alpine	3	10yr		3697.13	197.87		2.03	0.70		0.11	0.06	4416.13		4416.19	375.04	0.14

HEC-RAS Plan: Opt E_River: Alpine_Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Fronda # Ch
Alpine	5.33	100yr	1353.68	9164.25	94.07	1.60	9.72	1.07	0.45	3.40	0.25	4450.93	4450.93	4452.21	1121.97	0.61
Alpine	5.33	500yr	4535.62	11674.85	613.53	2.41	10.79	1.98	0.93	3.99	0.64	4452.09	4452.09	4453.37	1261.24	0.63
Alpine	5.49	2yr		428.00			6.44			2.85		4442.94	4442.94	4443.58	51.98	1.00
Alpine	5.49	5yr		1690.00			9.44			4.45		4444.86	4444.86	4446.24	65.50	1.00
Alpine	5.49	10yr		3655.00			11.43			5.76		4446.80	4446.80	4448.83	79.22	1.00
Alpine	5.49	25yr		5736.00			12.73			6.67		4448.35	4448.35	4450.86	90.14	1.00
Alpine	5.49	50yr		7481.00			13.57			7.29		4449.42	4449.42	4452.28	97.68	1.01
Alpine	5.49	100yr	2452.44	7860.77	298.78	1.91	9.47	1.51	0.66	3.27	0.42	4452.02	4452.02	4453.07	1231.24	0.62
Alpine	5.49	500yr	5696.26	10202.75	924.99	2.76	11.01	2.30	1.19	4.26	0.83	4452.87	4452.87	4454.06	1311.22	0.68
Alpine	5.66	2yr		428.00			4.82			1.11		4444.14	4444.14	4444.47	45.40	0.57
Alpine	5.66	5yr		1690.00			8.53			3.22		4446.21	4446.21	4447.33	58.39	0.82
Alpine	5.66	10yr		3655.00			11.88			5.84		4447.90	4447.90	4450.09	71.05	1.01
Alpine	5.66	25yr		5736.00			13.07			6.70		4449.59	4449.59	4452.25	83.71	1.01
Alpine	5.66	50yr	2332.24	4774.39	374.37	1.45	6.25	1.21	0.36	1.40	0.24	4452.96	4452.11	4453.36	1299.50	0.41
Alpine	5.66	100yr	2977.96	7187.72	446.32	2.12	9.71	1.75	0.79	3.41	0.54	4452.75	4452.75	4453.76	1269.27	0.65
Alpine	5.66	500yr	5864.85	9951.16	1008.00	3.12	12.52	2.58	1.57	5.53	1.08	4453.26	4453.26	4454.76	1327.49	0.81
Alpine	5.75															
Alpine	6	2yr		428.00			2.32			0.21		4447.08	4444.23	4447.16	44.37	0.20
Alpine	6	5yr		1690.00			5.39			0.93		4449.87	4446.45	4450.33	51.07	0.38
Alpine	6	10yr		3655.00			7.36			1.81		4452.75	4448.91	4453.59	920.51	0.51
Alpine	6	25yr		5736.00			10.61			3.76		4453.32	4451.43	4455.06	1119.73	0.72
Alpine	6	50yr		7481.00			14.48			7.02		4453.01	4453.01	4456.27	1018.36	0.99
Alpine	6	100yr	3925.56	5928.49	757.94	2.29	9.56	1.84	0.89	3.05	0.63	4454.25	4454.25	4455.07	1341.36	0.64
Alpine	6	500yr	7728.79	7184.60	1910.60	2.83	10.01	2.43	1.30	3.26	0.96	4455.30	4454.89	4456.04	1461.79	0.64
Alpine	6.125	2yr		428.00			3.04			0.39		4447.24	4445.38	4447.38	43.38	0.30
Alpine	6.125	5yr		1690.00			5.93			1.23		4450.32	4447.61	4450.87	54.42	0.46
Alpine	6.125	10yr		3655.00			7.28			1.86		4453.52	4450.26	4454.35	331.15	0.52
Alpine	6.125	25yr	1742.17	3331.39	682.44	1.06	4.61	1.05	0.21	0.73	0.19	4455.85	4452.47	4456.05	1393.67	0.31
Alpine	6.125	50yr	3141.01	3020.91	1319.08	1.01	3.38	1.02	0.16	0.37	0.15	4457.45	4453.92	4457.53	1488.35	0.21
Alpine	6.125	100yr	2873.09	6622.83	1116.08	2.03	9.50	2.06	0.80	3.12	0.76	4455.61	4455.61	4456.51	1357.06	0.65
Alpine	6.125	500yr	5972.14	8521.88	2329.98	2.82	10.93	2.76	1.38	4.04	1.23	4456.38	4456.31	4457.38	1446.61	0.72
Alpine	6.25	2yr		428.00			3.99			0.76		4447.62	4446.53	4447.87	42.60	0.44
Alpine	6.25	5yr		1690.00			6.17			1.46		4451.00	4448.76	4451.59	61.99	0.52
Alpine	6.25	10yr		3655.00			7.12			1.81		4454.34	4451.37	4455.13	88.50	0.52
Alpine	6.25	25yr		5736.00			9.09			2.94		4455.58	4453.21	4456.87	805.17	0.65
Alpine	6.25	50yr	1892.91	4400.35	1187.74	1.19	5.19	1.29	0.26	0.93	0.30	4457.50	4454.65	4457.75	1431.16	0.35
Alpine	6.25	100yr		8742.69	1869.31	10.93	10.93	2.49	1.18	4.19	1.18	4457.10	4457.10	4458.64	1389.11	0.75
Alpine	6.25	500yr	4601.83	9414.87	2807.30	2.59	10.77	2.75	1.21	3.97	1.33	4457.71	4457.71	4458.77	1446.74	0.71

HEC-RAS Plan: Oot E River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Val Left (ft/s)	Val Chnl (ft/s)	Val Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Chl
Alpine	7.6*	25yr		5736.00			10.23			3.85		4461.34	4459.53	4462.96	351.62	0.71
Alpine	7.6*	50yr	705.81	6079.41	695.78	1.10	8.70	1.03	0.31	2.58	0.47	4462.81	4460.90	4463.77	1479.94	0.57
Alpine	7.6*	100yr	2506.40	6364.85	1740.75	1.37	7.78	1.24	0.44	1.95	0.56	4464.03	4463.37	4464.61	1785.86	0.47
Alpine	7.6*	500yr	5835.56	7495.74	3492.70	1.78	7.90	1.53	0.63	1.92	0.74	4465.36	4464.34	4465.82	1873.39	0.45
Alpine	7.8*	2yr		428.00			4.57			1.04		4454.70	4453.93	4455.02	42.28	0.54
Alpine	7.8*	5yr		1690.00			7.55			2.06		4457.66	4456.16	4458.54	47.26	0.61
Alpine	7.8*	10yr		3655.00			9.94			3.34		4460.40	4458.70	4461.93	60.00	0.71
Alpine	7.8*	25yr		5736.00			11.02			4.05		4462.66	4460.93	4464.54	92.62	0.74
Alpine	7.8*	50yr	607.56	6558.87	314.58	1.40	11.11	0.88	0.49	4.07	0.42	4463.56	4462.41	4465.24	1151.82	0.72
Alpine	7.8*	100yr	2417.80	6723.06	1471.14	1.48	9.65	1.30	0.55	2.92	0.66	4464.87	4464.87	4465.80	1845.03	0.58
Alpine	7.8*	500yr	5581.35	8244.27	2998.38	2.07	10.68	1.70	0.92	3.46	1.02	4465.80	4465.68	4466.70	1952.17	0.61
Alpine	7.9	2yr		428.00			5.44			1.58		4455.50	4455.09	4455.96	41.92	0.70
Alpine	7.9	5yr		1690.00			8.45			2.83		4458.30	4457.33	4459.41	44.72	0.70
Alpine	7.9	10yr		3655.00			11.23			3.76		4461.03	4459.77	4462.98	47.44	0.76
Alpine	7.9	25yr		5736.00			13.07			5.07		4463.22	4462.00	4465.87	184.47	0.83
Alpine	7.9	50yr	1477.59	5442.10	561.31	1.42	9.49	0.87	0.35	2.60	0.36	4465.40	4465.40	4466.42	1674.94	0.56
Alpine	7.9	100yr	3066.73	6124.54	1420.73	1.50	9.74	1.18	0.53	2.66	0.55	4466.26	4466.26	4467.13	1969.98	0.55
Alpine	7.9	500yr	6167.87	7866.36	2789.77	2.11	11.68	1.64	0.95	3.73	0.97	4466.96	4466.96	4467.98	2063.77	0.63
Alpine	7.95		Bridge													
Alpine	8	2yr		428.00			3.85			0.89		4456.27	4455.09	4456.50	42.69	0.42
Alpine	8	5yr	118.47	1564.67	6.86	0.35	3.14	0.13	0.04	0.29	0.01	4464.22	4457.32	4464.36	684.93	0.20
Alpine	8	10yr	614.17	2838.13	202.69	0.76	5.09	0.41	0.09	0.76	0.09	4465.15	4459.77	4465.46	1507.87	0.30
Alpine	8	25yr	1942.99	2917.06	875.95	0.76	4.45	0.59	0.13	0.55	0.13	4466.68	4461.99	4466.84	2036.56	0.25
Alpine	8	50yr	2567.62	3758.15	1155.23	0.98	5.71	0.76	0.21	0.90	0.21	4466.72	4465.38	4466.98	2043.32	0.31
Alpine	8	100yr	4233.72	4446.50	1931.78	1.23	6.36	0.97	0.31	1.09	0.32	4467.37	4466.17	4467.64	2092.58	0.34
Alpine	8	500yr	7613.98	5717.24	3492.78	1.64	7.55	1.32	0.51	1.50	0.54	4468.26	4466.96	4468.59	2149.00	0.39
Alpine	8.33333*	2yr		428.00			4.27			0.89		4456.71	4455.80	4457.00	42.44	0.49
Alpine	8.33333*	5yr		1690.00			3.53			0.39		4464.27	4458.02	4464.46	137.55	0.22
Alpine	8.33333*	10yr	0.00	3655.00		0.02	6.86			1.45		4465.13	4460.47	4465.86	514.75	0.42
Alpine	8.33333*	25yr	960.22	4125.98	649.80	0.80	6.53	0.63	0.17	1.26	0.18	4466.64	4462.75	4467.12	2033.41	0.37
Alpine	8.33333*	50yr	1273.37	5946.78	860.85	1.04	8.44	0.82	0.29	2.11	0.30	4466.66	4464.19	4467.46	2036.62	0.48
Alpine	8.33333*	100yr	2805.30	5956.13	1850.56	1.38	8.74	1.07	0.45	2.21	0.45	4467.39	4467.12	4468.07	2159.78	0.48
Alpine	8.33333*	500yr	5842.73	7091.08	3890.20	1.83	9.50	1.44	0.69	2.53	0.71	4468.38	4467.95	4469.00	2275.51	0.50
Alpine	8.66666*	2yr		428.00			4.47			0.99		4457.31	4457.31	4457.62	42.33	0.52
Alpine	8.66666*	5yr		1690.00			3.64			0.44		4464.35	4464.55	4464.55	62.90	0.24
Alpine	8.66666*	10yr		3655.00			6.86			1.51		4465.42	4466.15	4466.15	64.90	0.42
Alpine	8.66666*	25yr	181.76	5455.50	98.74	0.74	6.95	0.44	0.19	2.50	0.12	4466.59	4467.77	4467.77	1073.67	0.52
Alpine	8.66666*	50yr	197.08	7188.78	95.13	0.92	11.89	0.52	0.30	4.42	0.19	4466.52	4464.58	4468.62	1040.16	0.70
Alpine	8.66666*	100yr	2043.37	6773.25	1795.38	1.36	9.56	1.03	0.46	2.74	0.45	4468.05	4468.05	4468.96	2287.02	0.52

HEC-RAS Plan: Oat E River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froutte # Cnl
Alpine	9.75	2yr		428.00			2.94			0.36		4462.66	4460.68	4462.79	43.48	0.28
Alpine	9.75	5yr		1690.00			4.17			0.57		4466.98	4462.91	4467.25	71.24	0.31
Alpine	9.75	10yr		3572.14	93.86		5.80	0.43		1.03	0.10	4469.63	4465.42	4470.14	436.70	0.39
Alpine	9.75	25yr	2.00	4855.19	907.82	0.30	6.16	0.64	0.04	1.11	0.19	4471.42	4467.17	4471.91	1305.55	0.39
Alpine	9.75	50yr	23.78	5493.23	2000.00	0.54	6.32	0.83	0.10	1.13	0.27	4472.22	4469.54	4472.68	1470.54	0.38
Alpine	9.75	100yr	112.84	6322.30	4020.86	0.78	6.68	1.03	0.16	1.22	0.37	4473.30	4471.72	4473.73	1690.54	0.38
Alpine	9.75	500yr	375.93	8452.13	8038.94	1.10	7.65	1.36	0.28	1.53	0.57	4474.58	4472.87	4475.05	1863.13	0.41
Alpine	9.8*	2yr		428.00			3.92			0.72		4462.78		4463.02	42.64	0.43
Alpine	9.8*	5yr		1690.00			4.96			0.83		4467.06		4467.44	64.54	0.38
Alpine	9.8*	10yr		3527.71	138.29		6.66	0.54		1.38	0.16	4469.74		4470.41	451.17	0.45
Alpine	9.8*	25yr	4.22	4567.86	1192.93	0.39	6.67	0.75	0.06	1.32	0.25	4471.56		4472.11	1334.90	0.42
Alpine	9.8*	50yr	33.91	5056.02	2427.07	0.62	6.69	0.92	0.12	1.28	0.33	4472.37		4472.84	1500.89	0.40
Alpine	9.8*	100yr	141.10	5880.73	4634.17	0.86	6.90	1.11	0.19	1.31	0.42	4473.46		4473.88	1724.42	0.39
Alpine	9.8*	500yr	445.44	7414.47	9007.09	1.15	7.64	1.43	0.30	1.54	0.62	4474.81		4475.23	1870.15	0.41
Alpine	9.9*	2yr		428.00			4.44			0.98		4463.45		4463.76	42.34	0.52
Alpine	9.9*	5yr		1690.00			5.72			1.15		4467.37		4467.88	58.54	0.45
Alpine	9.9*	10yr		3352.57	313.43		7.10	0.71		1.59	0.25	4470.18		4470.90	541.68	0.48
Alpine	9.9*	25yr	12.72	3913.90	1838.38	0.41	6.42	0.84	0.10	1.22	0.29	4472.02		4472.46	1427.36	0.40
Alpine	9.9*	50yr	47.54	4335.23	3134.23	0.55	6.51	0.98	0.15	1.22	0.35	4472.77		4473.15	1579.38	0.39
Alpine	9.9*	100yr	149.70	5045.18	5461.13	0.70	6.77	1.15	0.21	1.27	0.44	4473.81		4474.16	1794.22	0.38
Alpine	9.9*	500yr	420.35	6285.47	10161.18	0.91	7.40	1.47	0.31	1.45	0.63	4475.18		4475.51	1985.01	0.39
Alpine	10	2yr		428.00			4.55			1.04		4464.36	4463.59	4464.69	42.29	0.54
Alpine	10	5yr		1690.00			6.52			1.52		4467.84	4465.88	4468.50	52.64	0.52
Alpine	10	10yr		3666.00			9.09			2.63		4470.44	4468.22	4471.73	600.19	0.62
Alpine	10	25yr	27.96	3260.93	2476.12	0.48	6.16	0.89	0.12	1.12	0.30	4472.43	4470.29	4472.77	1548.22	0.38
Alpine	10	50yr	73.76	3608.14	3835.10	0.59	6.28	1.01	0.16	1.14	0.36	4473.14	4471.92	4473.44	1707.56	0.37
Alpine	10	100yr	194.46	4177.72	6283.83	0.73	6.53	1.15	0.22	1.19	0.43	4474.15	4472.53	4474.42	1939.57	0.36
Alpine	10	500yr	493.65	5131.61	11241.73	0.91	7.06	1.44	0.30	1.33	0.60	4475.52	4473.42	4475.77	2046.39	0.37
Alpine	10.3333*	2yr		428.00			4.57			1.05		4465.21	4464.45	4465.54	42.27	0.54
Alpine	10.3333*	5yr		1690.00			6.73			1.66		4468.43	4466.68	4469.13	52.57	0.54
Alpine	10.3333*	10yr		3666.00			8.89			2.53		4471.25	4468.99	4472.48	332.95	0.61
Alpine	10.3333*	25yr		5765.00			14.40			6.69		4471.06	4471.06	4474.28	266.41	0.99
Alpine	10.3333*	50yr		7517.00			14.96			7.04		4472.60	4472.60	4476.07	1127.50	1.00
Alpine	10.3333*	100yr	24.01	6486.46	4145.53	0.60	10.71	1.61	0.22	3.44	0.97	4473.97	4473.95	4475.07	1434.57	0.67
Alpine	10.3333*	500yr	288.66	7683.75	8894.39	1.08	10.68	1.92	0.51	3.23	1.20	4475.47	4474.90	4476.31	1749.02	0.61
Alpine	10.6666*	2yr		428.00			4.31			0.95		4466.13	4465.31	4466.42	49.95	0.54
Alpine	10.6666*	5yr		1690.00			6.53			1.61		4469.14	4467.44	4469.80	56.80	0.54
Alpine	10.6666*	10yr		3666.00			8.35			2.30		4472.13	4469.66	4473.21	64.39	0.56
Alpine	10.6666*	25yr	0.33	3685.46	1879.21	0.10	5.72	0.86	0.01	1.02	0.28	4475.33	4471.49	4475.68	1252.37	0.36

HEC-RAS Plan, Profile, River, Alpine Creek, Reach, Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Right (ft/s)	Shear LOB (lb/eq ft)	Shear Chan. (lb/eq ft)	Shear ROB (lb/eq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch1
Alpine	10.6666*	50yr	161.93	3676.51	3678.55	4.36	0.82	0.09	0.55	0.22	4477.20	4472.94	4477.95	1650.58	0.25
Alpine	10.6666*	100yr	0.54	7191.96	3463.51	10.60	1.59	0.04	3.50	0.97	4475.33	4475.33	4476.52	1249.91	0.67
Alpine	10.6666*	500yr	137.72	9490.27	7239.01	12.38	2.16	0.43	4.59	1.59	4476.33	4476.33	4477.70	1517.10	0.74
Alpine	11	2yr		428.00		4.03			0.83		4466.98	4466.23	4467.23	53.77	0.51
Alpine	11	5yr		1690.00		6.06			1.42		4469.89	4468.21	4470.46	63.87	0.51
Alpine	11	10yr		3666.00		7.58			1.91		4472.95	4470.21	4473.84	69.78	0.51
Alpine	11	25yr		5765.00		8.88			2.44		4475.25	4471.89	4476.47	86.83	0.53
Alpine	11	50yr	3.58	5092.44	2420.98	6.22	1.00	0.02	1.19	0.36	4477.24	4473.14	4477.65	1311.03	0.38
Alpine	11	100yr	0.28	7498.49	3157.22	9.42	1.45	0.02	2.74	0.79	4477.01	4477.01	4477.99	1179.23	0.58
Alpine	11	500yr	84.53	10660.04	6122.42	12.36	2.12	0.29	4.61	1.56	4477.67	4477.67	4479.20	1434.31	0.74
Alpine	11.3	Bridge													
Alpine	11.4	2yr		427.00		3.17			0.48		4467.81	4466.55	4467.97	55.04	0.36
Alpine	11.4	5yr		1691.00		5.27			1.04		4470.80	4468.50	4471.23	65.63	0.42
Alpine	11.4	10yr		3670.00		7.10			1.66		4473.66	4470.47	4474.44	71.15	0.46
Alpine	11.4	25yr	2.27	3892.90	1881.83	4.87	0.79	0.02	0.74	0.23	4477.20	4472.16	4477.45	1271.54	0.30
Alpine	11.4	50yr	48.08	4640.58	2845.33	5.43	0.96	0.07	5.43	0.31	4477.76	4473.39	4478.04	1447.85	0.33
Alpine	11.4	100yr	157.57	6101.37	4416.07	6.75	1.25	0.16	1.36	0.51	4478.25	4475.42	4478.66	1514.55	0.40
Alpine	11.4	500yr	665.39	8095.15	8126.47	7.82	1.60	0.36	1.75	0.76	4479.56	4477.72	4480.04	1693.15	0.43
Alpine	11.4333*	2yr		427.00		3.69			0.69		4468.02	4467.00	4468.23	59.78	0.47
Alpine	11.4333*	5yr		1691.00		5.30			1.08		4471.01	4469.04	4471.44	72.97	0.45
Alpine	11.4333*	10yr		3670.00		6.69			1.48		4473.98	4470.89	4474.68	80.93	0.45
Alpine	11.4333*	25yr		5777.00		6.96			1.50		4477.07	4472.78	4477.82	1058.37	0.44
Alpine	11.4333*	50yr	10.59	5268.05	2255.36	5.78	0.94	0.03	1.01	0.31	4477.82	4473.61	4478.19	1338.84	0.35
Alpine	11.4333*	100yr	86.14	6931.74	3657.12	7.15	1.24	0.13	1.52	0.52	4478.34	4475.58	4478.87	1403.17	0.43
Alpine	11.4333*	500yr	524.56	9258.15	7104.29	8.30	1.62	0.35	1.96	0.80	4479.67	4478.08	4480.27	1566.66	0.46
Alpine	11.4666*	2yr		427.00		4.06			0.88		4468.38	4467.44	4468.63	65.56	0.56
Alpine	11.4666*	5yr		1691.00		5.34			1.12		4471.24	4469.53	4471.68	80.37	0.47
Alpine	11.4666*	10yr		3670.00		6.36			1.35		4474.26	4471.31	4474.89	93.04	0.45
Alpine	11.4666*	25yr		5777.00		6.40			1.26		4477.36	4472.78	4477.99	991.59	0.41
Alpine	11.4666*	50yr	0.19	5829.37	1704.45	6.04	0.90	0.01	1.10	0.30	4477.89	4473.85	4478.33	1074.92	0.37
Alpine	11.4666*	100yr	32.80	7702.59	2939.61	7.47	1.22	0.08	1.66	0.52	4478.43	4475.65	4479.06	1285.76	0.45
Alpine	11.4666*	500yr	390.86	10415.00	6081.14	8.75	1.65	0.34	2.17	0.84	4479.75	4478.32	4480.50	1434.73	0.49
Alpine	11.5	2yr		427.00		3.99			0.82		4468.83	4467.86	4469.08	58.46	0.52
Alpine	11.5	5yr		1691.00		5.42			1.18		4471.50	4470.05	4471.96	88.00	0.51
Alpine	11.5	10yr		3670.00		6.05			1.24		4474.52	4471.74	4475.09	107.36	0.45
Alpine	11.5	25yr		5777.00		5.98			1.10		4477.58	4473.15	4478.14	905.60	0.38
Alpine	11.5	50yr		6445.94	1088.06	6.37	0.75	0.29	1.23	0.29	4477.95	4474.15	4478.49	938.05	0.40
Alpine	11.5	100yr	3.41	8645.52	2028.07	7.98	1.06	0.04	1.89	0.54	4478.50	4475.73	4479.31	1084.22	0.49
Alpine	11.5	500yr	253.13	12089.30	4544.57	9.68	1.52	0.33	2.65	0.96	4479.76	4478.62	4480.81	1293.30	0.55

HEC-RAS Plan: Opt F River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crt W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Crt
Alpine	11.5666*	2yr		427.00			4.08			0.85		4469.75		4470.01	52.13	0.51
Alpine	11.5666*	5yr		1691.00			6.12			1.53		4472.22		4472.80	79.59	0.58
Alpine	11.5666*	10yr		3670.00			7.08			1.76		4474.94		4475.72	96.89	0.54
Alpine	11.5666*	25yr		5709.66	67.34		7.01	0.37		1.53	0.09	4477.81		4478.56	519.79	0.45
Alpine	11.5666*	50yr		7418.21	115.79		8.97	0.49		2.50	0.15	4477.92	4475.35	4479.15	639.52	0.57
Alpine	11.5666*	100yr		10377.69	297.31		12.09	0.67		4.48	0.34	4478.22	4476.81	4480.42	879.80	0.75
Alpine	11.5666*	500yr	87.95	13518.28	3280.77	0.79	12.58	1.55	0.36	4.51	1.15	4480.23	4480.23	4482.21	1146.31	0.70
Alpine	11.6333*	2yr		427.00			4.23			0.94		4470.72		4471.00	53.87	0.54
Alpine	11.6333*	5yr		1691.00			6.48			1.73		4473.17		4473.82	73.80	0.61
Alpine	11.6333*	10yr		3670.00			8.10			2.33		4475.61		4476.63	80.95	0.60
Alpine	11.6333*	25yr		5768.32	8.68		8.73	0.25		2.42	0.07	4478.13		4479.31	252.99	0.55
Alpine	11.6333*	50yr		7482.93	51.07		10.88	0.49		3.71	0.20	4478.45	4476.48	4480.28	337.14	0.67
Alpine	11.6333*	100yr	0.72	10260.44	413.84	0.35	13.44	1.03	0.12	5.49	0.68	4479.35	4479.35	4482.05	491.81	0.78
Alpine	11.6333*	500yr	200.91	12929.46	3756.63	1.24	13.08	1.56	0.69	4.77	1.13	4482.04	4482.04	4484.09	1150.54	0.67
Alpine	11.7	2yr		427.00			4.08			0.87		4471.75		4472.01	53.86	0.52
Alpine	11.7	5yr		1691.00			7.06			2.03		4474.16		4474.94	56.99	0.61
Alpine	11.7	10yr		3670.00			9.90			3.52		4476.43		4477.95	58.76	0.69
Alpine	11.7	25yr		5773.11	3.89		11.54	0.34		4.39	0.10	4478.60	4476.80	4480.67	129.32	0.70
Alpine	11.7	50yr		7471.50	62.50		14.00	0.68		6.33	0.37	4479.16	4478.06	4482.18	271.26	0.83
Alpine	11.7	100yr	50.47	9104.08	1520.44	1.19	13.31	1.52	0.88	5.27	1.16	4481.66	4481.66	4484.02	578.12	0.69
Alpine	11.7	500yr	310.16	11042.07	5534.77	1.66	13.07	1.70	1.04	4.74	1.26	4484.34	4484.34	4486.09	1189.51	0.61
Alpine	11.9															
Alpine	12	2yr		427.00			2.90			0.36		4472.83	4471.30	4472.96	55.96	0.32
Alpine	12	5yr		1691.00			5.14			0.90		4476.01	4473.24	4476.42	58.43	0.38
Alpine	12	10yr	3.80	3422.02	244.18	0.34	5.75	0.50	0.07	0.95	0.15	4480.47	4475.32	4480.94	455.11	0.32
Alpine	12	25yr	83.71	4222.20	1471.09	0.62	5.40	0.60	0.15	0.77	0.17	4483.57	4477.10	4483.90	1139.38	0.26
Alpine	12	50yr	270.66	3201.11	4062.23	0.32	3.02	0.55	0.04	0.22	0.10	4488.19	4478.47	4488.26	1439.47	0.13
Alpine	12	100yr	207.05	6764.63	3703.31	1.01	8.03	1.05	0.38	1.66	0.47	4484.59	4481.82	4485.23	1193.75	0.38
Alpine	12	500yr	398.68	8558.20	7930.12	0.98	8.98	1.45	0.37	1.99	0.77	4486.43	4484.38	4487.08	1290.93	0.40
Alpine	12.5	2yr		427.00			3.90			0.72		4472.94	4471.80	4473.17	42.65	0.43
Alpine	12.5	5yr		1691.00			6.58			1.54		4476.08	4474.07	4476.75	51.52	0.52
Alpine	12.5	10yr		3675.00			7.34			1.55		4480.41	4476.50	4481.25	259.08	0.45
Alpine	12.5	25yr		4717.55	1072.45		6.81	0.72		1.22	0.24	4483.52	4478.50	4484.11	930.84	0.37
Alpine	12.5	50yr	175.09	3315.01	4059.90	0.54	3.23	0.64	0.06	0.25	0.13	4488.20	4479.92	4488.28	1236.23	0.15
Alpine	12.5	100yr	3.34	7510.29	3181.37	0.37	9.86	1.29	0.07	2.56	0.69	4484.53	4483.88	4485.60	1152.08	0.53
Alpine	12.5	500yr	210.60	8931.38	7764.02	1.32	9.89	1.72	0.41	2.43	1.01	4486.49	4485.25	4487.31	1209.69	0.49
Alpine	12.5666*	2yr		427.00			4.28			0.89		4473.32	4472.41	4473.61	42.43	0.49
Alpine	12.5666*	5yr		1691.00			6.57			1.58		4476.51	4474.73	4477.18	56.02	0.54

HEC-RAS Plan_Qot E River: Alpine_Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LDB (lb/sq ft)	Shear Chan. (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Proude # Chl
Alpine	13.5	100yr		9383.51	1320.49		12.18	1.64		4.46	1.34	4485.90	4485.90	4487.93	500.20	0.81
Alpine	13.5	500yr	3.96	13410.65	3501.39	0.48	14.08	2.37	0.22	5.62	2.37	4487.53	4487.53	4489.99	563.97	0.85
Alpine	13.75	2yr		427.00			6.88			2.20		4478.29	4478.07	4479.02	32.09	0.87
Alpine	13.75	5yr		1691.00			9.90			3.90		4480.78	4480.78	4482.30	55.79	1.00
Alpine	13.75	10yr		3678.00			11.29			4.62		4483.04	4483.04	4485.01	80.79	0.99
Alpine	13.75	25yr		5796.00			12.65			5.44		4484.55	4484.55	4487.04	93.33	1.01
Alpine	13.75	50yr		7347.98	210.02		9.01	0.69		2.44	0.32	4487.94	4485.63	4489.17	452.47	0.59
Alpine	13.75	100yr		10704.00			14.50			6.49		4487.26	4487.26	4490.52	360.22	1.00
Alpine	13.75	500yr	6.76	14959.09	1950.14	0.50	14.34	1.89	0.23	5.72	1.66	4489.93	4489.93	4492.75	562.05	0.84
Alpine	14	2yr		427.00			4.85			1.00		4479.24	4478.11	4479.60	34.64	0.54
Alpine	14	5yr		1691.00			8.15			2.41		4482.04	4480.99	4483.07	50.23	0.71
Alpine	14	10yr		3678.00			12.32			5.22		4483.67	4483.58	4486.03	61.57	0.99
Alpine	14	25yr		5796.00			13.46			5.89		4485.61	4485.61	4488.42	75.22	0.99
Alpine	14	50yr		7558.00			12.47			4.83		4487.71	4486.85	4490.12	91.74	0.85
Alpine	14	100yr		10704.00			15.02			6.86		4488.82	4488.82	4492.32	100.41	0.99
Alpine	14	500yr	23.31	15429.70	1462.99	0.55	13.73	1.62	0.26	5.20	1.28	4492.48	4492.48	4495.15	619.00	0.78
Alpine	14.3															
Alpine	14.5	2yr		427.00			4.16			0.72		4479.64	4478.11	4479.91	37.07	0.44
Alpine	14.5	5yr		1691.00			6.44			1.45		4483.07	4480.97	4483.71	57.35	0.53
Alpine	14.5	10yr		3681.00			8.16			2.15		4485.87	4483.58	4486.91	77.30	0.60
Alpine	14.5	25yr		5806.00			8.93			2.45		4488.18	4485.53	4489.42	95.42	0.60
Alpine	14.5	50yr		7570.00			8.13			1.93		4490.84	4486.83	4491.86	475.11	0.51
Alpine	14.5	100yr		10719.00			11.63			3.96		4490.75	4488.78	4492.85	454.85	0.73
Alpine	14.5	500yr	634.69	13086.57	3208.74	0.81	8.94	1.54	0.33	2.02	0.88	4495.39	4492.41	4496.36	929.76	0.45
Alpine	14.6666	2yr		427.00			1.80			0.12		4479.99		4480.04	54.04	0.15
Alpine	14.6666	5yr		1691.00			3.63			0.40		4483.77		4483.97	67.17	0.24
Alpine	14.6666	10yr		3681.00			5.31			0.81		4486.84		4487.27	83.37	0.32
Alpine	14.6666	25yr		5805.54	0.46		6.40	0.11		1.13	0.02	4489.18		4489.82	136.76	0.37
Alpine	14.6666	50yr	34.41	6807.50	728.09	0.37	5.91	0.58	0.09	0.89	0.17	4491.67		4492.16	834.15	0.30
Alpine	14.6666	100yr	131.05	8814.52	1773.44	0.50	6.94	0.86	0.14	1.19	0.33	4492.88		4493.50	947.56	0.34
Alpine	14.6666	500yr	977.77	10985.32	4966.91	0.70	6.92	1.19	0.22	1.10	0.49	4496.12		4496.61	1234.30	0.30
Alpine	14.8333	2yr		427.00			2.09			0.16		4480.02		4480.09	44.82	0.17
Alpine	14.8333	5yr		1691.00			4.26			0.55		4483.81		4484.09	57.85	0.29
Alpine	14.8333	10yr		3681.00			6.04			1.06		4486.90		4487.47	77.95	0.38
Alpine	14.8333	25yr	16.67	5410.12	379.21	0.46	6.77	0.74	0.11	1.22	0.14	4489.31		4489.97	627.57	0.38
Alpine	14.8333	50yr	143.63	5039.14	2387.23	0.49	4.97	0.95	0.10	0.61	0.16	4492.04		4492.30	1095.19	0.24
Alpine	14.8333	100yr	327.54	5985.74	4405.72	0.55	5.33	1.17	0.11	0.68	0.22	4493.42		4493.68	1287.03	0.25
Alpine	14.8333	500yr	1172.36	6634.41	9123.23	0.61	4.82	1.36	0.12	0.52	0.24	4496.61		4496.76	1553.83	0.20

HEC-RAS Plan, Out F River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	Chl
Alpine	15	2yr		427.00			2.34			0.21		4480.06		4480.15	44.32		0.20
Alpine	15	5yr		1691.00			4.71			0.65		4483.88		4484.22	50.37		0.31
Alpine	15	10yr	6.55	3580.82	113.83	0.41	6.59	0.60	0.09	1.18	0.10	4487.02		4487.67	365.30		0.39
Alpine	15	25yr	113.09	4067.27	1825.64	0.65	5.75	0.96	0.16	0.82	0.18	4489.80		4490.17	912.94		0.30
Alpine	15	50yr	251.33	3643.93	3674.74	0.50	4.27	0.91	0.09	0.43	0.13	4492.24		4492.38	1321.18		0.20
Alpine	15	100yr	453.12	4284.83	5981.05	0.51	4.58	1.07	0.09	0.47	0.17	4493.62		4493.76	1543.18		0.20
Alpine	15	500yr	1227.64	4717.11	10985.25	0.54	4.20	1.19	0.09	0.36	0.18	4496.72		4496.81	1855.00		0.17
Alpine	15.05	Bridge															
Alpine	15.1	2yr		419.00			2.00			0.14		4480.68	4477.23	4480.74	44.94		0.16
Alpine	15.1	5yr		1699.00			4.25			0.53		4484.64	4479.50	4484.92	55.40		0.28
Alpine	15.1	10yr	22.08	3456.46	332.46	0.48	5.85	0.67	0.11	0.90	0.11	4487.86	4482.10	4488.35	569.44		0.33
Alpine	15.1	25yr	139.77	4124.95	1880.28	0.67	5.64	0.93	0.16	0.78	0.17	4490.20	4484.69	4490.54	1060.40		0.28
Alpine	15.1	50yr	269.75	3774.25	3963.00	0.50	4.38	0.94	0.09	0.45	0.14	4492.38	4488.17	4492.53	1344.88		0.20
Alpine	15.1	100yr	489.71	4416.28	6334.00	0.53	4.68	1.11	0.10	0.49	0.18	4493.76	4489.46	4493.90	1565.39		0.21
Alpine	15.1	500yr	1288.65	4821.50	11336.95	0.55	4.28	1.21	0.09	0.39	0.19	4496.80	4491.04	4496.89	1855.00		0.17
Alpine	15.1666*	2yr		419.00			2.46			0.24		4480.70		4480.79	44.05		0.22
Alpine	15.1666*	5yr		1699.00			4.81			0.66		4484.68		4485.04	48.23		0.31
Alpine	15.1666*	10yr	0.32	3772.22	38.46	0.26	7.09	0.64	0.04	1.38	0.12	4487.83		4488.60	158.79		0.42
Alpine	15.1666*	25yr	43.70	5332.71	768.59	0.73	8.00	1.03	0.20	1.62	0.24	4490.02		4490.89	655.86		0.43
Alpine	15.1666*	50yr	176.75	5138.65	2691.80	0.72	6.38	1.10	0.17	0.97	0.22	4492.30		4492.71	1133.51		0.31
Alpine	15.1666*	100yr	355.47	5791.04	5093.48	0.75	6.49	1.32	0.18	0.97	0.29	4493.70		4494.05	1314.34		0.30
Alpine	15.1666*	500yr	1130.01	5967.19	10349.79	0.75	5.52	1.41	0.15	0.66	0.28	4496.78		4496.96	1656.32		0.23
Alpine	15.3333*	2yr		419.00			3.08			0.41		4480.84		4480.99	43.27		0.31
Alpine	15.3333*	5yr		1699.00			5.34			0.86		4484.87		4485.31	47.29		0.36
Alpine	15.3333*	10yr		3810.73	0.27		7.78	0.16		1.68	0.03	4488.12		4489.06	74.31		0.48
Alpine	15.3333*	25yr	2.58	6030.87	111.55	0.51	9.82	0.74	0.14	2.52	0.30	4490.12		4491.59	226.62		0.55
Alpine	15.3333*	50yr	61.96	7076.94	868.10	0.86	9.59	0.89	0.28	2.26	0.37	4492.10		4493.36	721.56		0.49
Alpine	15.3333*	100yr	186.90	8880.98	2172.12	1.10	10.86	1.13	0.42	2.80	0.55	4493.36		4494.82	1056.53		0.53
Alpine	15.3333*	500yr	882.01	9381.10	7183.89	1.07	9.18	1.37	0.34	1.86	0.62	4496.63		4497.35	1516.14		0.40
Alpine	15.5	2yr		419.00			3.82			0.69		4481.15		4481.37	42.66		0.42
Alpine	15.5	5yr		1699.00			5.91			1.10		4485.13		4485.67	46.64		0.42
Alpine	15.5	10yr		3811.00			8.36			1.93		4488.52		4489.61	57.27		0.52
Alpine	15.5	25yr		6119.16	25.84		10.49	0.62		2.92	0.25	4490.60		4492.30	127.24		0.61
Alpine	15.5	50yr	5.46	7798.40	203.13	0.63	11.32	0.72	0.20	3.22	0.31	4492.25		4494.19	406.30		0.61
Alpine	15.5	100yr	40.82	10367.03	832.15	1.00	13.88	1.13	0.42	4.56	0.64	4493.33		4496.01	635.93		0.70
Alpine	15.5	500yr	495.50	11787.65	5163.85	1.29	12.26	1.54	0.54	3.39	0.89	4496.50		4498.09	1266.47		0.56
Alpine	15.55	Bridge															
Alpine	15.6	2yr		419.00			1.95			0.14		4483.55	4479.98	4483.61	45.07		0.16

HCC-RAS Plan: Opt E River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Cmt (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude # Ch
Alpine	15.6	5yr		1699.00			4.69			0.62		4486.71	4482.25	4487.05	48.22	0.30
Alpine	15.6	10yr		3800.90	10.10		6.68	0.35		1.19	0.09	4490.37	4484.85	4491.06	115.99	0.39
Alpine	15.6	25yr	11.89	5824.10	309.01	0.51	7.99	0.61	0.12	1.58	0.19	4492.87	4487.14	4493.81	532.81	0.42
Alpine	15.6	50yr	93.28	6653.14	1260.58	0.71	7.86	0.76	0.18	1.45	0.26	4494.70	4489.15	4495.50	1006.12	0.38
Alpine	15.6	100yr	318.85	7596.69	3324.46	0.83	7.90	0.99	0.22	1.41	0.37	4496.50	4491.89	4497.16	1266.11	0.36
Alpine	15.6	500yr	839.81	9656.09	6951.10	1.03	9.01	1.34	0.32	1.76	0.59	4498.23	4495.91	4498.94	1482.52	0.39
Alpine	15.75*	2yr		419.00			2.59			0.27		4483.60		4483.71	43.86	0.24
Alpine	15.75*	5yr		1699.00			5.51			0.93		4486.83		4487.30	47.09	0.38
Alpine	15.75*	10yr		3809.86	1.14		7.46	0.24		1.56	0.05	4490.56		4491.42	82.39	0.46
Alpine	15.75*	25yr	2.35	6006.84	135.82	0.45	8.98	0.56	0.11	2.09	0.19	4493.01		4494.23	384.18	0.49
Alpine	15.75*	50yr	51.31	7070.59	885.10	0.74	9.03	0.82	0.22	2.01	0.32	4494.76		4495.88	784.56	0.46
Alpine	15.75*	100yr	232.38	8282.37	2725.24	0.93	9.22	1.07	0.29	2.00	0.46	4496.53		4497.50	1163.30	0.44
Alpine	15.75*	500yr	701.91	10451.36	6293.73	1.18	10.32	1.45	0.43	2.41	0.73	4498.29		4499.29	1395.41	0.46
Alpine	16*	2yr		419.00			3.56			0.58		4483.84		4484.04	42.84	0.38
Alpine	16*	5yr		1699.00			6.34			1.31		4487.22		4487.84	46.22	0.46
Alpine	16*	10yr		3810.93	0.07		8.07	0.14		1.80	0.02	4491.05		4492.06	68.93	0.52
Alpine	16*	25yr	0.40	6037.97	106.63	0.34	9.56	0.76	0.07	2.32	0.24	4493.51		4494.90	236.94	0.55
Alpine	16*	50yr	24.70	7366.62	615.69	0.67	10.03	0.84	0.20	2.43	0.35	4495.06		4496.50	647.99	0.53
Alpine	16*	100yr	161.19	8951.46	2127.35	0.97	10.63	1.10	0.34	2.60	0.52	4496.69		4498.09	1068.23	0.52
Alpine	16*	500yr	590.03	11238.90	5618.07	1.31	11.69	1.52	0.53	3.01	0.85	4498.50		4499.87	1316.18	0.54
Alpine	16.25*	2yr		419.00			4.43			0.98		4484.55		4484.85	42.30	0.52
Alpine	16.25*	5yr		1699.00			7.04			1.69		4487.89		4488.66	46.07	0.54
Alpine	16.25*	10yr		3811.00	0.00		8.54	0.07		2.08	0.01	4491.72		4492.85	64.70	0.57
Alpine	16.25*	25yr	0.00	6050.93	94.06	0.11	9.98	0.87	0.01	2.60	0.39	4494.17		4495.70	160.93	0.59
Alpine	16.25*	50yr	13.40	7511.25	482.35	0.61	10.68	0.84	0.18	2.84	0.37	4495.62		4497.28	592.83	0.58
Alpine	16.25*	100yr	128.06	9282.59	1829.34	1.01	11.50	1.13	0.38	3.14	0.57	4497.17		4498.86	1016.89	0.58
Alpine	16.25*	500yr	532.56	11601.62	5312.82	1.39	12.48	1.59	0.62	3.53	0.95	4498.98		4500.60	1273.30	0.59
Alpine	16.5	2yr		419.00			4.59			1.05		4485.72		4486.04	42.21	0.55
Alpine	16.5	5yr		1699.00			7.43			1.92		4488.82		4489.68	47.70	0.60
Alpine	16.5	10yr		3810.99	0.01		8.85	0.09		2.27	0.01	4492.54		4493.75	55.65	0.60
Alpine	16.5	25yr		6057.80	87.20		10.27	0.91		2.79	0.36	4494.96		4496.57	165.46	0.61
Alpine	16.5	50yr	8.29	7578.83	419.88	0.54	11.09	0.84	0.16	3.10	0.38	4496.33		4498.14	567.42	0.62
Alpine	16.5	100yr	113.21	9442.74	1684.05	1.02	12.02	1.15	0.40	3.48	0.60	4497.82		4499.71	991.65	0.63
Alpine	16.5	500yr	500.08	11752.31	5194.61	1.46	12.94	1.66	0.68	3.84	1.04	4499.61		4501.38	1219.62	0.63
Alpine	16.7	Bridge														
Alpine	17	2yr		419.00			4.34			0.87		4486.28	4485.42	4486.58	42.28	0.51
Alpine	17	5yr		1699.00			7.27			1.76		4489.34	4487.71	4490.16	48.99	0.59
Alpine	17	10yr		3809.66	1.34		8.66	0.33		2.10	0.09	4493.00	4490.35	4494.16	79.52	0.58
Alpine	17	25yr	0.05	6044.48	100.47	0.20	10.07	0.57	0.03	2.60	0.21	4495.41	4492.69	4496.96	348.54	0.60

HEC-RAS Plan: Out E. River: Alpine Creek Reach: Alpine (Continued)

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chrt (ft/s)	Vel Right (ft/s)	Shear LOB (lb/ft ²)	Shear Chan (lb/ft ²)	Shear ROB (lb/ft ²)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Fraude # Crt
Alpine	17	50yr	150.20	6044.80	1812.00	0.73	7.34	0.81	0.19	1.24	0.28	4498.68	4494.28	4499.31	1133.53	0.37
Alpine	17	100yr	305.27	7132.32	3802.41	0.68	7.74	1.05	0.16	1.33	0.40	4500.11	4497.72	4500.71	1381.74	0.37
Alpine	17	500yr	1084.39	9024.78	7337.83	1.15	8.75	1.39	0.37	1.64	0.82	4501.71	4499.45	4502.34	1401.80	0.40
Alpine	17.05*	2yr		419.00			4.69			1.12		4487.12		4487.46	42.18	0.57
Alpine	17.05*	5yr		1699.00			7.63			2.09		4490.12		4491.02	48.36	0.63
Alpine	17.05*	10yr		3811.00			8.93			2.40		4493.65		4494.89	68.22	0.63
Alpine	17.05*	25yr		6077.08	67.92		10.20	0.93		2.84	0.41	4496.03		4497.63	141.68	0.63
Alpine	17.05*	50yr	76.54	7063.74	866.72	0.77	8.91	0.85	0.22	1.97	0.31	4498.71		4499.80	833.95	0.48
Alpine	17.05*	100yr	283.49	8513.85	2442.66	1.04	9.50	1.13	0.35	2.15	0.47	4500.13		4501.19	1120.40	0.48
Alpine	17.05*	500yr	640.91	10970.28	5935.81	1.06	10.83	1.59	0.36	2.69	0.80	4501.72		4502.88	1411.59	0.51
Alpine	17.1*	2yr		419.00			4.58			1.06		4488.11		4488.43	42.23	0.55
Alpine	17.1*	5yr		1699.00			7.70			2.13		4491.03		4491.95	47.76	0.63
Alpine	17.1*	10yr		3811.00			9.01			2.47		4494.42		4495.68	70.86	0.65
Alpine	17.1*	25yr		6116.99	28.01		10.25	0.79		2.90	0.31	4496.73		4498.36	125.31	0.65
Alpine	17.1*	50yr	22.89	7719.93	264.18	0.67	10.15	0.80	0.19	2.62	0.29	4498.83		4500.38	468.66	0.57
Alpine	17.1*	100yr	128.59	10137.77	973.64	1.08	11.98	1.14	0.42	3.53	0.51	4499.93		4501.94	774.39	0.64
Alpine	17.1*	500yr	445.87	14077.58	2923.54	1.65	15.00	1.73	0.85	5.35	1.03	4501.10		4503.93	1036.57	0.76
Alpine	17.15*	2yr		419.00			4.58			1.06		4489.04		4489.37	42.23	0.55
Alpine	17.15*	5yr		1699.00			7.75			2.15		4491.96		4492.89	46.84	0.63
Alpine	17.15*	10yr		3811.00			9.05			2.50		4495.26		4496.53	73.28	0.66
Alpine	17.15*	25yr		6138.14	6.86		10.27	0.57		2.93	0.17	4497.50		4499.13	113.24	0.67
Alpine	17.15*	50yr	8.06	7863.55	135.39	0.60	10.47	1.17	0.16	2.83	0.48	4499.34		4501.01	195.38	0.61
Alpine	17.15*	100yr	73.58	10768.97	397.45	1.05	12.81	1.06	0.40	4.08	0.44	4500.43		4502.87	542.25	0.71
Alpine	17.15*	500yr	353.16	15345.03	1748.81	1.71	16.22	1.71	0.91	6.29	0.97	4501.69		4505.29	857.82	0.85
Alpine	17.2	2yr		419.00			4.58			1.06		4489.98		4489.31	42.23	0.55
Alpine	17.2	5yr		1699.00			7.79			2.16		4492.88		4493.83	45.60	0.63
Alpine	17.2	10yr		3811.00			9.06			2.52		4496.13		4497.41	75.58	0.68
Alpine	17.2	25yr		6144.82	0.18		10.24	0.23		2.94	0.04	4498.33		4499.96	95.82	0.69
Alpine	17.2	50yr	3.87	7935.97	67.17	0.64	10.68	1.09	0.18	2.98	0.40	4499.96		4501.71	160.31	0.65
Alpine	17.2	100yr	52.32	10997.22	190.47	1.01	12.90	1.04	0.38	4.15	0.40	4501.20		4503.73	368.97	0.73
Alpine	17.2	500yr	1101.31	12063.06	4282.63	1.36	9.78	1.55	0.45	2.11	0.55	4505.53		4506.57	1208.65	0.46
Alpine	17.3			Bridge												
Alpine	17.4214	2yr		419.00			4.40			0.96		4490.57		4490.87	42.31	0.52
Alpine	17.4214	5yr		1699.00			7.37			1.99		4493.61		4494.46	51.47	0.61
Alpine	17.4214	10yr		3809.85	1.15		6.40	0.33		1.29	0.04	4496.53		4499.16	105.89	0.43
Alpine	17.4214	25yr	2.42	6088.77	53.80	0.71	8.73	1.15	0.14	2.28	0.28	4499.69		4500.87	148.35	0.55
Alpine	17.4214	50yr	18.90	7819.88	168.22	0.92	10.09	1.63	0.21	2.93	0.49	4500.57		4502.12	200.06	0.60
Alpine	17.4214	100yr	827.65	7183.35	3229.00	1.14	6.06	1.28	0.19	0.92	0.23	4505.24		4505.61	1178.48	0.29
Alpine	17.4214	500yr	1561.85	9289.99	6615.15	1.20	7.04	1.76	0.22	1.20	0.38	4506.73		4507.16	1455.56	0.32

HEC-RAS Plan, Out F River, Alpine Creek Reach: Alpine (Continued)

Reach	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	Top Width (ft)	Froude #	Chl
Alpine	17.5371*		419.00			4.58			1.06		4491.65		4491.98	42.23		0.55
Alpine	17.5371*		1699.00			7.34			2.00		4494.74		4495.57	52.32		0.62
Alpine	17.5371*		3811.00			8.89			1.55		4499.01		4499.75	92.26		0.50
Alpine	17.5371*	0.09	6131.01	13.90	0.31	8.91	0.86	0.04	2.45	0.19	4500.43		4501.66	131.12		0.59
Alpine	17.5371*	8.28	7912.07	86.65	0.84	10.09	1.47	0.19	3.01	0.43	4501.42		4502.98	172.88		0.62
Alpine	17.5371*	605.62	8974.43	1659.95	1.36	7.76	1.30	0.29	1.56	0.28	4505.27		4506.02	959.67		0.40
Alpine	17.5371*	1439.33	11615.47	4392.20	1.71	8.91	1.87	0.43	1.98	0.49	4506.78		4507.62	1160.47		0.43
Alpine	17.6528*		419.00			4.58			1.06		4492.82		4493.15	42.23		0.55
Alpine	17.6528*		1699.00			7.25			1.96		4496.70		4496.70	54.35		0.62
Alpine	17.6528*		3811.00			7.39			1.84		4499.64		4500.49	94.78		0.56
Alpine	17.6528*		6143.14	1.86		9.01	0.55		2.58	0.10	4501.29		4502.55	118.77		0.62
Alpine	17.6528*	3.42	7961.35	42.24	0.72	10.02	1.28	0.15	3.04	0.36	4502.36		4503.91	158.52		0.64
Alpine	17.6528*	344.49	10376.69	518.83	1.46	9.38	1.20	0.37	2.38	0.28	4505.31		4506.57	633.52		0.51
Alpine	17.6528*	1011.97	14431.20	2003.83	2.08	11.58	1.86	0.68	3.49	0.58	4506.63		4508.37	919.23		0.59
Alpine	17.7685*		419.00			4.58			1.06		4493.99		4494.32	42.23		0.55
Alpine	17.7685*		1699.00			7.13			1.91		4497.03		4497.82	56.78		0.61
Alpine	17.7685*		3811.00			7.76			2.08		4500.46		4501.40	96.23		0.61
Alpine	17.7685*		6144.95	0.05		9.04	0.24		2.65	0.03	4502.27		4503.54	114.68		0.65
Alpine	17.7685*	1.01	7986.15	19.84	0.54	9.91	1.11	0.10	3.03	0.29	4503.38		4504.30	151.03		0.66
Alpine	17.7685*	186.97	10835.04	217.99	1.39	10.07	1.51	0.38	2.84	0.43	4505.75		4507.27	336.38		0.58
Alpine	17.7685*	673.34	16055.75	717.91	2.19	13.24	1.68	0.82	4.72	0.55	4506.94		4509.45	660.79		0.72
Alpine	17.8842*		419.00			4.58			1.06		4495.16		4495.49	42.23		0.55
Alpine	17.8842*		1699.00			6.99			1.86		4498.18		4498.94	59.42		0.61
Alpine	17.8842*		3811.00			7.95			2.17		4501.42		4502.40	91.84		0.61
Alpine	17.8842*		6145.00			9.02			2.67		4503.34		4504.60	116.59		0.66
Alpine	17.8842*	0.08	7997.71	9.21	0.27	9.78	0.96	0.04	3.01	0.24	4504.47		4505.95	146.56		0.67
Alpine	17.8842*	108.82	10985.61	145.58	1.31	10.35	1.77	0.36	3.09	0.56	4506.45		4508.07	265.23		0.62
Alpine	17.8842*	608.19	16462.64	376.17	2.16	13.15	1.54	0.80	4.72	0.48	4507.99	4506.85	4510.53	540.65		0.73
Alpine	18		419.00			4.58			1.06		4496.33		4496.66	42.23		0.55
Alpine	18		1699.00			6.86			1.81		4499.31		4500.04	61.99		0.60
Alpine	18		3811.00			8.04			2.20		4502.39		4503.39	88.07		0.61
Alpine	18		6145.00			8.98			2.66		4504.43		4505.68	117.85		0.66
Alpine	18		8002.81	4.19		9.63	0.84		2.96	0.19	4505.60		4507.04	143.53		0.67
Alpine	18	67.71	11090.28	82.01	1.25	10.51	1.68	0.34	3.26	0.53	4507.30		4508.99	239.14		0.66
Alpine	18	630.54	16482.43	334.03	2.10	12.48	1.81	0.75	4.27	0.61	4509.31		4511.60	445.86		0.70
Alpine	18.2*		419.00			6.20			1.88		4501.94	4501.74	4502.54	41.04		0.85
Alpine	18.2*		1699.00			8.85			3.11		4504.30		4505.52	62.61		0.89
Alpine	18.2*		3811.00			10.53			3.92		4506.65		4508.38	83.29		0.89
Alpine	18.2*		6144.92	0.08		11.10	0.34		4.08	0.06	4508.69		4510.60	108.06		0.85

Appendix D
Hydrologic Model Input/Output and
Watershed Boundary Map

Basin: Alpine Creek
Description: Flows north through the City of Alpine, TX
Last Modified Date: 29 January 2001
Last Modified Time: 09:19:10
Version: 2.0.3
Unit System: English
Default DSS File Name: D:\Projects\Alpine\Alpine\Alpine.dss
End:

Reach: R-C2
Canvas X: 434.254
Canvas Y: 248.337
From Canvas X: 509.801
From Canvas Y: 11.395
Label X: 13
Label Y: -2
Downstream: J-12

Route: Muskingum
Muskingum K: 0.170
Muskingum X: 0.25
Muskingum Steps: 1
End:

Junction: J-12
Canvas X: 434.254
Canvas Y: 248.337
Label X: 16
Label Y: 0
Downstream: R-C1
End:

Junction: J-13
Canvas X: 297.442
Canvas Y: 450.585
Label X: 16
Label Y: 0
Downstream: R-C4
End:

Reach: R-C1
Canvas X: 297.442
Canvas Y: 450.585
From Canvas X: 434.254
From Canvas Y: 248.337
Label X: 16
Label Y: 0
Downstream: J-13

Route: Muskingum
Muskingum K: 0.126
Muskingum X: 0.25
Muskingum Steps: 1
End:

Reach: R-C4
Canvas X: 362.141
Canvas Y: 900.787
From Canvas X: 297.442
From Canvas Y: 450.585
Label X: 16
Label Y: 0
Downstream: J-14

Route: Muskingum
Muskingum K: 0.729
Muskingum X: 0.25
Muskingum Steps: 1
End:

Junction: J-14
Canvas X: 362.141
Canvas Y: 900.787
Label X: 16
Label Y: 0
Downstream: R-C6A.1
End:

Junction: J-9
Canvas X: 753.611
Canvas Y: 1148.031
Label X: 14
Label Y: 7
Downstream: R-C6B
End:

Reach: R-C6A.1
Canvas X: 753.611
Canvas Y: 1148.031
From Canvas X: 362.141
From Canvas Y: 900.787

Label X: -56
Label Y: -6
Downstream: J-9

Route: Muskingum
Muskingum K: 0.139
Muskingum X: 0.25
Muskingum Steps: 1

End:

Reach: R-C6A.2
Canvas X: 753.611
Canvas Y: 1148.031
From Canvas X: 705.536
From Canvas Y: 656.977
Label X: 7
Label Y: -28
Downstream: J-9

Route: Muskingum
Muskingum K: 0.107
Muskingum X: 0.25
Muskingum Steps: 1

End:

Reach: R-B3.1
Canvas X: 959.648
Canvas Y: 880.183
From Canvas X: 880.667
From Canvas Y: 471.544
Label X: 2
Label Y: -18
Downstream: J-8

Route: Muskingum
Muskingum K: 0.248
Muskingum X: 0.25
Muskingum Steps: 1

End:

Junction: J-8
Canvas X: 959.648
Canvas Y: 880.183
Label X: 16
Label Y: 0
Downstream: R-B4

End:

Reach: R-B3.2
Canvas X: 959.648
Canvas Y: 880.183
From Canvas X: 1309.209
From Canvas Y: 648.702
Label X: 16
Label Y: 0
Downstream: J-8

Route: Muskingum
Muskingum K: 0.373
Muskingum X: 0.25
Muskingum Steps: 1

End:

Reach: R-B4
Canvas X: 753.611
Canvas Y: 1148.031
From Canvas X: 959.648
From Canvas Y: 880.183
Label X: 2
Label Y: 2
Downstream: J-9

Route: Muskingum
Muskingum K: 0.100
Muskingum X: 0.25
Muskingum Steps: 1

End:

Reach: R-C6B
Canvas X: 777.512
Canvas Y: 1431.096
From Canvas X: 753.611
From Canvas Y: 1148.031
Label X: 16
Label Y: 0
Downstream: J-10

Route: Muskingum
Muskingum K: 0.100
Muskingum X: 0.25
Muskingum Steps: 1

End:

Junction: J-10
Canvas X: 777.512
Canvas Y: 1431.096
Label X: 16
Label Y: 0
Downstream: R-C7

End:

Junction: Alpine
Canvas X: 843.630
Canvas Y: 1734.136
Label X: 16
Label Y: 0

End:

Reach: R-C7
Canvas X: 843.630
Canvas Y: 1734.136
From Canvas X: 777.512
From Canvas Y: 1431.096
Label X: 16
Label Y: 0
Downstream: Alpine

Route: Muskingum
Muskingum K: 0.156
Muskingum X: 0.25
Muskingum Steps: 1

End:

Subbasin: C1
Canvas X: 125.199
Canvas Y: 210.564
Label X: 16
Label Y: 0
Area: 2.11
Downstream: J-13

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.11

Transform: Snyder
SnyderTp: 0.55
SnyderCp: 0.32

Baseflow: None

End:

Subbasin: C2
Canvas X: 324.368
Canvas Y: -16.076
Label X: 16
Label Y: 0
Area: 2.40
Downstream: J-12

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.11

Transform: Snyder
SnyderTp: 0.89
SnyderCp: 0.42

Baseflow: None

End:

Subbasin: C4
Canvas X: 138.283
Canvas Y: 689.611
Label X: 16
Label Y: 0
Area: 1.62
Downstream: J-14

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.4

Transform: Snyder
SnyderTp: 0.66
SnyderCp: 0.39

Baseflow: None

End:

Subbasin: C6A
Canvas X: 544.140
Canvas Y: 818.372
Label X: 16
Label Y: 0
Area: 0.80
Downstream: J-9

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.4

Transform: Snyder
SnyderTp: 1.04
SnyderCp: 0.30

Baseflow: None

End:

Subbasin: C6B
Canvas X: 578.480
Canvas Y: 1261.351
Label X: 16
Label Y: 0
Area: 0.55
Downstream: J-10

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.4

Transform: Snyder
SnyderTp: 1.62
SnyderCp: 0.27

Baseflow: None

End:

Subbasin: B1
Canvas X: 938.583
Canvas Y: 303.964
Label X: 16
Label Y: 0
Area: 2.39
Downstream: R-B3.1

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.11

Transform: Snyder
SnyderTp: 0.89
SnyderCp: 0.42

Baseflow: None

End:

Subbasin: B2
Canvas X: 1403.771
Canvas Y: 480.973
Label X: 16
Label Y: 0
Area: 0.91
Downstream: R-B3.2

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.4

Transform: Snyder
SnyderTp: 0.59
SnyderCp: 0.26

Baseflow: None

End:

Subbasin: B3
Canvas X: 1158.816
Canvas Y: 457.808
Label X: 16
Label Y: 0
Area: 1.78
Downstream: J-8

LossRate: Initial+Constant
Percent Impervious Area: 0.0

Initial Loss: 0.5
Constant Loss Rate: 0.4

Transform: Snyder
SnyderTp: 1.60
SnyderCp: 0.33

Baseflow: None

End:

Subbasin: B4

Canvas X: 1083.270
Canvas Y: 1069.050
Label X: 16
Label Y: 0
Area: 0.42
Downstream: J-9

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.4

Transform: Snyder
SnyderTp: 0.53
SnyderCp: 0.18

Baseflow: None

End:

Subbasin: C7

Canvas X: 595.649
Canvas Y: 1587.576
Label X: 16
Label Y: 0
Area: 0.94
Downstream: Alpine

LossRate: Initial+Constant
Percent Impervious Area: 70
Initial Loss: 0.5
Constant Loss Rate: 0.4

Transform: Snyder
SnyderTp: 1.75
SnyderCp: 0.34

Baseflow: None

End:

Subbasin: C5

Canvas X: 678.665
Canvas Y: 556.308
Label X: 16
Label Y: 0
Area: 2.15
Downstream: R-C6A.2

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.11

Transform: Snyder
SnyderTp: 0.89
SnyderCp: 0.41

Baseflow: None

End:

Subbasin: C3

Canvas X: 605.951
Canvas Y: -36.680
Label X: 16
Label Y: 0
Area: 2.56
Downstream: R-C2

LossRate: Initial+Constant
Percent Impervious Area: 0.0
Initial Loss: 0.5
Constant Loss Rate: 0.11

Transform: Snyder
SnyderTp: 0.68
SnyderCp: 0.34

Baseflow: None

End:

HMS * Summary of Results

Project : Alpine

Run Name : Run 2

Start of Run : 01Apr01 0000 Basin Model : Alpine Creek
 End of Run : 04Apr01 0000 Met. Model : Met 1
 Execution Time : 30Jul01 1041 Control Specs : SCS Type I 48hr

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
C3	2112.1	02 Apr 01 0100	492.51	2.560
R-C2	2099.9	02 Apr 01 0100	492.51	2.560
C2	2357.5	02 Apr 01 0100	462.01	2.400
J-12	4457.4	02 Apr 01 0100	954.51	4.960
R-C1	4208.5	02 Apr 01 0100	954.56	4.960
C1	1628.8	02 Apr 01 0100	406.63	2.110
J-13	5837.3	02 Apr 01 0100	1361.2	7.070
R-C4	5066.7	02 Apr 01 0200	1361.2	7.070
C4	1448.7	02 Apr 01 0100	290.62	1.620
J-14	5842.3	02 Apr 01 0200	1651.8	8.690
R-C6A.1	5936.6	02 Apr 01 0200	1651.8	8.690
C5	2069.8	02 Apr 01 0100	414.27	2.150
R-C6A.2	2005.1	02 Apr 01 0100	414.27	2.150
B1	2347.8	02 Apr 01 0100	460.10	2.390
R-B3.1	2241.5	02 Apr 01 0130	460.10	2.390
B2	528.51	02 Apr 01 0100	163.75	0.910
R-B3.2	499.72	02 Apr 01 0130	163.75	0.910
B3	738.54	02 Apr 01 0130	319.11	1.780
J-8	3479.7	02 Apr 01 0130	942.95	5.080
R-B4	3507.6	02 Apr 01 0130	942.95	5.080
C6A	453.24	02 Apr 01 0100	144.02	0.800
B4	167.78	02 Apr 01 0100	75.735	0.420
J-9	11387	02 Apr 01 0130	3228.8	17.140
R-C6B	11152	02 Apr 01 0130	3228.8	17.140
C6B	189.84	02 Apr 01 0130	99.121	0.550
J-10	11342	02 Apr 01 0130	3327.9	17.690
R-C7	11612	02 Apr 01 0200	3327.9	17.690
C7	436.51	02 Apr 01 0200	199.39	0.940
Alpine	12049	02 Apr 01 0200	3527.3	18.630

HMS * Summary of Results for Alpine

Project : Alpine Run Name : Run 2

Start of Run : 01Apr01 0000 Basin Model : Alpine Creek
 End of Run : 04Apr01 0000 Met. Model : Met 1
 Execution Time : 30Jul01 1041 Control Specs : SCS Type I 48hr

Date	Time	Inflow (cfs) from R-C7	Inflow (cfs) from C7	Outflow (cfs)
31 Mar 01	2400	0	0	0
01 Apr 01	0030	0	0	0
01 Apr 01	0100	0	0	0
01 Apr 01	0130	0	0	0
01 Apr 01	0200	0	0	0
01 Apr 01	0230	0	0	0
01 Apr 01	0300	0	0	0
01 Apr 01	0330	0	0	0
01 Apr 01	0400	0	0	0
01 Apr 01	0430	0	0	0
01 Apr 01	0500	0	0	0
01 Apr 01	0530	0	0	0
01 Apr 01	0600	0	0	0
01 Apr 01	0630	0	0	0
01 Apr 01	0700	0	0	0
01 Apr 01	0730	0	0	0
01 Apr 01	0800	0	0	0
01 Apr 01	0830	0	0	0
01 Apr 01	0900	0	0	0
01 Apr 01	0930	0	0	0
01 Apr 01	1000	0	0	0
01 Apr 01	1030	0	0	0
01 Apr 01	1100	0	0	0
01 Apr 01	1130	0	0	0
01 Apr 01	1200	0	0	0
01 Apr 01	1230	0	0	0
01 Apr 01	1300	0	0	0
01 Apr 01	1330	0	0	0
01 Apr 01	1400	0	0	0
01 Apr 01	1430	0	0	0
01 Apr 01	1500	0	0	0
01 Apr 01	1530	0	0	0
01 Apr 01	1600	0	0	0

Date	Time	Inflow (cfs) from R-C7	Inflow (cfs) from C7	Outflow (cfs)
01 Apr 01	1630	0	0	0
01 Apr 01	1700	0	0	0
01 Apr 01	1730	0	0	0
01 Apr 01	1800	0	0	0
01 Apr 01	1830	0	0	0
01 Apr 01	1900	0	0	0
01 Apr 01	1930	0	0	0
01 Apr 01	2000	0	0	0
01 Apr 01	2030	0	0	0
01 Apr 01	2100	0	0	0
01 Apr 01	2130	0	0	0
01 Apr 01	2200	0	0	0
01 Apr 01	2230	0	0	0
01 Apr 01	2300	0	0	0
01 Apr 01	2330	0	0	0
01 Apr 01	2400	363	32	395
02 Apr 01	0030	2355	148	2503
02 Apr 01	0100	6558	319	6877
02 Apr 01	0130	10562	431	10994
02 Apr 01	0200	11612	437	12049
02 Apr 01	0230	10192	392	10585
02 Apr 01	0300	8160	348	8508
02 Apr 01	0330	6382	309	6691
02 Apr 01	0400	4984	274	5258
02 Apr 01	0430	3879	243	4122
02 Apr 01	0500	3029	216	3245
02 Apr 01	0530	2385	191	2576
02 Apr 01	0600	1884	170	2054
02 Apr 01	0630	1502	151	1653
02 Apr 01	0700	1205	134	1338
02 Apr 01	0730	974	119	1092
02 Apr 01	0800	792	105	897
02 Apr 01	0830	646	93	740
02 Apr 01	0900	523	83	606
02 Apr 01	0930	417	73	491
02 Apr 01	1000	339	65	405
02 Apr 01	1030	287	58	345
02 Apr 01	1100	245	51	296
02 Apr 01	1130	208	46	254
02 Apr 01	1200	177	40	217
02 Apr 01	1230	147	36	183

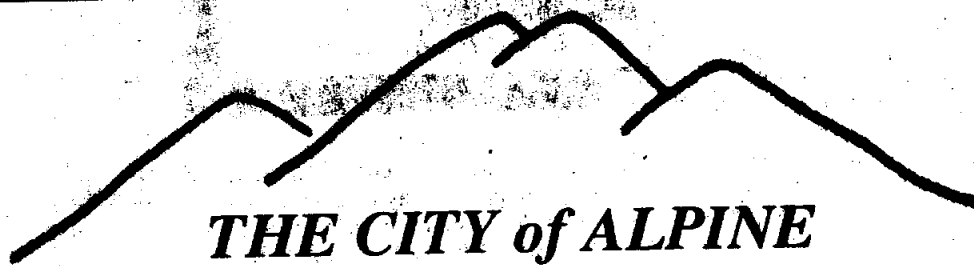
Date	Time	Inflow (cfs) from R-C7	Inflow (cfs) from C7	Outflow (cfs)
02 Apr 01	1300	120	32	152
02 Apr 01	1330	98	28	126
02 Apr 01	1400	81	25	106
02 Apr 01	1430	66	22	88
02 Apr 01	1500	52	20	72
02 Apr 01	1530	42	17	60
02 Apr 01	1600	36	16	52
02 Apr 01	1630	32	14	45
02 Apr 01	1700	28	12	40
02 Apr 01	1730	25	11	36
02 Apr 01	1800	22	10	32
02 Apr 01	1830	20	9	28
02 Apr 01	1900	18	8	25
02 Apr 01	1930	16	7	22
02 Apr 01	2000	14	6	20
02 Apr 01	2030	12	5	18
02 Apr 01	2100	11	5	16
02 Apr 01	2130	10	4	14
02 Apr 01	2200	8	4	12
02 Apr 01	2230	6	3	9
02 Apr 01	2300	3	2	5
02 Apr 01	2330	3	0	3
02 Apr 01	2400	3	0	3
03 Apr 01	0030	2	0	2
03 Apr 01	0100	0	0	0
03 Apr 01	0130	-0	0	-0
03 Apr 01	0200	0	0	0
03 Apr 01	0230	-0	0	0
03 Apr 01	0300	0	0	0
03 Apr 01	0330	0	0	0
03 Apr 01	0400	0	0	0
03 Apr 01	0430	0	0	0
03 Apr 01	0500	-0	0	0
03 Apr 01	0530	0	0	0
03 Apr 01	0600	-0	0	0
03 Apr 01	0630	0	0	0
03 Apr 01	0700	-0	0	0
03 Apr 01	0730	0	0	0
03 Apr 01	0800	-0	0	0
03 Apr 01	0830	0	0	0
03 Apr 01	0900	-0	0	0

Date	Time	Inflow (cfs) from R-C7	Inflow (cfs) from C7	Outflow (cfs)
03 Apr 01	0930	0	0	0
03 Apr 01	1000	-0	0	0
03 Apr 01	1030	0	0	0
03 Apr 01	1100	-0	0	0
03 Apr 01	1130	0	0	0
03 Apr 01	1200	-0	0	0
03 Apr 01	1230	0	0	0
03 Apr 01	1300	-0	0	0
03 Apr 01	1330	0	0	0
03 Apr 01	1400	-0	0	0
03 Apr 01	1430	0	0	0
03 Apr 01	1500	-0	0	0
03 Apr 01	1530	0	0	0
03 Apr 01	1600	-0	0	0
03 Apr 01	1630	0	0	0
03 Apr 01	1700	-0	0	0
03 Apr 01	1730	0	0	0
03 Apr 01	1800	-0	0	0
03 Apr 01	1830	0	0	0
03 Apr 01	1900	-0	0	0
03 Apr 01	1930	0	0	0
03 Apr 01	2000	-0	0	0
03 Apr 01	2030	0	0	0
03 Apr 01	2100	-0	0	0
03 Apr 01	2130	0	0	0
03 Apr 01	2200	-0	0	0
03 Apr 01	2230	0	0	0
03 Apr 01	2300	-0	0	-0
03 Apr 01	2330	0	0	0
03 Apr 01	2400	-0	0	-0

Appendix E
Public Notices for Meetings

e Observer

14, 2001 - Alpine, Texas • Home of Sul Ross State University



THE CITY of ALPINE

will host a Public Meeting to discuss:

“Flood Protection, Planning and Design”

for

Alpine’s Creeks and Watershed Areas

Public input is being sought by the City of Alpine, the Texas Water Development Board, and PBS&J Engineering to help initiate a Hydrologic Planning Analysis of Alpine Creek and other city watersheds to provide planning and preliminary designing for long-term flood protection and storm water runoff management.

This meeting will be one of three scheduled opportunities for the public to provide input during the administration of a Flood Protection Planning Grant awarded to the City of Alpine by the Texas Water Development Board from the Board’s Research & Planning Fund.

Thursday, March 15 at 7:00 PM

Kokernot Lodge

Loop Road 223

City continues Alpine Creek planning tonight

A City-sponsored public workshop to be held tonight at Kokernot Lodge will continue the process of gaining public input to develop a long awaited flood plan and pre-engineering study that may well re-define Alpine Creek, one of the community's most prominent natural landmarks. The City's Department of Community Development, PBS&J Engineering and Hydrology, and the Texas Water Development Board will be hearing public comments and suggestions related to various potential alternatives that may be used to reduce future flood damage, improve area watershed areas, and create public improvements and amenities within the Alpine Creek corridor.

The workshop will begin with a report from PBS&J Engineering that will summarize the input from last month's public meeting as well as offer preliminary views of what the creek may look like in the future. Subjects for discussion at the workshop will include the creek's historic role in the community, past and future floods, structural and non-structural solutions to drainage problems, environmental and wildlife habitat resource potential, property protection issues, and the potential for green-belts and mini-parks.

The meeting will be held 7 p.m. tonight, May 10, at Kokernot Lodge, Loop Road 223. All the public is invited.

Appendix F
FIS Floodplain Boundary Map

Appendix G
Floodplain Boundary Map – Option E

FLOOD PROTECTION PLANNING STUDY
ALPINE CREEK
BREWSTER COUNTY, TEXAS
CITY OF ALPINE
Contract #2001-483-375

The following maps are not attached to this report. Due to their size, they could not be copied. They are located in the official file and may be copied upon request.

Alpine Creek Flood Planning Study Watershed Boundary Map

Existing 100 Year FEMA FloodPlain Boundary Map

Option E 100 Year FloodPlain Boundary Map

Please contact Research and Planning Fund Grants Management Division at (512) 463-7926 for copies.