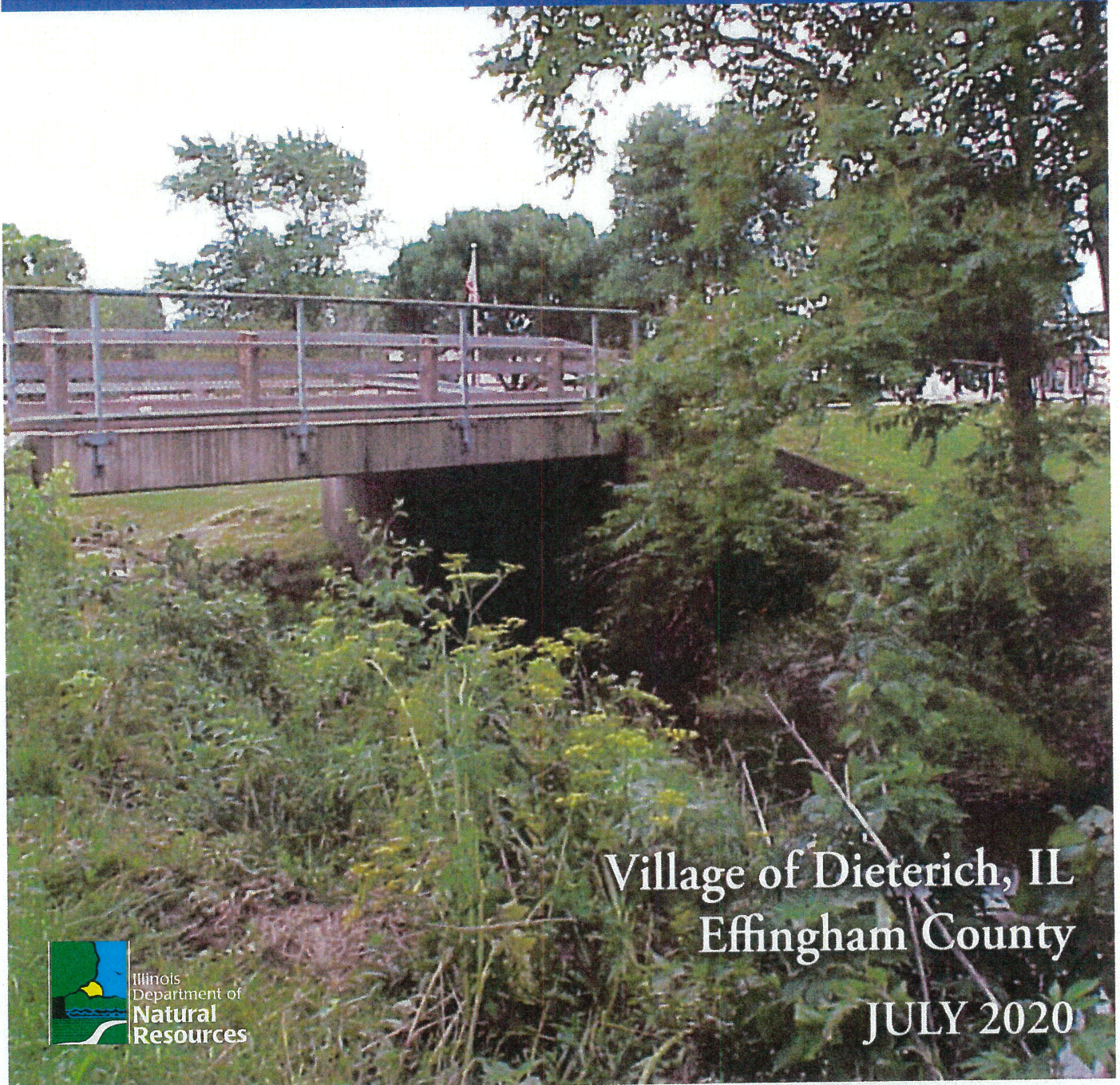




State of Illinois
Illinois Department of Natural Resources

URBAN FLOODING Dieterich Flood Control Project



Village of Dieterich, IL
Effingham County

JULY 2020



Illinois
Department of
**Natural
Resources**

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DIETERICH FLOOD CONTROL STUDY

Village of Dieterich
Effingham County, Illinois

I. PURPOSE AND AUTHORITY

This report documents the findings of a flood control study for the Village of Dieterich, Illinois. This study identifies the sources and extent of the existing flood problems, and to evaluate alternatives for reducing future flood damages.

The Illinois Department of Natural Resources/Office of Water Resources (OWR) is granted the authority to conduct flood control surveys and studies for all watersheds of the state through the Flood Control Act of 1945, 615 ILCS 15, Illinois Compiled Statutes.

II. WATERSHED DESCRIPTION

The Village of Dieterich, Illinois is in the eastern most part of Effingham County, approximately 110 miles northeast of St. Louis, Missouri and 80 miles southwest of Terra Haute, Indiana (Refer to Figure 1). Dieterich is located about 10 miles southeast of Effingham, Illinois along Illinois Route 33. There are two interstate highway systems close to Dieterich. Interstate 57 is located about 10 miles to the east and runs north and south. Interstate 70 is located about 10 miles to the north and runs southwest to northeast.

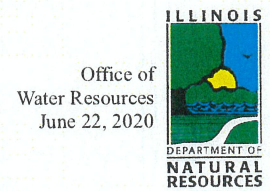
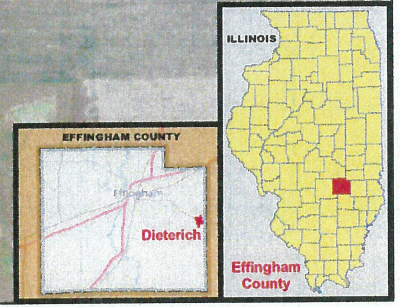
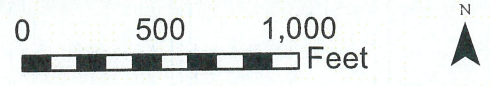
The Village of Dieterich has a population of 617 based on the 2010 census figures. Land use outside the Village limits is primarily agricultural and wooded areas. Land use within the Village limits is mostly residential with some commercial and industrial development. (Refer to Figure 2).

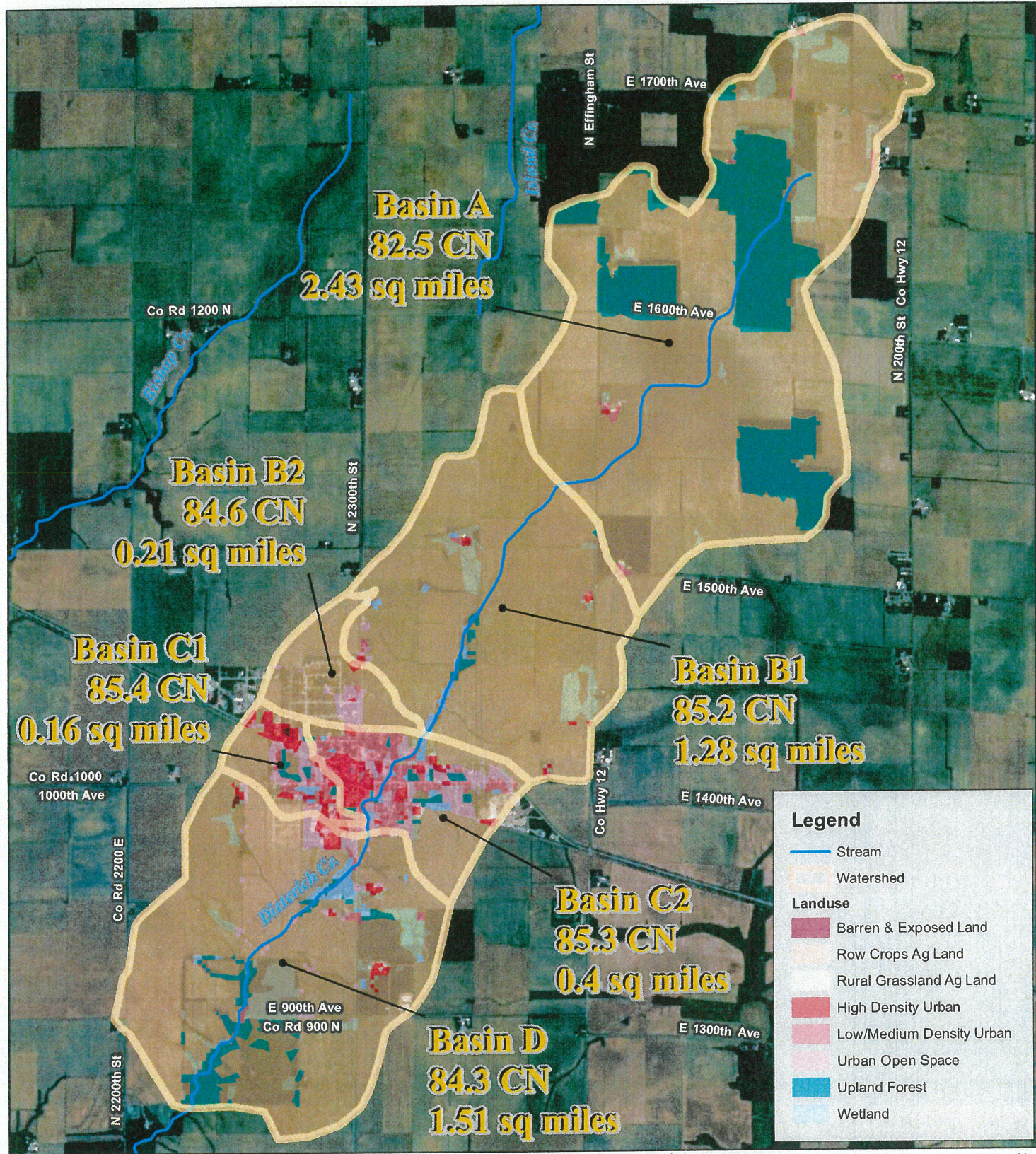


Dieterich Creek Location Map

Data Sources: USGS Imagery
 USGS National Hydrography Dataset
 ESRI World Transportation - Esri, HERE, Garmin, (c) OpenStreetMap contributors
 County Overview - © OpenStreetMap (and) contributors, CC-BY-SA

Figure 1.





**Dieterich Creek Watershed
Landuse Utilized For
Area Weighted Runoff Curve Number**

Data Sources: NRCS Ssurgo Soils
ISGS Landcover 1999-2000

Office of
Water Resources
July 8, 2020



Figure 2.

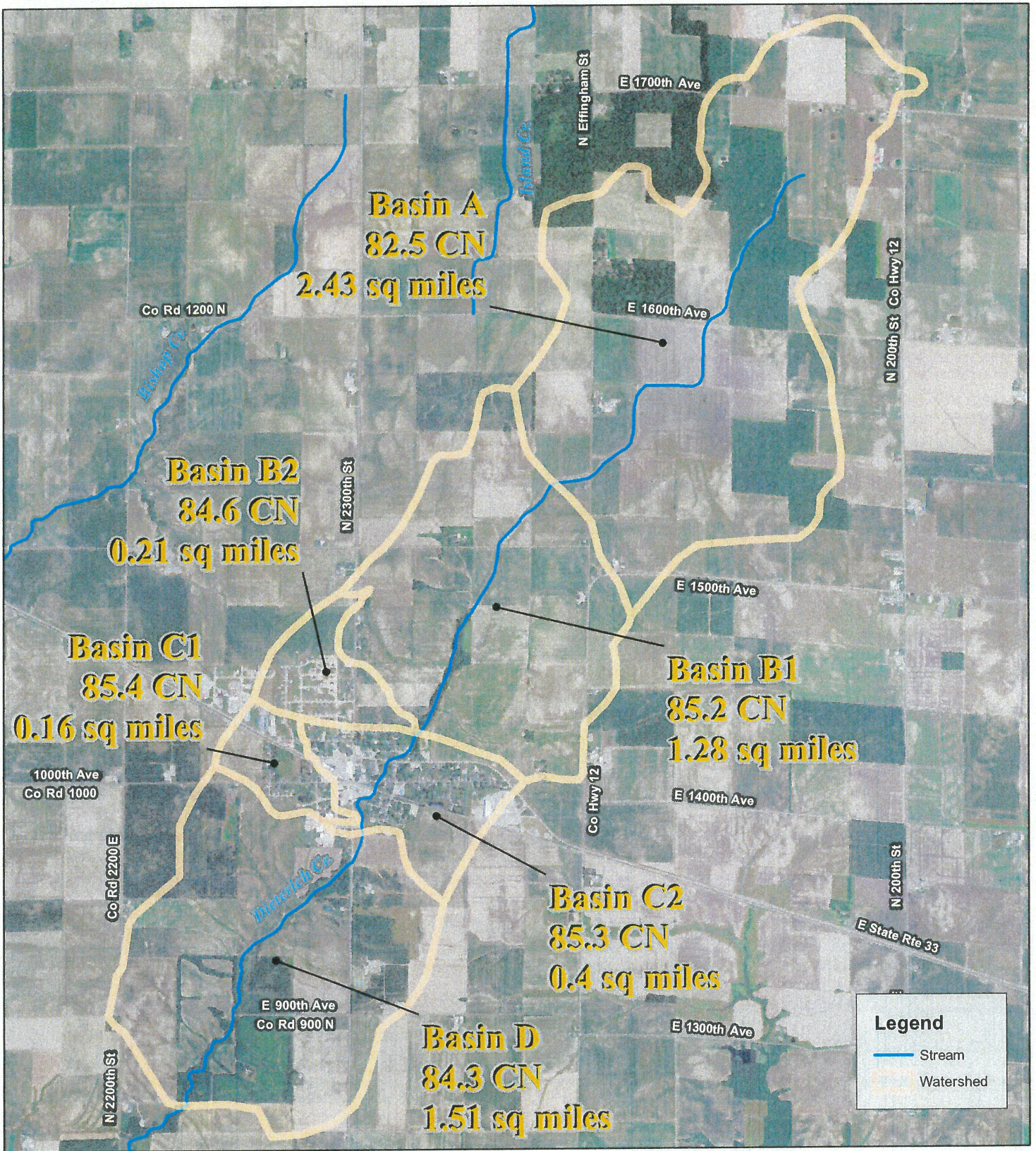
Dieterich Creek flows north to south through the eastern part of the village of Dieterich. It begins about 3.5 miles northeast of Dieterich and flows into Bishop Creek which is tributary to the Little Wabash River. The drainage area of Dieterich Creek located north of the Village is about 3.9 square miles. The drainage area for Dieterich Creek within the Village is about 0.2 square miles. Dieterich Creek flows through the Village for a distance of about 3,742 feet or 0.7 miles.

For this study, the watershed was divided into 6 subareas. (Refer to Figure 3). The total Dieterich Creek watershed area studied was approximately 5.99 square miles. Dieterich Creek has a slope of about 7.0 feet per mile through the study area which commences about 1.1 miles north of Dieterich Village limits and extends to about 0.6 miles downstream of the Village. Dieterich Creek conveys flow to the south through Dieterich, beneath the Illinois Route 33 bridge and 5 additional roadway bridges. Farmland, consisting primarily of row crops, is located northeast of the Village, and is designated as Subareas "A", "B1", and "B2". These subareas have a total combined drainage area of 3.9 square miles. Runoff from this area enters Dieterich Creek and these flows continue to the south through Dieterich. There is a small channel that conveys flow from sub-basin B2, which has a drainage area of 0.21 square miles. This channel flows from the west and outlets to Dieterich Creek just north of Elm Street. A second channel conveys flow from sub-basin C1, which has a drainage area of 0.16 square miles within the Village limits. This channel outlets into Dieterich Creek about 350 feet north of Church Street. (Refer to Figure 1).

III. FLOOD PROBLEM

A. Description

The drainage system in the Village of Dieterich consists of roadside ditches and a small channel that convey flows which eventually drain into Dieterich Creek. The Village does not have any storm sewer system but does have a sanitary sewer system. Flows from cropland north of Dieterich flow into Dieterich Creek and are conveyed south through the eastern part of the Village. A 2-year frequency runoff event will exceed the bank full conditions in some locations but does not cause any structure damages.



Dieterich Creek Watershed Area Weighted Runoff Curve Number

Data Sources: NRCS Ssurgo Soils
ISGS Landcover 1999-2000

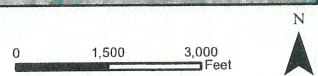
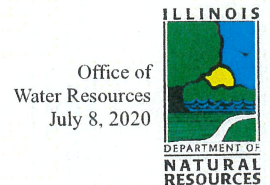


Figure 3.



Flows generated by runoff from the approximate 3.9 square mile drainage area upstream of the Village of Dieterich will exceed the channel capacity of Dieterich Creek for the 5, 10, 25, 50, and 100-year frequency runoff events at all locations through the Village. These runoff events cause structural damages within the Village. The 100-year frequency event causes damages to 29 structures in the Village. The primary cause of flooding is the limited capacity of Dieterich Creek. Also, some of the roadway bridge structures which cross the Creek generate increases in water surface elevations. Construction within the flood plain of Dieterich Creek results in structure flooding.

B. Historic Events and Damages

The Village has experienced four recent flood events. The most recent one occurred in June 2013 following a 3.5 inch rainfall over a 12-hour period. This flood followed a severe wind storm that brought down tree limbs that eventually lodged in the channel at the Railroad Bridge and created additional increases in flooding upstream. Another flood occurred February 2009, when an apartment complex, located at 303 East Maple Street, had to be evacuated due to rising flood water. Other floods also occurred June 2008, and July 2000. In July 2000, 5 structures including that same apartment complex, flooded. Damage Survey forms were submitted for this flood event by the Village with a total of \$49,260 in damages reported.

IV. GENERALIZED STUDY PROCEDURES

The watershed under consideration does not have stream gauging stations to provide historical or factual stream flow information. Therefore, synthetic methods were utilized to arrive at estimates of discharges for various frequency storm events, at strategic locations being studied. The US Army Corps of Engineers' HEC-1 computerized watershed hydrology model was used. Hydrographs (flow rates in relation to time) for the 2, 5, 10, 25, 50, and 100-year frequency flood events were calculated for each sub-watershed which included the use of various hydrologic parameters. These include area, time of concentration (TC), a storage coefficient (R), and runoff curve number (CN). (See Table 1).

SUB-BASIN	AREA (SQ. MI.)	TC (Hour)	R	CN
A	2.43	2.03	1.35	82.5
B1	1.29	2.42	1.61	85.2
B2	0.21	1.8	1.2	84.6
C1	0.41	1.22	0.81	85.4
C2	0.14	0.79	0.53	85.3
D	1.51	2.1	1.4	84.3

Table 1

A 100-year flood event has a 1% chance of occurring every year. Hydrographs were routed and combined as necessary to obtain storm hydrographs and peak discharges at strategic locations. (Refer to Appendix A).

A. Hydrologic Modeling

a. General

The US Army Corps of Engineers' HEC-1 computerized watershed hydrology model was used to develop a hydrologic model for the Dieterich Creek watershed. The HEC-1 model simulates the surface response of a drainage basin for a given rainfall and distribution to develop flood hydrographs. The model has the capability of routing the hydrographs and combining the runoff from multiple subareas. The subareas were delineated using United States Geological Survey (USGS) 7.5 minute Quadrangle Maps and field investigations.

b. Design Storms

The Illinois State Water Survey Bulletin 70, Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois, (Table 13) was used to select rainfall amounts for the 2, 5, 10, 25, 50, and 100-year frequency events. ISWS Circular 173, Time Distributions of Heavy Rainstorms in Illinois, (Table 3) was used to determine rainfall distribution based on the duration selected for the event. The Huff First Quartile distribution, for heavy rainfall at a point, was selected. Although five frequency events were modeled and analyzed, the 6 hour, 100-year

event was considered the design storm. The design HEC-1 model simulates the runoff from a 5.56 inch rain distributed over a 6 hour period.

c. Unit Hydrographs

The Clark unit hydrograph method was selected to compute a synthetic unit hydrograph for each subarea. The time of concentration (T_c) for each basin and the storage coefficient R was computed using the USGS Water Resource Investigation 82-22 method. The SCS curve number loss rate was the chosen loss rate method for the HEC-1 model.

For the HEC-1 model along the existing stream, the Modified Puls channel routing method was used. The storage volume versus discharge relationship was obtained from the hydraulics model. Iterations were performed to balance the HEC-1 and the HEC-RAS hydraulic models until insignificant changes (determined to be 5% difference or less) in computed discharges resulted.

B. Hydraulic Modeling

The US Army Corps of Engineers' HEC-RAS version 5.03 program was used to develop a hydraulic model from downstream of Dieterich Blacktop to upstream of the Village limits. Cross section information for the model was obtained from 2009 OWR field surveys.

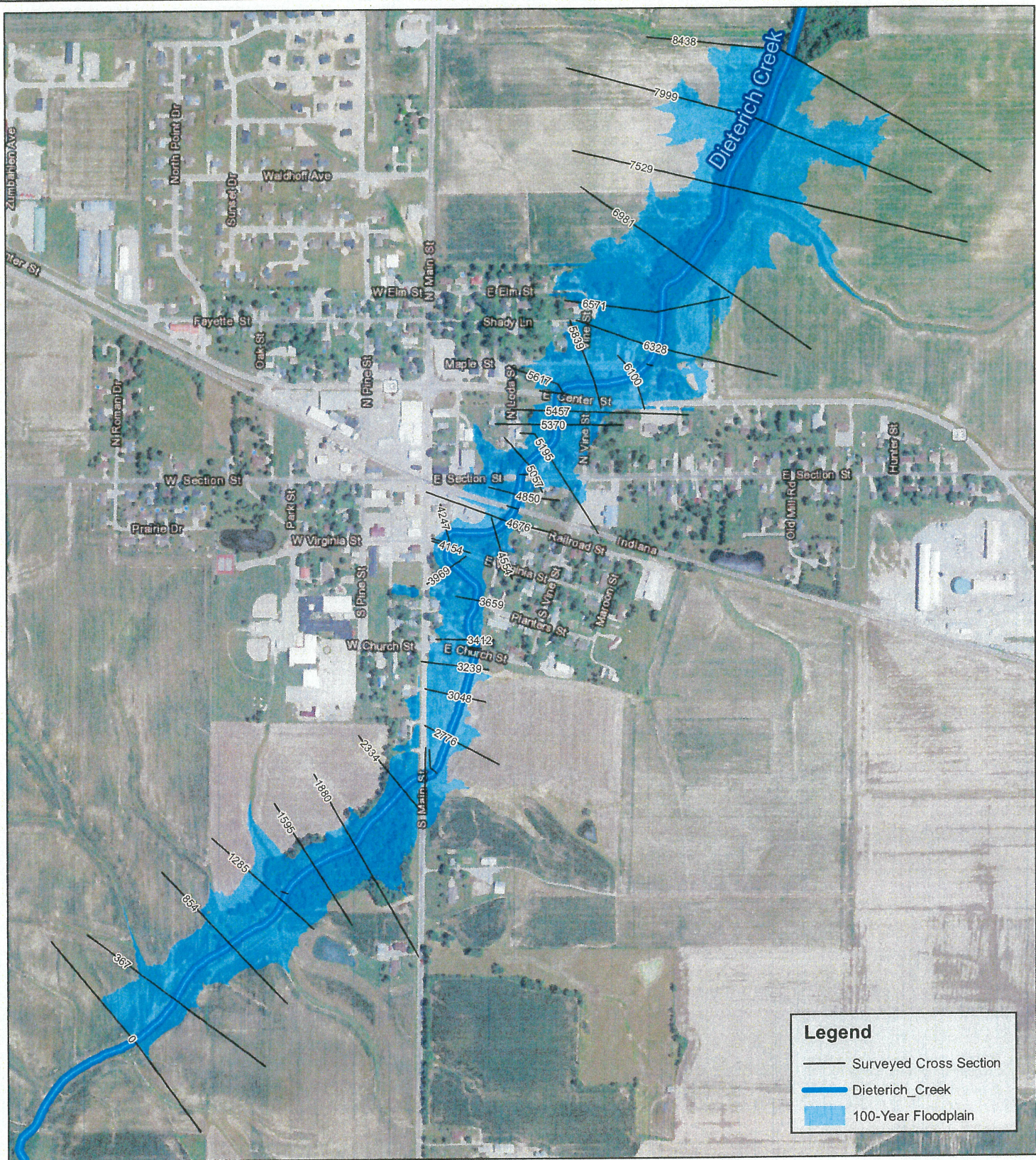
The HEC-RAS model was started at section number 0, which is a channel section located 3,496 feet downstream of Dieterich Blacktop Road. The slope area method was used to estimate the starting water surface elevation, assuming the slope of the energy grade line was similar to the bed slope.

Field inspections and ground photographs were used to determine ground cover within the channel and the overbanks. The Manning "n" values were selected based on these inspections. Discharges were obtained from the 6-hour duration HEC-1 model for the 2, 5, 10, 25, 50, and 100-year frequency events. The 6-hour duration was determined to be the critical in that it resulted in the highest discharge values.

U.S.G.S. StreamStats peak discharges were obtained for the 2,5,10,25,50 and 100 year frequency runoff events. The 90% minimum and 90%maximum confidence limits StreamStats peak discharges were plotted at five locations along Dieterich Creek. The OWR HEC1 existing conditions peak discharges used were also plotted and compared with the StreamStats peak discharges at these locations. The OWR Peak discharges plotted within the limits of the 90% confidence limits at each frequency at each location and relatively close to the StreamStats discharge values. They also Therefore, the OWR discharges used in this study are considered to be reasonably accurate.

The US Army Corps of Engineers HEC-RAS version 5.03 backwater model utilizes surveyed bridge, channel, and floodplain cross section information. The survey data datums used were NAD 83 and NAVD 88. This survey data is used to compute water surface profiles when a discharge is input into the HEC-RAS model. An existing conditions HEC-RAS model was thus developed based on all the survey information. The HEC-RAS hydraulic model defines the limits of the study area for Dieterich Creek and commences about 2,500 feet downstream (south) of S. Main Street. The model continues upstream through the Village and extends about 5,375 feet upstream (north) of East Elm Street. (See Figure 4).

The HEC-RAS model was calibrated using the June 7, 2008 flood event in the Village of Dieterich. HEC1 discharge were developed using the precipitation records from the Effingham hourly precipitation gage for this storm event. The National Weather Service AHPS doppler radar precipitation analysis for the date of the flood was reviewed. The analysis shows that that Dieterich received the same amount of precipitation over the majority of the watershed as was received at Effingham. The precipitation from the gage record was input into the HEC1 model to generate discharges for the flood event. These discharges were input into the existing conditions HEC-RAS model and the resulting water surface elevation was calculated.



Dieterich Creek Location of Cross Sections

0 500 1,000 2,000
Feet

Figure 4.

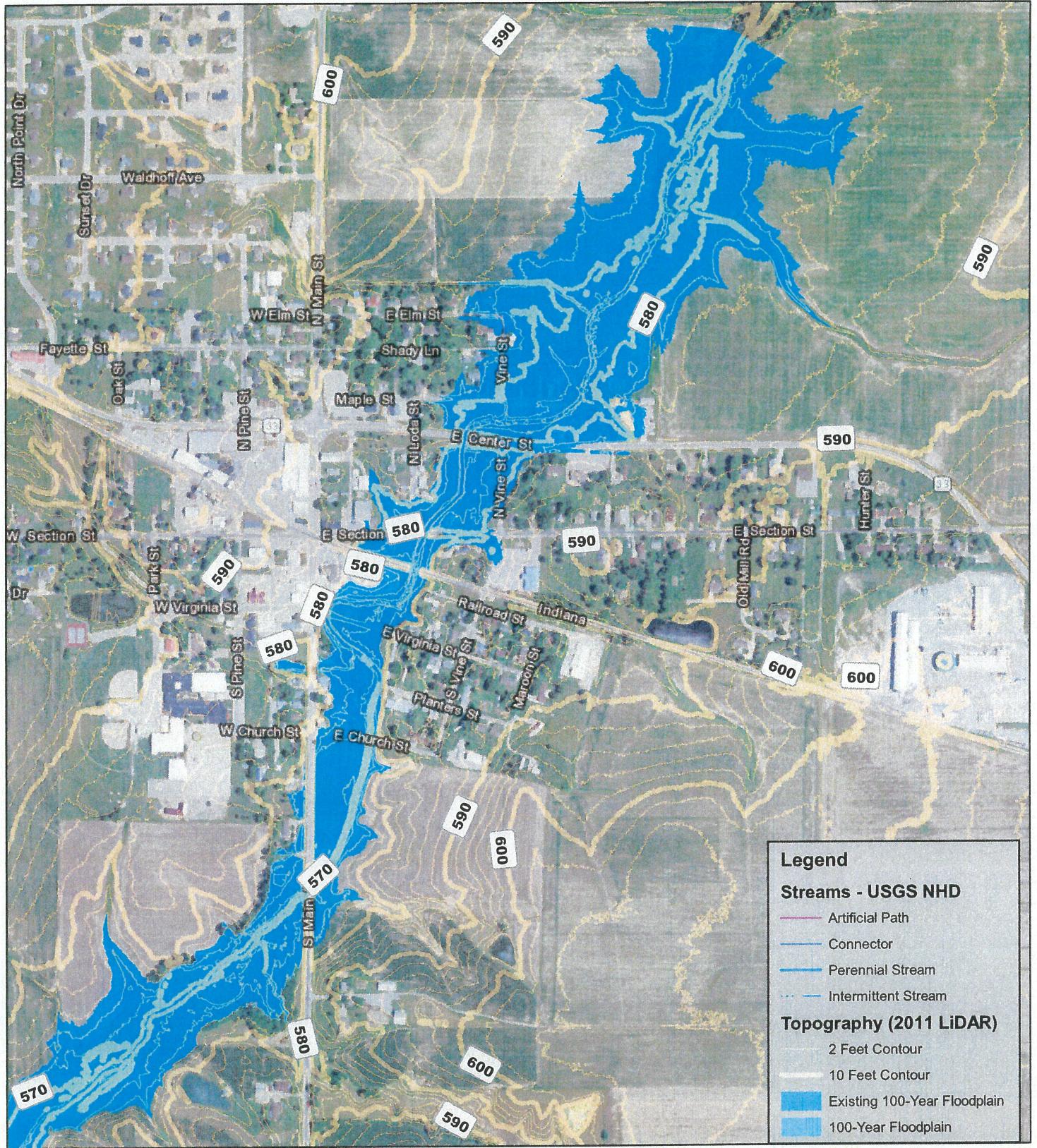
The elevations from the HEC-RAS model were then compared to reported high water mark elevations at several locations within the Village. These high water elevations matched fairly closely to the elevations from the HEC-RAS model. Thus, the model was considered to be reasonably accurate. A list of the high water mark elevations and HEC-RAS model elevation comparisons is shown in Table 2 below.

**Dieterich High Water Calibration
June 7, 2008 Flood Event**

Location	HEC-RAS SECNO	High Water Mark Elevation (FT)	HEC-RAS Model Elevation (FT)	Difference In Elevation (FT)
EJ Water office 108 Main St.	4154.359	578.00	578.37	0.37
109 E. Section St. 20 Inches in Garage	4850.423	579.7	579.054	-0.16
106 N. Vine St.	5456.605	580.50	580.95	0.45
303 maple St. Inside Apartments	5838.502	581.35	581.66	0.31

Table 2

The synthetic discharges computed using the Existing Conditions HEC-1 model were input into the Existing Conditions HEC-RAS model for the entire range of storm frequencies. This hydraulic model provided the flood frequency-elevation information for existing conditions. (See Appendix B). Once the HEC-RAS model was finalized, the 100-year floodplain was delineated on the plan map using the 100-year profile elevations from this model. (See Figure 5). Similar hydrologic and hydraulic modeling was completed for the project alternatives to determine project benefits by reducing flood elevations.



**Dieterich
Existing Conditions 100-Year Floodplain**

Figure 5.

V. DAMAGES MODEL

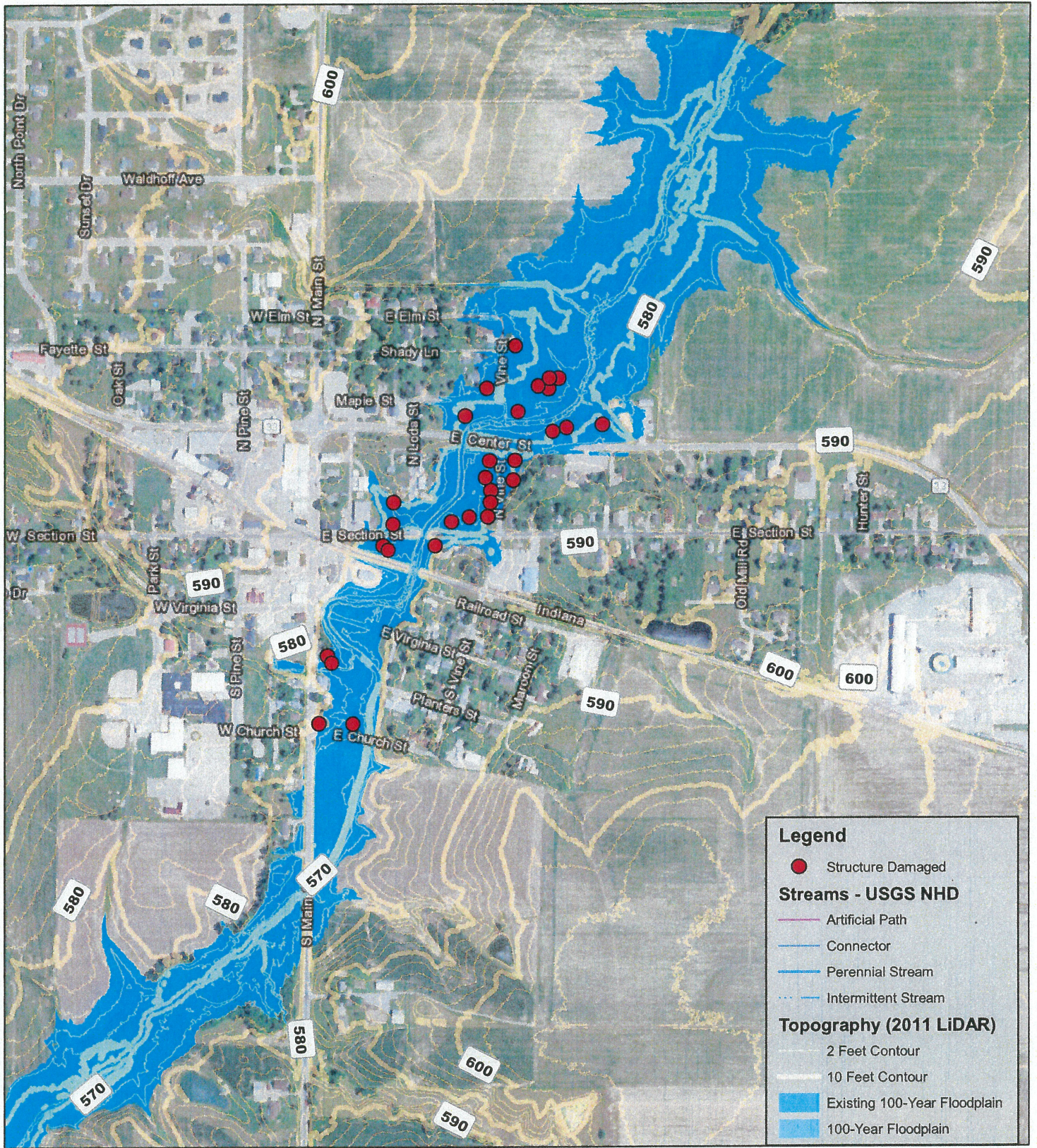
IDNR Damages computer model, was used to calculate damages based on the 100,50,25,10,5, and 2 year frequency discharges. The first floor and low water entry elevations were surveyed for all structures in the floodplain. All the structures were identified by structure type and input into the damage model along with their first floor and low water entry elevations.

The damage model used US Army Corps of Engineers depth-damage curves to determine structure and contents damages. The depth of flooding was determined from the first floor elevations and the water surface elevations computed from HEC-RAS. Based on this depth of flooding, damages are calculated for each structure using the depth-damage curves. Existing conditions average annual damages, the average amount of damages caused by flooding each year, were computed to be \$9,104 per October 2016 values. There was a total of 29 structures damaged based on the OWR analysis. Refer to Figure 5 for a map showing the Existing Conditions flood plain and damaged structures. These structures include 14 residences, 12 garages or storage buildings, 1 church, and 1 apartment building. (See Figure 6). A damage summary table is provided below in Table 3. See Appendix D for a list of the structure data.

Average Annual Damages (AAD) are the amount of damages that occur each year.

Frequency	# Structures	Structure Damages	Contents Damages	Total Damages
100 Year	29	\$119,837	\$37,956	\$157,793
50 Year	25	\$73,576	\$23,141	\$96,717
25 Year	21	\$38,854	\$11,512	\$50,366
10 Year	10	\$8,513	\$2,434	\$10,947
5 Year	4	\$1,992	\$565	\$2,556
2 Year	0	\$0	\$0	\$0
Total AAD				\$8,302

Table 3



**Dieterich
Existing Conditions 100-Year Floodplain
And Structures Damaged**



Figure 6.

VI. ALTERNATIVES INVESTIGATED

A total of eight alternatives were investigated which are discussed below. Alternatives included reservoir detention, levees, and various channel improvements that are described below.

Alternative 1 - Small Reservoir

Alternative 2 - Large Reservoir

Alternative 3 - 100 Year Levee

Alternative 4 - 50 Year Levee

Alternative 5 - 25 Year Levee

Alternative 6 - Virginia St. Bridge/Channel Improvement

Alternative 7 - Virginia St. Bridge Removal/Channel Improvement

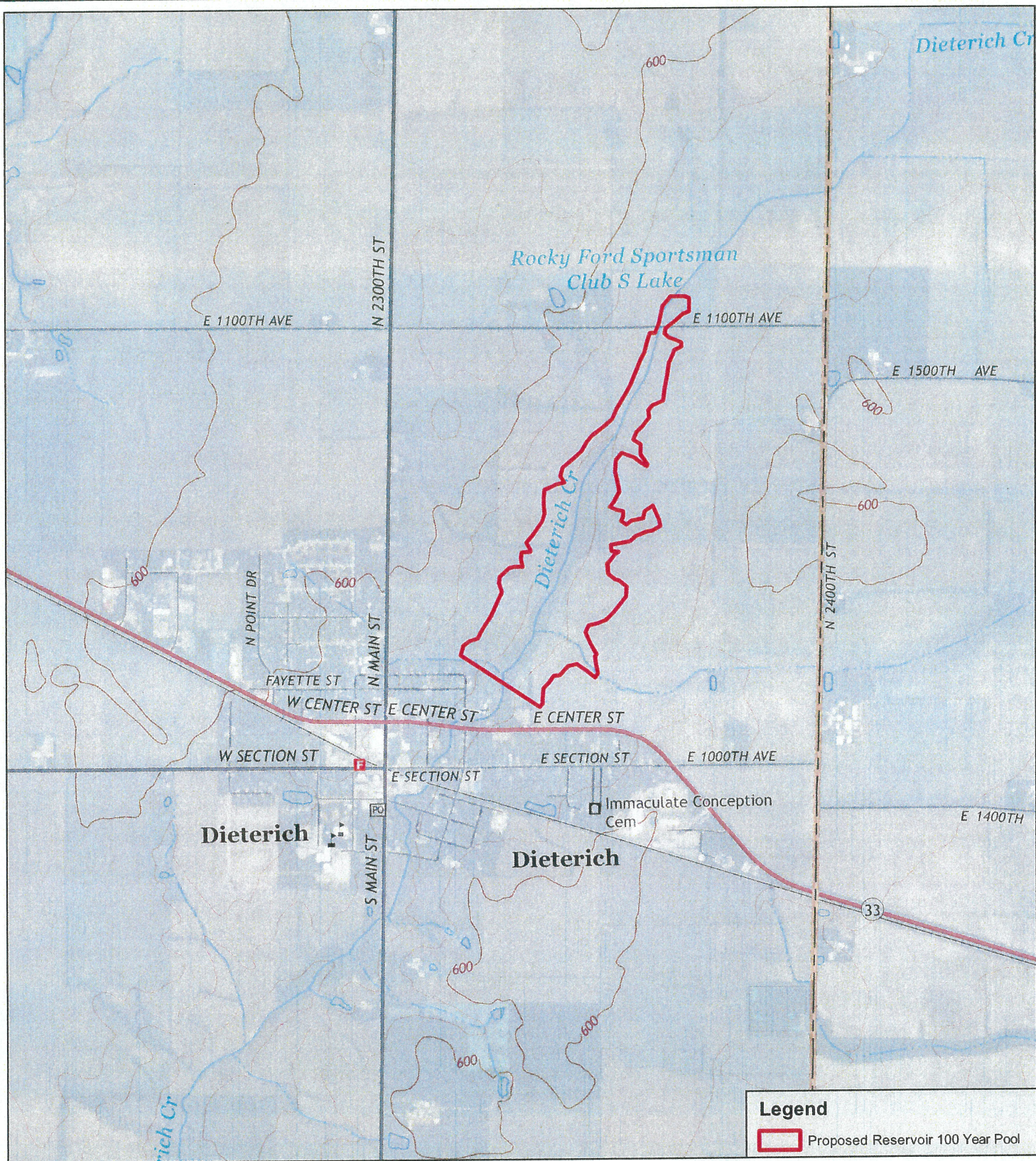
Alternative 8 - Virginia St. Bridge Removal/Channel Improvement With Weirs

Alternative 1 - Small Reservoir

Construction of an earthen embankment to create an inline reservoir upstream of Dieterich to impound runoff and reduce discharges that flow through Dieterich was investigated. This would be a gravity in gravity out design reservoir, with a low level outlet. The reservoir would be constructed upstream of the Village in the upper watershed area to store runoff. (See Exhibit 1).

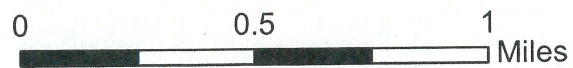
However, due to the storage volume required and the flat topography upstream of the Village, the reservoir would be required to have a large surface area. The 100 year pool elevation would be 582.5 feet and peak storage would be 149 acre feet. Land rights for the reservoir would be difficult to obtain because of the large area required. Storage which reduces runoff downstream through the Village would reduce flooding in the Village.

The land rights costs for such a reservoir were determined to be greater than \$548,289. Once structure embankment costs were determined, the total project cost would exceed \$833,399. This cost does not include an emergency spillway, principle spillway or low level outlet structure costs which would likely be significant. Total annual benefits generated by this reservoir project were only



**Dieterich
Alternative 1
Small Reservoir**

Exhibit 1.



about \$3,390. This is a high cost Alternative that only generates a 37 percent reduction of \$3,390 from \$9,104.33 in the total amount of average annual damages. No detailed analysis of this alternative was performed because it was cost prohibitive.

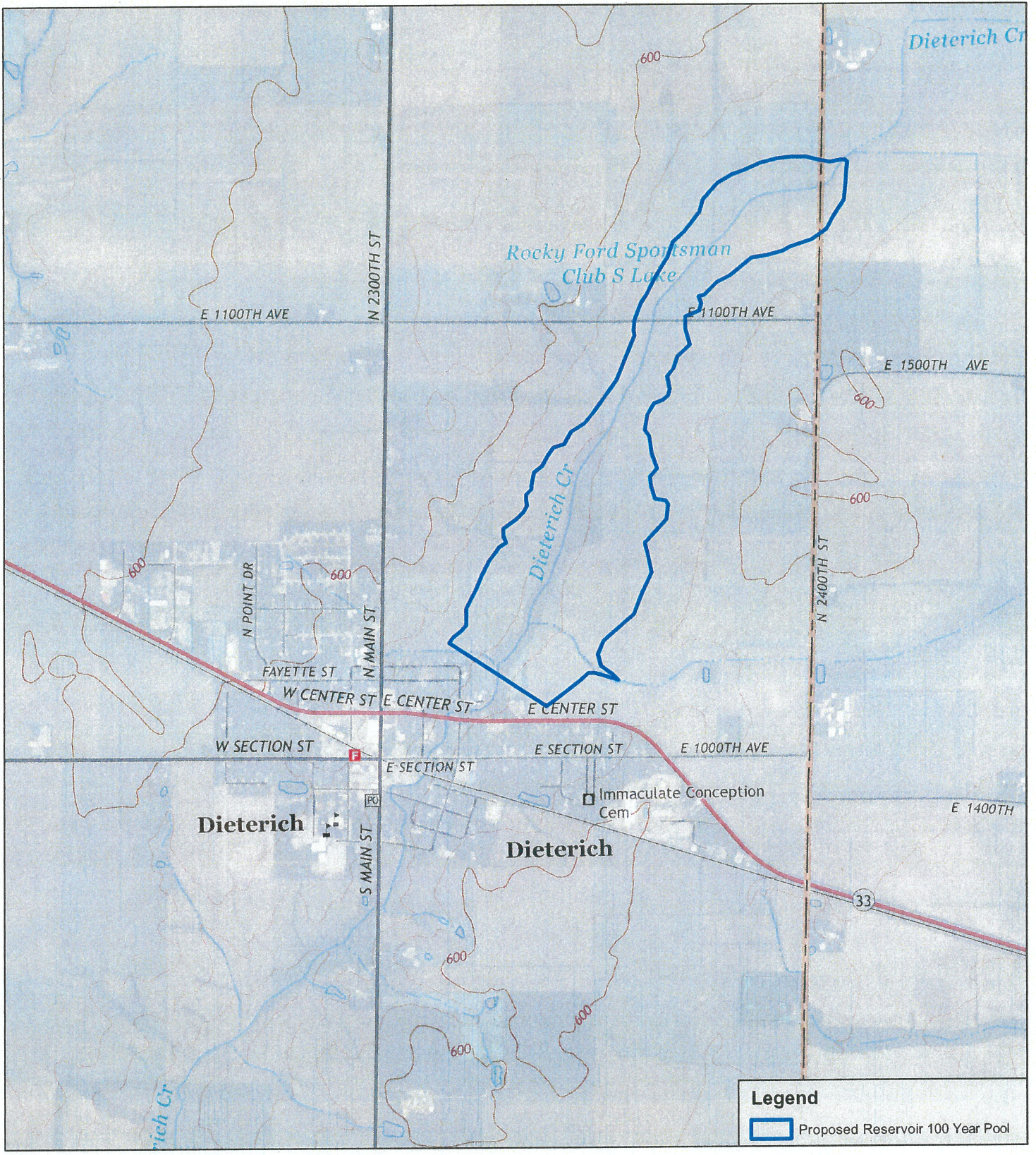
Alternative 2 - Large Reservoir

An earthen embankment would be constructed to create an inline reservoir upstream of Dieterich that is larger than Alternative 1. This would be a gravity in gravity out design reservoir, with a low level outlet. The reservoir would be constructed upstream of the Village in the upper watershed area to store runoff. Construction of the embankment to a higher elevation would provide more storage than Alternative 1. The 100 year pool elevation would be 584.3 feet and peak storage would be 323 acre feet. This Reservoir significantly reduced discharges in Dieterich Creek and result in lower water surface elevations that through Dieterich. However, the larger storage requires more land rights than Alternative 1. It also would require more embankment material. (See Exhibit 2).

The larger reservoir Alternative generated total annual benefits of \$7,621. The land rights required would be 146 acres and would cost an estimated \$584,000. The total project cost for this reservoir was \$1,070,683 and did not include an emergency spillway, principle spillway or low level outlet structure costs. These additional costs would likely be significant. In addition to the high cost, it is typically difficult to obtain large amounts of land rights necessary for such reservoir projects. Due to the large amount of lands rights requirements and excessive costs, this Alternative 2 was considered to be cost prohibitive. Thus, no further detailed component cost analysis was performed.

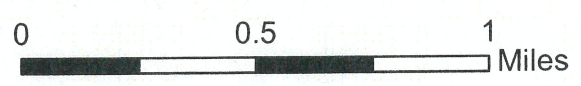
Alternative 3 - 100 Year Levee

This alternative would consist of a 100-Year Levee which would be constructed along both sides of Dieterich Creek. The levee would protect structures from the 100 year flood event. It commences along the upstream side of the railroad where it would tie into sufficiently high ground. The levee currently would extend from near X-section 4850.423 near the railroad bridge to X-section 6570.809 located just north of East Elm St. The levee would have an average height of 4.65 feet and a length



**Dieterich
Alternative 2
Large Reservoir**

Exhibit 2.



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NATURAL RESOURCES

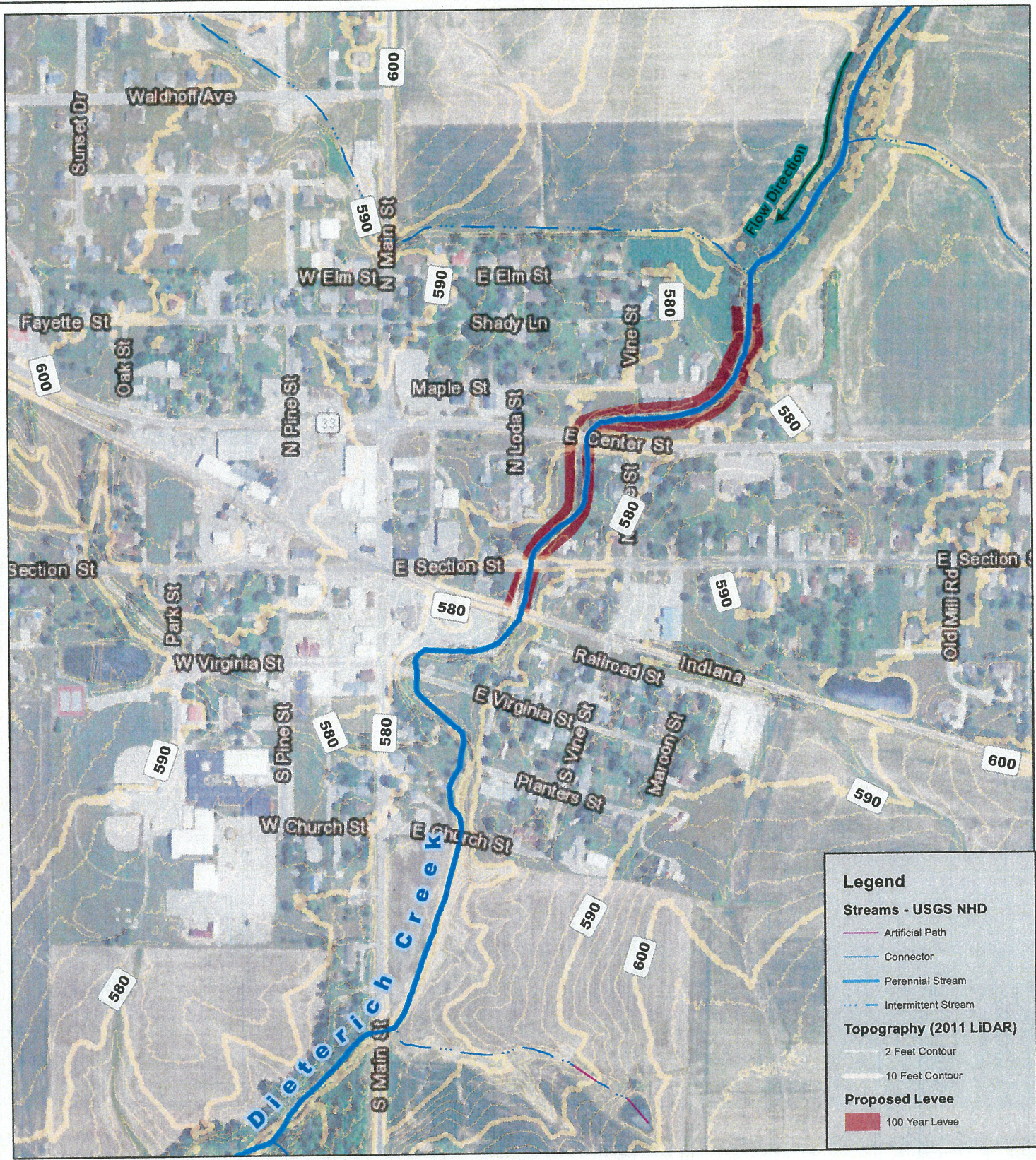
of about 2,084 feet on each side of the channel. The total amount of fill required for the levee would be 13,442 cubic yards. The total right of way required would be about 3.7 acres. The average width of the levee would be around 38 feet which includes a 10 foot top width and 3 to 1 side slopes. (See Exhibit 3).

This alternative will protect 25 structures from flooding at the 100 year frequency event and delivers a considerable amount of benefits, but has significant costs associated with it. The average levee width is 38 feet on each side of the channel and would be constructed through property owners' yards which could make land rights difficult to obtain. Also, the Levee alignment directly interfered with two homes and one apartment complex. Thus, some type of concrete or sheet pile wall construction would need to be designed and constructed in these specific areas to implement any of the Levee Alternatives. This construction would add to the Levee Alternatives costs.

This Alternative would have a total first cost of \$578,279.03 and the total annual cost would be \$24,138.99. The total annual benefits would be \$8,267.02 which yields a benefit to cost ratio of 0.34. Thus, OWR could provide \$218,850.77 towards project construction which is the amount of the capitalized benefits. This would require the Village to fund the remaining costs of \$360,428.26. (See Table 4).

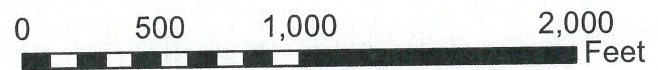
Alternative 4 - 50 Year levee

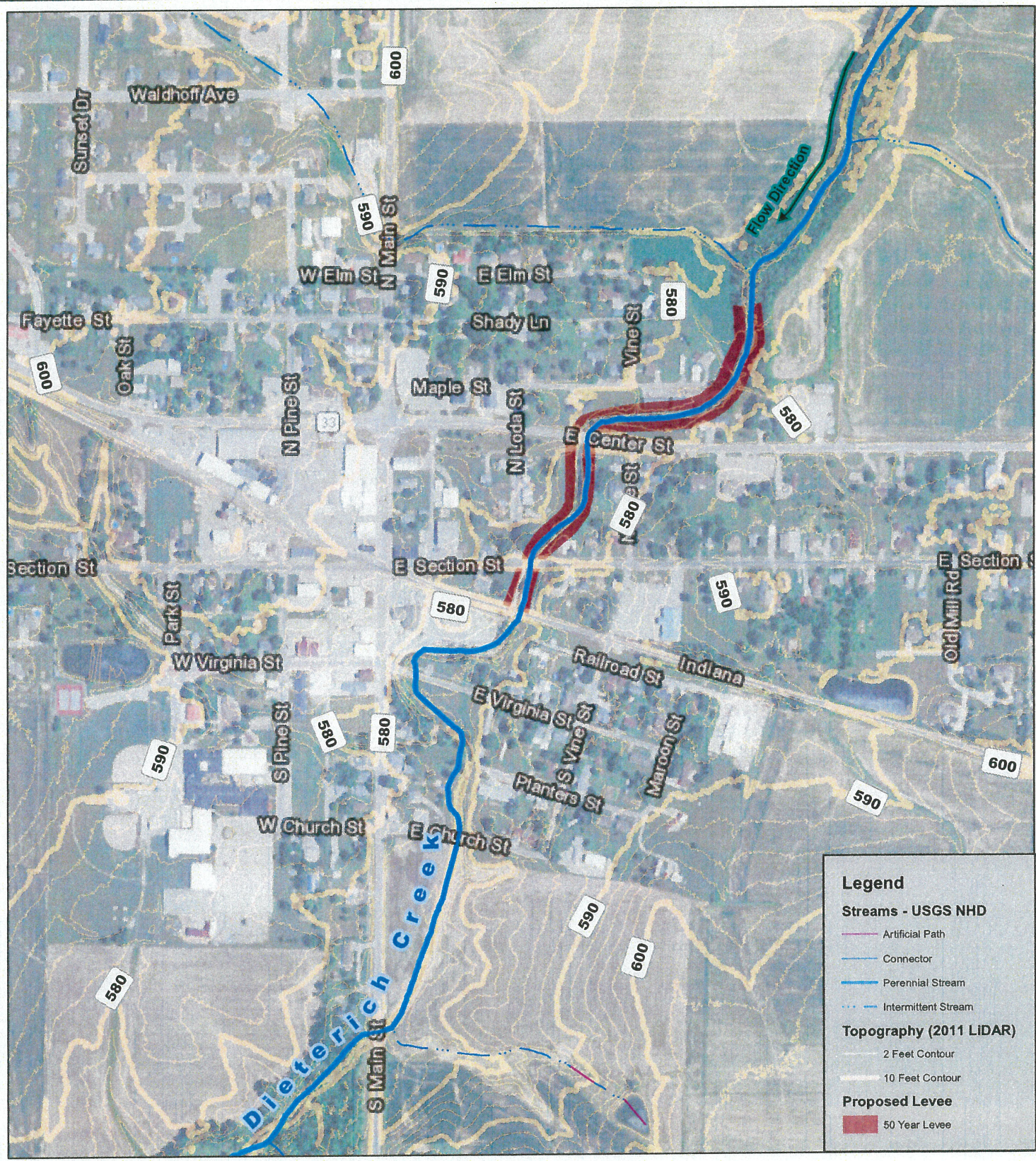
This alternative consists of a 50-Year Levee which would be constructed along both sides of Dieterich Creek. The levee would protect structures from the 50 year frequency flood event. It would commence along the upstream side of the railroad where it would tie into sufficiently high ground. The levee currently would extend from near X-section 4850.423 near the railroad bridge to X-section 6570.809 located just north of East Elm St. The levee would have an average height of 4.0 feet and a length of about 2,084 feet on each side of the channel. The total amount of fill required for the levee would be 12,079 cubic yards. The total right of way required would be about 2.8 acres. The average width of the levee would be around 34 feet which includes a 10 foot top width and 3 to 1 side slopes. (See Exhibit 4).



**Dieterich
Alternative 3
100 Year Levee**

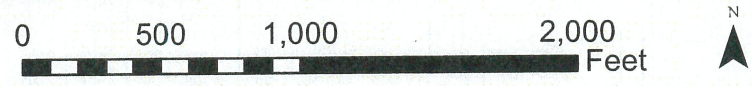
Exhibit 3.





**Dieterich
Alternative 4
50 Year Levee**

Exhibit 4.



Office of
Water Resources
July 6, 2020



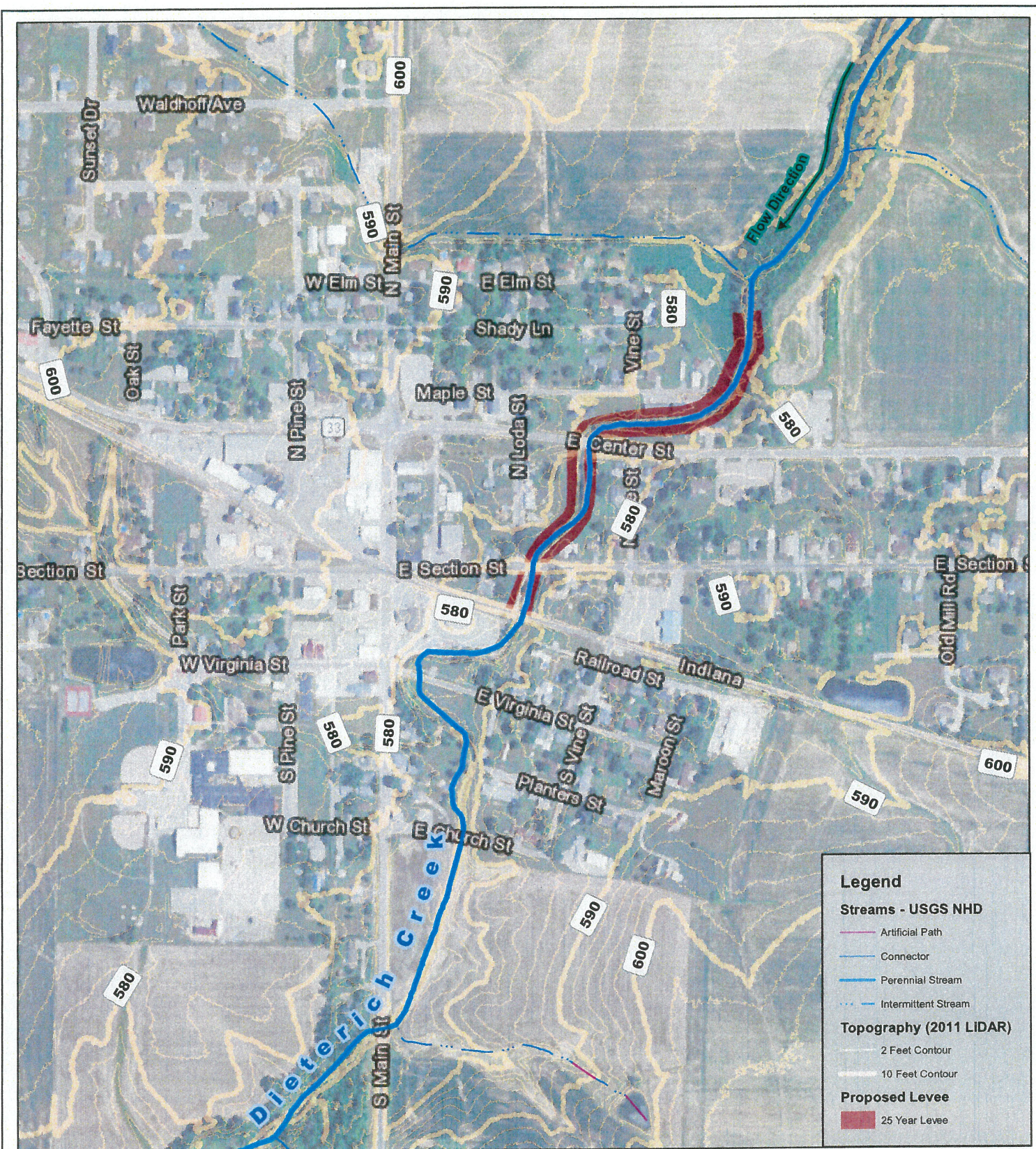
This alternative will protect 22 structures from flooding at the 50 year frequency flood event and delivers a considerable amount of benefits. This alternative has significant costs associated with it, even though costs are lower than Alternative 3 because the levee is not as high. The average levee width is 34 feet on each side of the channel and would be constructed through property owners' yards which could make land rights difficult to obtain. Also, the Levee alignment directly interfered with two homes and one apartment complex. Thus, some type of concrete or sheet pile wall construction would need to be designed and constructed in these specific areas to implement any of the Levee Alternatives. This construction would increase the Levee Alternatives costs.

This Alternative would have a total first cost of \$446,868.42 and the total annual cost would be \$18,653.54. The total annual benefits would be \$6,062.75 which yields a benefit to cost ratio of 0.33. Thus, OWR could provide \$159,764.31 towards project construction which is the amount of the capitalized benefits. This would require the Village to fund the remaining costs of \$287,104.11. (See Table 4).

Alternative 5 - 25 Year Levee

This Alternative consists of a 25-Year Levee which would be constructed along both sides of Dieterich Creek. The levee would protect structures from the 25 year frequency flood event. It would commence along the upstream side of the railroad where it would tie into sufficiently high ground. The levee currently would extend from near X-section 4850.423 near the railroad bridge to X-section 6570.809 located just north of East Elm St. The levee would have an average height of 3.3 feet and a length of about 2,084 feet on each side of the channel. The total amount of fill required for the levee would be 7,942 cubic yards. The total right of way required would be about 2.4 acres. The average width of the levee would be around 25 feet which includes a 10 foot top width and 3 to 1 side slopes. (See Exhibit 5).

This alternative will protect 20 structures from flooding at the 25 year frequency flood event and delivers a considerable amount of benefits. The costs are lower for this alternative than Alternative 4 because the levee is not as high. However, this alternative also has significant costs associated with it. The average levee width is 25 feet on each side of the channel and would be constructed through



**Dieterich
Alternative 5
25 Year Levee**

Exhibit 5.

property owners' yards which could make land rights difficult to obtain. The Levee alignment also directly interfered with two homes and one apartment complex. Thus, some type of concrete or sheet pile wall construction would need to be designed and constructed in these specific areas to implement any of the Levee Alternatives. This construction would add to the Levee Alternatives costs.

This Alternative would have a total first cost of \$359,208.24 and the total annual cost would be \$14,994.36. The total annual benefits would be \$5,043.03 which yields a benefit to cost ratio of 0.34. Thus, OWR could provide \$132,892.87 towards project construction which is the amount of the capitalized benefits. This would require the Village to fund the remaining costs of \$226,315.37. (See Table 4).

It should be noted the levees discussed in these Alternatives would also need to be extended slightly further upstream to tie off into sufficiently high ground which would increase the current cost estimate and reduce the benefit to cost ratio. Of course, the benefits would remain the same as currently calculated so the capitalized benefits amounts would be unchanged.

Alternative 6 – Virginia St. Bridge Replacement

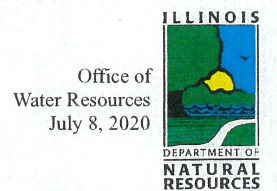
This alternative consists of replacement of the Virginia Street bridge with triple 12' x 8' RC box culverts. Additionally, the channel will be relocated to the east at Virginia Street based on the alignment provided by the Village. This realignment will eliminate a large bend in the existing channel which has been causing some erosion along the west channel bank near the existing Virginia Street bridge structure. A supplemental 12' x 9' RC box culvert would also be constructed at Section Street to further reduce water surface elevations upstream. (See Exhibit 6).

This Alternative would have a total first cost of \$687,623.23 and the total annual cost would be \$28,703.32. This is the highest cost Alternative investigated that was considered. The total annual benefits would be \$4,411 which yields a benefit to cost ratio of 0.15. The cost for the Village would be \$571,395.23 which is also the highest cost Alternative for the Village. (See Table 4).



**Dieterich
Alternative 6
Virginia St. Bridge /Channel Improvement
Exhibit 6**

Milano & Grunloh Engineers, LLC
114 W. Washington Ave. | POBox 897
Effingham, IL 62401



Alternative 7 - Close Virginia St./Channel Realignment

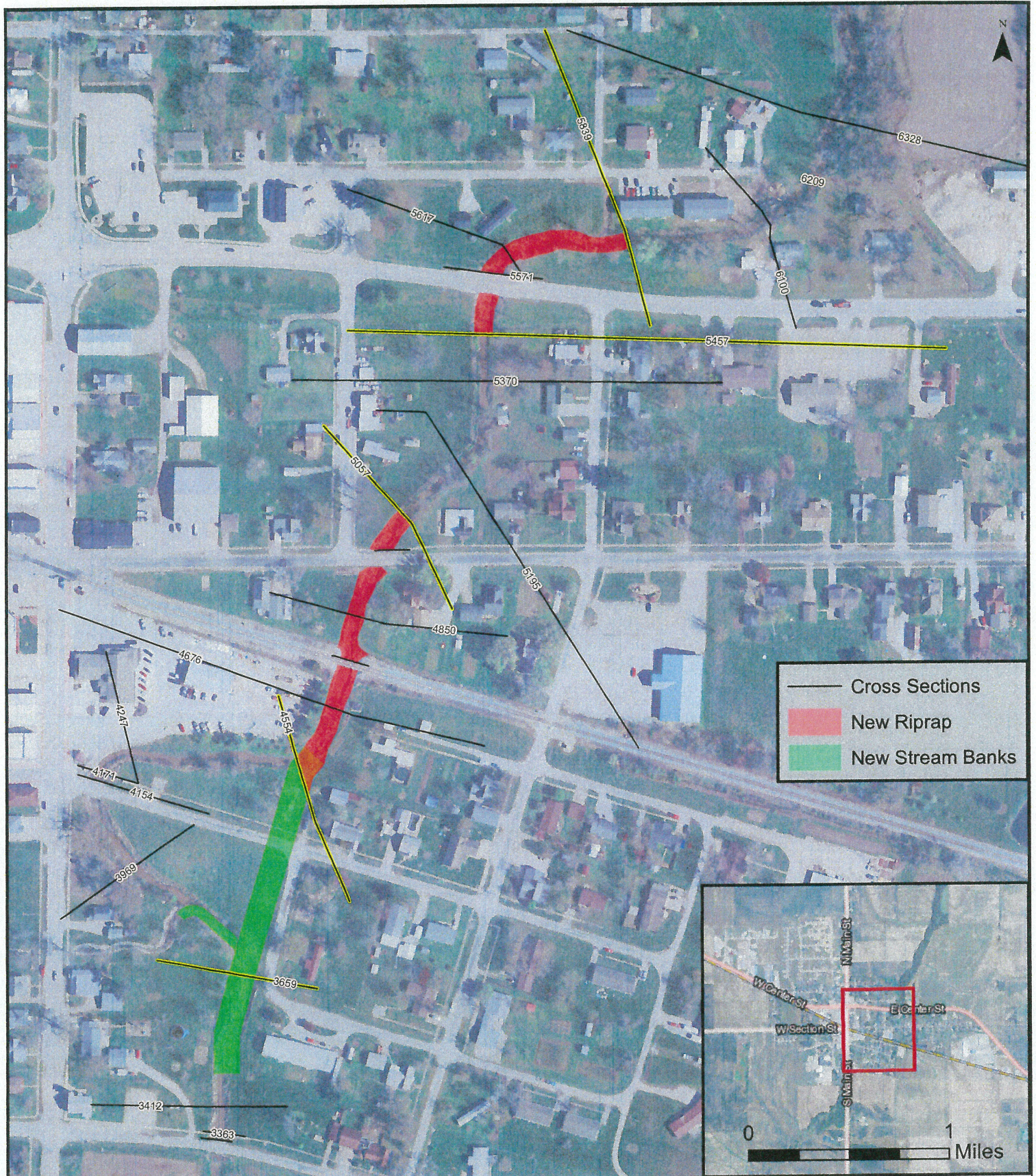
This alternative would consist of removal of the Virginia Street bridge and closure of Virginia Street. The channel will still be relocated to the east at Virginia Street based on the alignment provided by the Village. The only differences would be that no roadway bridge structure would be constructed to replace the existing bridge and Virginia Street would be closed permanently. Therefore, the proposed channel would be open cut through Virginia Street at a different location and the existing bridge structure would no longer convey flow. Also, the supplemental 12' x 9' RC box culvert that was to be constructed at Section Street would be eliminated. The existing channel would be filled as part of this Alternative. very similar to the Alternative 6 just discussed above. This alternative was investigated at the request of the Village. (See Exhibit 7).

Due to the lower water surface elevations which result from the channel relocation and removal of the Virginia Street bridge structure, the channel velocities increase upstream. In some channel reaches the velocities increase beyond the scour velocity. Also, a 10 percent or higher increase in existing scour velocities does occur. The scour velocity for the channel which is 5.0 feet per second, is based on soil type and vegetative cover. As a result, the channel would need to be lined with RR3 Riprap where these velocities occur, to protect the channel from erosion. The Riprap adds substantial cost.

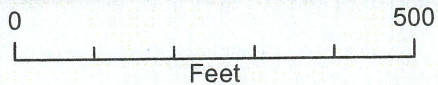
This Alternative would have a total first cost of \$416,039.23 and the total annual cost would be \$17,366.64. The total annual benefits would be \$3,855.67 which yields a benefit to cost ratio of 0.26. Thus, OWR could provide \$101,603.81 towards project construction which is the amount of the capitalized benefits. This would require the Village to fund the remaining costs of \$314,435.42. (See Table 4).

Alternative 8 - Close Virginia St./Channel Realignment With Weirs

This alternative is identical to Alternative 7 except that two in-channel weir structures would be constructed to reduce the velocities to levels that would be lower than scour velocity or less than a 10 percent increase in existing scour velocities. (See Exhibit 8).

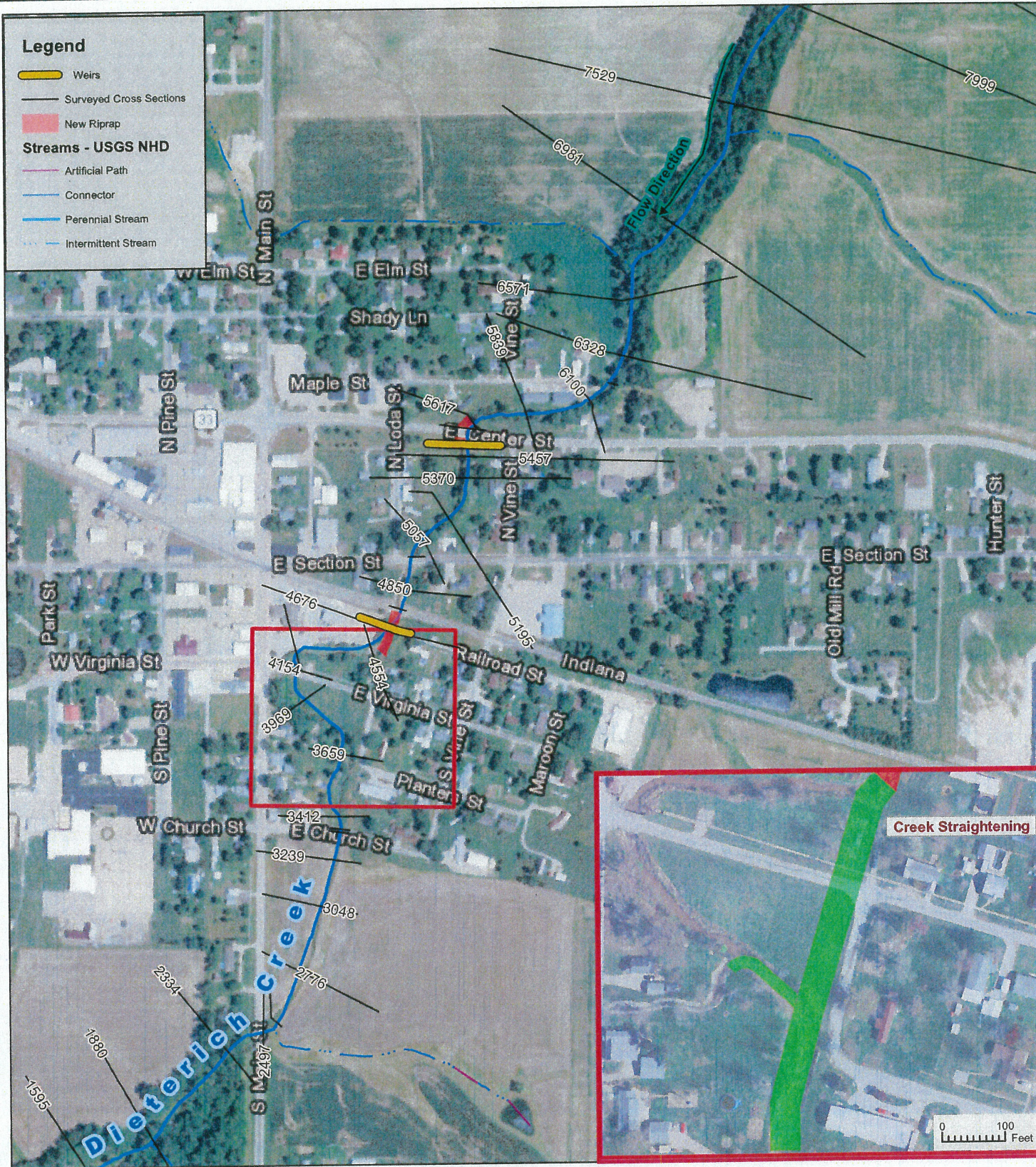


**Dieterich
Alternative 7
Virginia St. Bridge Removal/ Channel Improvement
Exhibit 7.**



Straightening Design by
Milano & Grunloh Engineers, LLC
114 W. Washington Ave. | POBox 897
Effingham, IL 62401

ILLINOIS
Office of
Water Resources
July 8, 2020
DEPARTMENT OF
NATURAL
RESOURCES



**Dieterich
Alternative 8
Virginia St. Bridge Removal/Channel Improvement/Weirs**

Reducing the amount of Riprap lining of the channel would reduce the Alternative costs. This Alternative did reduce velocities and thus the Riprap requirements. However, it also greatly reduced the flood control benefits to an insignificant amount as water surface elevations did increase substantially.

This Alternative would have a total first cost of \$ 261,153.10 and the total annual cost would be \$1,0901.26. The total annual benefits would be \$322.65 which yields a benefit to cost ratio of 0.03. Thus, OWR could provide \$8,502.41 towards project construction which is the amount of the capitalized benefits. This would require the Village to fund the remaining costs of \$252,651. This Alternative was not pursued any further because it really provided no meaningful flood reduction for the Village. (See Table 4).

VII. CONCLUSIONS

The Alternatives discussed above will reduce flood damages by varying amounts within Dieterich. As previously mentioned, the Reservoir Alternatives were dropped from further consideration due to excessive cost and will not be discussed here.

The 100-year Levee Alternative provides flood protection to structures up to and including the 100-year frequency and generates average annual benefits of \$8,267 which is the highest amount of benefits of all the Alternatives. It also has the second highest cost of all the alternatives at \$578,279.03. It has the highest benefit to cost ratio of 0.34 which is the same as the 25 Year Levee.

The 25-year design levee protects structures up to the 25-year frequency and has the lowest cost of all the levee Alternatives at \$359,208.24. It has the same benefit to cost ratio of 0.34 as the 100 year Levee Alternative. The average annual benefits are \$5,043 and OWR could provide \$132,892.87 for construction of this Alternative. The costs to the village would be \$226,315.30.

The Levee Alternatives that were investigated result in the highest Average Annual Benefits but have significant costs associated with them. Also, land rights could be very difficult to obtain as the levees

would be constructed along the channel through property owners' yards. With average levee widths ranging from 25 to 38 feet on each side of the channel, a significant amount of private property acquisition would be required from the property owners. Also, the Levee alignment directly interfered with two homes and one apartment complex. Thus, some type of concrete or sheet pile wall construction would need to be designed and constructed in these specific areas to implement any of the Levee Alternatives. This construction would add to the Levee Alternatives costs.

After consideration of the Alternatives that OWR investigated, the Village of Dieterich has selected Alternative 7 - Close Virginia St./Channel Realignment, to be implemented. No roadway bridge structure would be constructed to replace the existing bridge and Virginia Street would be closed permanently. The proposed channel will intersect the roadway at a different location and the existing bridge structure will no longer convey flow. Therefore, the proposed channel would be open cut through Virginia Street at the new location. This Alternative includes a channel realignment that eliminates a large bend in the channel in that area. The realigned channel would be located near Loda Street about 358 feet east of the existing channel as measured along Virginia Street. The realignment would extend from about 500 feet downstream of Virginia Street to 140 feet upstream as measured along the realigned channel.

This Alternative would have a total first cost of \$416,039.23 which includes construction, mobilization, contingencies, right of way, engineering and design. The total annual benefits would be \$3,855.67 which yields a benefit to cost ratio of 0.22. OWR could provide \$101,603.81 towards project construction which is the amount of the capitalized benefits of the project. The Village would be required to fund the remaining costs of \$314,435.42.

APPENDIX A

HYDROLOGIC MODELING (HEC1)

EXISTING CONDITIONS


```

* XCD6-62.dat
* ITERATION #2A
* STORAGE VOLUMES FROM ITERATION 1A HEC_RAS\EXISTING_CONDITIONS51.PRJ
* DIETERICH EXISTING CONDITIONS HEC1 MODEL
* BULLETIN 70 RAINFALL
* 6 HR DURATION
* 100 THROUGH 2 YEAR FREQUENCY
* CLARKS UNIT HYDROGRAPH
* SCS CURVE NUMBER LOSS RATE
* HUFF FIRST QUARTILE DISTRIBUTION
* AMC II CONDITIONS
*DIAGRAM
ID
IT 10 14MAR09 0.0 250
JR PREC 1.0 .840 .725 .599 .513 .408
KK A SUBBASIN A
KM COMPUTE RUNOFF FROM SUB A
BA 2.43
LN 18
IO 3
PB 5.56
PC 0 16 33 43 52 60 66 71 75
79
PC 82 84 86 88 90 92 94 96 97
98
LS 0 82.5
UC 2.03 1.35
KK RT_A
KO 1 1
RD
RC .04 .045 .04 5280 .0036 586.0
RX 0 100 141 148 152 159 200 350
RY 586. 581.0 579.8 577.5 577.5 579.8 581. 586.
KK B1 SUBBASIN B1
KM COMPUTE RUNOFF FROM SUB B1
BA 1.29
LS 0 85.2
UC 2.42 1.61
KK CA_B1
KM COMBINE SUBBASIN A AND B1
HC 2
KK RT_AB
KM CHANNEL ROUTE SECTIONS 8437.693-6570.809
RS 1 FLOW -1
SQ 0 437 662 847 1140 1414 1746 1931
SV 0 10.41 15.95 22.72 33.81 45.40 75.61 84.47
KK B2 SUBBASIN B2
KM COMPUTE RUNOFF FROM SUB B2
BA 0.21
LS 0 84.6
UC 1.80 1.20
KK CA_B2
KM COMBINE SUBBASIN CA_B1 AND B2
KO 1
HC 2
KK RT_CB

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KM      CHANNEL ROUTE SECTIONS 6570.809--4553.983
RS      1      FLOW      -1
SQ      0      459      685      873      1138      1422      1764      1955
SV      0      8.32     14.74     20.83     35.63     48.03     69.72     76.71
KK      C2      SUBBASIN C2
KM      COMPUTE RUNOFF FROM SUB C2
BA      0.14
LS      0      85.3
UC      0.79     0.53
KK      CA_C2
KM      COMBINE SUBBASIN CA_B2 AND C2
HC      2
KKRT   CA2
KM      CHANNEL ROUTE SECTIONS 4553.983--3658.847
RS      1      FLOW      -1
SQ      0      469      700      890      1160      1451      1797      1995
SV      0      3.57     5.55     7.38     9.18     11.55     13.11     15.06
KK      C1      SUBBASIN C1
KM      COMPUTE RUNOFF FROM SUB C1
BA      0.41
LS      0      85.4
UC      1.22     0.81
KK      CA_C1
KM      COMBINE SUBBASIN A-C2-C1
HC      2
KK      RT_CT
KM      CHANNEL ROUTE SECTIONS 3658.847--0
RS      1      FLOW      -1
SQ      0      491      721      913      1183      1520      1888      2090
SV      0      22.08    34.17    45.25    63.52    74.98    85.63    95.77
KK      D      SUBBASIN D
KM      COMPUTE RUNOFF FROM SUB D
BA      1.51
LS      0      84.3
UC      2.10     1.40
KK      CA_D
KM      COMBINE SUBBASINS A-C AND D
KO      1
HC      2
ZZ

```


CUMULATIVE AREA = 5.99 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION					
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
HYDROGRAPH AT	A	2.43	1	1258.	973.	774.	567.	433.	283.
				3.17	3.17	3.17	3.33	3.33	3.50
ROUTED TO	RT_A	2.43	1	1255.	970.	771.	565.	432.	282.
				3.50	3.50	3.67	3.67	3.83	4.00
HYDROGRAPH AT	B1	1.29	1	662.	519.	419.	312.	243.	164.
				3.33	3.50	3.50	3.50	3.67	3.83
2 COMBINED AT	CA_B1	3.72	1	1916.	1488.	1189.	877.	674.	445.
				3.50	3.50	3.50	3.67	3.83	4.00
ROUTED TO	RT_AB	3.72	1	1746.	1414.	1140.	847.	662.	437.
				4.17	4.00	4.00	4.17	4.17	4.33
HYDROGRAPH AT	B2	.21	1	123.	96.	77.	57.	44.	30.
				2.83	2.83	3.00	3.00	3.00	3.17
2 COMBINED AT	CA_B2	3.93	1	1839.	1492.	1204.	893.	699.	462.

DIETERICH

DIETERICH CREEK HEC1 DISCHARGES

PERFORM ITERATIONS UNTIL DIFF IS LESS THAN 5%

BOLDED DISCHARGES ARE FINAL Q VALUES

LOCATION	HEC1 NODE	ITERATION #1	ITERATION #2	DIFF	% DIFF	ITERATION #2A	DIFF	% DIFF
ABOUT 1850 FEET UPSTREAM OF E. ELM STREET	RT_AB	1545	1746	-201	-13.01	1746	0	0
		1405	1414	-9	-0.641	1414	0	0
		1140	1140	0	0	1140	0	0
		847	847	0	0	847	0	0
		662	662	0	0	662	0	0
		437	437	0	0	437	0	0
JUST DOWNSTREAM OF E. ELM STREET	RT_CB	1564	1764	-200	-12.79	1764	0	0
		1422	1425	-3	-0.211	1425	0	0
		1138	1140	-2	-0.176	1140	0	0
		873	873	0	0	873	0	0
		685	685	0	0	685	0	0
		459	459	0	0	459	0	0
ABOUT 200 FEET DOWNSTREAM OF RR BRIDGE	RT_CA2	1596	1797	-201	-12.59	1797	0	0
		1451	1452	-1	-0.069	1452	0	0
		1160	1161	-1	-0.086	1161	0	0
		890	890	0	0	890	0	0
		700	699	1	0.1429	699	0	0
		469	469	0	0	469	0	0
ABOUT 300 FEET UPSTREAM OF CHURCH STREET	RT_CT	1672	1888	-216	-12.92	1888	0	0
		1520	1514	6	0.3947	1514	0	0
		1183	1183	0	0	1183	0	0
		913	913	0	0	913	0	0
		721	720	1	0.1387	720	0	0
		491	489	2	0.4073	489	0	0
START OF STUDY	CA_D	2167	2453	-286	-13.2	2453	0	0
		1970	1961	9	0.4569	1961	0	0
		1525	1527	-2	-0.131	1527	0	0
		1188	1188	0	0	1188	0	0
		944	942	2	0.2119	942	0	0
		647	645	2	0.3091	645	0	0

DIETERICH SUBBASIN TC AND R COMPUTATIONS

SUB BASIN	DROP (FT)	TOTAL CHANNEL LENGTH MI	SLOPE FT/MI	(Tc+R)e (HRS)	R/(TC+R)	Re (HRS)	Tce (HRS)
A	50.79	1.21	41.98	2.06	0.4	0.82	1.23
B1	26.45	1.09	24.27	3.03	0.4	1.21	1.82
B2	43.86	0.95	46.17	1.74	0.4	0.69	1.04
C1	37.40	0.61	61.31	1.17	0.4	0.47	0.70
C2	32.50	0.24	135.42	0.44	0.4	0.18	0.26
D	49.78	1.88	26.48	3.50	0.4	1.40	2.10

$$R/(Tc+R)e = 0.4$$

$$(Tc+ R)e = 35.2L^{.39} X S^{-.78}$$

TC_CALC2.qpw

APPENDIX B

HYDRAULIC MODELING (HEC-RAS)

EXISTING CONDITIONS

HEC-RAS Plan: Proposed River: dietrich creek Reach: upper

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	8437.693	100	1746.00	574.38	582.92	581.78	582.98	0.000932	2.89	1040.48	620.06	0.19
upper	8437.693	50	1414.00	574.38	582.54	581.74	582.60	0.001142	3.08	818.17	554.59	0.21
upper	8437.693	25	1140.00	574.38	582.23	581.45	582.30	0.001350	3.24	650.94	515.90	0.23
upper	8437.693	10	847.00	574.38	581.90	580.62	581.98	0.001528	3.33	487.92	475.16	0.24
upper	8437.693	5	662.00	574.38	581.74	580.04	581.82	0.001344	3.06	416.34	451.24	0.22
upper	8437.693	2	437.00	574.38	581.29	578.42	581.38	0.001369	2.93	238.01	280.69	0.22
upper	7999.157	100	1746.00	574.04	582.71	581.08	582.73	0.000362	1.89	1662.44	1075.81	0.12
upper	7999.157	50	1414.00	574.04	582.27	580.88	582.30	0.000472	1.83	1232.31	831.15	0.14
upper	7999.157	25	1140.00	574.04	581.88	580.18	581.91	0.000625	2.01	931.28	711.57	0.15
upper	7999.157	10	847.00	574.04	581.44	579.34	581.48	0.000894	2.27	639.48	628.04	0.18
upper	7999.157	5	662.00	574.04	581.19	578.87	581.26	0.001254	2.60	363.39	252.83	0.21
upper	7999.157	2	437.00	574.04	580.76	577.75	580.82	0.001196	2.37	259.03	223.38	0.21
upper	7528.747	100	1746.00	573.54	582.52	580.54	582.55	0.000498	2.14	1257.43	621.40	0.14
upper	7528.747	50	1414.00	573.54	582.01	580.36	582.05	0.000664	2.36	961.02	549.88	0.16
upper	7528.747	25	1140.00	573.54	581.55	580.23	581.60	0.000822	2.50	733.76	439.71	0.17
upper	7528.747	10	847.00	573.54	580.98	580.03	581.04	0.001106	2.73	506.84	353.86	0.20
upper	7528.747	5	662.00	573.54	580.64	578.66	580.70	0.001214	2.75	394.69	307.16	0.21
upper	7528.747	2	437.00	573.54	580.17	577.39	580.24	0.001336	2.72	263.52	256.85	0.21
upper	6981.270	100	1746.00	573.40	582.30	579.86	582.33	0.000311	1.86	1487.24	641.84	0.12
upper	6981.270	50	1414.00	573.40	581.74	579.67	581.77	0.000374	1.94	1155.41	543.88	0.13
upper	6981.270	25	1140.00	573.40	581.21	579.49	581.25	0.000469	2.06	888.75	472.16	0.14
upper	6981.270	10	847.00	573.40	580.44	578.14	580.49	0.000847	2.55	556.04	386.59	0.19
upper	6981.270	5	662.00	573.40	580.06	577.49	580.12	0.000901	2.51	423.56	302.71	0.19
upper	6981.270	2	437.00	573.40	579.53	576.63	579.59	0.001016	2.49	276.22	251.90	0.20
upper	6570.809	100	1764.00	572.30	582.24	579.61	582.26	0.000134	1.37	1996.58	765.67	0.08
upper	6570.809	50	1425.00	572.30	581.68	579.52	581.69	0.000152	1.39	1599.62	664.93	0.09
upper	6570.809	25	1140.00	572.30	581.13	579.28	581.14	0.000201	1.53	1245.29	626.87	0.10
upper	6570.809	10	873.00	572.30	580.21	578.73	580.25	0.000585	2.39	698.68	556.45	0.16
upper	6570.809	5	685.00	572.30	579.65	577.03	579.75	0.001211	3.25	370.75	314.17	0.23
upper	6570.809	2	459.00	572.30	578.85	576.11	579.04	0.002037	3.83	164.01	125.95	0.29
upper	6328.415	100	1764.00	572.16	582.20	578.77	582.22	0.000157	1.55	1779.32	723.03	0.10
upper	6328.415	50	1425.00	572.16	581.63	578.56	581.65	0.000201	1.67	1382.32	657.35	0.11
upper	6328.415	25	1140.00	572.16	581.06	578.30	581.09	0.000251	1.77	1046.05	542.41	0.12
upper	6328.415	10	873.00	572.16	580.06	577.97	580.11	0.000555	2.38	589.20	362.17	0.17
upper	6328.415	5	685.00	572.16	579.47	576.84	579.53	0.000653	2.41	396.06	290.80	0.18
upper	6328.415	2	459.00	572.16	578.63	575.96	578.70	0.000860	2.47	243.99	143.29	0.20
upper	6238.826	100	1764.00	572.16	582.20	578.77	582.21	0.000151	1.52	1773.33	721.47	0.09
upper	6238.826	50	1425.00	572.16	581.62	578.56	581.64	0.000196	1.65	1375.14	655.90	0.11
upper	6238.826	25	1140.00	572.16	581.05	578.32	581.07	0.000248	1.76	1038.36	540.13	0.12
upper	6238.826	10	873.00	572.16	580.03	577.97	580.08	0.000574	2.41	575.98	356.06	0.17
upper	6238.826	5	685.00	572.16	579.42	576.84	579.48	0.000684	2.45	382.87	274.86	0.19
upper	6238.826	2	459.00	572.16	578.56	575.96	578.64	0.000952	2.58	234.09	141.13	0.21
upper	6208.826	100	1764.00	571.95	582.19	578.45	582.21	0.000144	1.47	1790.81	720.09	0.09
upper	6208.826	50	1425.00	571.95	581.61	578.06	581.63	0.000183	1.57	1392.11	654.28	0.10
upper	6208.826	25	1140.00	571.95	581.04	576.84	581.06	0.000225	1.65	1055.59	538.49	0.11
upper	6208.826	10	873.00	571.95	580.01	576.21	580.05	0.000489	2.18	591.91	352.86	0.16
upper	6208.826	5	685.00	571.95	579.40	575.69	579.46	0.000564	2.17	400.39	266.76	0.17
upper	6208.826	2	459.00	571.95	578.55	574.92	578.61	0.000581	2.14	259.40	115.00	0.17
upper	6208.527		Bridge									
upper	6198.8	100	1764.00	571.95	582.19	578.45	582.20	0.000144	1.47	1788.39	719.46	0.09
upper	6198.8	50	1425.00	571.95	581.60	578.06	581.62	0.000184	1.58	1388.84	653.36	0.10
upper	6198.8	25	1140.00	571.95	581.03	576.84	581.06	0.000227	1.66	1051.91	537.39	0.11
upper	6198.8	10	873.00	571.95	579.99	576.21	580.04	0.000500	2.20	585.65	349.90	0.16
upper	6198.8	5	685.00	571.95	579.39	575.69	579.44	0.000572	2.18	397.02	261.42	0.17
upper	6198.8	2	459.00	571.95	578.53	574.92	578.59	0.000591	2.16	257.69	114.86	0.17
upper	6163.8	100	1764.00	571.95	582.18	578.45	582.20	0.000145	1.47	1784.84	718.53	0.09
upper	6163.8	50	1425.00	571.95	581.60	577.48	581.62	0.000186	1.58	1384.81	652.24	0.10
upper	6163.8	25	1140.00	571.95	581.03	576.84	581.05	0.000229	1.67	1047.85	536.18	0.11
upper	6163.8	10	873.00	571.95	579.97	576.21	580.02	0.000512	2.22	579.44	346.94	0.16
upper	6163.8	5	685.00	571.95	579.37	575.69	579.42	0.000586	2.20	391.78	252.88	0.17
upper	6163.8	2	459.00	571.95	578.51	574.92	578.57	0.000605	2.18	255.22	114.65	0.17
upper	6099.642	100	1764.00	571.83	582.17	578.66	582.19	0.000138	1.48	1925.18	781.71	0.09
upper	6099.642	50	1425.00	571.83	581.59	578.48	581.61	0.000172	1.57	1493.61	692.87	0.10
upper	6099.642	25	1140.00	571.83	581.01	578.19	581.04	0.000225	1.71	1120.90	608.20	0.11
upper	6099.642	10	873.00	571.83	579.94	577.21	579.99	0.000580	2.45	583.95	393.58	0.18
upper	6099.642	5	685.00	571.83	579.29	576.66	579.38	0.000945	2.90	366.32	280.33	0.22
upper	6099.642	2	459.00	571.83	578.43	575.70	578.52	0.001043	2.70	213.36	119.77	0.23
upper	5838.501	100	1764.00	571.47	582.13	578.97	582.15	0.000172	1.73	1721.22	673.73	0.10
upper	5838.501	50	1425.00	571.47	581.53	578.33	581.56	0.000216	1.85	1340.94	610.93	0.11
upper	5838.501	25	1140.00	571.47	580.95	577.63	580.98	0.000253	1.90	906.95	358.39	0.12
upper	5838.501	10	873.00	571.47	579.82	576.68	579.87	0.000424	2.21	556.53	245.02	0.15

HEC-RAS Plan: Proposed River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	5838.501	5	685.00	571.47	579.12	576.04	579.18	0.000634	2.50	399.33	211.00	0.18
upper	5838.501	2	459.00	571.47	578.05	575.17	578.21	0.001462	3.31	162.59	81.10	0.27
upper	5775	100	1764.00	571.33	582.12	578.83	582.14	0.000153	1.65	1805.01	692.48	0.10
upper	5775	50	1425.00	571.33	581.52	578.19	581.55	0.000185	1.73	1416.80	618.07	0.11
upper	5775	25	1140.00	571.33	580.94	577.51	580.96	0.000197	1.70	1084.30	502.72	0.11
upper	5775	10	873.00	571.33	579.80	576.54	579.84	0.000363	2.07	607.30	307.83	0.14
upper	5775	5	685.00	571.33	579.09	575.90	579.14	0.000547	2.35	422.45	215.53	0.17
upper	5775	2	459.00	571.33	577.96	575.04	578.11	0.001385	3.25	167.17	86.58	0.26
upper	5770.253		Bridge									
upper	5763	100	1764.00	571.19	581.78	581.13	582.05	0.001552	4.91	478.02	159.30	0.30
upper	5763	50	1425.00	571.19	581.19	581.19	581.46	0.001597	4.75	390.03	137.72	0.30
upper	5763	25	1140.00	571.19	580.62	580.62	580.88	0.001596	4.52	317.64	117.02	0.29
upper	5763	10	873.00	571.19	579.42	579.42	579.74	0.002263	4.77	207.97	65.41	0.34
upper	5763	5	685.00	571.19	578.75	578.75	579.04	0.002271	4.43	169.82	52.73	0.33
upper	5763	2	459.00	571.19	577.80	577.80	578.02	0.002205	3.84	124.99	41.81	0.32
upper	5728	100	1764.00	571.11	581.73	581.13	582.00	0.001518	4.87	482.58	160.34	0.29
upper	5728	50	1425.00	571.11	581.13	581.13	581.40	0.001564	4.71	393.73	138.70	0.29
upper	5728	25	1140.00	571.11	580.57	580.57	580.82	0.001563	4.48	320.79	118.00	0.29
upper	5728	10	873.00	571.11	579.34	579.34	579.66	0.002262	4.77	208.03	65.45	0.34
upper	5728	5	685.00	571.11	578.68	578.68	578.96	0.002269	4.43	169.86	52.74	0.33
upper	5728	2	459.00	571.11	577.72	577.72	577.95	0.002200	3.84	125.11	41.84	0.32
upper	5616.515	100	1764.00	570.87	581.58	581.11	581.83	0.001421	4.74	496.88	163.56	0.28
upper	5616.515	50	1425.00	570.87	580.98	580.98	581.23	0.001467	4.59	405.28	141.70	0.29
upper	5616.515	25	1140.00	570.87	580.41	580.41	580.65	0.001465	4.37	330.56	120.98	0.28
upper	5616.515	10	873.00	570.87	579.09	579.09	579.41	0.002285	4.79	207.03	64.78	0.34
upper	5616.515	5	685.00	570.87	578.42	578.42	578.70	0.002300	4.45	168.94	52.52	0.34
upper	5616.515	2	459.00	570.87	577.48	577.48	577.70	0.002212	3.84	124.84	41.77	0.32
upper	5575.96	100	1764.00	572.53	581.11	578.16	581.72	0.002632	6.30	285.32	46.04	0.43
upper	5575.96	50	1425.00	572.53	580.68	580.68	581.14	0.002134	5.46	265.55	45.62	0.39
upper	5575.96	25	1140.00	572.53	580.23	577.00	580.57	0.001738	4.72	245.22	45.18	0.35
upper	5575.96	10	873.00	572.53	578.98	576.40	579.32	0.002227	4.65	189.49	43.95	0.38
upper	5575.96	5	685.00	572.53	578.33	575.92	578.61	0.002113	4.25	161.86	40.50	0.37
upper	5575.96	2	459.00	572.53	577.41	575.27	577.61	0.001939	3.62	126.65	36.22	0.34
upper	5570.965	100	1764.00	572.53	581.10	578.16	581.71	0.002654	6.31	284.58	46.02	0.43
upper	5570.965	50	1425.00	572.53	580.67	577.56	581.13	0.002148	5.47	264.98	45.60	0.39
upper	5570.965	25	1140.00	572.53	580.22	577.00	580.57	0.001748	4.73	244.77	45.17	0.35
upper	5570.965	10	873.00	572.53	578.97	576.40	579.30	0.002248	4.66	188.92	43.93	0.38
upper	5570.965	5	685.00	572.53	578.32	575.92	578.60	0.002129	4.26	161.36	40.40	0.37
upper	5570.965	2	459.00	572.53	577.40	575.27	577.60	0.001958	3.64	126.25	36.18	0.34
upper	5550.191		Bridge									
upper	5520.9	100	1764.00	571.72	581.04	578.50	581.53	0.001491	5.86	318.15	421.89	0.38
upper	5520.9	50	1425.00	571.72	580.61	577.96	580.99	0.001235	5.13	295.41	396.48	0.34
upper	5520.9	25	1140.00	571.72	580.17	577.24	580.46	0.001034	4.50	271.46	292.35	0.31
upper	5520.9	10	873.00	571.72	578.85	576.39	579.17	0.001543	4.73	200.19	266.28	0.36
upper	5520.9	5	685.00	571.72	578.18	575.71	578.48	0.001680	4.51	163.89	167.49	0.37
upper	5520.9	2	459.00	571.72	577.24	574.89	577.49	0.001799	4.04	116.95	95.74	0.37
upper	5456.605	100	1764.00	570.68	581.26	577.23	581.28	0.000073	1.44	1751.41	487.59	0.09
upper	5456.605	50	1425.00	570.68	580.78	577.01	580.80	0.000071	1.37	1523.18	468.65	0.08
upper	5456.605	25	1140.00	570.68	580.30	576.60	580.31	0.000070	1.30	1302.28	439.97	0.08
upper	5456.605	10	873.00	570.68	578.97	575.33	579.00	0.000153	1.70	733.60	287.52	0.12
upper	5456.605	5	685.00	570.68	578.28	574.67	578.31	0.000224	1.91	538.28	274.63	0.14
upper	5456.605	2	459.00	570.68	577.29	573.85	577.35	0.000376	2.18	291.05	183.88	0.18
upper	5369.742	100	1764.00	570.86	581.24	577.64	581.27	0.000100	1.67	1525.98	443.65	0.10
upper	5369.742	50	1425.00	570.86	580.77	576.48	580.79	0.000097	1.58	1320.24	420.79	0.10
upper	5369.742	25	1140.00	570.86	580.28	575.88	580.30	0.000097	1.52	1120.75	401.02	0.10
upper	5369.742	10	873.00	570.86	578.94	575.23	578.98	0.000254	2.15	617.65	336.87	0.15
upper	5369.742	5	685.00	570.86	578.23	574.70	578.29	0.000345	2.31	414.86	231.61	0.18
upper	5369.742	2	459.00	570.86	577.21	573.97	577.30	0.000574	2.59	220.13	161.27	0.22
upper	5195.169	100	1764.00	570.33	581.21	577.92	581.24	0.000154	2.11	1376.96	515.01	0.13
upper	5195.169	50	1425.00	570.33	580.73	577.55	580.76	0.000140	1.94	1160.51	420.98	0.12
upper	5195.169	25	1140.00	570.33	580.25	576.32	580.28	0.000145	1.89	963.24	390.59	0.12
upper	5195.169	10	873.00	570.33	578.85	575.45	578.92	0.000387	2.71	498.81	261.88	0.19
upper	5195.169	5	685.00	570.33	578.10	574.89	578.20	0.000555	2.98	331.02	192.68	0.22
upper	5195.169	2	459.00	570.33	577.00	574.07	577.17	0.000915	3.32	160.85	126.82	0.27
upper	5057.334	100	1764.00	570.60	581.12	577.07	581.21	0.000330	3.08	892.86	331.38	0.18
upper	5057.334	50	1425.00	570.60	580.63	576.22	580.73	0.000353	3.06	668.89	224.61	0.19
upper	5057.334	25	1140.00	570.60	580.15	575.59	580.24	0.000328	2.84	566.07	200.02	0.18
upper	5057.334	10	873.00	570.60	578.68	574.90	578.84	0.000673	3.54	317.91	140.02	0.25
upper	5057.334	5	685.00	570.60	577.91	574.36	578.10	0.000823	3.60	221.99	108.31	0.27
upper	5057.334	2	459.00	570.60	576.89	573.60	577.04	0.000813	3.13	148.49	41.68	0.26

HEC-RAS Plan: Proposed River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	4982.6	100	1764.00	570.45	580.80	576.36	581.15	0.000610	5.26	432.22	83.69	0.30
upper	4982.6	50	1425.00	570.45	580.45	575.70	580.68	0.000439	4.35	406.06	71.16	0.25
upper	4982.6	25	1140.00	570.45	580.03	575.07	580.21	0.000341	3.72	377.05	68.53	0.22
upper	4982.6	10	873.00	570.45	578.63	574.39	578.80	0.000409	3.63	287.02	59.61	0.23
upper	4982.6	5	685.00	570.45	577.90	573.89	578.05	0.000380	3.27	245.43	55.01	0.22
upper	4982.6	2	459.00	570.45	576.89	573.22	576.99	0.000322	2.71	193.11	48.60	0.20
upper	4977.634	100	1764.00	570.45	580.47	576.51	581.11	0.001028	6.63	276.53	297.25	0.38
upper	4977.634	50	1425.00	570.45	580.21	575.87	580.66	0.000740	5.53	268.38	286.85	0.32
upper	4977.634	25	1140.00	570.45	579.88	575.29	580.19	0.000541	4.61	257.74	67.39	0.27
upper	4977.634	10	873.00	570.45	578.52	574.55	578.79	0.000580	4.27	214.33	58.34	0.28
upper	4977.634	5	685.00	570.45	577.83	574.02	578.04	0.000508	3.74	192.23	53.73	0.25
upper	4977.634	2	459.00	570.45	576.86	573.30	576.99	0.000403	3.00	160.98	47.22	0.22
upper	4959.679		Bridge									
upper	4937.6	100	1764.00	570.63	580.27	577.11	580.32	0.000243	2.48	1056.08	357.30	0.16
upper	4937.6	50	1425.00	570.63	579.42	576.50	580.10	0.001917	6.63	215.99	302.18	0.44
upper	4937.6	25	1140.00	570.63	578.97	575.92	579.47	0.001527	5.67	202.22	277.73	0.39
upper	4937.6	10	873.00	570.63	578.29	575.29	578.65	0.001292	4.85	181.04	240.09	0.35
upper	4937.6	5	685.00	570.63	577.65	574.75	577.93	0.001169	4.28	161.17	200.74	0.33
upper	4937.6	2	459.00	570.63	576.73	573.99	576.92	0.000996	3.48	132.68	124.23	0.29
upper	4850.423	100	1764.00	570.63	580.25	577.30	580.30	0.000221	2.37	1093.81	362.43	0.15
upper	4850.423	50	1425.00	570.63	579.69	576.94	579.74	0.000235	2.32	899.34	325.01	0.15
upper	4850.423	25	1140.00	570.63	579.15	575.84	579.20	0.000252	2.28	733.32	296.36	0.16
upper	4850.423	10	873.00	570.63	578.39	575.18	578.45	0.000341	2.44	522.37	266.36	0.18
upper	4850.423	5	685.00	570.63	577.68	574.67	577.77	0.000508	2.73	354.28	216.67	0.21
upper	4850.423	2	459.00	570.63	576.69	573.91	576.81	0.000767	2.90	187.76	128.64	0.25
upper	4773.4	100	1764.00	570.20	579.55	576.55	580.21	0.001257	7.32	301.97	54.97	0.44
upper	4773.4	50	1425.00	570.20	579.17	575.86	579.66	0.000989	6.30	281.12	53.26	0.38
upper	4773.4	25	1140.00	570.20	578.77	575.22	579.14	0.000773	5.39	260.48	51.51	0.34
upper	4773.4	10	873.00	570.20	578.12	574.45	578.39	0.000645	4.65	227.59	48.59	0.30
upper	4773.4	5	685.00	570.20	577.49	573.90	577.71	0.000570	4.12	198.11	46.06	0.28
upper	4773.4	2	459.00	570.20	576.62	573.24	576.76	0.000437	3.29	161.09	37.94	0.24
upper	4768.386	100	1764.00	570.20	579.54	576.55	580.20	0.001262	7.33	301.46	54.93	0.44
upper	4768.386	50	1425.00	570.20	579.16	575.86	579.65	0.000992	6.31	280.76	53.23	0.38
upper	4768.386	25	1140.00	570.20	578.77	575.22	579.13	0.000775	5.40	260.23	51.49	0.34
upper	4768.386	10	873.00	570.20	578.11	574.45	578.39	0.000646	4.66	227.40	48.57	0.30
upper	4768.386	5	685.00	570.20	577.49	573.90	577.71	0.000571	4.12	197.95	46.05	0.28
upper	4768.386	2	459.00	570.20	576.62	573.24	576.76	0.000438	3.29	160.99	37.93	0.24
upper	4764.834		Bridge									
upper	4746	100	1764.00	570.01	579.56	576.79	579.95	0.001960	5.28	362.32	227.09	0.34
upper	4746	50	1425.00	570.01	579.17	575.89	579.47	0.001632	4.64	334.95	204.82	0.31
upper	4746	25	1140.00	570.01	578.77	575.29	579.00	0.001363	4.08	306.91	180.01	0.28
upper	4746	10	873.00	570.01	578.10	574.61	578.29	0.001298	3.71	260.02	131.83	0.27
upper	4746	5	685.00	570.01	577.46	574.04	577.64	0.001327	3.48	215.60	92.75	0.27
upper	4746	2	459.00	570.01	576.58	573.20	576.72	0.001228	2.97	158.42	51.82	0.25
upper	4676.062	100	1764.00	570.01	579.52	576.79	579.75	0.001410	4.46	549.52	225.09	0.29
upper	4676.062	50	1425.00	570.01	579.11	575.89	579.32	0.001355	4.21	460.77	201.37	0.28
upper	4676.062	25	1140.00	570.01	578.69	575.29	578.89	0.001274	3.92	382.63	174.71	0.27
upper	4676.062	10	873.00	570.01	578.00	574.61	578.20	0.001382	3.79	278.65	124.76	0.28
upper	4676.062	5	685.00	570.01	577.34	574.04	577.54	0.001483	3.62	209.61	85.47	0.28
upper	4676.062	2	459.00	570.01	576.48	573.20	576.63	0.001330	3.05	153.47	48.30	0.26
upper	4553.983	100	1797.00	570.26	579.48	576.90	579.59	0.000848	3.35	781.79	333.79	0.22
upper	4553.983	50	1452.00	570.26	579.06	576.32	579.16	0.000843	3.21	649.75	292.33	0.22
upper	4553.983	25	1161.00	570.26	578.65	575.81	578.74	0.000799	3.00	538.58	244.83	0.21
upper	4553.983	10	890.00	570.26	577.94	575.14	578.04	0.000883	2.92	393.76	170.60	0.21
upper	4553.983	5	699.00	570.26	577.25	574.50	577.36	0.001083	2.97	290.64	132.38	0.23
upper	4553.983	2	469.00	570.26	576.34	573.81	576.46	0.001387	2.97	176.66	74.49	0.26
upper	4247.029	100	1797.00	569.83	579.13		579.29	0.001061	3.63	568.83	165.21	0.25
upper	4247.029	50	1452.00	569.83	578.76		578.89	0.000911	3.24	510.65	151.32	0.23
upper	4247.029	25	1161.00	569.83	578.39		578.50	0.000771	2.87	458.20	137.31	0.21
upper	4247.029	10	890.00	569.83	577.68		577.78	0.000805	2.72	369.89	114.69	0.21
upper	4247.029	5	699.00	569.83	576.95		577.05	0.000922	2.75	290.77	101.89	0.22
upper	4247.029	2	469.00	569.83	576.98		576.08	0.001065	2.68	199.89	85.63	0.23
upper	4175.8	100	1797.00	569.59	579.11	575.17	579.24	0.000491	3.39	664.61	164.21	0.20
upper	4175.8	50	1452.00	569.59	578.75	574.57	578.85	0.000401	2.98	606.66	153.71	0.18
upper	4175.8	25	1161.00	569.59	578.38	573.97	578.46	0.000326	2.60	552.56	146.31	0.16
upper	4175.8	10	890.00	569.59	577.67	573.39	577.74	0.000326	2.44	452.15	135.33	0.16
upper	4175.8	5	699.00	569.59	576.94	572.97	577.01	0.000369	2.42	356.78	124.01	0.17
upper	4175.8	2	469.00	569.59	575.96	572.39	576.03	0.000411	2.29	242.87	108.96	0.17
upper	4170.814	100	1797.00	569.59	579.16		579.19	0.000135	1.78	1387.48	410.20	0.11

HEC-RAS Plan: Proposed River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	4170.814	50	1452.00	569.59	578.78		578.81	0.000122	1.64	1235.64	394.72	0.10
upper	4170.814	25	1161.00	569.59	578.41		578.43	0.000109	1.51	1092.34	378.16	0.09
upper	4170.814	10	890.00	569.59	577.69		577.72	0.000137	1.59	829.32	355.82	0.10
upper	4170.814	5	699.00	569.59	576.95		576.99	0.000220	1.87	573.41	334.12	0.13
upper	4170.814	2	469.00	569.59	575.96		576.03	0.000387	2.22	280.45	221.76	0.17
upper	4154.359	100	1797.00	570.83	579.15	576.72	579.19	0.000201	1.78	1225.47	407.44	0.11
upper	4154.359	50	1452.00	570.83	578.78	575.25	578.80	0.000188	1.67	1083.56	386.83	0.11
upper	4154.359	25	1161.00	570.83	578.40	574.66	578.43	0.000176	1.56	948.45	364.96	0.10
upper	4154.359	10	890.00	570.83	577.68	574.06	577.71	0.000248	1.74	699.35	334.43	0.12
upper	4154.359	5	699.00	570.83	576.93	573.59	576.98	0.000484	2.27	453.82	312.60	0.17
upper	4154.359	2	469.00	570.83	575.82	572.95	575.98	0.001291	3.29	142.79	128.86	0.27
upper	4150	100	1797.00	570.83	579.13	575.89	579.17	0.000262	2.03	1121.26	392.81	0.13
upper	4150	50	1452.00	570.83	578.75	575.25	578.79	0.000247	1.91	978.95	367.54	0.12
upper	4150	25	1161.00	570.83	578.38	574.66	578.42	0.000232	1.79	848.16	341.32	0.12
upper	4150	10	890.00	570.83	577.65	574.06	577.69	0.000326	1.99	615.19	302.45	0.14
upper	4150	5	699.00	570.83	576.87	573.59	576.94	0.000632	2.58	389.62	270.04	0.19
upper	4150	2	469.00	570.83	575.73	572.95	575.90	0.001369	3.35	140.17	94.22	0.27
upper	4145	100	1797.00	570.83	579.13	576.72	579.16	0.000205	1.80	1217.39	406.41	0.11
upper	4145	50	1452.00	570.83	578.76	576.53	578.79	0.000192	1.68	1076.20	385.66	0.11
upper	4145	25	1161.00	570.83	578.39	574.66	578.41	0.000180	1.58	941.84	363.86	0.10
upper	4145	10	890.00	570.83	577.66	574.06	577.69	0.000257	1.77	690.52	333.70	0.12
upper	4145	5	699.00	570.83	576.87	573.59	576.93	0.000530	2.36	437.00	310.80	0.17
upper	4145	2	469.00	570.83	575.72	572.95	575.90	0.001378	3.35	139.87	108.51	0.27
upper	4138.260		Bridge									
upper	4095.8	100	1797.00	569.48	578.26	576.73	578.50	0.000983	4.65	548.29	220.29	0.31
upper	4095.8	50	1452.00	569.48	577.92	574.93	578.16	0.000952	4.45	443.30	198.27	0.30
upper	4095.8	25	1161.00	569.48	577.57	574.31	577.78	0.000846	4.05	382.59	184.01	0.28
upper	4095.8	10	890.00	569.48	576.77	573.63	577.02	0.001087	4.21	258.03	155.78	0.31
upper	4095.8	5	699.00	569.48	576.19	573.08	576.50	0.001215	4.51	154.99	56.44	0.33
upper	4095.8	2	469.00	569.48	575.47	572.35	575.66	0.000853	3.46	135.64	40.34	0.27
upper	3969.194	100	1797.00	569.04	578.19	575.17	578.37	0.000711	4.09	631.20	241.81	0.26
upper	3969.194	50	1452.00	569.04	577.87	574.46	578.02	0.000613	3.69	558.03	221.37	0.24
upper	3969.194	25	1161.00	569.04	577.53	573.84	577.66	0.000532	3.33	485.47	199.41	0.22
upper	3969.194	10	890.00	569.04	576.71	573.17	576.87	0.000695	3.49	335.51	168.50	0.25
upper	3969.194	5	699.00	569.04	576.14	572.65	576.31	0.000763	3.43	245.26	153.27	0.26
upper	3969.194	2	469.00	569.04	575.41	571.92	575.53	0.000627	2.83	170.76	48.87	0.23
upper	3658.847	100	1888.00	569.51	578.13		578.19	0.000359	2.57	1004.82	357.39	0.18
upper	3658.847	50	1514.00	569.51	577.82		577.87	0.000317	2.36	895.89	344.01	0.17
upper	3658.847	25	1183.00	569.51	577.48		577.52	0.000282	2.16	781.22	329.35	0.16
upper	3658.847	10	913.00	569.51	576.59		576.66	0.000542	2.77	505.47	291.07	0.21
upper	3658.847	5	720.00	569.51	575.90		576.04	0.001010	3.52	318.53	247.51	0.29
upper	3658.847	2	489.00	569.51	575.00		575.22	0.001684	4.07	145.74	82.93	0.36
upper	3411.962	100	1888.00	568.38	577.95		578.07	0.000540	3.49	753.22	249.37	0.23
upper	3411.962	50	1514.00	568.38	577.67		577.77	0.000452	3.11	684.00	243.29	0.21
upper	3411.962	25	1183.00	568.38	577.36		577.43	0.000379	2.75	608.14	236.44	0.19
upper	3411.962	10	913.00	568.38	576.36		576.50	0.000711	3.38	384.32	214.98	0.25
upper	3411.962	5	720.00	568.38	575.59		575.77	0.001059	3.73	233.45	152.67	0.30
upper	3411.962	2	489.00	568.38	574.66		574.85	0.001310	3.60	150.44	72.04	0.32
upper	3367.5	100	1888.00	568.84	577.98		578.03	0.000262	2.48	1067.86	338.96	0.16
upper	3367.5	50	1514.00	568.84	577.69		577.74	0.000222	2.22	971.20	334.78	0.15
upper	3367.5	25	1183.00	568.84	577.37		577.41	0.000189	1.99	864.62	330.11	0.14
upper	3367.5	10	913.00	568.84	576.39		576.45	0.000315	2.31	567.05	263.12	0.17
upper	3367.5	5	720.00	568.84	575.62		575.71	0.000534	2.73	374.75	232.60	0.22
upper	3367.5	2	489.00	568.84	574.67		574.77	0.000699	2.71	212.64	100.59	0.24
upper	3362.576	100	1888.00	568.84	577.98		578.03	0.000262	2.48	1067.39	338.94	0.16
upper	3362.576	50	1514.00	568.84	577.69		577.73	0.000222	2.22	970.82	334.76	0.15
upper	3362.576	25	1183.00	568.84	577.37		577.41	0.000190	1.99	864.29	330.09	0.14
upper	3362.576	10	913.00	568.84	576.39		576.45	0.000315	2.31	566.60	263.04	0.17
upper	3362.576	5	720.00	568.84	575.62		575.70	0.000536	2.73	374.00	232.45	0.22
upper	3362.576	2	489.00	568.84	574.67		574.77	0.000702	2.71	212.24	100.50	0.24
upper	3350.083	100	1888.00	569.03	577.97	574.45	578.03	0.000243	2.47	1042.58	303.61	0.16
upper	3350.083	50	1514.00	569.03	577.69	573.87	577.73	0.000201	2.19	957.89	296.50	0.14
upper	3350.083	25	1183.00	569.03	577.37	573.23	577.40	0.000166	1.94	863.69	293.98	0.13
upper	3350.083	10	913.00	569.03	576.39	572.64	576.44	0.000290	2.32	581.12	280.02	0.16
upper	3350.083	5	720.00	569.03	575.47	572.18	575.66	0.000846	3.57	204.17	233.60	0.27
upper	3350.083	2	489.00	569.03	574.62	571.57	574.75	0.000700	2.90	169.99	87.34	0.24
upper	3340	100	1888.00	569.03	577.92	574.46	578.01	0.000348	2.94	896.83	279.96	0.19
upper	3340	50	1514.00	569.03	577.65	573.84	577.71	0.000286	2.61	821.46	275.05	0.17
upper	3340	25	1183.00	569.03	577.33	573.24	577.39	0.000234	2.29	737.53	269.49	0.15
upper	3340	10	913.00	569.03	576.33	572.64	576.42	0.000409	2.74	479.68	244.60	0.19
upper	3340	5	720.00	569.03	575.41	572.18	575.61	0.000888	3.64	200.49	186.80	0.28

HEC-RAS Plan: Proposed River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	3340	2	489.00	569.03	574.58	571.57	574.71	0.000730	2.94	167.40	74.62	0.24
upper	3338	100	1888.00	569.03	577.93	574.45	577.99	0.000251	2.50	1030.69	301.68	0.16
upper	3338	50	1514.00	569.03	577.65	573.87	577.70	0.000207	2.22	948.40	296.24	0.14
upper	3338	25	1183.00	569.03	577.34	573.23	577.38	0.000170	1.96	856.08	293.77	0.13
upper	3338	10	913.00	569.03	576.34	572.64	576.40	0.000307	2.38	567.91	279.08	0.17
upper	3338	5	720.00	569.03	575.40	572.18	575.61	0.000880	3.62	201.64	229.90	0.28
upper	3338	2	489.00	569.03	574.57	571.57	574.71	0.000726	2.93	168.03	85.57	0.24
upper	3336.833		Bridge									
upper	3292	100	1888.00	568.65	577.28	574.95	577.33	0.000196	2.04	1108.20	316.86	0.14
upper	3292	50	1514.00	568.65	576.71	574.31	576.76	0.000205	1.97	949.76	310.30	0.14
upper	3292	25	1183.00	568.65	576.21	573.68	576.25	0.000206	1.86	810.18	304.47	0.14
upper	3292	10	913.00	568.65	575.15	573.13	575.66	0.002208	5.77	159.07	292.12	0.45
upper	3292	5	720.00	568.65	574.71	572.70	575.10	0.001857	4.99	145.27	287.12	0.41
upper	3292	2	489.00	568.65	574.19	572.11	574.41	0.001291	3.84	128.38	281.00	0.33
upper	3239.315	100	1888.00	568.65	577.27		577.31	0.000281	2.14	1206.77	319.12	0.15
upper	3239.315	50	1514.00	568.65	576.70		576.74	0.000294	2.06	1027.87	312.50	0.15
upper	3239.315	25	1183.00	568.65	576.20		576.23	0.000294	1.95	872.09	306.62	0.15
upper	3239.315	10	913.00	568.65	575.33		575.38	0.000498	2.26	610.24	296.47	0.18
upper	3239.315	5	720.00	568.65	574.82		574.88	0.000666	2.42	460.97	290.53	0.21
upper	3239.315	2	489.00	568.65	574.20		574.28	0.000955	2.60	282.79	283.27	0.24
upper	3047.894	100	1888.00	567.96	577.19		577.25	0.000357	2.38	1045.88	268.78	0.16
upper	3047.894	50	1514.00	567.96	576.63		576.68	0.000370	2.28	894.65	264.51	0.16
upper	3047.894	25	1183.00	567.96	576.13		576.17	0.000365	2.14	763.14	260.75	0.16
upper	3047.894	10	913.00	567.96	575.21		575.27	0.000640	2.51	526.43	253.83	0.21
upper	3047.894	5	720.00	567.96	574.65		574.73	0.000911	2.74	385.73	249.63	0.24
upper	3047.894	2	489.00	567.96	573.98		574.08	0.001166	2.81	235.70	199.68	0.27
upper	2776.037	100	1888.00	567.68	577.09	573.96	577.16	0.000345	2.49	1026.41	284.84	0.16
upper	2776.037	50	1514.00	567.68	576.53	573.72	576.58	0.000343	2.35	871.65	261.24	0.16
upper	2776.037	25	1183.00	567.68	576.04	573.47	576.08	0.000315	2.13	748.40	238.96	0.15
upper	2776.037	10	913.00	567.68	575.07	572.44	575.13	0.000464	2.31	538.86	199.04	0.18
upper	2776.037	5	720.00	567.68	574.48	571.97	574.54	0.000572	2.37	423.10	190.60	0.20
upper	2776.037	2	489.00	567.68	573.76	571.26	573.83	0.000724	2.38	289.36	183.80	0.21
upper	2556.718	100	1888.00	566.96	576.97	574.17	577.07	0.000537	2.86	802.14	192.92	0.20
upper	2556.718	50	1514.00	566.96	576.41	573.26	576.50	0.000527	2.66	695.91	186.97	0.20
upper	2556.718	25	1183.00	566.96	575.93	572.60	576.00	0.000482	2.40	607.46	181.87	0.18
upper	2556.718	10	913.00	566.96	574.91	571.96	575.00	0.000808	2.70	426.91	170.98	0.23
upper	2556.718	5	720.00	566.96	574.26	571.41	574.37	0.001058	2.90	318.22	165.33	0.26
upper	2556.718	2	489.00	566.96	573.45	570.58	573.60	0.001456	3.13	157.71	53.33	0.30
upper	2496.623	100	1888.00	567.16	576.57	573.26	576.98	0.001918	5.43	373.38	67.02	0.36
upper	2496.623	50	1514.00	567.16	576.11	572.75	576.42	0.001546	4.71	344.79	65.00	0.32
upper	2496.623	25	1183.00	567.16	575.72	572.26	575.94	0.001156	3.94	321.01	63.28	0.27
upper	2496.623	10	913.00	567.16	574.73	571.66	574.93	0.001220	3.70	263.51	55.82	0.28
upper	2496.623	5	720.00	567.16	574.14	571.15	574.30	0.001119	3.33	231.00	54.26	0.26
upper	2496.623	2	489.00	567.16	573.42	570.43	573.52	0.000887	2.72	192.30	52.33	0.23
upper	2474.915		Bridge									
upper	2431.6	100	1888.00	566.74	576.25	574.07	576.68	0.003036	5.35	358.75	202.85	0.33
upper	2431.6	50	1514.00	566.74	575.87	573.69	576.19	0.002502	4.71	332.81	196.04	0.29
upper	2431.6	25	1183.00	566.74	575.55	573.14	575.78	0.001906	4.00	311.13	190.36	0.25
upper	2431.6	10	913.00	566.74	574.51	572.61	574.74	0.002604	4.24	240.15	134.54	0.29
upper	2431.6	5	720.00	566.74	573.90	571.53	574.12	0.002882	4.18	198.84	117.91	0.30
upper	2431.6	2	489.00	566.74	573.18	570.50	573.37	0.002888	3.85	149.87	78.22	0.29
upper	2333.996	100	1888.00	566.37	576.31		576.38	0.000628	2.63	929.95	281.07	0.16
upper	2333.996	50	1514.00	566.37	575.89		575.95	0.000588	2.47	814.47	271.11	0.15
upper	2333.996	25	1183.00	566.37	575.55		575.60	0.000502	2.22	723.30	262.98	0.14
upper	2333.996	10	913.00	566.37	574.44		574.52	0.000883	2.66	460.47	196.22	0.18
upper	2333.996	5	720.00	566.37	573.80		573.89	0.001114	2.80	343.36	172.17	0.20
upper	2333.996	2	489.00	566.37	573.05		573.15	0.001230	2.71	230.67	128.70	0.20
upper	1880.086	100	1888.00	565.58	576.13	572.65	576.17	0.000335	1.89	1228.27	357.08	0.12
upper	1880.086	50	1514.00	565.58	575.73	571.76	575.76	0.000286	1.69	1091.93	329.31	0.11
upper	1880.086	25	1183.00	565.58	575.42	571.03	575.45	0.000218	1.44	993.91	307.60	0.09
upper	1880.086	10	913.00	565.58	574.23	570.37	574.26	0.000370	1.68	667.28	247.36	0.12
upper	1880.086	5	720.00	565.58	573.50	569.85	573.53	0.000526	1.85	496.04	223.50	0.14
upper	1880.086	2	489.00	565.58	572.64	569.10	572.69	0.000796	2.04	315.71	196.18	0.16
upper	1595.417	100	1888.00	565.80	576.06	572.20	576.09	0.000207	1.52	1411.29	348.71	0.09
upper	1595.417	50	1514.00	565.80	575.67	571.18	575.70	0.000178	1.36	1277.46	341.83	0.08
upper	1595.417	25	1183.00	565.80	575.38	570.56	575.40	0.000138	1.17	1177.61	336.22	0.07
upper	1595.417	10	913.00	565.80	574.14	570.00	574.17	0.000265	1.44	776.56	310.52	0.10
upper	1595.417	5	720.00	565.80	573.37	569.56	573.40	0.000397	1.62	549.21	278.82	0.12
upper	1595.417	2	489.00	565.80	572.45	568.82	572.49	0.000584	1.75	347.29	184.02	0.14

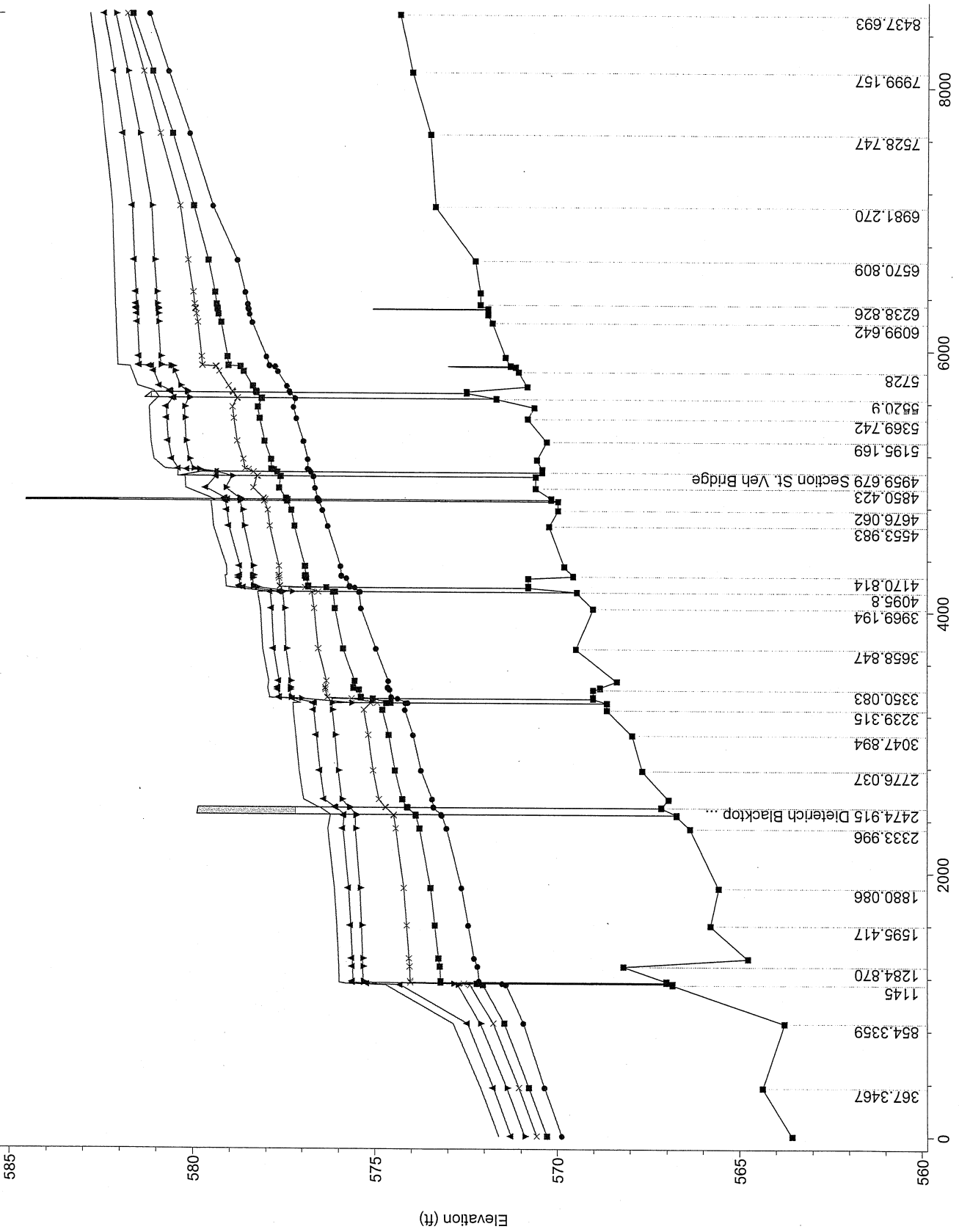
HEC-RAS Plan: Proposed River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	1345.156	100	1888.00	564.77	576.02		576.04	0.000158	1.40	1763.41	497.07	0.08
upper	1345.156	50	1514.00	564.77	575.64		575.85	0.000138	1.28	1577.36	475.80	0.07
upper	1345.156	25	1183.00	564.77	575.35		575.36	0.000108	1.11	1443.23	460.57	0.06
upper	1345.156	10	913.00	564.77	574.08		574.10	0.000227	1.45	903.67	381.95	0.09
upper	1345.156	5	720.00	564.77	573.27		573.30	0.000353	1.69	621.88	315.08	0.11
upper	1345.156	2	489.00	564.77	572.29		572.33	0.000563	1.93	358.74	225.05	0.14
upper	1284.870	100	1888.00	568.19	576.01	572.54	576.03	0.000199	1.31	1658.37	496.27	0.09
upper	1284.870	50	1514.00	568.19	575.62	572.32	575.64	0.000179	1.19	1473.29	475.21	0.08
upper	1284.870	25	1183.00	568.19	575.34	572.01	575.35	0.000144	1.03	1340.39	460.10	0.08
upper	1284.870	10	913.00	568.19	574.06	571.76	574.08	0.000370	1.40	797.14	380.28	0.12
upper	1284.870	5	720.00	568.19	573.23	571.51	573.27	0.000751	1.75	511.19	311.95	0.16
upper	1284.870	2	489.00	568.19	572.20	571.23	572.27	0.002316	2.46	238.36	215.59	0.27
upper	1173	100	1888.00	567.02	576.00	571.51	576.01	0.000111	1.33	2276.56	569.91	0.08
upper	1173	50	1514.00	567.02	575.62	571.28	575.63	0.000093	1.18	2064.67	545.79	0.08
upper	1173	25	1183.00	567.02	575.33	570.97	575.34	0.000070	0.99	1913.23	527.88	0.07
upper	1173	10	913.00	567.02	574.04	570.68	574.05	0.000124	1.15	1282.91	453.41	0.09
upper	1173	5	720.00	567.02	573.21	570.44	573.22	0.000188	1.28	923.88	404.57	0.10
upper	1173	2	489.00	567.02	572.16	570.10	572.18	0.000335	1.45	541.52	319.90	0.13
upper	1163.470											
			Bridge									
upper	1145	100	1888.00	566.85	574.72	574.72	575.66	0.009249	8.67	285.99	144.32	0.66
upper	1145	50	1514.00	566.85	574.31	574.31	575.25	0.008736	8.34	230.68	127.04	0.64
upper	1145	25	1183.00	566.85	572.74	572.12	574.38	0.015635	10.30	115.33	28.01	0.83
upper	1145	10	913.00	566.85	572.40	571.43	573.53	0.011594	8.54	106.87	23.73	0.71
upper	1145	5	720.00	566.85	572.05	570.86	572.88	0.009115	7.31	98.54	23.45	0.63
upper	1145	2	489.00	566.85	571.42	570.09	571.95	0.006701	5.82	83.99	22.97	0.54
upper	854.3359	100	1888.00	563.77	572.86	571.64	573.04	0.001785	4.37	677.10	336.49	0.30
upper	854.3359	50	1514.00	563.77	572.47	570.05	572.64	0.001762	4.16	553.88	289.39	0.29
upper	854.3359	25	1183.00	563.77	572.12	569.06	572.35	0.002167	4.44	359.95	166.19	0.32
upper	854.3359	10	913.00	563.77	571.76	568.35	571.96	0.001884	3.97	304.42	150.06	0.30
upper	854.3359	5	720.00	563.77	571.46	567.79	571.63	0.001595	3.58	260.95	136.77	0.27
upper	854.3359	2	489.00	563.77	570.94	567.01	571.07	0.001174	3.04	195.51	112.85	0.23
upper	367.3467	100	2453.00	564.37	572.11	570.61	572.22	0.001472	3.72	936.18	386.51	0.28
upper	367.3467	50	1961.00	564.37	571.76	570.30	571.86	0.001366	3.43	807.16	353.53	0.27
upper	367.3467	25	1527.00	564.37	571.39	570.02	571.48	0.001351	3.25	681.63	337.94	0.26
upper	367.3467	10	1188.00	564.37	571.06	569.70	571.14	0.001371	3.12	571.43	326.96	0.26
upper	367.3467	5	942.00	564.37	570.78	569.35	570.86	0.001403	3.02	482.22	317.79	0.26
upper	367.3467	2	645.00	564.37	570.35	569.08	570.42	0.001351	2.76	354.13	264.70	0.25
upper	0	100	2453.00	563.56	571.61	570.13	571.72	0.001283	3.45	1038.56	487.59	0.26
upper	0	50	1961.00	563.56	571.28	569.92	571.37	0.001283	3.30	879.07	457.86	0.26
upper	0	25	1527.00	563.56	570.91	569.68	571.00	0.001282	3.14	720.98	405.69	0.25
upper	0	10	1188.00	563.56	570.57	569.46	570.65	0.001284	2.99	591.75	363.60	0.25
upper	0	5	942.00	563.56	570.29	569.24	570.37	0.001283	2.86	493.52	331.48	0.25
upper	0	2	645.00	563.56	569.87	568.51	569.94	0.001285	2.67	364.39	280.59	0.24

DIETERICH CREEK M & G ENGINEERS EXISTING CONDITIONS WITH NEW PEDESTRIAN BRIDGES

dieterich creek upper

Legend	
WS 100	▲
WS 50	▼
WS 25	✕
WS 10	✱
WS 5	●
WS 2	○
Ground	■



Main Channel Distance (ft)

Elevation (ft)

- 585
- 580
- 575
- 570
- 565
- 8437.693
- 7999.157
- 7528.747
- 6981.270
- 6570.809
- 6238.826
- 6099.642
- 5728
- 5520.9
- 5369.742
- 5195.169
- 4959.679 Section St. Veh Bridge
- 4850.423
- 4676.062
- 4553.983
- 4170.814
- 4095.8
- 3969.194
- 3658.847
- 3350.083
- 3239.315
- 3047.894
- 2776.037
- 2474.915 Dieterich Blacktop
- 2333.996
- 1880.086
- 1595.417
- 1284.870
- 1145
- 854.359
- 367.3467
- 0
- 2000
- 4000
- 6000
- 8000

APPENDIX C

HYDRAULIC MODELING (HEC-RAS)

CALIBRATION

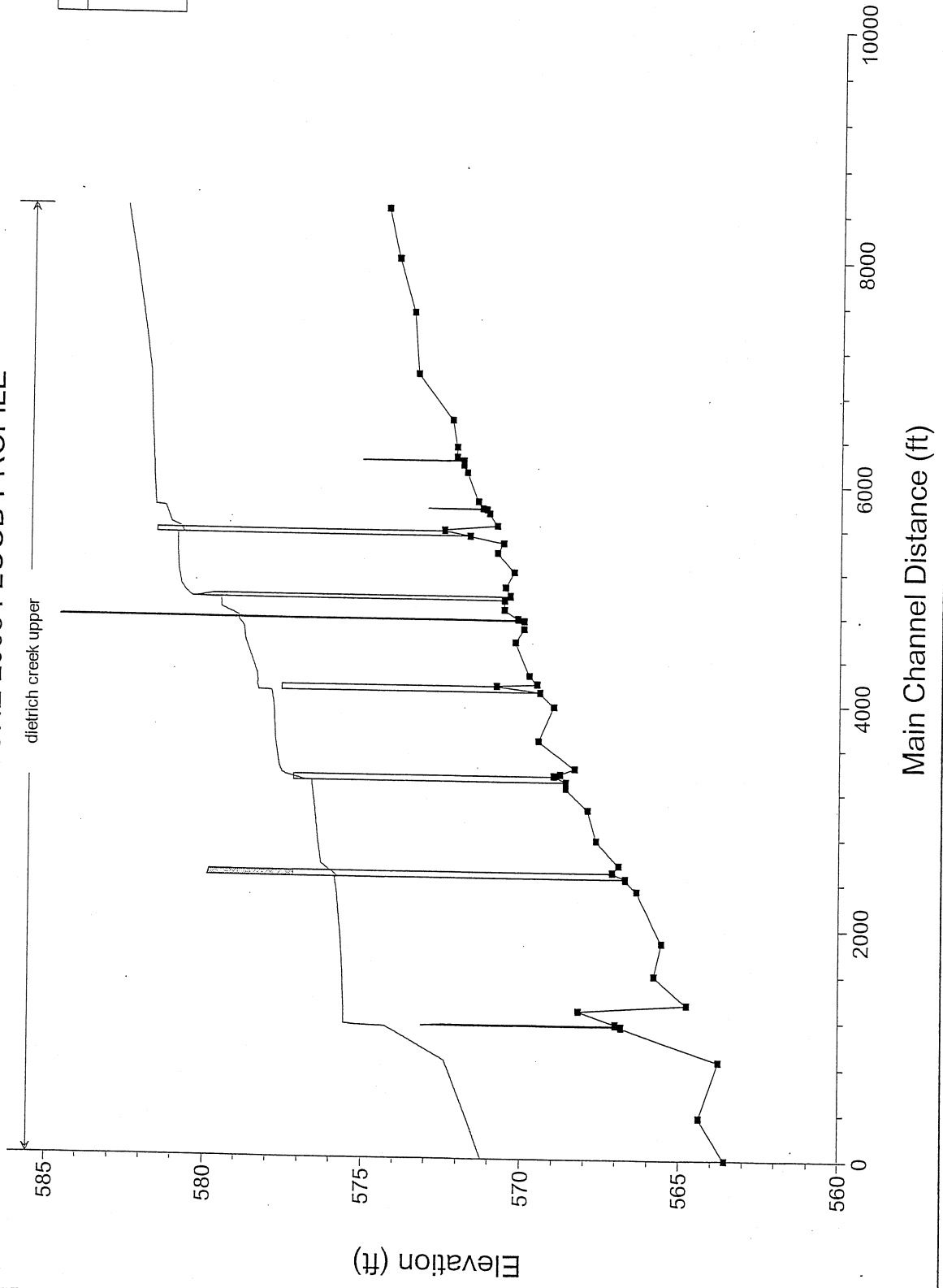
EXISTING CONDITIONS

dieterich_ras Plan: Plan 01 9/11/2015

JUNE 2008 FLOOD PROFILE

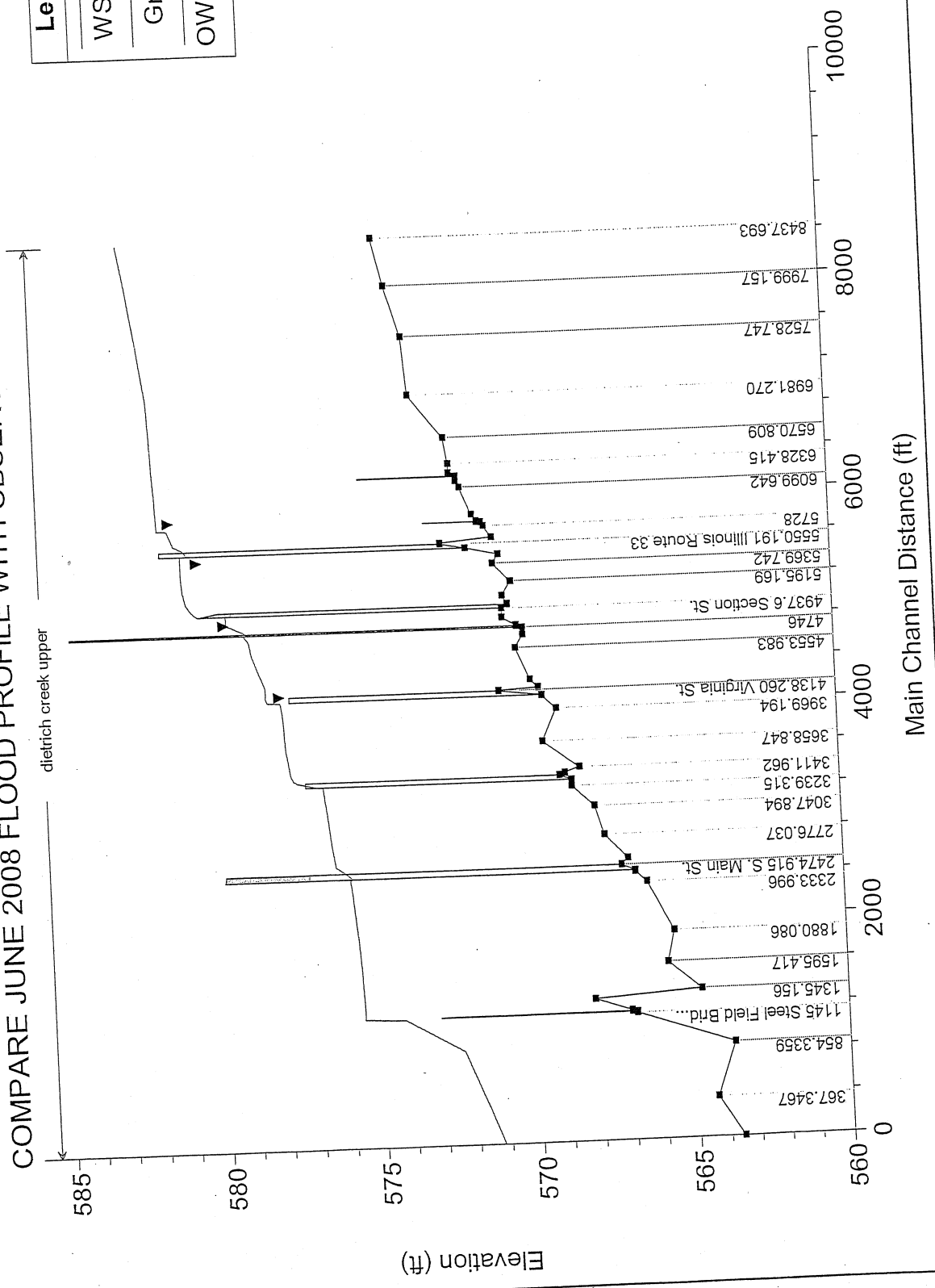
dieterich creek upper

Legend	
—	WS PF 1
—■—	Ground



dieterich_ras Plan: Plan 01 9/14/2015
COMPARE JUNE 2008 FLOOD PROFILE WITH OBSERVED HIGH WATER MARKS

Legend	
—	WS PF 1
—	Ground
▲	OWS PF 1



DIEDRICH HIGH WATER CALIBRATION

JUNE 6, 2008 FLOOD EVENT

HEC1 MODEL FINAL_CAL_B_6_08.DAT

HEC-RAS MODEL FINAL_CAL_B_06_08.PRJ

HEC-RAS SECNO	HW MARKS ELEV. (FT.)	HEC-RAS MODEL ELEV. (FT.)	DIFF WSEL (FT.)
4154.359	578.00	578.37	0.37
4850.423	579.70	579.54	-0.16
5456.605	580.50	580.95	0.45
5838.502	581.35	581.66	0.31

LOCATION

EJ Water Office 108 Main St. (Water 1.0 Ft. over Virginia St. per Village Engineer)

109 E. Section St. 20 inches inside garage. HW = FF+20" = 578.0+ 1.67 = 579.7

106 N. Vine St. (Water to front door but not inside house) HW = FF ELEV.

303 Maple Street Apartments. First Floor Elev. (Water Inside Apts estimate several inches at 9:00PM)
HW = FF + 3" = 581.1 + .25 FT = 581.35

CAL_B_06_08

APPENDIX D

DAMAGES

EXISTING CONDITIONS

4982.600	1571.	9	27155.	8	19083.	5	12989.	4	4475.			
5057.334	1613.	10	27974.	9	19773.	6	13470.					
5195.169	4287.	18	80865.	17	62672.	14	40192.	6	6580.			
5369.742												
5456.605												
5520.900												
5570.965												
5575.960												
5616.515												
5728.000												
5763.000	4381.	20	87146.									
5775.000												
5838.501	5289.	21	124705.	18	80125.	15	41277.	7	7052.			
6099.642	5410.	24	129158.	21	81874.	18	41964.		7.			
6163.800												
6198.800												
6208.826												
6238.826	6794.	26	145338.	23	92637.	20	49454.	9	10322.			
6328.415	7204.	28	156789.	25	96717.	21	50366.	10	10947.			
6570.809	7219.	29	157793.									
6981.270												
7528.747												
7999.157												
8437.693												
SUMMARY	7219.	29	157793.	25	96717.	21	50366.	10	10947.	4	2556.	0.

1

SUMMARY OF FLOOD DAMAGES

FREQUENCY (YEARS)	NUMBER OF STRUCTURES	STRUCTURE DAMAGES	CONTENTS DAMAGES	TOTAL DAMAGES
100.00	29	119837.	37956.	157793.
50.00	25	73576.	23141.	96717.
25.00	21	38854.	11512.	50366.
10.00	10	8513.	2434.	10947.

5.00	4	1992.	565.	2556.
2.00	0	0.	0.	0.

TOTAL A.A.D. FOR 29 STRUCTURES IS 7219.31
 INDIRECT DAMAGES (AT 15.00%) = 1082.90
 TOTAL DAMAGES (DIRECT + INDIRECT) = 8302.20
 CAPITALIZED DAMAGES (4.63% FOR 50 YEARS) = 160787.01

A AAD CALCULATION ASSUMES 0 DAMAGES AT 1 YEAR EVENT

DIETERICH

SUMMARY OF ALL STRUCTURES WHICH SUSTAIN DAMAGES UNDER EXISTING CONDITIONS

Survey ID	ADDRESS	Structure Type	Foundation Type	1st Floor Elev	Low Water Entry EL	Garage Type	Remark
12.2	206 N. Vine	1 Story	Slab	582.7	582.7		Garage
14	310 E. Maple	1 Story	Crawl	581.3	579.3	None	Residence
14.1	310 E. Maple	1 Story	Slab	578.7		Detached	Garage
14.2	310 E. Maple	1 Story	Slab	579.4		Detached	Shed
15	306 E. Maple	MH	Crawl	581.5	581.5		Residence
16	303 E. Maple	2 Story	Crawl	581.1	578.9	None	Apartments
17	212 E. Maple	1 Story	Crawl	583.1	581.6	Attached	Residence
19	209 E. Maple	1 Story		582.9	578.7		Residence
22	304 E. Center	1 Story	Crawl	582.1	580.2		Garage
22.1	304 E. Center	1 Story		578.9	580.9		Shed
23	308 E. Center	1 Story	Crawl	582.4	580.4		Garage
28	106 N. Vine	1 Story	Crawl	580.5	578.7	Attached	Residence
29	105 N. Vine	2 Story	Crawl	581.3	580		Residence
29.1	105 N. Vine	1 Story	Slab	578.3		Detached	North Garage
29.2	105 N. Vine	1 Story	Slab	578.9	578.9		Garage
30	104 N. Vine	1 Story	Crawl	581.1	579.9		Residence
32	103 N. Vine	1 Story	Basement	582.1	579.2		Residence
32.1	103 N. Vine	1 Story	Slab	579.7	579.7		Garage
36	204 E. Section	1 Story	Crawl	580.5	578.9		Residence
37	206 E. Section	1 Story	Crawl	579.9	578.5	Attached	Residence
39	203 E. Section	2 Story	Crawl	580.8	578.4		Residence
40	110 E. Section	2 Story	Crawl	579.8	578.4	None	Residence
41	109 E. Section	2 Story	Crawl	580	578.2		Residence
41.1	109 E. Section	1 Story	Slab	578		Detached	Garage
48.1	105 N. Loda	1 Story	Slab	579.9	578.7		Garage
54	Church St.	1 Story	Slab	576	576	None	Pump House
57	218 Main	1 Story	Basement	577.7	577.7		Church
60	208 Main	1 Story	Crawl	580.1	578		Residence
60.1	208 Main	1 Story	Slab	577.4	577.4		Garage

Exst_Cond_Structures_Damaged

Count	ID	ADDRESS	CLASS	River Mile	1st floor	Low Entry	Cont. Ratio	Str Code	Remark
1	1	100 W. Elm	Business	6570.809	596.50	596.50	0.83	SERV_P	Niebrugge Plum Apt. or Store
2	1.1	100 W. Elm	Business	6570.809	596.50	596.50	0.83	SERV_P	
3	1.2	100 W. Elm	Business	6570.809	596.50	596.50	0.83	SERV_P	
4	1.3	100 W. Elm	Business	6570.809	596.50	596.50	0.83	SERV_P	
5	2	100 E. Elm	Residential	6570.809	592.40	591.10	0.50	1SNB	
6	3	102 E. Elm	Residential	6570.809	592.10	590.40	0.50	1SNB	
7	4	104 E. Elm	Residential	6570.809	590.50	589.00	0.50	1SNB	
8	5	106 E. Elm	Residential	6570.809	590.40	588.60	0.50	1SNB	
10	6	108 E. Elm	Residential	6570.809	589.50	587.90	0.50	1SWB	
11	6.1	108 E. Elm	Residential	6570.809	586.50	586.50	0.50	1SNB	
12	7	202 E. Elm	Residential	6570.809	588.00	586.40	0.50	1SWB	
13	8	204 E. Elm	Residential	6570.809	587.40	585.20	0.50	1SWB	
14	8.1	204 E. Elm	Res/Garage	6570.809	584.00	584.00	0.50	1SNB	Garage
15	8.2	204 E. Elm	Res/Garage	6570.809	583.4	583.4	0.50	1SNB	Shed
16	10	208 E. Elm	Residential	6570.809	585.00	583.40	0.50	1SNB	
17	11	207 E. Elm	Residential	6570.809	585.40	583.60	0.50	1SNB	
18	11.1	207 E. Elm	Residential	6570.809	583.70	583.70	0.50	1SNB	
19	11.2	207 E. Elm	Residential	6570.809	583.70	583.70	0.50	1SNB	
20	12	206 N. Vine	Residential	6570.809	584.10	584.10	0.50	1SNB	
21	12.1	206 N. Vine	Residential	6570.809	583.20	583.20	0.50	1SNB	
22	12.2	206 N. Vine	Res/Garage	6570.809	582.70	582.70	0.50	1SNB	Shed
23	13	203 N. Vine	Residential	6238.826	586.30	586.30	0.50	MH	
24	13.1	203 N. Vine	Residential	6238.826	583.60	583.60	0.50	1SNB	
25	14	310 E. Maple	Residential	6238.826	581.30	579.30	0.50	1SNB	
26	14.1	310 E. Maple	Residential	6238.826	578.70	578.70	0.50	1SNB	
27	14.2	310 E. Maple	Res/Garage	6328.415	579.40	579.40	0.50	1SNB	Shed
28	15	306 E. Maple	Residential	6328.415	581.50	581.50	0.50	MH	
29	16	303 E. Maple	Residential	5838.501	581.10	578.90	0.30	APT_P	
30	17	212 E. Maple	Residential	5763	583.10	581.60	0.50	1SNB	
31	18	210 E. Maple	Residential	5838.501	584.70	583.30	0.50	1SNB	
32	19	209 E. Maple	Residential	5763	582.90	578.70	0.50	MH	
33	20	203 Shady Ln.	Residential	5763	587.50	585.40	0.50	2SWB	Breezeway 585.1
34	21	112 E. Maple	Residential	5763	586.70	586.70	0.50	MH	
35	22	304 E. Center	Residential	6099.642	582.10	580.20	0.50	1SNB	
36	22.1	304 E. Center	Residential	6099.642	578.90	580.90	0.50	1SNB	
37	23	308 E. Center	Residential	6099.642	582.40	580.40	0.50	1SNB	
38	24	E. Center	Business	6238.826	583.60	583.60	0.38	LT_E	Bishop Township Bldg
39	25	401 E. Center	Residential	5369.742	586.70	586.70	0.50	MH	
40	25.1	401 E. Center	Residential	5369.742	584.40	584.40	0.50	1SNB	
41	26	312 E. Center	Business	5369.742	586.40	586.40	0.21	OFF_P	Funeral Home
42	27	305 E. Center	Residential	5369.742	587.10	584.90	0.50	1SNB	
43	27.1	305 E. Center	Residential	5369.742	585.50	585.50	0.50	1SNB	
44	28	106 N. Vine	Residential	5195.169	580.50	578.70	0.50	1SNB	
45	29	105 N. Vine	Residential	5195.169	581.30	580.00	2.00	2SNB	
46	29.1	105 N. Vine	Res/Garage	5195.169	578.30	578.30	1.00	1SNB	North Garage

Count	ID	ADDRESS	CLASS	River Mile	1st floor	Low Entry	Cont. Ratio	Str Code	Remark
47	29.2	105 N. Vine	Res/Garage	5195.169	578.90	578.90	0.50	1SNB	South Garage
48	30	104 N. Vine	Residential	5195.169	581.10	579.90	0.50	1SNB	
49	31	102 N. Vine	Residential	5195.169	583.10	581.40	0.50	1SNB	
50	31.1	102 N. Vine	Residential	5195.169	582.50	582.50	0.50	1SNB	
51	32	103 N. Vine	Residential	5195.169	582.10	579.20	0.50	1SWB	
52	32.1	103 N. Vine	Res/Garage	5195.169	579.70	579.70	0.50	1SNB	
53	33	300 E. Section	Residential	5195.169	586.20	584.10	0.50	2SNB	
54	34	E. Section	Church	4773.4	587.10	587.10	0.08	RF_P	Parish Center
55	35	101 S. Vine	Residential	4773.4	587.40	585.80	0.50	2SWB	
56	36	204 E. Section	Residential	5195.169	580.50	578.90	1.20	1SNB	Tan & Blue
57	37	206 E. Section	Residential	4982.6	579.90	578.50	0.50	1SNB	
58	38	207 E. Section	Residential	5195.169	584.00	581.80	0.50	2SNB	
59	39	203 E. Section	Residential	4773.4	580.80	578.40	0.50	2SNB	
60	40	110 E. Section	Residential	4982.6	579.80	578.40	0.50	2SNB	
61	41	109 E. Section	Residential	4773.4	580.00	578.20	0.50	2SNB	
62	41.1	109 E. Section	Res/Garage	4773.4	578.00	578.00	1.00	1SNB	Very big, 2 doors, Google photo
63	42	E. Section	Warehouse	4982.6	581.90	581.90	0.47	WH_P	Wright Family Trust
64	43	E. Section	Warehouse	4982.6	584.20	584.20	0.47	WH_P	Wright Family Trust
65	44	Phone Co. Bld.	Business	4982.6	585.80	585.80	0.83	SERV_P	Montrose Mutual Telephone
66	45	111 N. Loda	Residential	5369.742	587.40	586.00	0.50	2SNB	
67	45.1	111 N. Loda	Residential	5369.742	585.30	585.30	0.50	1SNB	
68	46	104 N. Loda	Residential	5195.169	582.70	582.70	0.50	1SNB	
69	46.1	104 N. Loda	Res/Garage	5369.742	584.10	584.10	0.50	1SNB	North Garage
70	47	102 N. Loda	Residential	5057.334	584.80	584.80	0.50	MH	
71	48	105 N. Loda	Residential	5057.334	585.70	584.20	0.50	1SNB	Addition 583.7
72	48.1	105 N. Loda	Residential	5057.334	579.90	579.90	0.50	1SNB	
73	49	103 Railroad	Residential	4553.983	585.70	585.70	0.50	MH	
74	50	200 E. Virginia	Residential	4553.983	583.20	581.40	0.50	1SNB	
75	50.1	200 E. Virginia	Residential	4553.983	580.70	580.70	0.50	1SNB	
76	51	202 S. Loda	Residential	3969.194	586.10	586.10	0.50	MH	
77	52	206 S. Loda	Residential	3658.847	585.20	585.20	0.50	MH	
78	53	103 Planters	Business	3416.962	585.10	585.10	0.83	SERV_P	Addis Archery
79	54	Church Street	Business	3367.5	576.00	576.00	0.50	1SNB	Pump House
80	55	307 Main	Residential	3047.894	581.40	579.90	0.50	2SNB	
81	55.1	307 Main	Residential	3047.894	578.60	578.60	0.50	1SNB	
82	56	313 Main	Residential	2776.037	580.00	578.50	0.50	1SNB	
83	57	218 Main	Church	3411.962	577.70	577.70	0.08	RF_P	Church
84	58	214 Main	Residential	3411.962	582.80	580.30	0.50	1SWB	
85	59	212 Main	Residential	3411.962	580.80	578.80	0.50	1SNB	
86	59.1	212 Main	Residential	3411.962	578.80	578.80	0.50	1SNB	
87	60	208 Main	Residential	3658.847	580.10	578.00	0.50	1SNB	
88	60.1	208 Main	Residential	3658.847	577.40	577.40	0.50	1SNB	
89	61	106 & 108 Main	Business	4746	584.20	584.20	0.83	SERV_P	E J Water
90	61.1	106 & 108 Main	Business	4746	580.60	580.60	0.83	SERV_P	E J Water
91	62	102 Main	Business	4982.6	585.30	585.30	0.83	SERV_P	Montrose Mutual Telephone

Count	ID	ADDRESS	CLASS	River Mile	1st floor	Low Entry	Cont. Ratio	Str Code	Remark
92	63	201 Main	Business	4095.8	583.40	583.40	0.83	SERV_P	Post Office
93	64	203 Main	Business	4095.8	584.10	583.50	0.48	HOSP_P	Dieterich Medical Center
94	65	213 Main	Residential	3411.962	585.80	583.20	0.50	2SWB	
95	65.1	213 Main	Residential	3411.962	582.90	582.90	0.50	1SNB	
96	66	215 Main	Residential	3411.962	585.40	583.20	0.50	1SNB	
97	67	217 Main	Residential	3411.962	585.20	583.40	0.50	1SNB	
98	67.1	217 Main	Residential	3411.962	583.80	583.80	0.50	1SNB	
99	68	219 Main	Residential	3367.5	583.60	581.60	0.50	1SNB	
100	68.1	219 Main	Residential	3367.5	581.50	581.50	0.50	1SNB	
101	69	301 Main	Residential	3239.315	583.70	582.10	0.50	2SNB	

APPENDIX E

HYDROLOGIC MODELING (HEC1)

PROPOSED CONDITIONS


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* PCDE-62.dat
* ITERATION # 2
* STORAGE VOLUMES FROM ITERATION HEC_RAS Prop_Cond_VirginisStE_Stor.PRJ
* DIETERICH PROPOSED CONDITIONS HEC1 MODEL TO STRAIGHTEN VIRGINIA ST
* BULLETIN 70 RAINFALL
* 6 HR DURATION
* 100 THROUGH 2 YEAR FREQUENCY
* CLARKS UNIT HYDROGRAPH
* SCS CURVE NUMBER LOSS RATE
* HUFF FIRST QUANTILE DISTRIBUTION
* AMC II CONDITIONS
*DIAGRAM
ID
IT 10 14MAR09 0.0 250
JR PREC 1.0 .840 .725 .599 .513 .408
KK A SUBBASIN A
KM COMPUTE RUNOFF FROM SUB A
BA 2.43
IN 18
IO 3
PB 5.56
PC 0 16 33 43 52 60 66 71 75
79
PC 82 84 86 88 90 92 94 96 97
98
LS 0 82.5
UC 2.03 1.35
KK RT_A
KO 1 1
RD
RC .04 .045 .04 5280 .0036 586.0
RX 0 100 141 148 152 159 200 350
RY 586. 581.0 579.8 577.5 577.5 579.8 581. 586.
KK B1 SUBBASIN B1
KM COMPUTE RUNOFF FROM SUB B1
BA 1.29
LS 0 85.2
UC 2.42 1.61
KK CA_B1
KM COMBINE SUBBASIN A AND B1
HC 2
KK RT_AB
KM CHANNEL ROUTE SECTIONS 8437.693-6570.809
RS 1 FLOW -1
SQ 0 437 662 847 1157 1416 1768 1931
SV 0 10.31 15.80 22.23 31.53 43.13 76.67 84.41
KK B2 SUBBASIN B2
KM COMPUTE RUNOFF FROM SUB B2
BA 0.21
LS 0 84.6
UC 1.80 1.20
KK CA_B2
KM COMBINE SUBBASIN CA_B1 AND B2
KO 1
HC 2

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KK RT_CB
KM CHANNEL ROUTE SECTIONS 6570.809--4553.983
RS 1 FLOW -1
SQ 0 459 689 875 1185 1415 1790 1955
SV 0 7.84 13.26 18.65 29.05 43.80 69.23 75.33
KK C2 SUBBASIN C2
KM COMPUTE RUNOFF FROM SUB C2
BA 0.14
LS 0 85.3
UC 0.79 0.53
KK CA_C2
KM COMBINE SUBBASIN CA_B2 AND C2
HC 2
KKRT_CA2
KM CHANNEL ROUTE SECTIONS 4553.983--3658.847
RS 1 FLOW -1
SQ 0 470 704 892 1209 1440 1821 1995
SV 0 2.78 4.48 6.61 8.74 11.22 12.92 14.91
KK C1 SUBBASIN C1
KM COMPUTE RUNOFF FROM SUB C1
BA 0.41
LS 0 85.4
UC 1.22 0.81
KK CA_C1
KM COMBINE SUBBASIN A-C2-C1
HC 2
KK RT_CT
KM CHANNEL ROUTE SECTIONS 3658.847--0
RS 1 FLOW -1
SQ 0 490 724 916 1213 1517 1919 2090
SV 0 22.05 34.36 45.45 66.12 74.88 86.82 95.77
KK D SUBBASIN D
KM COMPUTE RUNOFF FROM SUB D
BA 1.51
LS 0 84.3
UC 2.10 1.40
KK CA_D
KM COMBINE SUBBASINS A-C AND D
KO 1
HC 2
ZZ
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION					
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
HYDROGRAPH AT				1.00	.84	.73	.60	.51	.41
+	A	2.43	1	1258.	973.	774.	567.	433.	283.
				3.17	3.17	3.17	3.33	3.33	3.50
ROUTED TO	RT_A	2.43	1	1255.	970.	771.	565.	432.	282.
+				3.50	3.50	3.67	3.67	3.83	4.00
HYDROGRAPH AT	B1	1.29	1	662.	519.	419.	312.	243.	164.
+				3.33	3.50	3.50	3.50	3.67	3.83
2 COMBINED AT	CA_B1	3.72	1	1916.	1488.	1189.	877.	674.	445.
+				3.50	3.50	3.50	3.67	3.83	4.00
ROUTED TO	RT_AB	3.72	1	1713.	1416.	1156.	849.	662.	437.
+				4.33	4.00	4.00	4.17	4.17	4.33
HYDROGRAPH AT	B2	.21	1	123.	96.	77.	57.	44.	30.
+				2.83	2.83	3.00	3.00	3.00	3.17
2 COMBINED AT	CA_B2	3.93	1	1804.	1494.	1220.	895.	699.	462.
+				4.17	4.00	4.00	4.17	4.00	4.17
ROUTED TO	RT_CB	3.93	1	1715.	1413.	1184.	878.	689.	459.
+									

DIETERICH
DIETERICH CREEK HEC1 DISCHARGES

For Prop_Conditions_VirginiaSt_E.prj

DISCHARGES FROM DIETERICHALL_FINAL\HEC1\PCDE-62.DAT

HEC1 MODEL ROUTING VOLUMES FROM HEC-RASIPROP_CONDITIONS_VIRGINIAST_E_STOR.PRJ

PERFORM ITERATIONS UNTIL DIFF IS LESS THAN 5%

BOLDED DISCHARGES ARE FINAL Q VALUES

LOCATION	HEC1 NODE	ITERATION #1	ITERATION #2	DIFF	% DIFF	ITERATION #3	DIFF	% DIFF	ITERATION #4	DIFF	% DIFF	ITERATION #5	DIFF	% DIFF	ITERATION #6	DIFF	% DIFF	ITERATION #7	DIFF	% DIFF
ABOUT 1850 FEET UPSTREAM OF E. ELM STREET	RT_AB	1852	1735	117	6.3175	1714	21	1.2104	1767	0	0	1711	-56.00	-3.169213	1768	57.00	3.331385	1713	-55.00	-3.11086
		1434	1422	12	0.8369	1418	4	0.2813	1419	0	0	1421	2.00	0.140944	1416	-5.00	-0.351865	1416	0.00	0
		1155	1140	15	1.2987	1140	0	0	1155	0	0	1156	1.00	0.086505	1157	1.00	0.086505	1156	-1.00	-0.08643
		849	848	1	0.1178	846	2	0.2358	849	0	0	849	0.00	0	847	-2.00	-0.235571	849	2.00	0.236128
		662	662	0	0	662	0	0	662	0	0	662	0.00	0	662	0.00	0	662	0.00	0
		438	437	1	0.2283	437	0	0	437	0	0	437	0.00	0	437	0.00	0	437	0.00	0
JUST DOWNSTREAM OF E. ELM STREET	RT_CB	1889	1750	139	7.3584	1722	28	1.6	1789	0	0	1711	-78.00	-4.359978	1790	79.00	4.617183	1715	-75.00	-4.189944
		1467	1435	32	2.1813	1432	3	0.2091	1424	0	0	1426	2.00	0.140449	1415	-11.00	-0.771388	1413	-2.00	-0.141343
		1185	1145	40	3.3755	1139	6	0.524	1177	0	0	1182	5.00	0.424809	1185	3.00	0.253807	1184	-1.00	-0.064388
		883	879	4	0.453	873	6	0.6928	878	0	0	879	1.00	0.113895	879	-4.00	-0.455063	878	3.00	0.342857
		683	688	-5	-0.732	687	1	0.1453	689	0	0	689	0.00	0	689	0.00	0	689	0.00	0
		459	458	1	0.2179	458	0	0	459	0	0	459	0.00	0	459	0.00	0	459	0.00	0
ABOUT 200 FEET DOWNSTREAM OF RR BRIDGE	RT_CA2	1925	1783	142	7.3766	1755	28	1.5704	1821	0	0	1743	-78.00	-4.293361	1821	78.00	4.475043	1748	-73.00	-4.008786
		1486	1460	26	2.4084	1460	0	0	1450	0	0	1454	4.00	0.275862	1440	-14.00	-0.962861	1438	-2.00	-0.138889
		1208	1167	41	3.394	1160	7	0.5998	1199	0	0	1206	7.00	0.59352	1209	3.00	0.249756	1206	-1.00	-0.062713
		902	897	5	0.5543	890	7	0.7804	896	0	0	895	-1.00	-0.111607	892	-3.00	-0.335196	896	4.00	0.44843
		698	704	-6	-0.86	699	5	0.7102	704	0	0	704	0.00	0	704	0.00	0	704	0.00	0
		471	469	2	0.4246	469	0	0	470	0	0	470	0.00	0	470	0.00	0	470	0.00	0
ABOUT 300 FEET UPSTREAM OF CHURCH STREET	RT_CT	1984	1883	101	5.0907	1856	27	1.4339	1919	0	0	1833	-86.00	-4.481501	1919	86.00	4.691762	1847	-72.00	-3.751954
		1575	1508	67	4.254	1529	-21	-1.393	1521	0	0	1541	20.00	1.314924	1517	-24.00	-1.55745	1516	-1.00	-0.06592
		1212	1228	-16	-1.32	1180	48	3.9088	1233	0	0	1210	-23.00	-1.865369	1213	3.00	0.247934	1211	-2.00	-0.16488
		916	921	-5	-0.546	914	7	0.76	918	0	0	918	0.00	0	916	-2.00	-0.217865	918	2.00	0.218341
		720	723	-3	-0.417	718	5	0.6916	724	0	0	724	0.00	0	724	0.00	0	724	0.00	0
		481	489	2	0.4073	489	0	0	490	0	0	490	0.00	0	490	0.00	0	490	0.00	0
START OF STUDY	CA_D	2453	2453	0	0	2430	23	0.9376	2592	0	0	2392	-200.00	-7.716049	2530	138.00	5.769231	2410	-120.00	-4.743083
		1970	1952	18	0.9137	1988	-36	-1.844	1975	0	0	2049	74.00	3.746835	1970	-79.00	-3.855539	1971	1.00	0.050761
		1525	1613	-88	-5.77	1522	91	5.6417	1591	0	0	1572	-19.00	-1.194217	1576	4.00	0.254453	1574	-2.00	-0.126904
		1188	1199	-11	-0.926	1190	9	0.7508	1196	0	0	1196	0.00	0	1192	-4.00	-0.334448	1196	4.00	0.33557
		944	949	-5	-0.53	938	11	1.1591	951	0	0	951	0.00	0	951	0.00	0	951	0.00	0
		647	645	2	0.3091	645	0	0	647	0	0	647	0.00	0	647	0.00	0	647	0.00	0

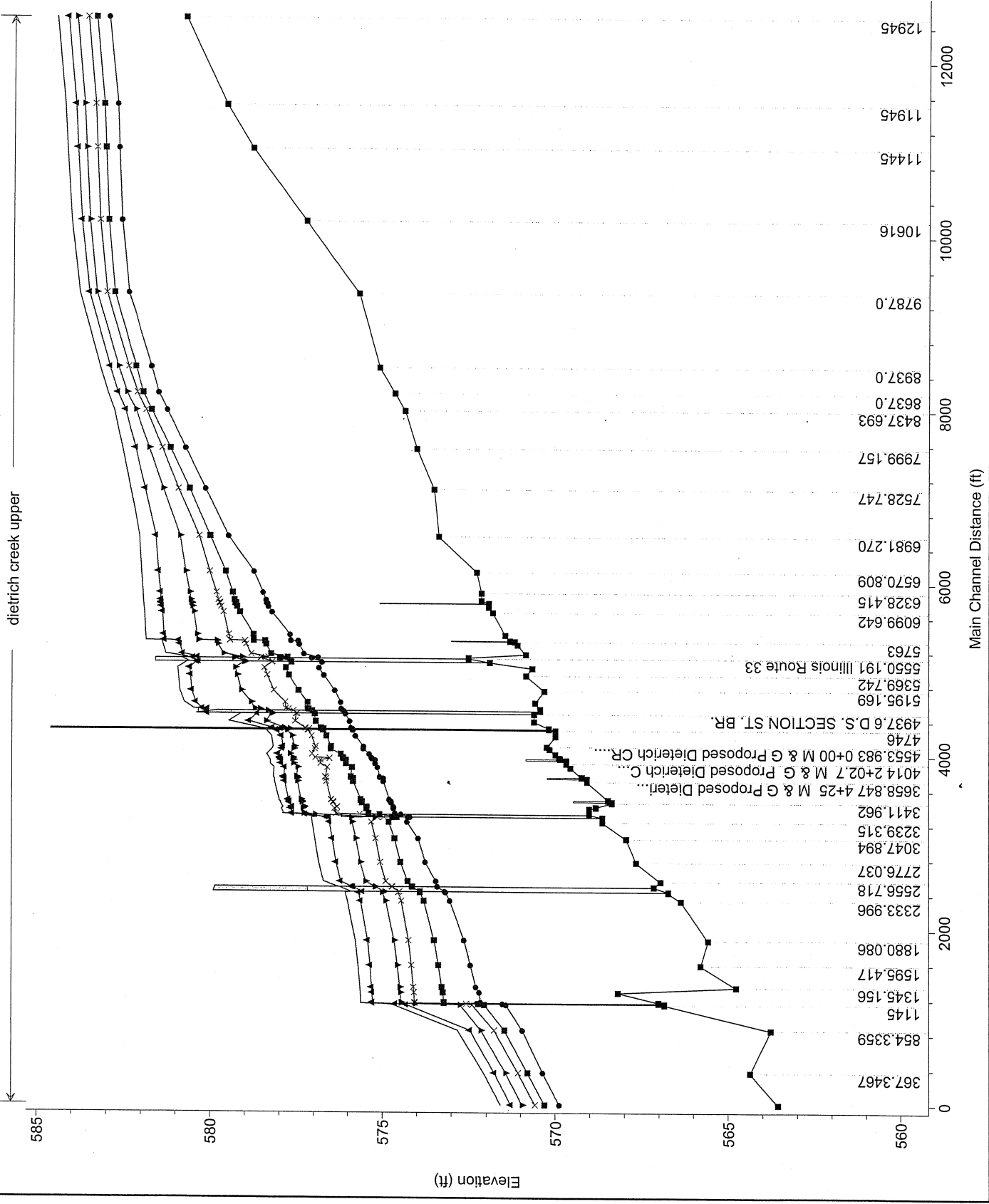
APPENDIX F

HYDRAULIC MODELING (HEC-RAS)

PROPOSED CONDITIONS

dieterich_ras DIETERICH CREEK PLAN10 PROPOSED CONDITIONS ALT E3-10 WITH NEW PEDESTRIAN BRIDGES

Legend	
WS PF 1	▲
WS PF 2	▼
WS PF 3	✕
WS PF 4	◆
WS PF 5	●
WS PF 6	■
Ground	■



Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	12945	PF 1	1255.00	580.78	584.51		584.54	0.000485	1.52	1029.30	570.29	0.15
upper	12945	PF 2	970.00	580.78	584.20		584.22	0.000521	1.47	853.66	553.57	0.16
upper	12945	PF 3	771.00	580.78	583.95		583.97	0.000576	1.44	714.83	539.99	0.16
upper	12945	PF 4	565.00	580.78	583.63		583.65	0.000717	1.47	547.26	523.13	0.18
upper	12945	PF 5	432.00	580.78	583.39		583.40	0.000961	1.57	419.92	509.95	0.20
upper	12945	PF 6	282.00	580.78	583.02		583.05	0.001776	1.86	246.64	420.11	0.26
upper	11945	PF 1	1255.00	579.58	584.27		584.28	0.000144	0.96	1676.41	803.07	0.09
upper	11945	PF 2	970.00	579.58	583.97		583.98	0.000131	0.86	1440.54	752.69	0.08
upper	11945	PF 3	771.00	579.58	583.72		583.73	0.000120	0.79	1258.34	711.34	0.08
upper	11945	PF 4	565.00	579.58	583.41		583.41	0.000110	0.70	1042.58	659.03	0.07
upper	11945	PF 5	432.00	579.58	583.15		583.16	0.000103	0.64	881.59	617.11	0.07
upper	11945	PF 6	282.00	579.58	582.76		582.77	0.000103	0.58	652.16	551.90	0.07
upper	11445	PF 1	1255.00	578.83	584.21		584.22	0.000152	1.03	1636.88	791.75	0.09
upper	11445	PF 2	970.00	578.83	583.91		583.92	0.000137	0.93	1408.74	742.34	0.08
upper	11445	PF 3	771.00	578.83	583.66		583.67	0.000126	0.85	1232.41	701.77	0.08
upper	11445	PF 4	565.00	578.83	583.35		583.36	0.000113	0.76	1022.85	650.27	0.07
upper	11445	PF 5	432.00	578.83	583.11		583.11	0.000106	0.70	865.85	608.83	0.07
upper	11445	PF 6	282.00	578.83	582.71		582.71	0.000106	0.63	639.10	543.45	0.07
upper	10616	PF 1	1255.00	577.28	584.07		584.08	0.000176	1.24	1544.82	768.96	0.09
upper	10616	PF 2	970.00	577.28	583.79		583.79	0.000158	1.13	1333.58	721.88	0.09
upper	10616	PF 3	771.00	577.28	583.55		583.56	0.000143	1.04	1169.87	683.16	0.08
upper	10616	PF 4	565.00	577.28	583.25		583.26	0.000127	0.94	973.48	633.61	0.08
upper	10616	PF 5	432.00	577.28	583.01		583.02	0.000117	0.87	824.98	593.39	0.07
upper	10616	PF 6	282.00	577.28	582.62		582.62	0.000117	0.82	604.18	527.96	0.07
upper	9787.0	PF 1	1255.00	575.73	583.83		583.86	0.000465	1.84	1208.60	940.80	0.15
upper	9787.0	PF 2	970.00	575.73	583.56		583.58	0.000473	1.78	966.03	838.28	0.15
upper	9787.0	PF 3	771.00	575.73	583.34		583.36	0.000476	1.72	790.13	746.98	0.15
upper	9787.0	PF 4	565.00	575.73	583.05		583.07	0.000485	1.66	592.81	628.99	0.15
upper	9787.0	PF 5	432.00	575.73	582.82		582.84	0.000494	1.60	456.36	532.32	0.15
upper	9787.0	PF 6	282.00	575.73	582.41		582.44	0.000571	1.59	273.72	364.82	0.16
upper	8937.0	PF 1	1255.00	575.13	583.24	582.29	583.30	0.000973	2.83	794.42	549.26	0.19
upper	8937.0	PF 2	970.00	575.13	582.96	582.06	583.01	0.001019	2.81	640.39	513.36	0.20
upper	8937.0	PF 3	771.00	575.13	582.71	581.21	582.77	0.001105	2.85	516.21	482.48	0.20
upper	8937.0	PF 4	565.00	575.13	582.41	579.75	582.48	0.001077	2.72	354.02	331.39	0.20
upper	8937.0	PF 5	432.00	575.13	582.20	579.15	582.27	0.000957	2.50	287.39	307.02	0.19
upper	8937.0	PF 6	282.00	575.13	581.75	578.34	581.82	0.000960	2.36	163.95	227.23	0.18
upper	8637.0	PF 1	1255.00	574.68	583.02	581.83	583.06	0.000660	2.38	920.29	578.99	0.16
upper	8637.0	PF 2	970.00	574.68	582.73	581.62	582.76	0.000661	2.31	756.46	540.63	0.16
upper	8637.0	PF 3	771.00	574.68	582.46	580.77	582.50	0.000706	2.33	617.63	507.84	0.16
upper	8637.0	PF 4	565.00	574.68	582.17	579.29	582.21	0.000730	2.29	473.76	471.46	0.17
upper	8637.0	PF 5	432.00	574.68	581.98	578.70	582.02	0.000659	2.13	390.42	441.45	0.16
upper	8637.0	PF 6	282.00	574.68	581.54	577.88	581.58	0.000627	1.97	224.50	273.04	0.15
upper	8437.693	PF 1	1713.00	574.38	582.82	581.86	582.88	0.001035	3.01	982.57	593.80	0.20
upper	8437.693	PF 2	1416.00	574.38	582.51	581.75	582.57	0.001215	3.16	800.26	550.57	0.22
upper	8437.693	PF 3	1156.00	574.38	582.21	581.47	582.28	0.001447	3.35	640.42	513.37	0.24
upper	8437.693	PF 4	849.00	574.38	581.90	580.63	581.98	0.001535	3.33	487.95	475.17	0.24
upper	8437.693	PF 5	662.00	574.38	581.74	579.97	581.82	0.001337	3.06	417.30	451.60	0.22
upper	8437.693	PF 6	437.00	574.38	581.28	578.42	581.38	0.001369	2.93	237.99	280.68	0.22
upper	7999.157	PF 1	1713.00	574.04	582.58	581.07	582.61	0.000434	1.82	1523.74	1017.90	0.13
upper	7999.157	PF 2	1416.00	574.04	582.21	580.88	582.24	0.000524	1.92	1184.24	813.23	0.14
upper	7999.157	PF 3	1156.00	574.04	581.81	580.21	581.85	0.000739	2.17	881.75	689.91	0.17
upper	7999.157	PF 4	849.00	574.04	581.43	579.36	581.48	0.000913	2.29	635.11	627.18	0.18
upper	7999.157	PF 5	662.00	574.04	581.19	578.88	581.26	0.001259	2.60	362.88	252.69	0.21
upper	7999.157	PF 6	437.00	574.04	580.75	577.73	580.82	0.001196	2.37	258.96	223.36	0.21
upper	7528.747	PF 1	1713.00	573.54	582.34	580.53	582.38	0.000605	2.32	1152.08	598.49	0.15
upper	7528.747	PF 2	1416.00	573.54	581.92	580.37	581.96	0.000762	2.50	911.11	528.95	0.17
upper	7528.747	PF 3	1156.00	573.54	581.40	580.24	581.46	0.001063	2.80	669.77	419.28	0.20
upper	7528.747	PF 4	849.00	573.54	580.96	580.03	581.02	0.001153	2.78	498.82	350.22	0.20
upper	7528.747	PF 5	662.00	573.54	580.63	578.66	580.70	0.001230	2.76	392.58	306.30	0.21
upper	7528.747	PF 6	437.00	573.54	580.17	577.41	580.24	0.001342	2.72	262.98	256.69	0.21
upper	6981.270	PF 1	1713.00	573.40	582.08	579.85	582.11	0.000379	2.01	1350.28	603.34	0.13
upper	6981.270	PF 2	1416.00	573.40	581.60	579.67	581.63	0.000440	2.08	1082.02	522.21	0.14
upper	6981.270	PF 3	1156.00	573.40	580.90	579.51	580.95	0.000748	2.52	748.22	436.59	0.18
upper	6981.270	PF 4	849.00	573.40	580.35	578.15	580.41	0.000991	2.73	522.52	377.19	0.20
upper	6981.270	PF 5	662.00	573.40	580.03	577.50	580.09	0.000939	2.56	416.24	300.35	0.19
upper	6981.270	PF 6	437.00	573.40	579.50	576.64	579.57	0.001058	2.53	270.84	250.23	0.20
upper	6570.809	PF 1	1715.00	572.30	582.02	579.61	582.03	0.000148	1.42	1830.19	688.57	0.09
upper	6570.809	PF 2	1413.00	572.30	581.53	579.50	581.54	0.000179	1.49	1500.88	654.55	0.09
upper	6570.809	PF 3	1184.00	572.30	580.74	579.30	580.77	0.000396	2.07	1008.31	600.06	0.14
upper	6570.809	PF 4	878.00	572.30	580.05	578.74	580.10	0.000814	2.78	610.75	528.72	0.19
upper	6570.809	PF 5	689.00	572.30	579.58	577.04	579.69	0.001353	3.41	350.82	295.46	0.24
upper	6570.809	PF 6	459.00	572.30	578.77	576.11	578.98	0.002261	4.00	154.03	118.14	0.31

HEC-RAS Plan: Plan 10 River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chi
upper	6328.415	PF 1	1715.00	572.16	581.97	578.77	581.99	0.000192	1.68	1613.55	692.56	0.11
upper	6328.415	PF 2	1413.00	572.16	581.47	578.55	581.49	0.000239	1.80	1280.02	624.46	0.12
upper	6328.415	PF 3	1184.00	572.16	580.62	578.34	580.66	0.000482	2.35	820.85	471.31	0.16
upper	6328.415	PF 4	878.00	572.16	579.85	577.97	579.91	0.000768	2.73	514.48	330.54	0.20
upper	6328.415	PF 5	689.00	572.16	579.38	576.85	579.44	0.000740	2.54	371.60	257.12	0.19
upper	6328.415	PF 6	459.00	572.16	578.51	575.96	578.59	0.001044	2.68	225.98	139.34	0.22
upper	6238.826	PF 1	1715.00	572.16	581.96	578.77	581.98	0.000187	1.65	1606.37	691.49	0.10
upper	6238.826	PF 2	1413.00	572.16	581.45	578.56	581.48	0.000235	1.78	1271.83	619.45	0.11
upper	6238.826	PF 3	1184.00	572.16	580.59	578.35	580.64	0.000490	2.36	807.20	466.66	0.16
upper	6238.826	PF 4	878.00	572.16	579.79	577.97	579.86	0.000823	2.81	496.00	325.01	0.21
upper	6238.826	PF 5	689.00	572.16	579.32	576.85	579.39	0.000783	2.59	358.38	234.61	0.20
upper	6238.826	PF 6	459.00	572.16	578.42	575.96	578.51	0.001201	2.83	213.38	136.50	0.24
upper	6208.826	PF 1	1715.00	571.95	581.95	578.40	581.97	0.000177	1.60	1622.98	690.58	0.10
upper	6208.826	PF 2	1413.00	571.95	581.44	577.75	581.47	0.000218	1.69	1288.14	617.27	0.11
upper	6208.826	PF 3	1184.00	571.95	580.57	577.23	580.62	0.000436	2.19	821.36	463.70	0.15
upper	6208.826	PF 4	878.00	571.95	579.76	576.32	579.83	0.000692	2.52	510.13	322.40	0.19
upper	6208.826	PF 5	689.00	571.95	579.30	575.71	579.37	0.000640	2.28	373.03	177.76	0.18
upper	6208.826	PF 6	459.00	571.95	578.40	574.92	578.47	0.000689	2.30	242.24	113.55	0.18
upper	6208.527		Bridge									
upper	6198.8	PF 1	1715.00	571.95	581.95	578.40	581.97	0.000178	1.60	1619.90	690.12	0.10
upper	6198.8	PF 2	1413.00	571.95	581.44	577.75	581.46	0.000219	1.70	1284.26	615.97	0.11
upper	6198.8	PF 3	1184.00	571.95	580.56	577.23	580.60	0.000444	2.21	814.56	461.36	0.16
upper	6198.8	PF 4	878.00	571.95	579.74	576.32	579.81	0.000711	2.55	504.20	320.60	0.19
upper	6198.8	PF 5	689.00	571.95	579.28	575.71	579.34	0.000657	2.30	368.75	176.38	0.18
upper	6198.8	PF 6	459.00	571.95	578.37	574.92	578.44	0.000710	2.32	239.25	113.29	0.19
upper	6163.8	PF 1	1715.00	571.95	581.94	578.40	581.96	0.000179	1.60	1615.73	689.50	0.10
upper	6163.8	PF 2	1413.00	571.95	581.43	577.48	581.45	0.000221	1.70	1279.68	614.42	0.11
upper	6163.8	PF 3	1184.00	571.95	580.54	576.93	580.59	0.000453	2.23	807.42	458.88	0.16
upper	6163.8	PF 4	878.00	571.95	579.72	576.23	579.79	0.000739	2.59	495.49	317.92	0.20
upper	6163.8	PF 5	689.00	571.95	579.26	575.71	579.32	0.000673	2.33	366.02	205.86	0.18
upper	6163.8	PF 6	459.00	571.95	578.35	574.92	578.42	0.000733	2.35	236.21	113.03	0.19
upper	6099.642	PF 1	1715.00	571.83	581.92	578.66	581.95	0.000248	1.94	1423.44	602.12	0.12
upper	6099.642	PF 2	1413.00	571.83	581.41	578.47	581.44	0.000297	2.03	1131.11	538.79	0.13
upper	6099.642	PF 3	1184.00	571.83	580.49	578.25	580.56	0.000626	2.70	697.75	394.18	0.19
upper	6099.642	PF 4	878.00	571.83	579.64	577.20	579.74	0.000981	3.08	422.84	257.10	0.23
upper	6099.642	PF 5	689.00	571.83	579.17	576.69	579.27	0.001048	3.00	318.18	188.18	0.23
upper	6099.642	PF 6	459.00	571.83	578.24	575.71	578.36	0.001375	3.01	190.65	113.72	0.26
upper	5838.501	PF 1	1715.00	571.47	581.89	578.97	581.90	0.000125	1.45	1993.68	773.03	0.09
upper	5838.501	PF 2	1413.00	571.47	581.37	578.33	581.38	0.000151	1.52	1608.54	710.16	0.10
upper	5838.501	PF 3	1184.00	571.47	580.40	577.78	580.43	0.000369	2.18	982.41	570.31	0.15
upper	5838.501	PF 4	878.00	571.47	579.49	576.69	579.55	0.000570	2.48	572.19	352.68	0.18
upper	5838.501	PF 5	689.00	571.47	578.77	576.04	578.95	0.001517	3.72	267.28	189.18	0.28
upper	5838.501	PF 6	459.00	571.47	577.72	575.17	577.92	0.002022	3.71	139.01	65.44	0.31
upper	5775	PF 1	1715.00	571.33	581.87	578.02	581.89	0.000183	4.77	1635.38	650.81	0.11
upper	5775	PF 2	1413.00	571.33	581.35	577.65	581.37	0.000225	1.88	1308.28	602.49	0.12
upper	5775	PF 3	1184.00	571.33	580.36	577.18	580.41	0.000412	2.33	816.06	427.28	0.15
upper	5775	PF 4	878.00	571.33	579.45	576.63	579.51	0.000563	2.49	507.38	258.51	0.18
upper	5775	PF 5	689.00	571.33	578.77	576.21	578.85	0.000822	2.78	355.39	198.59	0.21
upper	5775	PF 6	459.00	571.33	577.70	575.02	577.81	0.001149	2.85	195.57	101.07	0.24
upper	5770.253		Bridge									
upper	5763	PF 1	1715.00	571.19	581.42		581.82	0.000978	5.67	432.08	146.19	0.36
upper	5763	PF 2	1413.00	571.19	580.93		581.30	0.000921	5.27	364.94	128.37	0.34
upper	5763	PF 3	1184.00	571.19	579.84		580.31	0.001342	5.72	248.06	83.54	0.40
upper	5763	PF 4	878.00	571.19	579.03		579.40	0.001254	5.05	193.66	56.14	0.38
upper	5763	PF 5	689.00	571.19	578.44		578.75	0.001181	4.55	162.82	48.76	0.36
upper	5763	PF 6	459.00	571.19	577.49		577.72	0.001125	3.85	121.43	38.54	0.34
upper	5728	PF 1	1715.00	571.11	581.39		581.78	0.000938	5.57	440.63	148.17	0.35
upper	5728	PF 2	1413.00	571.11	580.91		581.26	0.000882	5.17	372.71	130.41	0.33
upper	5728	PF 3	1184.00	571.11	579.80		580.25	0.001298	5.64	252.06	85.32	0.39
upper	5728	PF 4	878.00	571.11	578.99		579.35	0.001210	4.97	196.61	56.68	0.37
upper	5728	PF 5	689.00	571.11	578.40		578.71	0.001135	4.47	165.56	49.32	0.35
upper	5728	PF 6	459.00	571.11	577.45		577.67	0.001075	3.78	123.74	39.01	0.33
upper	5616.515	PF 1	1715.00	570.87	581.31		581.68	0.000891	5.53	458.53	153.68	0.34
upper	5616.515	PF 2	1413.00	570.87	580.82		581.16	0.000839	5.15	388.37	136.04	0.33
upper	5616.515	PF 3	1184.00	570.87	579.64		580.11	0.001317	5.77	254.11	88.82	0.40
upper	5616.515	PF 4	878.00	570.87	578.84		579.22	0.001217	5.08	197.04	57.86	0.38
upper	5616.515	PF 5	689.00	570.87	578.27		578.58	0.001136	4.56	165.77	50.62	0.36
upper	5616.515	PF 6	459.00	570.87	577.32		577.55	0.001069	3.86	123.20	40.17	0.34
upper	5575.96	PF 1	1715.00	572.53	580.67	579.10	581.56	0.002878	7.64	229.66	45.60	0.58

HEC-RAS Plan: Plan 10 River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	5575.96	PF 2	1413.00	572.53	580.39	578.61	581.07	0.002320	6.65	217.07	45.33	0.52
upper	5575.96	PF 3	1184.00	572.53	579.10	578.14	579.98	0.004176	7.52	159.54	44.07	0.68
upper	5575.96	PF 4	878.00	572.53	578.35	577.53	579.10	0.004422	6.95	127.00	40.60	0.68
upper	5575.96	PF 5	689.00	572.53	577.80	576.71	578.46	0.004644	6.53	105.71	37.60	0.68
upper	5575.96	PF 6	459.00	572.53	576.89	575.91	577.45	0.003853	5.97	76.88	26.35	0.62
upper	5570.965	PF 1	1715.00	572.53	580.84	578.08	581.47	0.001616	6.43	272.89	45.77	0.45
upper	5570.965	PF 2	1413.00	572.53	580.52	577.53	581.00	0.001292	5.58	258.41	45.46	0.40
upper	5570.965	PF 3	1184.00	572.53	579.33	577.10	579.86	0.001824	5.85	204.92	44.29	0.46
upper	5570.965	PF 4	878.00	572.53	578.57	576.41	578.98	0.001692	5.15	171.63	42.40	0.44
upper	5570.965	PF 5	689.00	572.53	578.02	575.93	578.35	0.001492	4.62	149.35	38.46	0.41
upper	5570.965	PF 6	459.00	572.53	577.10	575.27	577.34	0.001419	3.97	115.57	35.12	0.39
upper	5550.191		Bridge									
upper	5520.9	PF 1	1715.00	571.92	580.69	578.64	581.27	0.001467	6.52	289.82	401.02	0.44
upper	5520.9	PF 2	1413.00	571.92	580.41	578.18	580.85	0.001178	5.68	274.70	299.85	0.39
upper	5520.9	PF 3	1184.00	571.92	579.04	577.75	579.65	0.002142	6.55	200.95	269.72	0.51
upper	5520.9	PF 4	878.00	571.92	578.25	576.92	578.79	0.002326	6.10	158.09	170.72	0.52
upper	5520.9	PF 5	689.00	571.92	577.68	576.24	578.18	0.002490	5.75	127.45	131.72	0.52
upper	5520.9	PF 6	459.00	571.92	576.78	575.43	577.20	0.002650	5.19	90.40	54.07	0.52
upper	5456.605	PF 1	1715.00	570.68	580.96	577.22	580.98	0.000089	1.55	1606.32	475.64	0.09
upper	5456.605	PF 2	1413.00	570.68	580.61	576.99	580.63	0.000081	1.44	1443.81	458.97	0.09
upper	5456.605	PF 3	1184.00	570.68	579.30	576.67	579.33	0.000202	2.02	827.70	297.48	0.14
upper	5456.605	PF 4	878.00	570.68	578.46	575.38	578.50	0.000290	2.22	587.35	277.79	0.16
upper	5456.605	PF 5	689.00	570.68	577.84	574.71	577.91	0.000434	2.52	420.03	266.85	0.19
upper	5456.605	PF 6	459.00	570.68	576.87	573.85	576.96	0.000664	2.72	220.64	155.59	0.23
upper	5369.742	PF 1	1715.00	570.86	580.94	577.60	580.97	0.000121	1.79	1393.42	428.58	0.11
upper	5369.742	PF 2	1413.00	570.86	580.59	577.29	580.62	0.000111	1.67	1248.08	413.25	0.11
upper	5369.742	PF 3	1184.00	570.86	579.25	575.99	579.31	0.000333	2.54	727.18	360.59	0.18
upper	5369.742	PF 4	878.00	570.86	578.38	575.25	578.47	0.000478	2.77	442.85	218.66	0.21
upper	5369.742	PF 5	689.00	570.86	577.75	574.72	577.86	0.000635	2.94	315.24	187.78	0.23
upper	5369.742	PF 6	459.00	570.86	576.73	573.96	576.88	0.001026	3.20	156.14	107.87	0.29
upper	5195.169	PF 1	1715.00	570.33	580.90	577.86	580.94	0.000175	2.19	1208.57	406.60	0.13
upper	5195.169	PF 2	1413.00	570.33	580.55	577.54	580.59	0.000163	2.06	1072.18	390.05	0.13
upper	5195.169	PF 3	1184.00	570.33	579.12	576.52	579.23	0.000521	3.23	575.55	287.89	0.22
upper	5195.169	PF 4	878.00	570.33	578.19	575.48	578.34	0.000816	3.66	349.18	199.61	0.27
upper	5195.169	PF 5	689.00	570.33	577.48	574.89	577.69	0.001177	4.02	225.73	148.58	0.32
upper	5195.169	PF 6	459.00	570.33	576.41	574.08	576.65	0.001611	4.01	119.01	48.13	0.36
upper	5057.334	PF 1	1715.00	570.60	580.76	576.90	580.89	0.000456	3.52	702.96	230.85	0.21
upper	5057.334	PF 2	1413.00	570.60	580.44	576.21	580.55	0.000409	3.25	628.65	223.88	0.20
upper	5057.334	PF 3	1184.00	570.60	578.84	575.69	579.11	0.001065	4.53	341.96	146.40	0.31
upper	5057.334	PF 4	878.00	570.60	577.85	574.93	578.18	0.001416	4.69	216.15	104.65	0.35
upper	5057.334	PF 5	689.00	570.60	577.21	574.38	577.50	0.001452	4.37	163.42	54.80	0.35
upper	5057.334	PF 6	459.00	570.60	576.23	573.59	576.44	0.001332	3.66	125.26	31.05	0.32
upper	4982.6	PF 1	1715.00	570.45	580.49	576.26	580.83	0.000624	5.20	409.15	71.44	0.30
upper	4982.6	PF 2	1413.00	570.45	580.25	575.66	580.50	0.000473	4.45	392.25	69.92	0.26
upper	4982.6	PF 3	1184.00	570.45	578.73	575.17	579.04	0.000710	4.83	293.28	60.28	0.31
upper	4982.6	PF 4	878.00	570.45	577.84	574.42	578.09	0.000646	4.25	242.20	54.64	0.29
upper	4982.6	PF 5	689.00	570.45	577.21	573.91	577.41	0.000589	3.79	208.91	50.62	0.27
upper	4982.6	PF 6	459.00	570.45	576.22	573.23	576.36	0.000518	3.16	161.81	44.33	0.25
upper	4977.634	PF 1	1715.00	570.45	580.35	576.09	580.81	0.000807	5.69	424.32	430.63	0.34
upper	4977.634	PF 2	1413.00	570.45	580.10	575.54	580.48	0.000666	5.07	354.05	357.70	0.31
upper	4977.634	PF 3	1184.00	570.45	578.58	575.10	579.02	0.000959	5.34	223.16	58.73	0.36
upper	4977.634	PF 4	878.00	570.45	577.77	574.40	578.08	0.000798	4.49	197.05	53.29	0.32
upper	4977.634	PF 5	689.00	570.45	577.17	573.90	577.40	0.000690	3.90	177.90	49.30	0.29
upper	4977.634	PF 6	459.00	570.45	576.21	573.20	576.36	0.000575	3.14	147.09	42.88	0.26
upper	4959.679		Bridge									
upper	4937.6	PF 1	1715.00	570.63	579.13	576.46	580.04	0.001806	7.64	224.49	98.99	0.50
upper	4937.6	PF 2	1413.00	570.63	578.67	575.91	579.38	0.001525	6.72	210.28	94.39	0.45
upper	4937.6	PF 3	1184.00	570.63	578.26	575.46	578.82	0.001323	6.00	197.35	90.21	0.42
upper	4937.6	PF 4	878.00	570.63	577.54	574.77	577.93	0.001081	5.01	175.22	83.05	0.37
upper	4937.6	PF 5	689.00	570.63	577.00	574.26	577.29	0.000932	4.35	158.39	75.42	0.34
upper	4937.6	PF 6	459.00	570.63	576.09	573.56	576.28	0.000794	3.52	130.24	51.94	0.30
upper	4850.423	PF 1	1715.00	570.63	579.47	577.24	579.57	0.000360	3.28	832.12	313.35	0.22
upper	4850.423	PF 2	1413.00	570.63	578.90	576.90	579.02	0.000427	3.37	661.73	283.42	0.24
upper	4850.423	PF 3	1184.00	570.63	578.40	575.96	578.53	0.000513	3.50	526.20	257.14	0.26
upper	4850.423	PF 4	878.00	570.63	577.57	575.19	577.75	0.000755	3.83	330.55	203.20	0.30
upper	4850.423	PF 5	689.00	570.63	576.96	574.68	577.17	0.000944	3.92	225.16	148.01	0.33
upper	4850.423	PF 6	459.00	570.63	575.97	573.89	576.19	0.001236	3.78	124.34	51.07	0.36
upper	4773.4	PF 1	1715.00	570.20	578.58	576.30	579.44	0.001772	8.13	254.87	50.63	0.51
upper	4773.4	PF 2	1413.00	570.20	578.23	575.68	578.90	0.001442	7.12	237.66	49.09	0.46
upper	4773.4	PF 3	1184.00	570.20	577.89	575.17	578.43	0.001219	6.35	221.25	47.59	0.42

HEC-RAS Plan: Plan 10 River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	4773.4	PF 4	878.00	570.20	577.28	574.29	577.66	0.000956	5.30	192.85	45.29	0.36
upper	4773.4	PF 5	689.00	570.20	576.81	573.75	577.10	0.000771	4.54	173.09	38.68	0.32
upper	4773.4	PF 6	459.00	570.20	575.93	573.06	576.12	0.000613	3.65	140.34	35.32	0.28
upper	4768.386	PF 1	1715.00	570.20	578.56	576.30	579.43	0.001785	8.15	254.11	50.56	0.51
upper	4768.386	PF 2	1413.00	570.20	578.22	575.68	578.89	0.001450	7.13	237.11	49.05	0.46
upper	4768.386	PF 3	1184.00	570.20	577.88	575.17	578.42	0.001225	6.36	220.83	47.55	0.42
upper	4768.386	PF 4	878.00	570.20	577.27	574.29	577.66	0.000959	5.31	192.57	45.26	0.36
upper	4768.386	PF 5	689.00	570.20	576.81	573.75	577.09	0.000774	4.54	172.90	38.66	0.32
upper	4768.386	PF 6	459.00	570.20	575.92	573.06	576.11	0.000614	3.65	140.21	35.31	0.28
upper	4764.834	Bridge										
upper	4746	PF 1	1715.00	570.01	578.39	576.36	579.02	0.001991	6.58	288.55	153.07	0.49
upper	4746	PF 2	1413.00	570.01	578.12	575.80	578.61	0.001635	5.78	269.60	133.59	0.44
upper	4746	PF 3	1184.00	570.01	577.81	575.33	578.21	0.001450	5.23	247.44	113.15	0.41
upper	4746	PF 4	878.00	570.01	577.21	574.61	577.52	0.001282	4.52	205.58	78.60	0.37
upper	4746	PF 5	689.00	570.01	576.75	574.08	577.00	0.001151	4.00	175.51	57.85	0.35
upper	4746	PF 6	459.00	570.01	575.88	573.32	576.06	0.000959	3.37	136.34	38.49	0.32
upper	4676.062	PF 1	1715.00	570.01	578.25	576.36	578.88	0.002118	6.67	319.42	142.47	0.50
upper	4676.062	PF 2	1413.00	570.01	577.97	575.80	578.49	0.001789	5.93	283.13	122.79	0.45
upper	4676.062	PF 3	1184.00	570.01	577.65	575.33	578.10	0.001625	5.42	247.11	104.33	0.43
upper	4676.062	PF 4	878.00	570.01	577.08	574.61	577.42	0.001423	4.68	197.07	72.70	0.39
upper	4676.062	PF 5	689.00	570.01	576.65	574.08	576.91	0.001238	4.11	169.89	54.36	0.36
upper	4676.062	PF 6	459.00	570.01	575.80	573.32	575.99	0.001016	3.44	133.26	38.07	0.32
upper	4553.983	PF 1	1748.00	570.26	578.20	578.59	578.59	0.001629	5.78	444.19	193.73	0.44
upper	4553.983	PF 2	1438.00	570.26	577.92	578.24	578.24	0.001401	5.17	393.72	169.11	0.40
upper	4553.983	PF 3	1208.00	570.26	577.58	577.87	577.87	0.001348	4.85	340.53	148.44	0.39
upper	4553.983	PF 4	896.00	570.26	576.97	577.23	577.23	0.001381	4.48	257.89	121.86	0.39
upper	4553.983	PF 5	704.00	570.26	576.51	576.75	576.75	0.001381	4.20	206.37	102.28	0.38
upper	4553.983	PF 6	470.00	570.26	575.57	575.82	575.82	0.001769	4.11	125.96	69.46	0.42
upper	4528	PF 1	1748.00	570.18	578.23	578.52	578.52	0.001456	5.09	485.10	196.65	0.37
upper	4528	PF 2	1438.00	570.18	577.94	578.18	578.18	0.001240	4.54	433.19	170.70	0.34
upper	4528	PF 3	1208.00	570.18	577.60	577.82	577.82	0.001175	4.24	379.35	149.37	0.33
upper	4528	PF 4	896.00	570.18	576.99	577.17	577.17	0.001141	3.84	296.40	122.48	0.32
upper	4528	PF 5	704.00	570.18	576.53	576.69	576.69	0.001148	3.59	243.01	108.35	0.31
upper	4528	PF 6	470.00	570.18	575.57	575.75	575.75	0.001524	3.60	152.22	82.91	0.35
upper	4247.029	PF 1	1748.00	570.01	578.38	578.38	578.41	0.000219	1.79	1242.12	385.30	0.14
upper	4247.029	PF 2	1438.00	570.01	578.06	575.82	578.09	0.000199	1.65	1123.63	369.49	0.13
upper	4247.029	PF 3	1208.00	570.01	577.71	575.37	577.74	0.000205	1.61	993.94	364.06	0.13
upper	4247.029	PF 4	896.00	570.01	577.07	574.69	577.10	0.000254	1.67	762.57	360.12	0.15
upper	4247.029	PF 5	704.00	570.01	576.23	574.22	576.58	0.002153	4.78	147.40	319.84	0.42
upper	4247.029	PF 6	470.00	570.01	575.40	573.48	575.65	0.001864	4.00	117.47	221.68	0.38
upper	4154.359	PF 1	1748.00	569.90	578.32	576.31	578.40	0.000505	2.75	850.71	355.90	0.22
upper	4154.359	PF 2	1438.00	569.90	578.00	575.76	578.08	0.000496	2.66	740.84	342.52	0.22
upper	4154.359	PF 3	1208.00	569.90	577.64	575.31	577.72	0.000554	2.74	619.85	323.51	0.23
upper	4154.359	PF 4	896.00	569.90	576.97	574.62	577.07	0.000768	3.05	418.06	274.59	0.27
upper	4154.359	PF 5	704.00	569.90	576.17	574.11	576.49	0.001951	4.52	155.70	200.58	0.42
upper	4154.359	PF 6	470.00	569.90	575.34	573.37	575.57	0.001695	3.87	121.43	63.49	0.38
upper	4084	PF 1	1748.00	569.87	578.32	576.27	578.39	0.000516	2.63	861.32	359.81	0.21
upper	4084	PF 2	1438.00	569.87	578.00	575.74	578.07	0.000533	2.58	748.13	358.39	0.22
upper	4084	PF 3	1208.00	569.87	577.64	575.29	577.71	0.000599	2.67	620.28	330.70	0.23
upper	4084	PF 4	896.00	569.87	576.56	574.59	576.97	0.002649	5.14	174.28	243.95	0.47
upper	4084	PF 5	704.00	569.87	576.15	574.07	576.47	0.002194	4.51	156.14	196.62	0.42
upper	4084	PF 6	470.00	569.87	575.32	573.34	575.55	0.001895	3.85	121.94	55.32	0.38
upper	4064	Inl Struct										
upper	4014	PF 1	1748.00	569.69	578.28	578.36	578.36	0.000492	2.75	847.45	346.10	0.22
upper	4014	PF 2	1438.00	569.69	577.98	578.05	578.05	0.000476	2.65	744.16	337.87	0.22
upper	4014	PF 3	1208.00	569.69	577.61	577.69	577.69	0.000536	2.73	623.17	324.56	0.23
upper	4014	PF 4	896.00	569.69	576.82	576.94	576.94	0.000866	3.25	388.27	265.32	0.29
upper	4014	PF 5	704.00	569.69	576.08	576.31	576.31	0.001518	4.03	215.02	181.90	0.37
upper	4014	PF 6	470.00	569.69	575.23	575.45	575.45	0.001557	3.75	125.32	39.24	0.37
upper	3969.194	PF 1	1748.00	569.57	578.17	578.31	578.31	0.000924	3.57	667.43	323.51	0.29
upper	3969.194	PF 2	1438.00	569.57	577.87	578.00	578.00	0.000896	3.43	573.75	300.92	0.28
upper	3969.194	PF 3	1208.00	569.57	577.49	577.64	577.64	0.001001	3.51	465.63	265.59	0.29
upper	3969.194	PF 4	896.00	569.57	576.62	576.86	576.86	0.001617	4.14	268.17	187.81	0.37
upper	3969.194	PF 5	704.00	569.57	575.90	576.21	576.21	0.002115	4.45	158.33	47.25	0.41
upper	3969.194	PF 6	470.00	569.57	575.16	575.37	575.37	0.001684	3.69	127.46	39.57	0.36
upper	3735	PF 1	1748.00	569.25	578.20	575.87	578.24	0.000232	2.05	1129.55	391.04	0.15
upper	3735	PF 2	1438.00	569.25	577.90	575.11	577.93	0.000211	1.91	1015.15	377.60	0.14
upper	3735	PF 3	1208.00	569.25	577.53	574.88	577.56	0.000222	1.90	877.94	360.82	0.15
upper	3735	PF 4	896.00	569.25	576.68	574.32	576.73	0.000357	2.22	588.72	322.61	0.18
upper	3735	PF 5	704.00	569.25	575.94	573.44	576.03	0.000671	2.83	364.37	267.31	0.24

HEC-RAS Plan: Plan 10 River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	3735	PF 6	470.00	569.25	575.10	572.71	575.22	0.000897	2.97	189.77	107.22	0.28
upper	3720		Inl Struct									
upper	3658.847	PF 1	1847.00	569.10	578.16		578.22	0.000339	2.48	997.36	355.17	0.18
upper	3658.847	PF 2	1516.00	569.10	577.87		577.92	0.000304	2.29	896.71	342.14	0.17
upper	3658.847	PF 3	1211.00	569.10	577.50		577.55	0.000290	2.16	772.08	325.28	0.17
upper	3658.847	PF 4	918.00	569.10	576.65		576.72	0.000482	2.57	511.75	286.87	0.21
upper	3658.847	PF 5	724.00	569.10	575.87		576.01	0.000937	3.28	304.02	235.30	0.28
upper	3658.847	PF 6	490.00	569.10	574.99		575.18	0.001309	3.48	147.42	68.52	0.33
upper	3449	PF 1	1847.00	568.49	578.03	575.30	578.14	0.000427	3.25	788.66	251.02	0.21
upper	3449	PF 2	1516.00	568.49	577.76	574.67	577.85	0.000364	2.92	722.27	245.23	0.20
upper	3449	PF 3	1211.00	568.49	577.40	573.96	577.48	0.000326	2.67	635.40	237.43	0.18
upper	3449	PF 4	918.00	568.49	576.51	573.31	576.61	0.000487	2.96	431.84	218.09	0.22
upper	3449	PF 5	724.00	568.49	575.65	572.74	575.82	0.000811	3.42	260.66	165.75	0.28
upper	3449	PF 6	490.00	568.49	574.82	572.01	574.95	0.000789	2.96	178.99	77.70	0.26
upper	3430		Inl Struct									
upper	3411.962	PF 1	1847.00	568.38	577.99	575.26	578.11	0.000417	3.32	782.95	250.21	0.22
upper	3411.962	PF 2	1516.00	568.38	577.72	574.55	577.82	0.000355	2.99	716.48	244.39	0.20
upper	3411.962	PF 3	1211.00	568.38	577.38	573.84	577.46	0.000313	2.71	633.31	236.91	0.19
upper	3411.962	PF 4	918.00	568.38	576.44	573.15	576.59	0.000551	3.25	324.92	216.73	0.24
upper	3411.962	PF 5	724.00	568.38	575.61	572.65	575.77	0.000702	3.29	250.15	160.04	0.27
upper	3411.962	PF 6	490.00	568.38	574.76	571.93	574.89	0.000734	2.96	178.19	75.74	0.26
upper	3367.5	PF 1	1847.00	568.84	577.92		578.07	0.000645	3.87	739.18	338.16	0.25
upper	3367.5	PF 2	1516.00	568.84	577.65		577.79	0.000581	3.58	649.74	320.57	0.24
upper	3367.5	PF 3	1211.00	568.84	577.30		577.43	0.000540	3.34	543.18	291.60	0.23
upper	3367.5	PF 4	918.00	568.84	576.34		576.55	0.000883	3.84	302.87	195.06	0.28
upper	3367.5	PF 5	724.00	568.84	575.48		575.71	0.001139	3.91	192.24	62.11	0.31
upper	3367.5	PF 6	490.00	568.84	574.69		574.85	0.000974	3.21	155.08	43.41	0.28
upper	3362.576	PF 1	1847.00	568.84	577.92		578.07	0.000647	3.88	737.94	338.10	0.25
upper	3362.576	PF 2	1516.00	568.84	577.65		577.79	0.000583	3.59	648.72	320.31	0.24
upper	3362.576	PF 3	1211.00	568.84	577.30		577.43	0.000542	3.34	542.32	291.36	0.23
upper	3362.576	PF 4	918.00	568.84	576.33		576.54	0.000888	3.85	301.89	194.33	0.29
upper	3362.576	PF 5	724.00	568.84	575.47		575.71	0.001144	3.91	191.84	61.17	0.32
upper	3362.576	PF 6	490.00	568.84	574.69		574.85	0.000979	3.21	154.84	43.39	0.28
upper	3350.083	PF 1	1847.00	569.03	577.96	574.41	578.02	0.000234	2.42	1040.07	303.21	0.15
upper	3350.083	PF 2	1516.00	569.03	577.69	573.86	577.74	0.000200	2.19	959.17	296.53	0.14
upper	3350.083	PF 3	1211.00	569.03	577.34	573.30	577.38	0.000178	2.00	856.26	293.78	0.13
upper	3350.083	PF 4	918.00	569.03	576.40	572.65	576.46	0.000287	2.32	586.05	280.37	0.16
upper	3350.083	PF 5	724.00	569.03	575.48	572.20	575.68	0.000848	3.58	204.76	234.45	0.27
upper	3350.083	PF 6	490.00	569.03	574.69	571.58	574.82	0.000667	2.86	172.76	89.85	0.24
upper	3340	PF 1	1847.00	569.03	577.91	574.40	578.00	0.000335	2.89	895.03	279.84	0.18
upper	3340	PF 2	1516.00	569.03	577.65	573.84	577.72	0.000285	2.60	822.66	275.13	0.17
upper	3340	PF 3	1211.00	569.03	577.31	573.30	577.36	0.000252	2.37	730.10	268.99	0.16
upper	3340	PF 4	918.00	569.03	576.35	572.65	576.43	0.000404	2.73	484.10	245.14	0.19
upper	3340	PF 5	724.00	569.03	575.42	572.20	575.63	0.000890	3.65	201.06	187.81	0.28
upper	3340	PF 6	490.00	569.03	574.65	571.58	574.78	0.000695	2.90	170.22	79.12	0.24
upper	3338	PF 1	1847.00	569.03	577.92	574.41	577.98	0.000242	2.46	1028.63	301.35	0.15
upper	3338	PF 2	1516.00	569.03	577.66	573.86	577.71	0.000206	2.22	949.69	296.28	0.14
upper	3338	PF 3	1211.00	569.03	577.31	573.30	577.35	0.000183	2.02	848.04	293.56	0.13
upper	3338	PF 4	918.00	569.03	576.36	572.65	576.42	0.000303	2.37	572.96	279.44	0.17
upper	3338	PF 5	724.00	569.03	575.42	572.20	575.62	0.000882	3.63	202.22	230.86	0.28
upper	3338	PF 6	490.00	569.03	574.65	571.58	574.77	0.000691	2.89	170.89	88.16	0.24
upper	3336.833		Bridge									
upper	3292	PF 1	1847.00	568.65	577.08	574.88	577.13	0.000222	2.13	1051.13	314.50	0.15
upper	3292	PF 2	1516.00	568.65	576.67	574.31	576.62	0.000235	2.08	910.01	308.65	0.15
upper	3292	PF 3	1211.00	568.65	576.32	573.74	576.36	0.000299	2.16	728.74	301.05	0.17
upper	3292	PF 4	918.00	568.65	575.15	573.14	575.67	0.002222	5.79	159.30	292.20	0.45
upper	3292	PF 5	724.00	568.65	574.72	572.71	575.11	0.001866	5.01	145.55	287.22	0.41
upper	3292	PF 6	490.00	568.65	574.28	572.12	574.49	0.001205	3.76	131.21	282.02	0.32
upper	3239.315	PF 1	1847.00	568.65	577.06		577.11	0.000318	2.23	1141.75	316.73	0.16
upper	3239.315	PF 2	1516.00	568.65	576.56		576.60	0.000338	2.17	982.83	310.81	0.16
upper	3239.315	PF 3	1211.00	568.65	576.30		576.35	0.000430	2.26	780.21	303.10	0.17
upper	3239.315	PF 4	918.00	568.65	575.34		575.39	0.000497	2.26	612.90	296.58	0.18
upper	3239.315	PF 5	724.00	568.65	574.83		574.89	0.000662	2.41	463.95	290.65	0.21
upper	3239.315	PF 6	490.00	568.65	574.30		574.37	0.000790	2.41	310.72	284.42	0.22
upper	3047.894	PF 1	1847.00	567.96	576.98	574.57	577.04	0.000406	2.49	988.48	267.17	0.17
upper	3047.894	PF 2	1516.00	567.96	576.47	573.97	576.53	0.000428	2.41	853.48	263.34	0.18
upper	3047.894	PF 3	1211.00	567.96	575.79	573.42	575.85	0.000549	2.52	675.61	258.21	0.20
upper	3047.894	PF 4	918.00	567.96	575.21	572.81	575.28	0.000639	2.51	528.72	253.90	0.21
upper	3047.894	PF 5	724.00	567.96	574.66	572.33	574.74	0.000904	2.74	388.58	249.71	0.24

HEC-RAS Plan: Plan 10 River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	3047.894	PF 6	490.00	567.96	573.97	571.63	574.15	0.001648	3.34	147.95	46.52	0.32
upper	2776.037	PF 1	1847.00	567.68	576.87	573.92	576.94	0.000392	2.59	962.68	275.38	0.17
upper	2776.037	PF 2	1516.00	567.68	576.36	573.72	576.42	0.000394	2.47	827.73	253.53	0.17
upper	2776.037	PF 3	1211.00	567.68	575.66	573.49	575.72	0.000462	2.48	661.06	221.83	0.18
upper	2776.037	PF 4	918.00	567.68	575.08	572.47	575.13	0.000465	2.32	540.64	199.17	0.18
upper	2776.037	PF 5	724.00	567.68	574.49	571.99	574.55	0.000570	2.37	425.41	190.78	0.20
upper	2776.037	PF 6	490.00	567.68	573.77	571.28	573.83	0.000719	2.37	290.70	183.86	0.21
upper	2556.718	PF 1	1847.00	566.96	576.73	574.14	576.83	0.000614	2.98	755.72	190.35	0.21
upper	2556.718	PF 2	1516.00	566.96	576.23	573.28	576.32	0.000616	2.82	660.93	184.97	0.21
upper	2556.718	PF 3	1211.00	566.96	575.50	572.67	575.60	0.000757	2.84	529.88	177.27	0.23
upper	2556.718	PF 4	918.00	566.96	574.92	571.97	575.01	0.000809	2.70	428.40	171.07	0.23
upper	2556.718	PF 5	724.00	566.96	574.28	571.42	574.38	0.001052	2.89	320.41	165.45	0.26
upper	2556.718	PF 6	490.00	566.96	573.46	570.58	573.61	0.001452	3.13	158.14	53.52	0.30
upper	2496.623	PF 1	1847.00	567.16	576.31	573.21	576.74	0.002074	5.53	359.72	65.89	0.37
upper	2496.623	PF 2	1516.00	567.16	575.90	572.75	576.24	0.001728	4.89	332.94	64.06	0.34
upper	2496.623	PF 3	1211.00	567.16	575.24	572.32	575.52	0.001588	4.43	291.95	57.15	0.32
upper	2496.623	PF 4	918.00	567.16	574.74	571.67	574.94	0.001228	3.72	263.90	55.84	0.28
upper	2496.623	PF 5	724.00	567.16	574.16	571.17	574.31	0.001122	3.34	231.64	54.29	0.26
upper	2496.623	PF 6	490.00	567.16	573.43	570.43	573.53	0.000885	2.72	192.72	52.36	0.23
upper	2474.915											
upper	2431.6	PF 1	1847.00	566.74	576.09		576.27	0.001908	4.19	575.09	199.96	0.26
upper	2431.6	PF 2	1516.00	566.74	575.71		575.88	0.001897	4.05	500.92	193.23	0.26
upper	2431.6	PF 3	1211.00	566.74	575.02		575.21	0.002406	4.28	375.66	157.86	0.28
upper	2431.6	PF 4	918.00	566.74	574.55		574.72	0.002156	3.88	307.80	135.24	0.26
upper	2431.6	PF 5	724.00	566.74	573.92		574.13	0.002851	4.17	226.63	118.80	0.30
upper	2431.6	PF 6	490.00	566.74	573.18		573.38	0.002987	3.91	151.46	78.49	0.30
upper	2333.996	PF 1	1847.00	566.37	576.02		576.10	0.000777	2.87	849.53	274.17	0.17
upper	2333.996	PF 2	1516.00	566.37	575.64		575.72	0.000750	2.73	747.90	265.20	0.17
upper	2333.996	PF 3	1211.00	566.37	574.92		575.01	0.001015	2.99	562.50	237.24	0.19
upper	2333.996	PF 4	918.00	566.37	574.46		574.54	0.000877	2.66	464.30	197.69	0.18
upper	2333.996	PF 5	724.00	566.37	573.81		573.90	0.001108	2.80	345.61	172.45	0.20
upper	2333.996	PF 6	490.00	566.37	573.06		573.15	0.001229	2.71	231.20	129.02	0.20
upper	1880.086	PF 1	1847.00	565.58	575.80	572.64	575.84	0.000406	2.03	1113.85	333.93	0.13
upper	1880.086	PF 2	1516.00	565.58	575.44	571.77	575.48	0.000354	1.84	999.70	308.92	0.12
upper	1880.086	PF 3	1211.00	565.58	574.67	571.11	574.71	0.000421	1.87	780.50	264.17	0.13
upper	1880.086	PF 4	918.00	565.58	574.25	570.39	574.28	0.000366	1.67	672.63	248.18	0.12
upper	1880.086	PF 5	724.00	565.58	573.51	569.86	573.55	0.000522	1.84	499.41	223.97	0.14
upper	1880.086	PF 6	490.00	565.58	572.64	569.11	572.69	0.000793	2.04	316.75	196.36	0.16
upper	1595.417	PF 1	1847.00	565.80	575.71	572.18	575.75	0.000257	1.64	1291.43	342.61	0.10
upper	1595.417	PF 2	1516.00	565.80	575.37	571.20	575.40	0.000228	1.50	1174.27	336.03	0.10
upper	1595.417	PF 3	1211.00	565.80	574.58	570.62	574.61	0.000299	1.60	913.52	320.91	0.11
upper	1595.417	PF 4	918.00	565.80	574.17	570.01	574.19	0.000261	1.43	783.62	311.46	0.10
upper	1595.417	PF 5	724.00	565.80	573.39	569.55	573.42	0.000394	1.62	553.71	279.48	0.12
upper	1595.417	PF 6	490.00	565.80	572.46	568.81	572.50	0.000581	1.75	348.39	184.38	0.14
upper	1345.156	PF 1	1847.00	564.77	575.66		575.68	0.000202	1.55	1588.56	477.05	0.09
upper	1345.156	PF 2	1516.00	564.77	575.32		575.34	0.000182	1.43	1429.20	458.94	0.08
upper	1345.156	PF 3	1211.00	564.77	574.50		574.53	0.000255	1.59	1073.03	413.02	0.10
upper	1345.156	PF 4	918.00	564.77	574.10		574.12	0.000224	1.44	912.71	383.90	0.09
upper	1345.156	PF 5	724.00	564.77	573.29		573.31	0.000350	1.68	627.28	316.49	0.11
upper	1345.156	PF 6	490.00	564.77	572.30		572.34	0.000561	1.93	360.27	225.66	0.14
upper	1284.870	PF 1	1847.00	568.19	575.64	572.52	575.67	0.000263	1.44	1482.02	476.19	0.10
upper	1284.870	PF 2	1516.00	568.19	575.30	572.33	575.32	0.000245	1.34	1323.60	458.16	0.10
upper	1284.870	PF 3	1211.00	568.19	574.48	572.04	574.51	0.000385	1.52	965.22	411.53	0.12
upper	1284.870	PF 4	918.00	568.19	574.08	571.77	574.10	0.000363	1.39	806.28	382.26	0.12
upper	1284.870	PF 5	724.00	568.19	573.25	571.54	573.28	0.000738	1.74	516.70	313.41	0.16
upper	1284.870	PF 6	490.00	568.19	572.20	571.24	572.28	0.002333	2.48	239.56	216.75	0.27
upper	1173	PF 1	1847.00	567.02	575.63	571.49	575.64	0.000137	1.43	2072.41	546.69	0.09
upper	1173	PF 2	1516.00	567.02	575.29	571.28	575.30	0.000118	1.29	1891.44	525.25	0.09
upper	1173	PF 3	1211.00	567.02	574.47	571.00	574.48	0.000147	1.32	1478.87	475.84	0.09
upper	1173	PF 4	918.00	567.02	574.07	570.69	574.08	0.000122	1.15	1293.88	454.70	0.08
upper	1173	PF 5	724.00	567.02	573.23	570.44	573.24	0.000186	1.27	931.11	405.79	0.10
upper	1173	PF 6	490.00	567.02	572.16	570.10	572.18	0.000333	1.45	543.57	320.43	0.13
upper	1163.470											
upper	1145	PF 1	1847.00	566.85	574.70	574.70	575.62	0.009000	8.55	283.51	143.59	0.65
upper	1145	PF 2	1516.00	566.85	574.31	574.31	575.26	0.008731	8.34	231.13	127.19	0.64
upper	1145	PF 3	1211.00	566.85	572.76	572.21	574.47	0.016118	10.48	116.03	28.46	0.84
upper	1145	PF 4	918.00	566.85	572.41	571.44	573.55	0.011668	8.58	107.04	23.73	0.71
upper	1145	PF 5	724.00	566.85	572.06	570.88	572.89	0.009157	7.33	98.76	23.46	0.63
upper	1145	PF 6	490.00	566.85	571.42	570.09	571.95	0.006707	5.83	84.08	22.97	0.54

HEC-RAS Plan: Plan 10 River: dietrich creek Reach: upper (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
upper	854.3359	PF 1	1847.00	563.77	572.83	571.61	573.00	0.001771	4.34	665.93	332.45	0.30
upper	854.3359	PF 2	1516.00	563.77	572.48	570.05	572.65	0.001751	4.15	556.05	289.93	0.29
upper	854.3359	PF 3	1211.00	563.77	572.16	569.13	572.39	0.002172	4.47	366.99	168.12	0.32
upper	854.3359	PF 4	918.00	563.77	571.77	568.36	571.97	0.001887	3.98	305.68	150.45	0.30
upper	854.3359	PF 5	724.00	563.77	571.47	567.79	571.64	0.001596	3.59	262.42	137.22	0.27
upper	854.3359	PF 6	490.00	563.77	570.94	567.02	571.08	0.001175	3.04	195.96	113.17	0.23
upper	367.3467	PF 1	2410.00	564.37	572.08	570.59	572.20	0.001463	3.69	925.32	383.84	0.28
upper	367.3467	PF 2	1971.00	564.37	571.77	570.31	571.87	0.001367	3.43	810.09	354.32	0.27
upper	367.3467	PF 3	1574.00	564.37	571.43	570.06	571.53	0.001350	3.26	695.98	339.34	0.26
upper	367.3467	PF 4	1196.00	564.37	571.07	569.71	571.15	0.001370	3.12	574.17	327.23	0.26
upper	367.3467	PF 5	951.00	564.37	570.80	569.37	570.87	0.001401	3.03	485.67	318.15	0.26
upper	367.3467	PF 6	647.00	564.37	570.36	569.08	570.43	0.001351	2.76	355.11	265.33	0.25
upper	0	PF 1	2410.00	563.56	571.59	570.09	571.69	0.001283	3.44	1025.31	485.53	0.26
upper	0	PF 2	1971.00	563.56	571.29	569.88	571.38	0.001282	3.31	882.88	458.86	0.26
upper	0	PF 3	1574.00	563.56	570.95	569.72	571.04	0.001282	3.16	738.52	411.80	0.25
upper	0	PF 4	1196.00	563.56	570.58	569.50	570.66	0.001284	3.00	594.82	364.55	0.25
upper	0	PF 5	951.00	563.56	570.30	569.24	570.38	0.001283	2.87	497.21	332.75	0.25
upper	0	PF 6	647.00	563.56	569.87	568.54	569.94	0.001282	2.67	365.55	281.10	0.24

APPENDIX G

DAMAGES

PROPOSED CONDITIONS

1

STATION	A.A.D.	STRS	100.00-YEAR \$DAMAGE	50.00-YEAR STRS \$DAMAGE	25.00-YEAR STRS \$DAMAGE	10.00-YEAR STRS \$DAMAGE	5.00-YEAR STRS \$DAMAGE	2.00-YEAR STRS \$DAMAGE
.000								
367.347								
854.336								
1145.000								
1173.000								
1284.870								
1345.156								
1595.417								
1880.086								
2333.996								
2431.600								
2496.623								
2556.718								
2776.037								
3047.894								
3239.315								
3292.000								
3338.000								
3340.000								
3350.083								
3362.576								
3367.500								
3411.962								
3449.000								
3658.847								
3735.000								
3969.194								
4014.000								
4084.000								
4154.359								
4247.029								
4528.000								
4553.983								
4676.062								
4746.000								
210.	1	2006.	1	1849.	1	1645.	1	1076.
290.	2	6637.	2	2592.				
312.	4	7069.	3	2910.	2	1902.		

1

SUMMARY OF FLOOD DAMAGES

FREQUENCY (YEARS)	NUMBER OF STRUCTURES	STRUCTURE DAMAGES	CONTENTS DAMAGES	TOTAL DAMAGES
100.00	25	83561.	26589.	110150.
50.00	23	56854.	17765.	74619.
25.00	14	11953.	3603.	15555.
10.00	5	3752.	1025.	4777.
5.00	2	1481.	407.	1888.
2.00	0	0.	0.	0.

TOTAL A.A.D. FOR 25 STRUCTURES IS 4153.53
 INDIRECT DAMAGES (AT 15.00%) = 623.03
 TOTAL DAMAGES (DIRECT + INDIRECT) = 4776.56
 CAPITALIZED DAMAGES (4.63% FOR 50 YEARS) = 92506.69

A AAD CALCULATION ASSUMES 0 DAMAGES AT 1 YEAR EVENT

APPENDIX H
BENEFITS AND COSTS

ALTERNATIVE 3

100-YEAR LEVEE PROJECT

DIETERICH FLOOD CONTROL PROJECT BENEFIT/COSTS SUMMARY

COSTS AND BENEFITS UPDATED TO OCTOBER 2016 DOLLARS

CONSTRUCTION COSTS				\$399,735.98
TOTAL FIRST COST				\$578,279.03
AVERAGE ANNUAL COST				\$21,944.53
AT 2.875 % FOR 50 YEARS				2.875%
CRF				0.037948
ANNUAL O & M				\$2,194.45
(10%)				
TOTAL ANNUAL COSTS				\$24,138.99
TOTAL ANNUAL BENEFITS				\$8,267.02
BENEFIT COST RATIO				0.34

ALTERNATIVE 4

50-YEAR LEVEE PROJECT

DIETERICH FLOOD CONTROL PROJECT BENEFIT/COSTS SUMMARY

COSTS AND BENEFITS UPDATED TO OCTOBER 2016 DOLLARS

CONSTRUCTION COSTS				\$362,903.28
TOTAL FIRST COST				\$446,868.42
AVERAGE ANNUAL COST				\$16,957.76
AT 2.875 % FOR 50 YEARS				2.875%
CRF				0.037948
ANNUAL O & M				\$1,695.78
	-10%			
TOTAL ANNUAL COSTS				\$18,653.54
TOTAL ANNUAL BENEFITS				\$6,062.75
BENEFIT COST RATIO				0.33

ALTERNATIVE 5

25-YEAR LEVEE PROJECT

DIETERICH FLOOD CONTROL PROJECT BENEFIT/COSTS SUMMARY

COSTS AND BENEFITS UPDATED TO OCTOBER 2016 DOLLARS

CONSTRUCTION COSTS				\$ 304,494.42
TOTAL FIRST COST				\$ 359,208.24
AVERAGE ANNUAL COST				\$ 13,631.23
AT 2.875 % FOR 50 YEARS				2.875%
CRF				0.0379480
ANNUAL O & M				\$ 1,363.12
(10%)				
TOTAL ANNUAL COSTS				\$ 14,994.36
TOTAL ANNUAL BENEFITS				\$ 5,043.03
BENEFIT COST RATIO				\$ 0.34

ALTERNATIVE 6

DIETERICH FLOOD CONTROL PROJECT BENEFIT/COSTS SUMMARY

**PROPOSED CHANNEL IMPROVEMENT/REPLACE VIRGINIA ST. BRIDGE
WITH TRIPLE 12' X 8' RC BOX CULVERTS
CONSTRUCT SUPPLEMENTAL 12' X 9' RC BOX CULVERT AT SECTION ST.**

COSTS AND BENEFITS UPDATED TO OCTOBER 2016 DOLLARS

CONSTRUCTION COSTS				\$ 684,313.11
TOTAL FIRST COST				\$ 687,623.23
AVERAGE ANNUAL COST				\$ 26,093.93
AT 2.875 % FOR 50 YEARS				2.875%
CRF				0.0379480
ANNUAL O & M				\$ 2,609.39
TOTAL ANNUAL COSTS				\$ 28,703.32
TOTAL ANNUAL BENEFITS				\$ 4,410.63
BENEFIT COST RATIO				\$ 0.15

ALTERNATIVE 7

DIETERICH FLOOD CONTROL PROJECT BENEFIT/COSTS SUMMARY

OWR M&G FINAL PLAN 10 WITH RIPRAP

**REMOVE VIRGINIA ST. BRIDGE/CHANNEL IMPROVEMENT
OPEN CUT THROUGH VIRGINIA ST. AND CLOSE ST.**

COSTS AND BENEFITS UPDATED TO OCTOBER 2016 DOLLARS

CONSTRUCTION COSTS				\$ 410,081.00
TOTAL FIRST COST				\$ 416,039.23
AVERAGE ANNUAL COST				\$ 15,787.86
AT 2.875 % FOR 50 YEARS				2.875%
CRF				0.0379480
ANNUAL O & M				\$ 1,578.79
(10%)				
TOTAL ANNUAL COSTS				\$ 17,366.64
TOTAL ANNUAL BENEFITS				\$ 3,855.67
BENEFIT COST RATIO				\$ 0.22

ALTERNATIVE 8

DIETERICH FLOOD CONTROL PROJECT BENEFIT/COSTS SUMMARY

**REMOVE VIRGINIA ST. BRIDGE/CHANNEL IMPROVEMENT
OPEN CUT THROUGH VIRGINIA ST. AND CLOSE ST.**

PLAN 19 FINAL REDUCED RIPRAP

COSTS AND BENEFITS UPDATED TO OCTOBER 2016 DOLLARS

CONSTRUCTION COSTS				\$ 256,977.25
TOTAL FIRST COST				\$ 261,153.10
AVERAGE ANNUAL COST				\$ 9,910.24
AT 2.875 % FOR 50 YEARS				2.875%
CRF				0.0379480
ANNUAL O & M				\$ 991.02
(10%)				
TOTAL ANNUAL COSTS				\$ 10,901.26
TOTAL ANNUAL BENEFITS				\$ 1,112.53
BENEFIT COST RATIO				\$ 0.10

DIETERICH

ALTERNATIVES ECONOMIC ANALYSIS

**DAMAGES ARE AVERAGE ANNUAL DAMAGES (AAD)
BENEFITS ARE AVERAGE ANNUAL BENEFITS (AAB)**

AAD INCLUDE 15% NON-TANGIBLE DAMAGES

INTEREST RATE 2.875 PERCENT FY 2020

TOTAL RESIDENCES DAMAGED = 14
TOTAL GARAGES/STORAGE STRUCTURES DAMAGED = 13
CHURCH STRUCTURES DAMAGED = 1
APARTMENT COMPLEXES DAMAGED = 1

SELECT PLAN 10

ALTERNATIVES	AAD OCT 2016 DOLLARS	AAB OCT 2016 DOLLARS	# STRUCTURES DAMAGED	CAPITALIZED BENEFITS OCT 2016 DOLLARS	FLOOD EASEMENT COSTS	PROJECT COSTS OCT 2016 DOLLARS	B/C RATIO	COSTS LESS CAPITALIZED BENEFITS (DIETERICH) (COSTS)
(NONE) EXISTING	\$9,104.33	\$0.00	29	\$0	\$0	\$0	0.00	\$0
ALTERNATIVE 3 100-YEAR LEVEE AVG. HEIGHT. -- 4.65 FT. LENGTH -- 4,167 FT. VOLUME -- 13,605 CU.YD. R.O.W. 2.6 AC.	\$837.31	\$8,267.02	7	\$217,850.77	\$159,700.80	\$578,279.03	0.34	\$360,428.26
ALTERNATIVE 4 50-YEAR LEVEE AVG. HEIGHT. -- 3.95 FT. LENGTH -- 4,167 FT. VOLUME -- 8,165 CU.YD. R.O.W. -- 2.1 AC.	\$3,041.58	\$6,062.75	29	\$159,764.31	\$69,706.14	\$446,868.42	0.33	\$287,104.11
ALTERNATIVE 5 25-YEAR LEVEE AVG. HEIGHT. -- 3.2 FT. LENGTH -- 4,167 VOLUME -- 6,440 CU.YD. R.O.W. -- 2.1 AC.	\$4,061.30	\$5,043.03	29	\$132,892.87	\$42,491.82	\$359,208.24	0.34	\$226,315.37
ALTERNATIVE 6 PROPOSED VIRGINIA ST. RELOCATION/CHANNEL REALIGN TRIPLE 12' X 8' RC BOX CULVERTS 1-SUPPLEMENTAL 12' X 9' RC BOX AT SECTION ST. Prop_Conditions_VirginiaSt_D.prj	\$4,693.70	\$4,410.63	27	\$116,228.00	\$0.00	\$687,623.23	0.15	\$571,395.23
ALTERNATIVE 7 PLAN 10 FINAL WITH RIPRAP WITH RIPRAP CHANNEL UPSTREAM PROPOSED CLOSE VIRGINIA ST RELOCATION / CHANNEL REALIGN DO NOT FILL FLOODPLAIN Prop_Conditions_VirginiaSt_E3.prj	\$5,248.66	\$3,855.67	25	\$101,603.81	\$0.00	\$416,039.23	0.22	\$314,435.42
ALTERNATIVE 8 OWR / M & G ENGINEERS FINAL PLAN 19 FINAL REDUCED RIPRAP ADD 2 INLINE STRUCTURES TO REDUCE VELOCITIES TO REDUCE RIPRAP REQUIRED PROPOSED CLOSE VIRGINIA ST RELOCATION / CHANNEL REALIGN DO NOT FILL FLOODPLAIN Prop_Conditions_VirginiaSt_E3.prj	\$8,781.68	\$322.65	0.10	\$8,502.41	\$0.00	\$261,153.10	0.10	\$252,650.69

DIETERICH CREEK DAMAGES ANALYSIS COMPARISON

DAMAGES ARE AVERAGE ANNUAL DAMAGES (AAD)

BENEFITS ARE AVERAGE ANNUAL BENEFITS (AAB)

AAD INCLUDE 15% NON-TANGIBLE DAMAGES

INTEREST RATE 2.875 PERCENT FY 2019

ALTERNATIVES	AAD OCT 2016 DOLLARS	AAB OCT 2016 DOLLARS	B/C RATIO	Structures Damaged Protected() at 100-YR	Structures Damaged Protected() at 50-YR	Structures Damaged Protected() at 25-YR	Structures Damaged Protected() at 10-YR	Structures Damaged Protected() at 5-YR	Structures Damaged Protected() at 2-YR
(NONE) EXISTING	\$9,104.33	\$0.00	0.00	29	25	21	10	4	0
ALTERNATIVE 3 100-YEAR LEVEE AVG. HEIGHT. -- 4.65 FT. LENGTH -- 4,167 FT. VOLUME -- 13,605 CU.YD. R.O.W. 2.6 AC.	\$837.31	\$8,267.02	0.34	4 (25)	3 (22)	1 (20)	1 (9)	0 (4)	0 (0)
ALTERNATIVE 4 50-YEAR LEVEE AVG. HEIGHT. -- 3.95 FT. LENGTH -- 4,167 FT. VOLUME -- 8,165 CU.YD. R.O.W. -- 2.1 AC.	\$3,041.58	\$6,062.75	0.33	29 (0)	3 (22)	1 (20)	0 (10)	0 (4)	0 (0)
ALTERNATIVE 5 25-YEAR LEVEE AVG. HEIGHT. -- 3.2 FT. LENGTH -- 4,167 VOLUME -- 6,440 CU.YD. R.O.W. -- 2.1 AC.	\$4,061.30	\$5,043.03	0.34	29 (0)	25 (0)	1 (20)	1 (9)	0 (4)	0 (0)
ALTERNATIVE 6 PROPOSED VIRGINIA ST RELOCATION/CHANNEL REALIGN TRIPLE 12' X 8' RC BOX CULVERTS 1-SUPPLEMENTAL 12' X 9' RC BOX AT SECTION ST. Prop_Conditions_VirginiaSt_D.prj	\$4,693.70	\$4,410.63	0.15	27 (2)	23 (2)	15 (6)	6 (3)	3 (1)	0 (0)
ALTERNATIVE 7 OWR / M & G ENGINEERS FINAL PLAN 10 FINAL WITH RIPRAP WITH RIPRAP CHANNEL UPSTREAM PROPOSED CLOSE VIRGINIA ST RELOCATION / CHANNEL REALIGN DO NOT FILL FLOODPLAIN Prop_Conditions_VirginiaSt_E3.prj	\$5,248.66	\$3,855.67	0.26	25 (4)	23 (2)	14 (7)	5 (4)	2 (2)	0 (0)
ALTERNATIVE 8 OWR / M & G ENGINEERS FINAL PLAN 19 FINAL REDUCED RIPRAP ADD 2 INLINE-STRUCTURES TO REDUCE VELOCITIES TO REDUCE RIPRAP REQUIRED PROPOSED CLOSE VIRGINIA ST RELOCATION / CHANNEL REALIGN DO NOT FILL FLOODPLAIN Prop_Conditions_VirginiaSt_E3.prj	\$8,781.68	\$322.65	0.10	29 (0)	25 (0)	22 (1)	7 (3)	4 (0)	0 (0)