APPENDIX A

IDNR PERMITS SUMMARY

IDNR PERMITS SUMMARY
COOL CREEK WATERSHED

LITTLE COOL CREEK		
Application Date	**Status**	**Description**
6/26/01	Terminated	Fill for parking lot near stream
9/28/00	Terminated	Installation of 15" Storm Sewer with underground storage
6/28/96	Approved	Construction of vehicular and pedestrian bridge
3/25/91	Approved	Excavation and fill in floodplain
3/25/91	Approved	Excavation and fill in floodplain
3/11/91	Approved	Fill in floodplain
COOL CREEK		
Being Reviewed	N/A	Fill for retaining wall
3/7/02	Approved	Bank stabilization
9/25/01	Approved	Bridge replacement
8/28/01	Approved	Bridge replacement
8/1/01	Approved	Construction of bridge
5/14/01	Approved	Excavation for ponds
12/14/00	Approved	Bridge replacement
12/14/00	Approved	Bridge replacement
12/14/00	Approved	Bridge replacement
6/15/00	Denied	Installation of booster station
2/10/00	Approved	Installation of water main
1/1/00	Approved	Excavation for pond, and rechannel Mary Wilson Drain
1/1/00	Approved	Installation of storm outfall
1/1/00	Approved	Installation of storm outfall
4/16/99	Approved	Installation of water main

IDNR PERMITS SUMMARY
COOL CREEK WATERSHED

2/25/99	Approved	Installation of private drive
1/29/99	Approved	Installation of storm outfall
1/22/99	Approved	Bridge widening
8/21/98	Approved	Construction of gabions
4/24/98	Approved	Bridge widening
3/25/98	Approved	Excavation for sand and gravel mining
11/7/97	Approved	Installation of 24" storm sewer
6/16/97	Approved	Bridge replacement
5/29/97	Approved	Bridge replacement
5/23/97	Approved	Excavation for sand and gravel mining and bridge construction
5/9/97	Approved	Bank stabilization
7/26/96	Approved	Bridge widening
7/17/96	Approved	Installation of sanitary sewer
7/5/96	Approved	Fill in floodplain for access drive
6/7/96	Approved	Installation of new culverts and excavation/fill in floodplain
2/2/96	Approved	Installation of storm outfalls and trails
12/8/95	Approved	Installation of tennis courts and storm outfalls
10/27/95	Approved	Construction of bridge and playground and bank stabilization
9/1/95	Approved	Construction of a low water crossing
8/25/95	Approved	Installation of 27" and 36" Storm Sewer
8/25/95	Approved	Installation of storm outfalls
8/25/95	Approved	Excavation for pond and installation of storm outfall
8/18/95	Approved	Installation of new culvert

IDNR PERMITS SUMMARY
COOL CREEK WATERSHED

5/19/95	Approved	Excavation for ponds and installation of storm outfalls
3/2/95	Approved	Installation of new 36" Storm Sewer
12/15/94	Approved	Installation of 27" Storm Sewer
11/18/94	Approved	Bridge widening
6/28/94	Terminated	Construction of trail
9/3/93	Terminated	Construction of new trails
9/3/93	Approved	Construction of a pedestrian bridge
5/14/93	Approved	Fill for road realignmnet
4/8/93	Approved	Construction of a dog pen
3/12/93	Denied	Construction of boardwalk and trails
2/8/93	Approved	Installation of storm outfall
2/2/93	Approved	Fill for parking lot near stream
11/6/92	Approved	Installation of storm outfall
11/6/92	Approved	Installation of storm outfall
10/23/92	Terminated	Installation of storm outfall
6/26/92	Approved	Bank stabilization
2/17/92	Approved	Bank stabilization
1/27/92	Approved	Water main crossing
11/13/91	Approved	Bridge replacement (151st street)
10/7/91	Approved	Excavation for lake
10/7/91	Approved	Installation of sanitary sewer
10/7/91	Approved	Installation of storm outfall
10/7/91	Approved	Installation of storm outfall

IDNR PERMITS SUMMARY
COOL CREEK WATERSHED

9/23/91	Approved	Construction of retention pond
7/1/91	Terminated	Installation of tennis courts
7/1/91	Approved	Installation of storm outfall
7/1/91	Approved	Installation of storm outfalls
7/1/91	Approved	Water line crossing
7/1/91	Terminated	Installation of storm outfall
6/3/91	Approved	Installation of storm outfall
6/3/91	Approved	Bridge widening
2/5/91	Approved	Installation of storm outfalls
2/5/91	Approved	Construction of storage building
6/13/90	Approved	Excavation for sand and gravel mining
4/18/90	Approved	Installation of sanitary sewer
4/18/90	Approved	Installation of storm outfall
4/18/90	Approved	Construction of swale
3/21/90	Approved	Construction of swale
1/8/90	Approved	Installation of water main
11/21/89	Approved	Installation of gabions
9/26/89	Approved	Construction of water tower
7/20/89	Approved	Excavation/Fill for parking lot and dry detention
6/23/89	Approved	Natural gas crossing
11/28/88	Approved	Installation of sanitary force main

IDNR PERMITS SUMMARY
COOL CREEK WATERSHED

GRASSY BRANCH (ANNA KENDALL DRAIN)		
No Date	Not Listed	Stream dredging
10/18/02	Approved	Private tennis court and swimming pool
11/14/01	Approved	Replace a private road bridge
2/4/99	Approved	Fill for construction of a parking lot
11/12/97	Terminated	Installation of storm outfall
8/1/97	Approved	Installation of storm outfall
8/9/96	Approved	New private drive crossing
6/19/96	Approved	Bridge deck replacement
5/16/96	Approved	Installation of storm outfall
10/11/91	Approved	Water main crossing
8/6/90	Approved	Installation of storm outfall
6/11/90	Approved	Water main crossing
6/11/90	Approved	Sanitary sewer force main crossing
3/21/90	Approved	Fill along the right (south) bank of the stream (about 200 feet)

APPENDIX B

DEVELOPER MEETING SUMMARY

Clark Dietz

MEMO

To: Project File - Cool Creek Watershed Management Plan
From: Hans J. Peterson, P.E.
Date: October 30, 2002
Subject: Meeting Summary – Developer Input

Copies: Meeting Attendees
Kent Ward, Hamilton Co.
Kate Weese, Carmel
David Johnston, Westfield

On October 30, 2002, a meeting was held at the Hamilton County Surveyors Office to obtain input from the development community on stormwater issues affecting the Cool Creek watershed. The following were in attendance at the meeting:

Name	Representing	E-mail
Hans Peterson	Clark Dietz, Inc.	hansp@clark-dietz.com
Dale Tekippe	Clark Dietz, Inc.	dalet@clark-dietz.com
Robert Thompson	Hamilton County	rct@co.hamilton.in.us
Steven Cash	Hamilton County	stc@co.hamilton.in.us
Bruce Hauk	Town of Westfield	bhauk@netdirect.net
Mike McBride	City of Carmel	mmcbride@ci.carmel.in.us
John Talbot	Estridge	talbotj@estridge.net
Jose Kreutz	Brenwick	josek@ brenwick.com
Tim Walter	Platinum Properties	Twalter platinum-properites.com
Jim Langston	Langston Development	jlang@langstondev.com
John Edwards	Langston Development	Jedwards@langstondev.com

Topics covered at the meeting included:

- Overview and purpose of the Cool Creek Watershed Plan
- Existing stormwater problems in the watershed
- Effectiveness of stormwater runoff controls associated with new development
- Regional detention facilities
- Rule 13 requirements and impacts to new development

Overview

Hans Peterson reviewed the overall purpose of the watershed study. One of the key drivers of the study was the concern with stormwater impacts resulting from new development, particularly with the upper watershed (Westfield) developing and the lower watershed (Carmel) being already fully developed. The project included a detailed review of existing problems in the watershed, analysis of the watershed using

hydrologic/hydraulic modeling, identification of impacts from development, and development of solutions to existing stream problem areas.

Stormwater Problems

Stream flooding on the main Cool Creek channel is generally not currently a problem in Carmel. The stream does get out of its channel banks during major storms, but for the most part, does not overtop roads or flood structures. Some of the tributaries to the main channel do have some flooding problems. Westfield has some roads that overtop and the Evan Kendall drain has some potential flooding concerns. The primary concern in Carmel is with stream bank erosion. Several reaches of the stream have moderate to severe erosion. A photo book was shared with the meeting attendees showing typical stream bank erosion examples.

Effectiveness of Stormwater Controls

The impacts of new development were analyzed with the hydrologic model. Undeveloped areas in the watershed were simulated in the model as fully developed. The County's detention policy (100-year controlled at pre-development 10-year rate and 10-year controlled at the pre-development 2-year rate) was factored into the model. Hydrograph printouts of the results were distributed to the attendees. The analysis showed that under future full build-out conditions, the County's detention policy would result in a 5 to 10 percent reduction in peak flows. However, the duration that flow remains in the channel following a storm event is 20 to 30 percent longer. Also, the flow rates on the trailing limb of the hydrograph are much higher (two to four times) than existing flows. The higher flows over a long period of time following a storm event will tend to increase stream bank erosion in Carmel. This situation can be better controlled if the smaller, more frequent storm events are retained on site through modifications to the detention policy to incorporate a "channel protection" volume in detention basin designs.

Regional Detention

The advantages/disadvantages of regional detention were discussed. John Talbot of Estridge commented that they built an on-line regional pond, but ran into significant permitting challenges with IDEM, even though the basin was built on a small, normally dry channel that ran through a farm field. The regional pond was then considered a "water of the State" and required "pre-treatment" of any stormwater discharges into the basin. Tim Walter of Platinum Properties has also built on-line ponds in series and has also run into similar obstacles. If the drainage area to the pond is less than one square mile (640 acres), IDNR and IDEM do not get involved and regional ponds can be permitted directly with the County.

Off-line regional facilities can be used; however, the size and location of ponds in a development is often dictated by the need for earthwork fill as well as the need to provide water amenities. Also, the cost of building larger conveyance facilities to reach a regional pond can preclude their use. Tim Walter commented that they have "over-detained" in some instances to reduce the size of the outlet pipe that is needed to discharge into a nearby creek. If the County desires to use larger regional basins, they should be identified early on in the planning process so the development community can anticipate them. John Talbot also indicated that if regional ponds with amenities are promoted, they should count towards the open space requirement (they currently do not count toward this requirement in Westfield).

Rule 13

A handout summarizing the requirements of Rule 13 was distributed. The primary impact to the development community will be that erosion and sediment controls will be required for all sites greater than one acre (vs. the current 5-acre threshold) and best management practices (BMPs) will be required to control the quality of post-construction runoff.

A handout was distributed with some examples of BMPs. The primary BMP that is used to control post-construction runoff quality is wet ponds with water quality features incorporated. Smaller developments and re-developments can use other structural BMPs such as sand filters, vortex devices, etc. Jose Kruetz of Brenwick commented that BMPs that rely on infiltration for treatment would not work in Hamilton County or many other parts of central Indiana due to clayey soils. He also asked whether these requirements apply to just new development or will cities be required to retrofit existing development. We discussed that this requirement applies to new development and re-development.

John Talbot of Estridge asked whether zoning and land use issues would be addressed as part of the post-construction runoff issue. He commented that impervious area could be reduced if street lane width requirements were reduced and other parking lot space requirements were re-considered.

John Edwards of Langston Development asked how development in the floodplain would be addressed in the watershed. We discussed that the County prohibits any development in the floodplain. Carmel and Westfield do not have the same requirements, but that would make sense on a watershed basis to be consistent on this issue. Mr. Edwards indicated that this policy is unrealistic in situations where floodplains are very wide (300 or 400 feet) and the flood depths are shallow (less than one foot). A lot of prime development area is lost and property owners see reduced land values. We discussed the importance of maintaining buffer strips along streams and that these could be an important component of Rule 13 compliance with post-construction runoff controls. Perhaps there is a compromise to maintain buffers while allowing some development in instances where floodplains are very wide and shallow. Compensatory storage could also be included to account for lost floodplain storage.

Robert Thompson discussed that the County and other communities affected by Rule 13 are just beginning the process of deciding how to approach the requirements of the rule and what types of BMPs will be used. He mentioned that there was an upcoming BMP seminar that Hamilton County and a BMP vendor are sponsoring.

Summary

Key feedback from representatives of the development community is summarized as follows:

- Regional on-line detention has become very difficult to implement because of environmental permitting issues.
- Regional detention for areas less than one square mile can work; however detention basin configurations are often dictated by other engineering issues (need for earthwork fill, limitations on conveyance facility sizes, etc.)
- If regional basins are constructed, credit should be given towards open space requirements.
- If the communities or the County want a particular regional detention basin site, the development community should know this early on so it can be accommodated in the development process.
- Development restrictions in the floodplain should be re-considered in areas of very wide, shallow floodplains.
- Street widths and parking space requirements should be considered when looking at the non-structural aspects of the post-construction runoff control requirement.

Please contact Hans Peterson if there are comments or corrections to this meeting summary.

Hans J. Peterson, PE
Clark Dietz, Inc.
8445 Keystone Crossing, Suite 105
Indianapolis, IN
Hansp@clark-dietz.com
317.259.4644

APPENDIX C

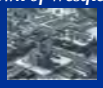
PUBLIC MEETING PRESENTATION MATERIALS AND MEETING SUMMARIES

Public Meeting
Cool Creek Watershed Management Plan

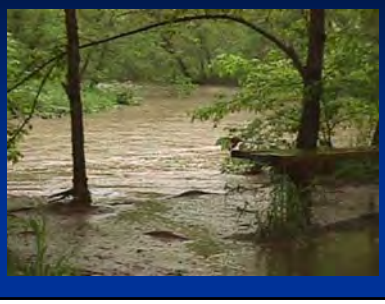
May 21, 2002

City of Carmel

Town of Westfield



Hamilton County



Agenda

- Project Purpose/Scope Review
- Progress Review/Findings to Date
- Upcoming Activities
- Input on Drainage Problem Areas

Project Purpose

- Identify and solve existing stormwater flooding problems (focus on regional problems associated with Cool Creek and its tributaries)
- Prevent future stormwater problems due to rapid development

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NEWS / CENSUS 2000

Hamilton County growth paces Indiana, brings challenges

By JOSH DUKE, Ledger regional editor

March 10, 2001 -- Hamilton County eclipsed all Indiana counties, ranking No. 1 in population growth and percent of population change from 1990 to 2000, according to Census 2000 numbers released Friday.

The population increased by 73,804 people, a 67.7 percent jump during the 1990s.

Hamilton outdistanced Marion County, which finished second in population growth with 63,295. In fact, Hamilton, Marion and Johnson counties combined to account for 30 percent of the entire state's growth during the decade.

Malcolm Bray, 85, was born in rural Westfield, and has lived there most of his life. Hamilton County's explosive growth is no surprise to him.

More on Census 2000

Links

Growth...

Planning is key to town's growth

■ Master plan gives officials map to follow to ensure that town expansion is smooth.

By Phil Dunlap
Correspondent

WESTFIELD

Annexation, investment in technology and expanding infrastructure are topics of discussion for Westfield officials these days. They're all signs of a growing community.

This month, the town is preparing to annex about 264 acres on top of 102 acres annexed in December. An additional 350 acres are being considered for annexation by the end of the year.

Westfield also is negotiating with land owners and developers to annex an additional 1,700 acres by July 2003, assuming the economy and real estate markets remain steady.

There is no controversy, no angry outcry from the public — just a smooth transition for several parcels asking to be brought into the town.

"We want to be a smart growth community and (do it) in an orderly fashion, building out from our existing base," said Westfield Town Manager David Johnston. "It's all driven by our 2020 Comprehensive Plan."

The town requires written agreements with developers that their subdivisions will become part of Westfield once the municipal limits are contiguous with their developments.

The new 340-acre Centennial subdivision built by the Estridge Co., south of 156th Street between Spring Mill and Fitch roads, falls under these guidelines and will become part of the town when annexation reaches it.

The new 590-acre Bridgewater Club, a planned-unit development with a golf course, retail/commercial and residential areas, also is expected to become a part of the town.

For growth to progress logically and make annexation practical, the water, sewer and road infrastructure must be in place.

"We've had a water and sewer master plan completed since last January, and have received a special sewer grant with the help of (U.S. Rep. Dan) Burton's office to help open up the westside of U.S. 31 to economic development — particularly the (230-acre) Thunder Island property," Johnston said.

This year, Westfield Utilities bought the portion of Hamilton Western Utilities that served

See Growth, Page N8

Growth

■ Town growth is estimated at 1,300 people a year.

From N1

Washington and Noblesville townships. Those parts of Hamilton Western originally were built by Wilking Development nearly 30 years ago to serve its own subdivisions. The move substantially increases Westfield's water/sewer infrastructure.

Johnston said the Town Council also has sent a draft of a new thoroughfare plan to the Plan Commission for review over the next few months.

He said officials have made roads a priority out of necessity.

"We're estimating we now gain about 1,300 people a year in our town. That's quite a population jump — and along with that come vehicles."

Town officials also are excited about access to technology.

From cell phone networks and wireless technology to fiber optics, Johnston says it's up to the community to plan and make certain technology is available.

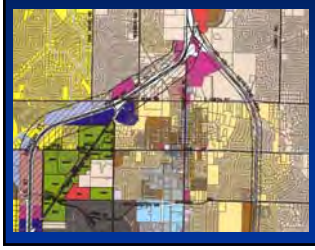
"We need to package Westfield to be successful in its economic development, decide which area we want to target and do some niche marketing. We do have competitive assets, and we need to understand that we can't just settle for anything," he says.

Project Scope

- Inventory & Problem Identification
- Problem Analysis
- Solution Development
- Recommendations and Implementation
- Watershed Management Plan

Inventory & Problem Identification

- Maps, Plans, Reports



Inventory & Problem Identification

- Hamilton County online mapping

Inventory & Problem Identification

- Standards, Ordinances, Policies
- Interviews

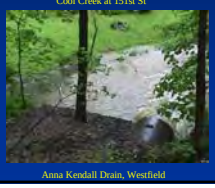
Inventory & Problem Identification

- Public Input

Inventory & Problem Identification


Cool Creek at 151st St

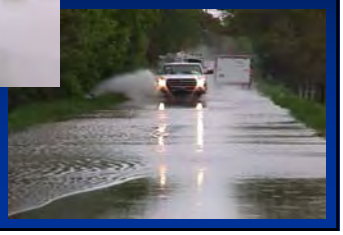
- Field Investigation


Anna Kendall Drain, Westfield


Mary Wilson Drain, Soccer Fields

Inventory & Problem Identification

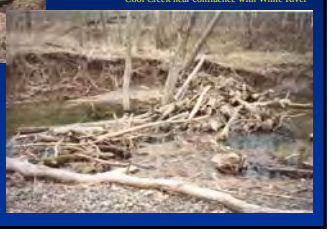
Grassy Branch Road North of SR 32



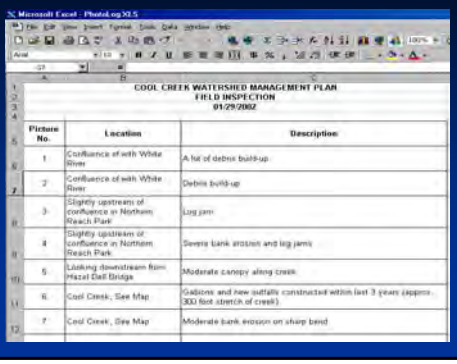
Inventory & Problem Identification

Cool Creek in Brookshire Golf Course

Cool Creek near confluence with White River



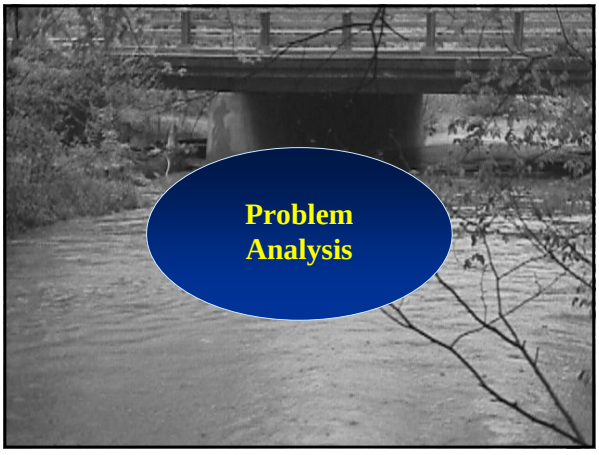
Inventory & Problem Identification



COOL CREEK WATERSHED MANAGEMENT PLAN
FIELD INSPECTION
01/29/2002

Picture No.	Location	Description
1	Confluence of with White River	A fair of debris build-up
2	Confluence of with White River	Debris build-up
3	Slightly upstream of confluence in Northern Reach Park	Log jam
4	Slightly upstream of confluence in Northern Reach Park	Severe bank erosion and log jams
5	Looking downstream from Hazel Dell Bridge	Moderate canopy along creek
6	Cool Creek, See Map	Gabions and new outfalls constructed within last 3 years (approx. 300 foot stretch of creek)
7	Cool Creek, See Map	Moderate bank erosion on sharp bend

Flooding Problem Areas To Date

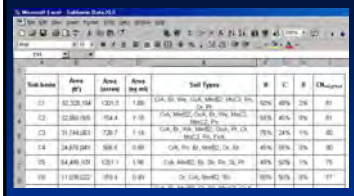


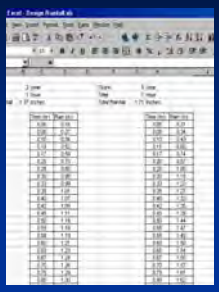
Problem Analysis

Problem Analysis

- Field Survey for detailed reach information
- Develop computer model of stream
- Stream Sampling

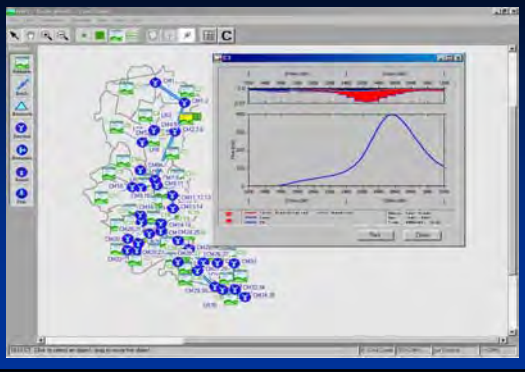
Hydrologic/Hydraulic Analysis





- Soil & Rainfall Data

HEC Modeling



Stream Sampling Locations

- 116th Street Crossing
- 146th Street Crossing
- Grassy Branch Road North of SR 32

Sampling Results

Microsoft Excel - Sampling Data.XLS

		NURP	116th St Crossing	146th St Crossing	Grassy Branch Road
BOD	mg/L	12	5.1	5	5
COD	mg/L	80	10	10	10
Nitrogen, Kjelhdahl	mg/L	2	2.3	2.1	1.1
Nitrogen, Nitrate	mg/L	0.9	0.9	1.2	2.2
Nitrogen, Ammonia	mg/L	N/R	0.88	5.1	4.3
Suspended Solids	mg/L	175	120	61	11
Dissolved Solids	mg/L	N/R	280	290	390
E coli	/100 mL	N/R	900	300	900

Solution Development

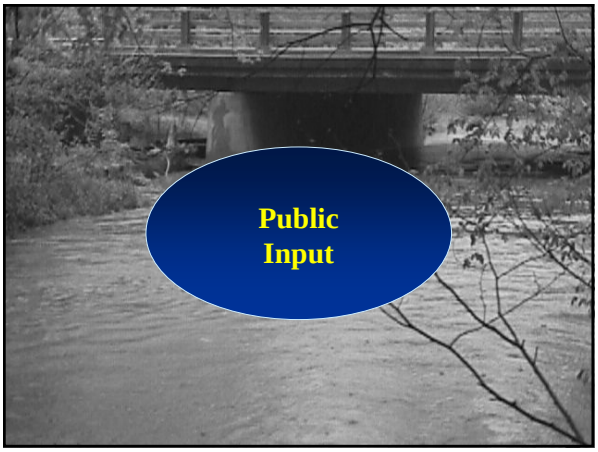
- Modifications to ordinances, standards, and policies
- Preliminary design solutions for local and regional problems (size, location, etc.)
- Meet with developers and public

Recommendations/Implementation

- Finalize policy and watershed improvements
- Prepare final report
- Funding alternatives

Upcoming Activities

- Solution development
- Continue stream sampling
- Continue public input
- Watershed Management Plan
- Hamilton County Website
  www.co.hamilton.in.us/news/Public.htm



Clark Dietz

Westfield Public Meeting Summary

Project:	Cool Creek Watershed Management Plan
Date:	May 21, 2002
Staff Attendees:	Kent Ward, Tricia Banta – Hamilton County Surveyor's Office David Johnston – Town of Westfield Dale Tekippe, Hans Peterson, Wes Christmas – Clark Dietz

The meeting was held as a public information meeting for the Cool Creek Watershed Management Plan. Approximately 40 people attended the meeting. A listing of the people who signed in at the meeting is attached (not all attendees signed in). A brief summary of comments/questions was prepared by Wes Christmas of Clark Dietz, Inc. Please forward any comments or corrections on to him or Hans Peterson. The meeting discussions are summarized as follows:

David Johnston and Kent Ward kicked off the meeting by introducing the project and the consultant preparing the management plan, Clark Dietz.

Hans Peterson gave a presentation covering the scope of the project, description of the findings to date, and the upcoming activities pertaining to the project. Following the presentation the floor was opened to questions and/or comments from the public. The following were the general concerns mentioned:

- Several residents expressed concern with filling or development taking place within the floodplain.
- A general desire was expressed to maintain the aesthetic value of the creek, including preservation of riparian areas.
- Concerns about water quality were discussed. Residents showed interest in continued sampling and monitoring of the quality of water in the creek. Residents would also like to see sampling results compared to target values rather than national averages. There was interest in dry weather sampling as well as wet weather sampling of the creek. Comments were expressed that we should strive to improve the water quality, not just maintain it.
- Concern was expressed regarding the amount of native plant growth residing in the riparian areas adjacent to the creek and the invasion of non-native plants. It was suggested that a bio-diversity assessment of the creek/watershed system be considered.

- General concern was expressed regarding blockages in the creek. Kent Ward discussed which drains were regulated and maintained and which were private and did not have maintenance access.

- Interest was expressed to have information available on the Internet, including the presentation slides. The County Surveyor's web site was included in the handout packet and residents were encouraged to check the site for updates.

Four stations with watershed maps were setup and occupied by project personnel to discuss individual problems, concerns, or questions. Several individual concerns were recorded.

Clark Dietz

Carmel Public Meeting Summary

Project:	Cool Creek Watershed Management Plan
Date:	May 22, 2002
Staff Attendees:	Kent Ward, Tricia Banta – Hamilton County Surveyor's Office Kate Weese – City of Carmel Dale Tekippe, Hans Peterson, Wes Christmas – Clark Dietz

The meeting was held as a public information meeting for the Cool Creek Watershed Management Plan. Approximately 30 people attended the meeting. A listing of the people who signed in at the meeting is attached (not all attendees signed in). A brief summary of comments/questions was prepared by Wes Christmas of Clark Dietz, Inc. Please forward any comments or corrections on to him or Hans Peterson. The meeting discussions are summarized as follows:

Kate Weese kicked off the meeting by introducing the project and the consultant preparing the management plan, Clark Dietz.

Hans Peterson gave a presentation covering the scope of the project, description of the findings to date, and the upcoming activities pertaining to the project. Following the presentation the floor was opened to questions and/or comments from the public. The following were the general concerns mentioned:

- There were some questions regarding the future expansion of US 31 and its impact on the watershed. Kate Weese discussed that bridges under US 31 are generally sized for at least the 100-year event and that existing bridges are usually extended to accommodate additional lane expansions. Hans Peterson discussed that we did not have detailed information on the plans for the expansion incorporated into the hydrologic model because this information is not yet available. Following the meeting, it was discussed that environmental data (fish and wildlife habit, wetlands, native species, etc.) may be available in conjunction with some of the planning work being performed by INDOT's consultant. We will follow up to determine the availability of this data.

- Residents displayed interest in performing channel clean out, erosion control, streambank stabilization, and general creek maintenance. It was discussed that creek maintenance on private property is the responsibility of the landowner. John South of the Hamilton County SWCD mentioned that the SWCD provides permitting and technical assistance to property owners with stream maintenance concerns.

- Residents showed interest in Rule 5 compliance within the watershed. Kent Ward indicated he was not aware of any significant violations in the watershed. We will check with the state to determine the status of any Rule 5 violations in the watershed.

- Several complaint/concerns were voiced regarding construction and filling taking place in the floodplain.

- Some residents expressed concern regarding the formation of sandbar islands that change the direction of the creek and cause erosion. Kate Weese discussed how channel movement and sandbar formation is often a natural process. We will follow up on some specific locations mentioned.

- General concern was expressed regarding flooding and erosion along the creek adjacent to Cool Creek Drive.

- Interest was expressed to have information available on the Internet, including the presentation slides. The County Surveyor's web site was included in the handout packet and residents were encouraged to check the site for updates.

Four stations with watershed maps were set up and occupied by project personnel to discuss individual problems, concerns, or questions. Several individual concerns were recorded.

Study looks at reasons for flooding

By Phil Dunlap
Correspondent

Flooding — and how to prevent it — was on the minds of a group of about 50 residents who met this week at Westfield Town Hall.

At the center of discussion

WESTFIELD

was a $150,000 Cool Creek Watershed Management Study enlisted to identify storm water flooding problems along Cool Creek and its tributaries and propose possible solutions.

Officials hope that by identifying potential flood areas early, communities can find ways to solve problems before they begin.

Hans Peterson, vice president of Clark Dietz, Inc., the firm hired to do the study, said modifying ordinances and policies will be a part of the effort.

Peterson noted that, beginning in March, communities will see much stricter federal regulations on water management.

He suggested that totally avoiding development in sensitive areas is a possibility.

"Any town over 10,000 people will have to develop programs to address these issues."

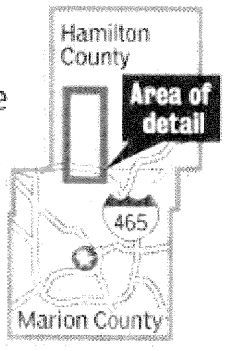
Hamilton County Surveyor Kent Ward led the presentation and said having the study in hand puts the county ahead of the new Environmental Protection Agency regulations.

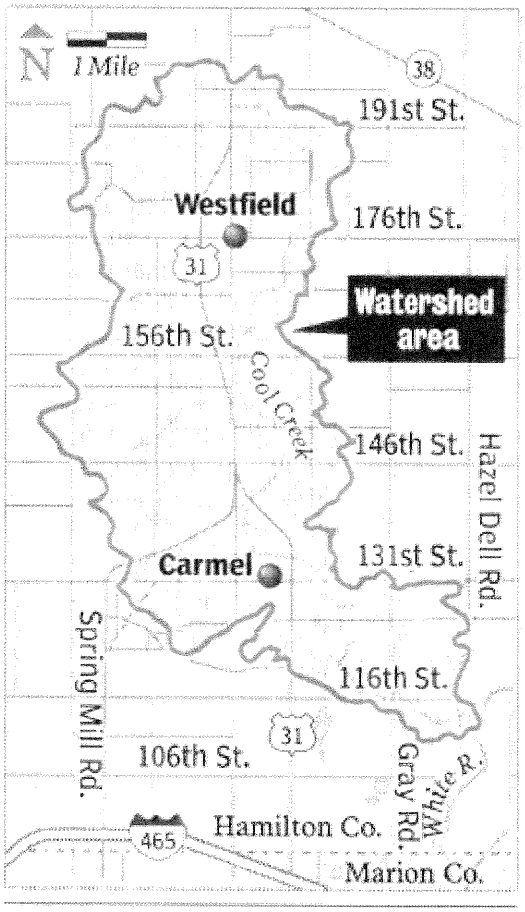
Increased interest in the pres-

See Flooding, Page NA2

Watershed studied

Officials of Carmel, Westfield and Hamilton County are looking at flooding potential in the Cool Creek watershed in hopes of heading off problems in the future.





Staff graphic

Flooding

■ Banning development in some areas may be needed.

From NA1

entation was likely sparked by recent heavy rains and significant flooding.

The cost of the study was borne by Carmel, Westfield, and Hamilton County, all of which are affected by the 14.7 mile tributary to White River.

The watershed accommodates drainage to more than 23 square miles of land.

An idea from biologist Dawn Stelts peaked considerable interest.

She said too many invasive plants, not native to Indiana, have been allowed to proliferate along the creek and in watershed areas.

She suggested that a program to reintroduce native plant species could help filter and absorb more of the impurities in runoff water, and be beneficial to wildlife.

The need to identify potential drainage problems when proposals come in from developers was a repeated theme.

Westfield Town Council President Mike McDonald said the Plan Commission is sensitive to that issue, having recently denied a petition for a large shopping center at 161st Street and U.S. 31.

"A big consideration for rejecting their proposal was that they (wanted to) fill in a flood plain area," said McDonald.

"Westfield has been pretty strict with how drainage impacts the region."

APPENDIX D

STREAM WATER QUALITY TEST RESULTS

WET WEATHER SAMPLING EVENT

MARCH 25, 2002

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job Number: 02.01329

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: COOL CREEK WATERSHED STUDY

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
316473	116TH ST. CROSSING	03/25/2002	09:10	03/25/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

6964 HILLSDALE CT. / INDIANAPOLIS, IN 46250 / 317-842-4261 / FAX: 317-842-4286

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
3445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job No.: 02.01329

Date Received: 03/25/2002
Job Description: COOL CREEK WATERSHED STUDY

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
316473 116TH ST. CROSSING			03/25/2002 09:10			
BOD - Five Day	5.1		mg/L	sld 04/01/2002 08:52	EPA 405.1	<5.
BOD - Five Day (Prep)	Complete			lng 03/27/2002 10:50	EPA 405.1	Complete
Chromium, Hexavalent	<0.010		mg/L	jss 03/25/2002 14:30	SM3500CrD	<0.010
COD	10		mg/L	tpd 03/26/2002 10:00	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl 03/27/2002 08:30		Complete
Cyanide, Total	<0.005		mg/L	dsp 03/28/2002 13:18	EPA 335.4	<0.005
Nitrogen, Ammonia	0.88		mg/L	dsp 03/28/2002 15:36	EPA 350.1	<0.10
Nitrogen, Kjeldahl	2.3		mg/L	dsp 04/04/2002 08:51	EPA 351.2	<0.30
Nitrogen, Nitrate	0.90		mg/L	dsp 03/26/2002 13:33	EPA 353.2	<0.02
Nitrogen, Organic	1.4		mg/L	sld 04/10/2002	EPA 351-EPA	<0.10
Nitrogen, Total	3.2		mg/L	sld 04/10/2002	EPA 351+EPA	<0.10
Oil & Grease	<5.	1	mg/L	mhl 04/01/2002 14:30	EPA 1664A	<5.
pH	7.7		S.U.	jss 03/25/2002 14:00	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl 03/29/2002 09:30		Complete
Phenol	<0.010		mg/L	dsp 04/01/2002 13:38	EPA 420.2	<0.010
Phosphorus, Dissolved	<0.05		mg/L	tpd 03/27/2002 09:40	EPA 365.2	<0.05
Phosphorus, Total - Prep	Complete			tpd 03/27/2002 09:40		Complete
Solids, Dissolved	280		mg/L	lng 03/27/2002 13:16	EPA 160.1	<20.
Solids, Suspended	120		mg/L	lng 03/27/2002 13:03	EPA 160.2	<5.
Digestion, TKN	Complete			mhl 04/02/2002 08:30		Complete
Antimony, ICP	<0.10		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.005
Cadmium, ICP	<0.030		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.030

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job No.: 02.01329

Date Received: 03/25/2002
Job Description: COOL CREEK WATERSHED STUDY

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
316473 116TH ST. CROSSING			03/25/2002 09:10			
Chromium, ICP	<0.040		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.040
Copper, ICP	<0.020		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400 03/28/2002 07:12	EPA 245.1	<0.0002
Nickel, ICP	<0.010		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400 03/28/2002 13:05	EPA 200.7	<0.50
Zinc, ICP	<0.050		mg/L	400 03/27/2002 12:14	EPA 200.7	<0.050
E. coli	900		/100 mL	out 03/29/2002	SM9222G	<1
Fecal Streptococcus	120		/100 mL	out 03/29/2002	SM9230C	<1

KEY TO ABBREVIATIONS

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: CLARK DIETZ Client #: _____

Address: 8445 KEYSTONE CROSSING SUITE 105

City/State/Zip Code: INDIANAPOLIS IN 46240

Project Manager: HANS PETERSON

Telephone Number: 317-259-4644 Fax: 317-259-4660

Sampler Name: (Print Name) WES CHRISTMAS

Sampler Signature: W Ch

Project Name: COOL CREEK WATERSHED STUDY

Project #: H21010

Site/Location ID: 1-116TH STREET CROSSING State: IN

Report To: HANS PETERSON

Invoice To: CLARK DIETZ

Quote #: 01.0122 PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix (SL - Sludge DW - Drinking Water GW - Groundwater S - Soil/Solid WW - Wastewater Specify Other)	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	E. Coli, Fecal, Strep	TKN, NH_4, Org. N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cr^{6+}	Diss. Phos.	Oil + Grease			REMARKS
1a - 116TH ST. CROSSING	3/25/02	9:10			STREAM				1				X										(AMBER GLASS)
1b - 116TH ST. CROSSING	3/25/02	9:10			STREAM							3		X									
1c - 116TH ST. CROSSING	3/25/02	9:10			STREAM				1						X								
1d - 116TH ST. CROSSING	3/25/02	9:10			STREAM			1	[illegible]							X							
1e - 116TH ST. CROSSING	3/25/02	9:10			STREAM	1											X						
1f - 116TH ST. CROSSING	3/25/02	9:10			STREAM						2							X	X				LAB FILTER
1g - 116TH ST. CROSSING	3/25/02	9.10			STREAM				1											X			

Special Instructions:

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp: 4.2° C
Custody Seals: Y N (N/A)
Bottles Supplied by TestAmerica: (Y) N
Method of Shipment: Client

	Date	Time		Date	Time
Relinquished By: W Ch	3/25/02	10:50	Received By: [signature]	3-25-02	1050
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job Number: 02.01330

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: COOL CREEK WATERSHED STUDY

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
316474	146TH ST. CROSSING	03/25/2002	09:35	03/25/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
9445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job No.: 02.01330

Date Received: 03/25/2002
Job Description: COOL CREEK WATERSHED STUDY

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
316474 146TH ST. CROSSING			03/25/2002 09:35			
BOD - Five Day	<5		mg/L	sld 04/01/2002 08:52	EPA 405.1	<5.
BOD - Five Day (Prep)	Complete			lng 03/27/2002 10:50	EPA 405.1	Complete
Chromium, Hexavalent	<0.010		mg/L	jss 03/25/2002 14:30	SM3500CrD	<0.010
COD	<10.		mg/L	tpd 03/26/2002 10:00	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl 03/27/2002 08:30		Complete
Cyanide, Total	<0.005		mg/L	dsp 03/28/2002 13:18	EPA 335.4	<0.005
Nitrogen, Ammonia	5.1		mg/L	dsp 03/28/2002 15:36	EPA 350.1	<0.10
Nitrogen, Kjeldahl	2.1		mg/L	dsp 04/04/2002 08:51	EPA 351.2	<0.30
Nitrogen, Nitrate	1.2		mg/L	dsp 03/26/2002 13:33	EPA 353.2	<0.02
Nitrogen, Organic	<0.10		mg/L	sld 04/10/2002	EPA 351-EPA	<0.10
Nitrogen, Total	3.3		mg/L	sld 04/10/2002	EPA 351+EPA	<0.10
Oil & Grease	<5.	l	mg/L	mhl 04/01/2002 14:30	EPA 1664A	<5.
pH	7.7		S.U.	jss 03/25/2002 14:00	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl 03/29/2002 09:30		Complete
Phenol	<0.010		mg/L	dsp 04/01/2002 13:38	EPA 420.2	<0.010
Phosphorus, Dissolved	<0.05		mg/L	tpd 03/27/2002 09:40	EPA 365.2	<0.05
Phosphorus, Total - Prep	Complete			tpd 03/27/2002 09:40		Complete
Solids, Dissolved	290		mg/L	lng 03/27/2002 13:16	EPA 160.1	<20.
Solids, Suspended	61		mg/L	lng 03/27/2002 13:03	EPA 160.2	<5.
Digestion, TKN	Complete			mhl 04/02/2002 08:30		Complete
Antimony, ICP	<0.10		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.005
Cadmium, ICP	<0.030		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.030

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job No.: 02.01330

Date Received: 03/25/2002
Job Description: COOL CREEK WATERSHED STUDY

Sample Number / Sample I.D. / Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst / Date & Time Analyzed	Method	Reporting Limit
316474 146TH ST. CROSSING			03/25/2002 09:35			
Chromium, ICP	<0.040		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.040
Copper, ICP	<0.020		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400 03/28/2002 07:14	EPA 245.1	<0.0002
Nickel, ICP	<0.010		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400 03/28/2002 13:11	EPA 200.7	<0.50
Zinc, ICP	<0.050		mg/L	400 03/27/2002 12:17	EPA 200.7	<0.050
E. coli	300		/100 mL	out 03/29/2002	SM9222G	<1
Fecal Streptococcus	240		/100 mL	out 03/29/2002	SM9230C	<1

KEY TO ABBREVIATIONS

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: CLARK DIETZ Client #: _____

Address: 8445 KEYSTONE CROSSING SUITE 105

City/State/Zip Code: INDIANAPOLIS IN 46240

Project Manager: HANS PETERSON

Telephone Number: 317-259-4644 Fax: 317-259-4660

Sampler Name: (Print Name) WES CHRISTMAS

Sampler Signature: W CHR

Project Name: COOL CREEK WATERSHED STUDY

Project #: H21010

Site/Location ID: 2-146TH STREET CROSSING State: IN

Report To: HANS PETERSON

Invoice To: CLARK DIETZ

Quote #: 01.0122 PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix (SL - Sludge DW - Drinking Water GW - Groundwater S - Soil/Solid WW - Wastewater Specify Other)	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	E. Coli, Fecal, Strep	TKN, NH_4, Org. N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cr 6+	Diss. Phos	Oil + Grease			REMARKS
2a - 146TH ST. CROSSING	3/25/02	9:35			STREAM				1				X										(AMBER GLASS)
2b - 146TH ST. CROSSING	3/25/02	9:35			STREAM							3		X									
2c - 146TH ST. CROSSING	3/25/02	9:35			STREAM				1						X								
2d - 146TH ST. CROSSING	3/25/02	9:35			STREAM			1								X							
2e - 146TH ST. CROSSING	3/25/02	9:35			STREAM	1											X						
2f - 146TH ST. CROSSING	3/25/02	9:35			STREAM						2							X	X				LAB FILTER
2g - 146TH ST. CROSSING	3/25/02	9:35			STREAM				1											X			

Special Instructions:

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp: 4.2 °C
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment: Client

Relinquished By: W CHR	Date: 3/26/02	Time: 10:30	Received By:	Date: 3-25-02	Time: 1050
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job Number: 02.01331

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: COOL CREEK WATERSHED STUDY

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
316475	186TH ST. CROSSING	03/25/2002	09:55	03/25/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
3445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job No.: 02.01331

Date Received: 03/25/2002
Job Description: COOL CREEK WATERSHED STUDY

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
316475 186TH ST. CROSSING			03/25/2002 09:55			
BOD - Five Day	<5		mg/L	sld 04/01/2002 08:52	EPA 405.1	<5.
BOD - Five Day (Prep)	Complete			lng 03/27/2002 10:50	EPA 405.1	Complete
Chromium, Hexavalent	<0.010		mg/L	jss 03/25/2002 14:30	SM3500CrD	<0.010
COD	<10.		mg/L	tpd 03/26/2002 10:00	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl 03/27/2002 08:30		Complete
Cyanide, Total	<0.005		mg/L	dsp 03/28/2002 13:18	EPA 335.4	<0.005
Nitrogen, Ammonia	4.3		mg/L	dsp 03/28/2002 15:36	EPA 350.1	<0.10
Nitrogen, Kjeldahl	1.1		mg/L	dsp 04/04/2002 08:51	EPA 351.2	<0.30
Nitrogen, Nitrate	2.2	d1x10	mg/L	dsp 03/26/2002 13:33	EPA 353.2	<0.20
Nitrogen, Organic	<0.10		mg/L	sld 04/10/2002	EPA 351-EPA	<0.10
Nitrogen, Total	3.3		mg/L	sld 04/10/2002	EPA 351+EPA	<0.10
Oil & Grease	<5.	1	mg/L	mhl 04/01/2002 14:30	EPA 1664A	<5.
pH	7.5		S.U.	jss 03/25/2002 14:00	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl 03/29/2002 09:30		Complete
Phenol	<0.010		mg/L	dsp 04/01/2002 13:38	EPA 420.2	<0.010
Phosphorus, Dissolved	<0.05		mg/L	tpd 03/27/2002 09:40	EPA 365.2	<0.05
Phosphorus, Total - Prep	Complete			tpd 03/27/2002 09:40		Complete
Solids, Dissolved	390		mg/L	lng 03/27/2002 13:16	EPA 160.1	<20.
Solids, Suspended	11		mg/L	lng 03/27/2002 13:03	EPA 160.2	<5.
Digestion, TKN	Complete			mhl 04/02/2002 08:30		Complete
Antimony, ICP	<0.10		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.005
Cadmium, ICP	<0.030		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.030

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
3445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

04/15/2002

Job No.: 02.01331

Date Received: 03/25/2002
Job Description: COOL CREEK WATERSHED STUDY

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
316475 186TH ST. CROSSING			03/25/2002 09:55			
Chromium, ICP	<0.040		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.040
Copper, ICP	<0.020		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400 03/28/2002 07:16	EPA 245.1	<0.0002
Nickel, ICP	<0.010		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400 03/28/2002 13:16	EPA 200.7	<0.50
Zinc, ICP	<0.050		mg/L	400 03/27/2002 12:20	EPA 200.7	<0.050
E. coli	900		/100 mL	out 03/29/2002	SM9222G	<1
Fecal Streptococcus	<10		/100 mL	out 03/29/2002	SM9230C	<10

KEY TO ABBREVIATIONS

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: CLARK DIETZ Client #: _____
Address: 8445 KEYSTONE CROSSING SUITE 105
City/State/Zip Code: INDIANAPOLIS IN 46240
Project Manager: HANS PETERSON
Telephone Number: 317-259-4644 Fax: 317-259-4660
Sampler Name: (Print Name) WES CHRISTMAS
Sampler Signature: W. C

Project Name: COOL CREEK WATERSHED STUDY
Project #: H21010
Site/Location ID: 3 - 186TH STREET CROSSING State: IN
Report To: HANS PETERSON
Invoice To: CLARK DIETZ
Quote #: 01.0122 PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix (SL - Sludge, DW - Drinking Water, GW - Groundwater, S - Soil/Solid, WW - Wastewater, Specify Other)	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	E. Coli, Fecal, Strep	TKN, NH_4, Dig. N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cr^{6+}	Diss. Phos	Oil + Grease			REMARKS
3a - 186TH St. Crossing	3/25/02	9:55			Stream				1				X										(Amber Glass)
3b - 186TH St. Crossing	3/25/02	9:55			Stream							3		X									
3c - 186TH St. Crossing	3/25/02	9:55			Stream				1						X								
3d - 186TH St. Crossing	3/25/02	9:55			Stream			1								X							
3e - 186TH St. Crossing	3/25/02	9:55			Stream	1											X						
3f - 186TH St. Crossing	3/25/02	9:55			Stream						2							X	X				LAB FILTER
3g - 186TH St. Crossing	3/25/02	9:55			Stream				1											X			

Special Instructions:

Relinquished By: W. C	Date: 3/25/02	Time: 10:50	Received By:	3-25-02	1050
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp: 4.2 °C
Custody Seals: Y N (N/A)
Bottles Supplied by TestAmerica: (Y) N
Method of Shipment: Client

DRY WEATHER SAMPLING EVENT

JUNE 21, 2002

TestAmerica
INCORPORATED

JUL - 3 2002

ANALYTICAL AND QUALITY CONTROL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Enclosed is the Analytical and Quality Control reports for the following samples submitted to the TestAmerica, Inc. Indianapolis Division.
Project Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
322191	2A-G 146TH ST CROSSING	06/21/2002	10:37	06/21/2002
322213	3A-G 186 TH ST CROSSING	06/21/2002	10:15	06/21/2002
322214	1A-G 116TH ST CROSSING	06/21/2002	11:00	06/21/2002

The Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

6964 HILLSDALE CT. / INDIANAPOLIS, IN 46250 / 317-842-4261 / FAX: 317-842-4286

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Client Project ID: COOL CREEK WATERSHED STUDY/H21010

yte	Wet Wt. Result	Flag	Units	Reporting Limit	Date/Time Analyzed	Analyst Initials	Prep Batch No.	Run Batch No.	Method Reference
AMPLE NO. 22191	SAMPLE DESCRIPTION 2A-G 146TH ST CROSSING							DATE-TIME TAKEN 06/21/2002 10:37	
- Five Day	<5		mg/L	<5.	06/26/2002 13:25	lng	1341	1995	EPA 405.1
- Five Day (Prep)	Complete			Complete	06/21/2002 13:00	lng	1341		EPA 405.1
mium, Hexavalent	<0.010		mg/L	<0.010	06/22/2002 08:30	sdh		1305	SM3500CrD
	<10.		mg/L	<10.	06/25/2002 09:15	tpd		1116	EPA 410.4
ide - Prep	Complete			Complete	06/24/2002 08:30	mhl	729		
ide, Total	<0.005		mg/L	<0.005	06/24/2002 13:30	jss	729	1051	EPA 335.4
ogen, Ammonia	<0.10		mg/L	<0.10	06/27/2002 13:03	jss		1164	EPA 350.1
ogen, Kjeldahl	0.84		mg/L	<0.30	06/25/2002 11:57	jss	635	703	EPA 351.2
ogen, Nitrate	0.85		mg/L	<0.02	06/21/2002 15:32	jss		1067	EPA 353.2
ogen, Organic	0.84		mg/L	<0.10	06/27/2002 15:00	jss		1165	EPA 351-EPA 350
ogen, Total	1.7		mg/L	<0.10	06/27/2002 15:00	jss		704	EPA 351+EPA 353
& Grease	<5.	l	mg/L	<5.	06/25/2002 09:45	sdh		1682	EPA 1664A
	8.0		S.U.	<0.1	06/21/2002 14:15	sdh		3155	EPA 150.1
ol - Prep	Complete			Complete	06/25/2002 09:00	mhl	440		
ol	<0.010		mg/L	<0.010	06/29/2002 10:45	jss	440	700	SW 9066
phorus, Dissolved	<0.05		mg/L	<0.05	06/26/2002 09:30	tpd		8	EPA 365.2
phorus, Total - Prep	Complete			Complete	06/26/2002 09:30	tpd	223		
ds, Dissolved	390		mg/L	<20.	06/24/2002 15:25	lng		897	EPA 160.1
ds, Suspended	<5		mg/L	<5.	06/25/2002 10:56	lng		1925	EPA 160.2
le Filtration	Complete			Complete	06/21/2002	sld		409	
stion, TKN	Complete			Complete	06/24/2002 09:30	mhl	635		
METALS AQUEOUS	Complete			Complete	06/27/2002 14:59	401		5462	
mony, ICP	<0.10		mg/L	<0.10	06/27/2002 14:59	400	3859	4550	EPA 200.7
nic, ICP	<0.10		mg/L	<0.10	06/27/2002 14:59	400	3859	4714	EPA 200.7
llium, ICP	<0.005		mg/L	<0.005	06/27/2002 14:59	400	3859	4671	EPA 200.7
ium, ICP	<0.030		mg/L	<0.030	06/27/2002 14:59	400	3859	4918	EPA 200.7

TestAmerica
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ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
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Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Client Project ID: COOL CREEK WATERSHED STUDY/H21010

yte	Wet Wt. Result	Flag	Units	Reporting Limit	Date/Time Analyzed	Analyst Initials	Prep Batch No.	Run Batch No.	Method Reference
AMPLE NO. 12191	SAMPLE DESCRIPTION 2A-G 146TH ST CROSSING								DATE-TIME TAKEN 06/21/2002 10:37
mium, ICP	<0.040		mg/L	<0.040	06/27/2002 14:59	400	3859	5105	EPA 200.7
er, ICP	<0.020		mg/L	<0.020	06/27/2002 14:59	400	3859	5045	EPA 200.7
, ICP	<0.080		mg/L	<0.080	06/27/2002 14:59	400	3859	5058	EPA 200.7
ury, CVAA	<0.0002		mg/L	<0.0002	06/26/2002 09:51	400	3151	1464	EPA 245.1
el, ICP	<0.010		mg/L	<0.010	06/27/2002 14:59	400	3859	4981	EPA 200.7
nium, ICP	<0.10		mg/L	<0.10	06/27/2002 14:59	400	3859	4641	EPA 200.7
er, ICP	<0.040		mg/L	<0.040	06/27/2002 14:59	400	3859	4668	EPA 200.7
lium, ICP	<0.50		mg/L	<0.50	06/27/2002 14:59	400	3859	4630	EPA 200.7
, ICP	<0.050		mg/L	<0.050	06/27/2002 14:59	400	3859	5109	EPA 200.7
Metals Digestion-Aqueous	Complete			Complete	06/25/2002 10:40	400	3859		EPA 200.2
ury-Aqueous Digestion	Complete			Complete	06/24/2002 21:00	400	3151		EPA 245.1
oli	220		/100 mL	<1	06/25/2002	635		617	SM9222G
l Streptococcus	12		/mL	<1	06/25/2002	635		4	SM9230C
AMPLE NO. 12213	SAMPLE DESCRIPTION 3A-G 186 TH ST CROSSING								DATE-TIME TAKEN 06/21/2002 10:15
- Five Day	<5		mg/L	<5.	06/26/2002 13:25	lng	1341	1995	EPA 405.1
- Five Day (Prep)	Complete			Complete	06/21/2002 13:00	lng	1341		EPA 405.1
mium, Hexavalent	<0.010		mg/L	<0.010	06/22/2002 08:30	sdh		1305	SM3500CrD
	<10.		mg/L	<10.	06/25/2002 09:15	tpd		1116	EPA 410.4
ide - Prep	Complete			Complete	06/24/2002 08:30	mhl	729		
ide, Total	<0.005		mg/L	<0.005	06/24/2002 13:30	jss	729	1051	EPA 335.4

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Client Project ID: COOL CREEK WATERSHED STUDY/H21010

yte	Wet Wt. Result	Flag	Units	Reporting Limit	Date/Time Analyzed	Analyst Initials	Prep Batch No.	Run Batch No.	Method Reference
AMPLE NO. 22213	SAMPLE DESCRIPTION 3A-G 186 TH ST CROSSING							DATE-TIME TAKEN 06/21/2002 10:15	
ogen, Ammonia	<0.10		mg/L	<0.10	06/27/2002 13:03	jss		1164	EPA 350.1
ogen, Kjeldahl	0.73		mg/L	<0.30	06/25/2002 11:57	jss	635	703	EPA 351.2
ogen, Nitrate	1.8		mg/L	<0.02	06/21/2002 15:32	jss		1067	EPA 353.2
ogen, Organic	0.73		mg/L	<0.10	06/27/2002 15:00	jss		1165	EPA 351-EPA 350
ogen, Total	2.5		mg/L	<0.10	06/27/2002 15:00	jss		704	EPA 351+EPA 353
& Grease	<5.	1	mg/L	<5.	06/25/2002 09:45	sdh		1682	EPA 1664A
	7.9		S.U.	<0.1	06/21/2002 14:15	sdh		3155	EPA 150.1
ol - Prep	Complete			Complete	06/25/2002 09:00	mhl	440		
ol	<0.010		mg/L	<0.010	06/29/2002 10:45	jss	440	700	SW 9066
phorus, Dissolved	0.067		mg/L	<0.05	06/26/2002 09:30	tpd		8	EPA 365.2
phorus, Total - Prep	Complete			Complete	06/26/2002 09:30	tpd	223		
ds, Dissolved	360		mg/L	<20.	06/24/2002 15:25	lng		897	EPA 160.1
ds, Suspended	<5		mg/L	<5.	06/25/2002 10:56	lng		1925	EPA 160.2
le Filtration	Complete			Complete	06/21/2002	sld		409	
stion, TKN	Complete			Complete	06/24/2002 09:30	mhl	635		
METALS AQUEOUS	Complete			Complete	06/27/2002 15:02	401		5462	
mony, ICP	<0.10		mg/L	<0.10	06/27/2002 15:02	400	3859	4550	EPA 200.7
nic, ICP	<0.10		mg/L	<0.10	06/27/2002 15:02	400	3859	4714	EPA 200.7
llium, ICP	<0.005		mg/L	<0.005	06/27/2002 15:02	400	3859	4671	EPA 200.7
ium, ICP	<0.030		mg/L	<0.030	06/27/2002 15:02	400	3859	4918	EPA 200.7
mium, ICP	<0.040		mg/L	<0.040	06/27/2002 15:02	400	3859	5105	EPA 200.7
er, ICP	<0.020		mg/L	<0.020	06/27/2002 15:02	400	3859	5045	EPA 200.7
, ICP	<0.080		mg/L	<0.080	06/27/2002 15:02	400	3859	5058	EPA 200.7
ury, CVAA	<0.0002		mg/L	<0.0002	06/26/2002 09:53	400	3151	1464	EPA 245.1
el, ICP	<0.010		mg/L	<0.010	06/27/2002 15:02	400	3859	4981	EPA 200.7
nium, ICP	<0.10		mg/L	<0.10	06/27/2002 15:02	400	3859	4641	EPA 200.7

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Client Project ID: COOL CREEK WATERSHED STUDY/H21010

yte	Wet Wt. Result	Flag	Units	Reporting Limit	Date/Time Analyzed	Analyst Initials	Prep Batch No.	Run Batch No.	Method Reference
MPLE NO. 2213	SAMPLE DESCRIPTION 3A-G 186 TH ST CROSSING								DATE-TIME TAKEN 06/21/2002 10:15
er, ICP	<0.040		mg/L	<0.040	06/27/2002 15:02	400	3859	4668	EPA 200.7
lium, ICP	<0.50		mg/L	<0.50	06/27/2002 15:02	400	3859	4630	EPA 200.7
, ICP	<0.050		mg/L	<0.050	06/27/2002 15:02	400	3859	5109	EPA 200.7
Metals Digestion-Aqueous	Complete			Complete	06/25/2002 10:40	400	3859		EPA 200.2
ury-Aqueous Digestion	Complete			Complete	06/24/2002 21:00	400	3151		EPA 245.1
oli	170		/100 mL	<1	06/25/2002	635		617	SM9222G
l Streptococcus	5		/mL	<1	06/25/2002	635		4	SM9230C
MPLE NO. 2214	SAMPLE DESCRIPTION 1A-G 116TH ST CROSSING								DATE-TIME TAKEN 06/21/2002 11:00
- Five Day	<5		mg/L	<5.	06/26/2002 13:25	lng	1341	1995	EPA 405.1
- Five Day (Prep)	Complete			Complete	06/21/2002 13:00	lng	1341		EPA 405.1
nium, Hexavalent	0.010		mg/L	<0.010	06/22/2002 08:30	sdh		1305	SM3500CrD
	<10.		mg/L	<10.	06/25/2002 09:15	tpd		1116	EPA 410.4
ide - Prep	Complete			Complete	06/24/2002 08:30	mhl	729		
ide, Total	0.029		mg/L	<0.005	06/24/2002 13:30	jss	729	1051	EPA 335.4
gen, Ammonia	<0.10		mg/L	<0.10	06/27/2002 13:03	jss		1164	EPA 350.1
gen, Kjeldahl	0.56		mg/L	<0.30	06/25/2002 11:57	jss	635	703	EPA 351.2
gen, Nitrate	0.65		mg/L	<0.02	06/21/2002 15:32	jss		1067	EPA 353.2
gen, Organic	0.56		mg/L	<0.10	06/27/2002 15:00	jss		1165	EPA 351-EPA 350
gen, Total	1.2		mg/L	<0.10	06/27/2002 15:00	jss		704	EPA 351+EPA 353
& Grease	11	1	mg/L	<5.	06/25/2002 09:45	sdh		1682	EPA 1664A

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Client Project ID: COOL CREEK WATERSHED STUDY/H21010

yte	Wet Wt. Result	Flag	Units	Reporting Limit	Date/Time Analyzed	Analyst Initials	Prep Batch No.	Run Batch No.	Method Reference
AMPLE NO. :2214	SAMPLE DESCRIPTION 1A-G 116TH ST CROSSING							DATE-TIME TAKEN 06/21/2002 11:00	
	7.9		S.U.	<0.1	06/21/2002 14:15	sdh		3155	EPA 150.1
ol - Prep	Complete			Complete	06/25/2002 09:00	mhl	440		
ol	0.012		mg/L	<0.010	06/29/2002 10:45	jss	440	700	SW 9066
phorus, Dissolved	<0.05		mg/L	<0.05	06/26/2002 09:30	tpd		8	EPA 365.2
phorus, Total - Prep	Complete			Complete	06/26/2002 09:30	tpd	223		
ds, Dissolved	440		mg/L	<20.	06/24/2002 15:25	lng		897	EPA 160.1
ds, Suspended	<5		mg/L	<5.	06/25/2002 10:56	lng		1925	EPA 160.2
le Filtration	Complete			Complete	06/21/2002	sld		409	
stion, TKN	Complete			Complete	06/24/2002 09:30	mhl	635		
METALS AQUEOUS	Complete			Complete	06/27/2002 15:05	401		5462	
mony, ICP	<0.10		mg/L	<0.10	06/27/2002 15:05	400	3859	4550	EPA 200.7
nic, ICP	<0.10		mg/L	<0.10	06/27/2002 15:05	400	3859	4714	EPA 200.7
llium, ICP	<0.005		mg/L	<0.005	06/27/2002 15:05	400	3859	4671	EPA 200.7
ium, ICP	<0.030		mg/L	<0.030	06/27/2002 15:05	400	3859	4918	EPA 200.7
mium, ICP	<0.040		mg/L	<0.040	06/27/2002 15:05	400	3859	5105	EPA 200.7
er, ICP	<0.020		mg/L	<0.020	06/27/2002 15:05	400	3859	5045	EPA 200.7
, ICP	<0.080		mg/L	<0.080	06/27/2002 15:05	400	3859	5058	EPA 200.7
ury, CVAA	<0.0002		mg/L	<0.0002	06/26/2002 09:56	400	3151	1464	EPA 245.1
el, ICP	<0.010		mg/L	<0.010	06/27/2002 15:05	400	3859	4981	EPA 200.7
nium, ICP	<0.10		mg/L	<0.10	06/27/2002 15:05	400	3859	4641	EPA 200.7
er, ICP	<0.040		mg/L	<0.040	06/27/2002 15:05	400	3859	4668	EPA 200.7
lium, ICP	<0.50		mg/L	<0.50	06/27/2002 15:05	400	3859	4630	EPA 200.7
, ICP	<0.050		mg/L	<0.050	06/27/2002 15:05	400	3859	5109	EPA 200.7
Metals Digestion-Aqueous	Complete			Complete	06/25/2002 10:40	400	3859		EPA 200.2
ury-Aqueous Digestion	Complete			Complete	06/24/2002 21:00	400	3151		EPA 245.1
oli	170		/100 mL	<1	06/25/2002	635		617	SM9222G

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Client Project ID: COOL CREEK WATERSHED STUDY/H21010

yte	Wet Wt. Result	Flag	Units	Reporting Limit	Date/Time Analyzed	Analyst Initials	Prep Batch No.	Run Batch No.	Method Reference
MPLE NO. 2214	SAMPLE DESCRIPTION 1A-G 116TH ST CROSSING							DATE-TIME TAKEN 06/21/2002 11:00	
l Streptococcus	13		/mL	<1	06/25/2002	635	4		SM9230C

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

The following samples were submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
322191	2A-G 146TH ST CROSSING	06/21/2002	10:37	06/21/2002
322213	3A-G 186 TH ST CROSSING	06/21/2002	10:15	06/21/2002
322214	1A-G 116TH ST CROSSING	06/21/2002	11:00	06/21/2002

Approved by:

6964 HILLSDALE CT. / INDIANAPOLIS, IN 46250 / 317-842-4261 / FAX: 317-842-4286

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Analyte	Prep Batch No.	Run Batch No.	CCV True Value	CCV Conc Found	CCV % Rec	Flag	Date Analyzed
Chromium, Hexavalent		1305	0.10	0.102	102		06/22/2002
Chromium, Hexavalent		1305	0.10	0.110	110		06/22/2002
Cyanide, Total		1051	0.250	0.254	102		06/24/2002
Cyanide, Total		1051	0.250	0.257	103		06/24/2002
Cyanide, Total		1051	0.250	0.254	102		06/24/2002
Nitrogen, Ammonia		1164	5.00	5.05	101		06/27/2002
Nitrogen, Ammonia		1164	5.00	5.03	101		06/27/2002
Nitrogen, Ammonia		1164	5.00	4.98	100		06/27/2002
Nitrogen, Kjeldahl		703	3.00	3.28	109		06/25/2002
Nitrogen, Kjeldahl		703	3.00	3.16	105		06/25/2002
Nitrogen, Nitrate		1067	0.50	0.505	101		06/21/2002
Nitrogen, Nitrate		1067	0.50	0.496	99		06/21/2002
pH		3155	7.0	7.03	100		06/21/2002
Phenol		700	0.100	0.100	100		06/29/2002
Phenol		700	0.100	0.100	100		06/29/2002
Phenol		700	0.100	0.0996	100		06/29/2002
Phosphorus, Dissolved		8	0.45	0.490	109		06/26/2002
Copper, ICP		5045	1.00	0.97	97		06/27/2002
Lead, ICP		5058	1.00	1.06	106		06/27/2002
Mercury, CVAA		1464	0.00500	0.00505	101		06/26/2002
Nickel, ICP		4981	1.00	1.08	108		06/27/2002
Silver, ICP		4668	1.00	1.03	103		06/27/2002
Thallium, ICP		4630	6.00	5.61	94		06/27/2002
Zinc, ICP		5109	1.00	1.05	105		06/27/2002

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT
BLANKS

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Analyte	Prep Batch No.	Run Batch No.	Blank Value	Flag	Units	Reporting Limit	Date Analyzed
BOD - Five Day	1341	1670	<5		mg/L	<5.	08/15/2000
BOD - Five Day	1341	1670	<5		mg/L	<5.	08/15/2000
BOD - Five Day		1995	<5		mg/L	<5.	06/26/2002
BOD - Five Day		1995	<5		mg/L	<5.	06/26/2002
BOD - Five Day		1995	<5		mg/L	<5.	06/26/2002
BOD - Five Day		1995	<5		mg/L	<5.	06/26/2002
Chromium, Hexavalent		1305	<0.010		mg/L	<0.010	06/22/2002
Chromium, Hexavalent		1305	<0.010		mg/L	<0.010	06/22/2002
COD		1116	<10		mg/L	<10.	06/25/2002
COD		1116	<10		mg/L	<10.	06/25/2002
Cyanide, Total	729	1051	<0.005		mg/L	<0.005	06/24/2002
Nitrogen, Ammonia		1164	<0.10		mg/L	<0.10	06/27/2002
Nitrogen, Ammonia		1164	<0.10		mg/L	<0.10	06/27/2002
Nitrogen, Ammonia		1164	<0.10		mg/L	<0.10	06/27/2002
Nitrogen, Ammonia		1164	<0.10		mg/L	<0.10	06/27/2002
Nitrogen, Kjeldahl	635	703	<0.30		mg/L	<0.30	06/25/2002
Nitrogen, Nitrate		1067	<0.020		mg/L	<0.02	06/21/2002
Nitrogen, Nitrate		1067	<0.020		mg/L	<0.02	06/21/2002
Nitrogen, Nitrate		1067	<0.020		mg/L	<0.02	06/21/2002
Nitrogen, Nitrate		1067	<0.020		mg/L	<0.02	06/21/2002
Oil & Grease		1682	<5		mg/L	<5.	06/25/2002
Phenol	440	700	<0.010		mg/L	<0.010	06/29/2002
Phosphorus, Dissolved		8	<0.050		mg/L	<0.05	06/26/2002
Phosphorus, Dissolved		8	<0.050		mg/L	<0.05	06/26/2002
Solids, Dissolved		897	<20		mg/L	<20.	06/24/2002
Solids, Suspended		1925	<5		mg/L	<5.	06/25/2002
Copper, ICP		5045	<0.020		mg/L	<0.020	06/27/2002
Lead, ICP	3859	5058	<0.080		mg/L	<0.080	06/27/2002
Lead, ICP		5058	<0.080		mg/L	<0.080	06/27/2002
Mercury, CVAA	3151	1464	<0.0002		mg/L	<0.0002	06/26/2002
Nickel, ICP	3859	4981	<0.010		mg/L	<0.010	06/27/2002
Nickel, ICP		4981	<0.010		mg/L	<0.010	06/27/2002
Silver, ICP	3859	4668	<0.040		mg/L	<0.040	06/27/2002
Silver, ICP		4668	<0.040		mg/L	<0.040	06/27/2002

TestAmerica
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QUALITY CONTROL REPORT
BLANKS

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Analyte	Prep Batch No.	Run Batch No.	Blank Value	Flag	Units	Reporting Limit	Date Analyzed
Thallium, ICP	3859	4630	<0.50		mg/L	<0.50	06/27/2002
Thallium, ICP		4630	<0.50		mg/L	<0.50	06/27/2002
Zinc, ICP	3859	5109	<0.050		mg/L	<0.050	06/27/2002
Zinc, ICP		5109	<0.050		mg/L	<0.050	06/27/2002

TestAmerica
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QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Analyte	Prep Batch No.	Run Batch No.	LCS True Conc	LCS Conc Found	LCS % Rec.	LCS Dup. Conc Found	LCS Dup. % Rec.	RPD	Flag	Date Analyzed
BOD - Five Day		1995	19.8	18.48	93					06/26/2002
BOD - Five Day		1995	198	176.3	89					06/26/2002
COD		1116	50.	47.2	94	43.0	86	9.3		06/25/2002
Cyanide, Total	729	1051	0.100	0.103	103					06/24/2002
Nitrogen, Ammonia		1164	5.00	4.77	95					06/27/2002
Nitrogen, Kjeldahl	635	703	2.50	2.81	112					06/25/2002
Nitrogen, Nitrate		1067	0.500	0.480	96					06/21/2002
Oil & Grease		1682	40.0	36	90	43	108	18		06/25/2002
pH		3155	7.0	6.96	99					06/21/2002
Phenol		700	0.100	0.106	106					06/29/2002
Phosphorus, Dissolved		8	0.450	0.471	105					06/26/2002
Solids, Dissolved		897	100	95	95					06/24/2002
Solids, Suspended		1925	100	90	90					06/25/2002
Lead, ICP	3859	5058	1.00	1.01	101					06/27/2002
Mercury, CVAA	3151	1464	0.00200	0.00201	101					06/26/2002
Nickel, ICP	3859	4981	1.00	1.04	104					06/27/2002
Silver, ICP	3859	4668	1.00	0.98	98					06/27/2002
Thallium, ICP	3859	4630	1.00	0.90	90					06/27/2002
Zinc, ICP	3859	5109	1.00	0.99	99					06/27/2002

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QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

ılyte	Prep Batch No.	Run Batch No.	Conc. Spike Added	Sample Result	Conc. MS Result	MS % Rec.	Conc. MSD Result	MSD % Rec.	RPD	Flag	Date Analyzed	Sample Spiked
:omium, Hexavalent		1305	0.10	<0.010	0.098	98	0.102	102	4		06/22/2002	322191
)		1116	50	<5	50.3	101	45.7	91	9.6		06/25/2002	322117
ınide, Total	729	1051	0.200	<0.005	0.196	98	0.195	98	0.5		06/24/2002	322191
:rogen, Ammonia		1164	5.00	<0.10	3.65	73	3.66	73	0.3		06/27/2002	322191
:rogen, Kjeldahl		703	2.50	0.78	2.93	86	2.90	85	1		06/25/2002	322117
:rogen, Nitrate		1067	0.50	0.033	0.477	89	0.466	87	2.3		06/21/2002	322218
:nol	440	700	0.10	<0.010	0.112	112	0.106	106	5.5		06/29/2002	322191
)sphorus, Dissolved		8	0.450	0.22	0.716	110	0.689	104	3.8		06/26/2002	322125
:imony, ICP	3859	4550	2.00	<0.20	1.10	55	1.11	56	0.9	q	06/27/2002	-2218
:yllium, ICP	3859	4671	2.00	<0.01	1.13	57	1.12	56	0.9	q	06/27/2002	-2218
:omium, ICP	3859	5105	1.00	<0.040	0.96	96	1.00	100	4.1		06/27/2002	322042
)per, ICP	3859	5045	1.00	<0.020	0.88	88	0.89	89	1.1		06/27/2002	322042
ıd, ICP	3859	5058	1.00	<0.080	0.96	96	0.98	98	2.1		06/27/2002	322042
:cury, CVAA	3151	1464	0.00100	<0.0002	0.00112	112	0.00114	114	1.8		06/26/2002	-2217
:cury, CVAA	3151	1465	0.00100	<0.0002	0.00112	112	0.00114	114	1.8		06/26/2002	-2223
:kel, ICP	3859	4981	1.00	<0.010	0.96	96	1.00	100	4.1		06/27/2002	322042
:ver, ICP	3859	4668	1.00	<0.040	0.96	96	0.97	97	1		06/27/2002	322042
ıllium, ICP	3859	4630	2.00	<1.0	<1.0	0	<1.0	0		q	06/27/2002	-2218
ıllium, ICP	3859	4630	1.00	<0.50	0.83	83	0.88	88	5.8		06/27/2002	322042
ıc, ICP	3859	5109	1.00	<0.050	0.97	97	1.00	100	3		06/27/2002	322042

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT
DUPLICATES

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

07/01/2002

Job Number: 02.02893

Analyte	Prep Batch No.	Run Batch No.	Sample Result	Duplicate Sample Result	Units	RPD	Flag	Date Analyzed	Duplicate Sample Number
BOD - Five Day	1341	1995	<5	<5	mg/L			06/26/2002	322214
pH		3155	8.0	8.1	S.U.	1.2		06/21/2002	322191
Solids, Dissolved		897	390	410	mg/L	5.0		06/24/2002	322191
Solids, Dissolved		897	510	510	mg/L	0.0		06/24/2002	322227
Solids, Suspended		1925	110	100	mg/L	9.5		06/25/2002	322334

KEY TO ABBREVIATIONS

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: Clark Dietz Client #: _____
Address: 8445 Keystone Crossing Suite 105
City/State/Zip Code: Indianapolis IN 46240
Project Manager: Hans Peterson
Telephone Number: 317-259-4644 Fax: 317-259-4660
Sampler Name: (Print Name) Emily Wehmeyer
Sampler Signature: Emily J Wehmeyer

Project Name: Cool Creek Watershed Study
Project #: H21010
Site/Location ID: 1-116th ST. crossing State: IN
Report To: Hans Peterson
Invoice To: Clark Dietz
Quote #: _____ PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix (SL - Sludge DW - Drinking Water; GW - Groundwater S - Soil/Solid; WW - Wastewater Specify Other)	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	E.coli, Fecal, Strep	TKN, NH_4, ORG. N, COD, Total N	CN	METALS	pH, TDS, TSS, BOD, NITRATE, Cr^{6+}	Diss. Phos.	Oil + Grease			REMARKS
1a - 116th ST. Crossing	6/21/02	11:00			Stream				1				X										(Amber glass)
1b - 116th ST. Crossing	6/21/02	11:00			Stream							3		X									
1c - 116th ST. Crossing	6/21/02	11:00			Stream				1						X								
1d - 116th ST. Crossing	6/21/02	11:00			Stream			1								X							
1e - 116th ST. crossing	6/21/02	11:00			Stream	1											X						
1F - 116th ST crossing	6/21/02	11:00			Stream						2							X	X				LAB filter
1g - 116th ST crossing	6/21/02	11:00			Stream				1											X			

Special Instructions:

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp:
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment:

Relinquished By: Emily J Wehmeyer	Date: 6/21/02	Time: 1120	Received By:	Date: 6-24-02	Time: 1120
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: Clark Dietz Client #: _____
Address: 8445 Keystone Crossing Suite 105
City/State/Zip Code: Indianapolis, IN 46240
Project Manager: Hans Peterson
Telephone Number: 317-259-4644 Fax: 317-259-4660
Sampler Name: (Print Name) Emily Wehmeyer
Sampler Signature: Emily J Wehmeyer

Project Name: Cool Creek Watershed Study
Project #: H21010
Site/Location ID: 3-180th St Crossing State: IN
Report To: Hans Peterson
Invoice To: Clark Dietz
Quote #: _____ PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

Matrix: SL - Sludge, DW - Drinking Water, GW - Groundwater, S - Soil/Solid, WW - Wastewater, Specify Other
Preservation & # of Containers: HNO_3, HCl, NaOH, H_2SO_4, Methanol, None, Other (Specify)
Analyze For: Phenol; E Coli, Fecal, Strep; TKN, NH_4, Org N, COD, Total N; CN; Metals; pH, TDS, TSS, BOD, Nitrate, Cr 6+; Diss. Phos; Oil + Grease

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix	HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Phenol	E Coli, Fecal, Strep	TKN, NH_4, Org N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cr 6+	Diss. Phos	Oil + Grease			REMARKS
3a-180th St Crossing	6/21/02	10:15			Stream				1				X										(Amber Glass)
3b-180th St Crossing	6/21/02	10:15			Stream							3		X									
3c-180th St Crossing	6/21/02	10:15			Stream				1						X								
3d-180th St Crossing	6/21/02	10:15			Stream			1								X							
3e-180th St Crossing	6/21/02	10:15			Stream	1											X						
3f-180th St Crossing	6/21/02	10:15			Stream						2							X	X				LAB FILTER
3g-180th St Crossing	6/21/02	10:15			Stream				1											X			

Special Instructions:

Relinquished By: Emily J Wehmeyer	Date: 6/21/02	Time: 1120	Received By:	Date: 6-21-02	Time: 1120	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp: 3.2
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment: Client

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: Clark Dietz Client #: _____

Address: 8445 Keystone Crossing Suite 105

City/State/Zip Code: Indianapolis, IN 46240

Project Manager: Hans Peterson

Telephone Number: 317-259-4644 Fax: 317-259-4660

Sampler Name: (Print Name) Emily Wehmeyer

Sampler Signature: Emily Wehmeyer

Project Name: Cool Creek Watershed Study

Project #: HZ1010

Site/Location ID: 2-146th Street Crossing State: IN

Report To: Hans Peterson

Invoice To: Clark Dietz

Quote #: _____ PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix: SL - Sludge, DW - Drinking Water, GW - Groundwater, S - Soil/Solid, WW - Wastewater, Specify Other	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	E Coli, Fecal, Strep	TKN, NH_4, NO_2&N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cr^{3+}	Diss Phos	Oil & Grease			REMARKS
2a-146th St Crossing	6/21/02	10:37			Stream				1				X										
2b-146th St Crossing	6/21/02	10:37			Stream							3		X									
2c-146th St Crossing	6/21/02	10:37			Stream				1						X								
2d-146th St Crossing	6/21/02	10:37			Stream			1								X							
2e-146th St Crossing	6/21/02	10:37			Stream	1											X						
2f-146th St Crossing	6/21/02	10:37			Stream						2							X	X				
2g-146th St Crossing	6/21/02	10:37			Stream				1											X			

Special Instructions:

Relinquished By: Emily Wehmeyer	Date: 6/21/02	Time: 1120	Received By:	Date: 6-21-02	Time: 1120	LABORATORY COMMENTS: Init Lab Temp: Rec Lab Temp: 3.2 °C
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	Custody Seals: Y N (N/A)
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	Bottles Supplied by TestAmerica: (Y) N Method of Shipment: client

WET WEATHER SAMPLING EVENT

AUGUST 19, 2002

TestAmerica
INCORPORATED

SEP 09 2002

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/03/2002

Job Number: 02.03861

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: COOL CREEK WATERSHED STUDY

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
326011	116TH ST CROSSING	08/19/2002	09:30	08/19/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

6964 Hillsdale Ct. / Indianapolis, IN 46250 / 317-842-4261 / Fax: 317-842-4286

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
9445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/03/2002

Job No.: 02.03861

Date Received: 08/19/2002
Job Description: COOL CREEK WATERSHED STUDY

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
326011 116TH ST CROSSING			08/19/2002 09:30			
BOD - Five Day	5.5		mg/L	lng 08/26/2002 10:55	EPA 405.1	<5.
BOD - Five Day (Prep)	Complete			lng 08/21/2002 08:45	EPA 405.1	Complete
Chromium, Hexavalent	0.015		mg/L	sld 08/20/2002 08:12	SM3500CrD	<0.010
COD	59		mg/L	tpd 08/20/2002 09:42	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl 08/21/2002 10:00		Complete
Cyanide, Total	<0.005		mg/L	jss 08/22/2002 10:10	EPA 335.4	<0.005
Nitrogen, Ammonia	0.14		mg/L	jss 08/23/2002 11:52	EPA 350.1	<0.10
Nitrogen, Kjeldahl	3.0		mg/L	jss 08/22/2002 13:26	EPA 351.2	<0.30
Nitrogen, Nitrate	0.69	q	mg/L	jss 08/21/2002 09:01	EPA 353.2	<0.02
Nitrogen, Organic	2.9		mg/L	jss 08/27/2002 08:30	EPA 351-EPA	<0.10
Nitrogen, Total	3.7		mg/L	sld 08/28/2002	EPA 351+EPA	<0.10
Oil & Grease	<5.	l	mg/L	mhl 09/03/2002 09:30	EPA 1664A	<5.
pH	8.0		S.U.	sld 08/19/2002 14:40	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl 08/19/2002 14:00		Complete
Phenol	0.025		mg/L	jss 08/20/2002 11:54	EPA 420.2	<0.010
Phosphorus, Total	0.56		mg/L	tpd 08/21/2002 09:00	EPA 365.2	<0.05
Phosphorus, Dissolved	0.15		mg/L	tpd 08/21/2002 09:00	EPA 365.2	<0.05
Phosphorus, Total - Prep	Complete			tpd 08/21/2002 09:00		Complete
Solids, Dissolved	120		mg/L	lng 08/20/2002 10:19	EPA 160.1	<20.
Solids, Suspended	490		mg/L	lng 08/20/2002 09:47	EPA 160.2	<5.
Digestion, TKN	Complete			mhl 08/21/2002 08:30		Complete
Antimony, ICP	<0.10		mg/L	400 08/22/2002 19:07	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.005

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/03/2002

Job No.: 02.03861

Date Received: 08/19/2002
Job Description: COOL CREEK WATERSHED STUDY

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
326011 116TH ST CROSSING			08/19/2002 09:30			
Cadmium, ICP	<0.030		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.030
Chromium, ICP	<0.040		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.040
Copper, ICP	0.033		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400 08/22/2002 11:30	EPA 245.1	<0.0002
Nickel, ICP	0.018		mg/L	400 08/22/2002 16:56	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.50
Zinc, ICP	0.095		mg/L	400 08/22/2002 14:54	EPA 200.7	<0.050
E. coli	1600		/100 mL	635 08/23/2002	SM9222G	<1
Coliform, Fecal	2		/100 mL	635 08/23/2002	SM9222D	<1
Fecal Streptococcus	920			635 08/23/2002	SM9230C	<1

TestAmerica
INCORPORATED

PROJECT NARRATIVE

JOB NUMBER: 02.03861

SAMPLE: 326011

ANALYSIS: Nitrate

MS/MSD recovery values are below the acceptable limits. Matrix interference may be suppressing analyte recovery. Concentration values for this sample may be biased low due to the suspected matrix interference. All other quality control indicators are within acceptable limits.
jss 8/21/02.

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

SUBCONTRACTED LABORATORY CODES

1	MISC
75	A & L GREATLAKES LABS
175	TESTAMERICA-NASHVILLE
200	TESTAMERICA-CEDAR FALLS
250	TESTAMERICA-ORLANDO
400	TESTAMERICA-DAYTON
401	TESTAMERICA-DAYTON/NO UTC
425	EARTH EXPLORATION
430	HOOSIER MICROBIOLOGICAL LAB
440	ECCS
475	EMSL
635	TOWNSEND RESEARCH LABS
645	TRIANGLE LABS
700	TESTAMERICA-WATERTOWN

CHAIN OF CUSTODY IS ATTACHED

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring ____

Client Name: Clark Dietz, Inc. Client #: ____
Address: 8445 Keystone Crossing Suite 105
City/State/Zip Code: Indianapolis, IN 46240
Project Manager: Hans Peterson
Telephone Number: 317-259-46644 Fax: 317-259-46660
Sampler Name: (Print Name) Wes Christmas
Sampler Signature:

Project Name: Cool Creek Watershed Study
Project #: H21010
Site/Location ID: I-116th Street Crossing State: IN
Report To: Hans Peterson
Invoice To: Clark Dietz
Quote #: 01-0122 PO#: ____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: ____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: ____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix: SL - Sludge DW - Drinking Water GW - Groundwater S - Soil/Solid WW - Wastewater Specify Other	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	Ecoli, Fecal, Strep	TKN, NH4, ORG.N, COD, TOTAL N.	CN	Metals	PH, TDS, TSS, BOD, Nitrate, Cr 6+, Diss PHOS	OIL + GREASE				REMARKS
1a-116th St Crossing	8/19/02	9:30			Stream				1				X										
1b-116th St Crossing	8/19/02	9:30			Stream							2		X										
1c-116th St Crossing	8/19/02	9:30			Stream				1						X									
1d-116th St Crossing	8/19/02	9:30			Stream			1								X								
1e-116th St Crossing	8/19/02	9:30			Stream	1											X							
1f-116th St Crossing	8/19/02	9:30			Stream						1							X						
1g-116th St Crossing	8/19/02	9:30			Stream				1										X					

Special Instructions:

LABORATORY COMMENTS:
Init Lab Temp: 19.6°C
Rec Lab Temp: on ice
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment:

	Date	Time		Date	Time
Relinquished By:	8/19/02	10:30	Received By:	8/19/02	10:30
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/03/2002

Job Number: 02.03862

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: 2-146TH ST CROSSING

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
326012	146TH CROSSING	08/19/2002	09:00	08/19/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

TestAmerica
INCORPORATED

ANALYTICAL REPORT

r. Hans J. Peterson
LARK DIETZ, INC.
445 Keystone Crossing
uite 105
ndianapolis, IN 46240

09/03/2002

Job No.: 02.03862

ate Received: 08/19/2002
ob Description: 2-146TH ST CROSSING

ample Number / Sample I.D. arameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
326012 146TH CROSSING			08/19/2002 09:00			
BOD - Five Day	6.9		mg/L	lng 08/26/2002 10:55	EPA 405.1	<5.
BOD - Five Day (Prep)	Complete			lng 08/21/2002 08:45	EPA 405.1	Complete
Chromium, Hexavalent	<0.010		mg/L	sld 08/20/2002 08:12	SM3500CrD	<0.010
COD	81		mg/L	tpd 08/20/2002 09:42	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl 08/21/2002 10:00		Complete
Cyanide, Total	<0.005		mg/L	jss 08/22/2002 10:10	EPA 335.4	<0.005
Nitrogen, Ammonia	0.16		mg/L	jss 08/23/2002 11:52	EPA 350.1	<0.10
Nitrogen, Kjeldahl	3.6		mg/L	jss 08/22/2002 13:26	EPA 351.2	<0.30
Nitrogen, Nitrate	0.81		mg/L	jss 08/21/2002 08:49	EPA 353.2	<0.02
Nitrogen, Organic	3.4		mg/L	jss 08/27/2002 08:30	EPA 351-EPA	<0.10
Nitrogen, Total	4.4		mg/L	sld 08/28/2002	EPA 351+EPA	<0.10
Oil & Grease	<5.	1	mg/L	mhl 09/03/2002 09:30	EPA 1664A	<5.
pH	7.6		S.U.	sld 08/19/2002 14:40	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl 08/19/2002 14:00		Complete
Phenol	0.017		mg/L	jss 08/20/2002 11:54	EPA 420.2	<0.010
Phosphorus, Total	0.72		mg/L	tpd 08/21/2002 09:00	EPA 365.2	<0.05
Phosphorus, Dissolved	0.21		mg/L	tpd 08/21/2002 09:00	EPA 365.2	<0.05
Phosphorus, Total - Prep	Complete			tpd 08/21/2002 09:00		Complete
Solids, Dissolved	210		mg/L	lng 08/20/2002 10:19	EPA 160.1	<20.
Solids, Suspended	580		mg/L	lng 08/20/2002 09:47	EPA 160.2	<5.
Digestion, TKN	Complete			mhl 08/21/2002 08:30		Complete
Antimony, ICP	<0.10		mg/L	400 08/22/2002 14:53	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400 08/22/2002 14:53	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400 08/22/2002 14:53	EPA 200.7	<0.005

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/03/2002

Job No.: 02.03862

Date Received: 08/19/2002
Job Description: 2-146TH ST CROSSING

Sample Number / Sample I.D. / Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst	Date & Time Analyzed	Method	Reporting Limit
326012 146TH CROSSING			08/19/2002 09:00				
Cadmium, ICP	<0.030		mg/L	400	08/22/2002 14:53	EPA 200.7	<0.030
Chromium, ICP	<0.040		mg/L	400	08/22/2002 14:53	EPA 200.7	<0.040
Copper, ICP	0.025		mg/L	400	08/22/2002 14:53	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400	08/22/2002 16:14	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400	08/22/2002 11:37	EPA 245.1	<0.0002
Nickel, ICP	<0.010		mg/L	400	08/22/2002 16:14	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400	08/22/2002 16:14	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400	08/22/2002 14:53	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400	08/22/2002 14:53	EPA 200.7	<0.50
Zinc, ICP	<0.050		mg/L	400	08/22/2002 14:53	EPA 200.7	<0.050
E. coli	1600		/100 mL	635	08/23/2002	SM9222G	<1
Coliform, Fecal	8		/100 mL	635	08/23/2002	SM9222D	<1
Fecal Streptococcus	960		/100 mL	635	08/23/2002	SM9230C	<1

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

SUBCONTRACTED LABORATORY CODES

1	MISC
75	A & L GREATLAKES LABS
175	TESTAMERICA-NASHVILLE
200	TESTAMERICA-CEDAR FALLS
250	TESTAMERICA-ORLANDO
400	TESTAMERICA-DAYTON
401	TESTAMERICA-DAYTON/NO UTC
425	EARTH EXPLORATION
430	HOOSIER MICROBIOLOGICAL LAB
440	ECCS
475	EMSL
635	TOWNSEND RESEARCH LABS
645	TRIANGLE LABS
700	TESTAMERICA-WATERTOWN

CHAIN OF CUSTODY IS ATTACHED

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: Clark Dietz Client #: _____
Address: 8445 Keystone Crossing Suite 105
City/State/Zip Code: Indianapolis, IN 46240
Project Manager: Hans Peterson
Telephone Number: 317-259-4644 Fax: 317-259-4660
Sampler Name: (Print Name) Wes Christmas
Sampler Signature:

Project Name: Cool Creek Watershed Study
Project #: H21010
Site/Location ID: 2-146th St Crossing State: IN
Report To: Hans Peterson
Invoice To: Clark Dietz
Quote #: 01-0122 PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix: SL - Sludge DW - Drinking Water GW - Groundwater S - Soil/Solid WW - Wastewater Specify Other	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	E Coli, Fecal, Strep	TKN, NH_4, Org N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cr^{6+}, Diss Phos	Oil + Grease				REMARKS
2a - 146th St Crossing	8/19/02	9:00											X										
2b - 146th St Crossing	8/19/02	9:00												X									
2c - 146th St Crossing	8/19/02	9:00													X								
2d - 146th St Crossing	8/19/02	9:00														X							
2e - 146th St Crossing	8/19/02	9:00															X						
2f - 146th St Crossing	8/19/02	9:00																X					
2g - 146th St Crossing	8/19/02	9:00																	X				

Special Instructions:

LABORATORY COMMENTS:
Init Lab Temp: 19.1°C
Rec Lab Temp: On ice
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment:

	Date	Time		Date	Time
Relinquished By:	8/19/02	10:30	Received By:	8/19/02	10:30
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/03/2002

Job Number: 02.03863

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: 3-186TH ST CROSSING

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
326013	186TH ST CROSSING	08/19/2002	08:45	08/19/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/03/2002

Job No.: 02.03863

Date Received: 08/19/2002
Job Description: 3-186TH ST CROSSING

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
326013 186TH ST CROSSING			08/19/2002 08:45			
BOD - Five Day	5.4		mg/L	lng 08/26/2002 10:55	EPA 405.1	<5.
BOD - Five Day (Prep)	complete			lng 08/21/2002 08:45	EPA 405.1	Complete
Chromium, Hexavalent	0.012		mg/L	sld 08/20/2002 08:12	SM3500CrD	<0.010
COD	32		mg/L	tpd 08/20/2002 09:42	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl 08/21/2002 10:00		Complete
Cyanide, Total	<0.005		mg/L	jss 08/22/2002 10:10	EPA 335.4	<0.005
Nitrogen, Ammonia	0.28		mg/L	jss 08/23/2002 11:52	EPA 350.1	<0.10
Nitrogen, Kjeldahl	2.1		mg/L	jss 08/22/2002 13:26	EPA 351.2	<0.30
Nitrogen, Nitrate	1.2	h	mg/L	jss 08/21/2002 08:50	EPA 353.2	<0.02
Nitrogen, Organic	1.8		mg/L	jss 08/27/2002 08:30	EPA 351-EPA	<0.10
Nitrogen, Total	3.3		mg/L	sld 08/28/2002	EPA 351+EPA	<0.10
Oil & Grease	<5.	l	mg/L	mhl 09/03/2002 09:30	EPA 1664A	<5.
pH	7.4		S.U.	sld 08/19/2002 14:40	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl 08/19/2002 14:00		Complete
Phenol	0.018		mg/L	jss 08/20/2002 11:54	EPA 420.2	<0.010
Phosphorus, Total	0.52	d1x10	mg/L	tpd 08/21/2002 09:00	EPA 365.2	<0.50
Phosphorus, Dissolved	0.28		mg/L	tpd 08/21/2002 09:00	EPA 365.2	<0.05
Phosphorus, Total - Prep	Complete			tpd 08/21/2002 09:00		Complete
Solids, Dissolved	140		mg/L	lng 08/20/2002 10:19	EPA 160.1	<20.
Solids, Suspended	160		mg/L	lng 08/20/2002 09:47	EPA 160.2	<5.
Digestion, TKN	Complete			mhl 08/21/2002 08:30		Complete
Antimony, ICP	<0.10		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.005

TestAmerica
INCORPORATED

ANALYTICAL REPORT

r. Hans J. Peterson
LARK DIETZ, INC.
445 Keystone Crossing
uite 105
ndianapolis, IN 46240

09/03/2002

Job No.: 02.03863
Page 3 of 6

ate Received: 08/19/2002
ob Description: 3-186TH ST CROSSING

ample Number / Sample I.D. arameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
326013 186TH ST CROSSING			08/19/2002 08:45			
Cadmium, ICP	<0.030		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.030
Chromium, ICP	<0.040		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.040
Copper, ICP	<0.020		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400 08/22/2002 16:17	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400 08/22/2002 11:39	EPA 245.1	<0.0002
Nickel, ICP	<0.010		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.50
Zinc, ICP	<0.050		mg/L	400 08/22/2002 14:58	EPA 200.7	<0.050
E. coli	>1600		/100 mL	635 08/23/2002	SM9222G	<1
Coliform, Fecal	7		/100 mL	635 08/23/2002	SM9222D	<1
Fecal Streptococcus	1700		/100 mL	635 08/23/2002	SM9230C	<1

TestAmerica
INCORPORATED

PROJECT NARRATIVE

JOB NUMBER: 02.03863

SAMPLE: 326013

ANALYSIS: Nitrate

Due to QC problems sample 326013 was analyzed 4 minutes past recommended hold time.
jss 8/21/02.

6964 Hillsdale Ct. / Indianapolis, IN 46250 / 317-842-4261 / Fax: 317-842-4286

KEY TO ABBREVIATIONS

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

SUBCONTRACTED LABORATORY CODES

1	MISC
75	A & L GREATLAKES LABS
175	TESTAMERICA-NASHVILLE
200	TESTAMERICA-CEDAR FALLS
250	TESTAMERICA-ORLANDO
400	TESTAMERICA-DAYTON
401	TESTAMERICA-DAYTON/NO UTC
425	EARTH EXPLORATION
430	HOOSIER MICROBIOLOGICAL LAB
440	ECCS
475	EMSL
635	TOWNSEND RESEARCH LABS
645	TRIANGLE LABS
700	TESTAMERICA-WATERTOWN

CHAIN OF CUSTODY IS ATTACHED

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: Clark Dietz Client #: _____
Address: 8445 Keystone Crossing Suite 105
City/State/Zip Code: Indianapolis, IN 46240
Project Manager: Hans Peterson
Telephone Number: 317-259-46044 Fax: 317-259-46660
Sampler Name: (Print Name) Wes Christmas
Sampler Signature: [signature]

Project Name: Cool Creek Watershed Study
Project #: HZ1010
Site/Location ID: 3-186th St Crossing State: IN
Report To: Hans Peterson
Invoice To: Clark Dietz
Quote #: 01-0122 PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

Matrix: SL - Sludge, DW - Drinking Water, GW - Groundwater, S - Soil/Solid, WW - Wastewater, Specify Other
Preservation & # of Containers: HNO_3, HCl, NaOH, H_2SO_4, Methanol, None, Other (Specify)
Analyze For: Phenol; E coli, Fecal; Strep; TKN, NH4 Org N; COD, Total N; CN; Metals; pH, TDS, TSS, BOD; Nitrate, Cr 6+, Diss Phos; Oil & Grease

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix	Preservation & # of Containers	Phenol	E coli, Fecal	Strep	TKN, NH4 Org N	COD, Total N	CN	Metals	pH, TDS, TSS, BOD	Nitrate, Cr 6+, Diss Phos	Oil & Grease	REMARKS
3a-186th St Crossing	8/19/02	8:45 a.m.					X										
3b-186th St Crossing	8/19/02	8:45						X									
3c-186th St Crossing	8/19/02	8:45							X								
3d-186th St Crossing	8/19/02	8:45									X						
3e-186th St Crossing	8/19/02	8:45										X					
3f-186th St Crossing	8/19/02	8:45											X				
3g-186th St Crossing	8/19/02	8:45													X		

Special Instructions:

LABORATORY COMMENTS:
Init Lab Temp: 19.6°C
Rec Lab Temp: on ice
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment:

Relinquished By: [signature]	Date: 8/19/02	Time: 10:30	Received By: [signature] White	Date: 8/19	Time: 10:30
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

DRY WEATHER SAMPLING EVENT

SEPTEMBER 9, 2002

TestAmerica
INCORPORATED

OCT - 1 2002

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/19/2002

Job Number: 02.04229

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
327739	1A-1G 116TH ST CROSSING	09/09/2002	11:20	09/09/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

6964 HILLSDALE CT. / INDIANAPOLIS, IN 46250 / 317-842-4261 / FAX: 317-842-4286

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/19/2002

Job No.: 02.04229

Date Received: 09/09/2002
Job Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
327739 1A-1G 116TH ST CROSSING			09/09/2002 11:20			
BOD - Five Day	<5		mg/L	lng 09/16/2002 09:30	EPA 405.1	<5.
BOD - Five Day (Prep)	Complete			lng 09/11/2002 08:10	EPA 405.1	Complete
Chromium, Hexavalent	<0.010		mg/L	bsb 09/10/2002 08:40	SM3500CrD	<0.010
COD	<10.		mg/L	tpd 09/11/2002 08:54	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl 09/13/2002 09:15		Complete
Cyanide, Total	<0.005		mg/L	jss 09/16/2002 10:51	EPA 335.4	<0.005
Nitrogen, Ammonia	<0.10		mg/L	jss 09/13/2002 15:13	EPA 350.1	<0.10
Nitrogen, Kjeldahl	0.30		mg/L	jss 09/12/2002 12:47	EPA 351.2	<0.30
Nitrogen, Nitrate	0.47		mg/L	jss 09/10/2002 09:34	EPA 353.2	<0.02
Nitrogen, Organic	0.30		mg/L	sld 09/17/2002	EPA 351-EPA	<0.10
Nitrogen, Total	0.77		mg/L	sld 09/17/2002	EPA 351+EPA	<0.10
Oil & Grease	<5.	1	mg/L	mhl 09/16/2002 09:00	EPA 1664A	<5.
pH	7.5		S.U.	bsb 09/09/2002 17:34	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl 09/10/2002 09:00		Complete
Phenol	0.022		mg/L	jss 09/11/2002 14:26	EPA 420.2	<0.010
Phosphorus, Dissolved	<0.05		mg/L	tpd 09/11/2002 09:40	EPA 365.2	<0.05
Solids, Dissolved	530		mg/L	sld 09/11/2002 15:10	EPA 160.1	<20.
Solids, Suspended	<5		mg/L	lng 09/11/2002 13:15	EPA 160.2	<5.
Digestion, TKN	Complete			mhl 09/11/2002 09:00		Complete
Antimony, ICP	<0.10		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.005
Cadmium, ICP	<0.030		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.030
Chromium, ICP	<0.040		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.040

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/19/2002

Job No.: 02.04229

Date Received: 09/09/2002
Job Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
327739 1A-1G 116TH ST CROSSING			09/09/2002 11:20			
Copper, ICP	<0.020		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400 09/13/2002 10:49	EPA 245.1	<0.0002
Nickel, ICP	<0.010		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.50
Zinc, ICP	<0.050		mg/L	400 09/12/2002 21:34	EPA 200.7	<0.050
E. coli	>1600		/100 mL	out 09/13/2002	SM9222G	<1
Coliform, Fecal	>1600		/100 mL	out 09/13/2002	SM9222D	<1
Fecal Streptococcus	3		/100 mL	out 09/13/2002	SM9230C	<1

KEY TO ABBREVIATIONS

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

SUBCONTRACTED LABORATORY CODES

1	MISC
75	A & L GREATLAKES LABS
175	TESTAMERICA-NASHVILLE
200	TESTAMERICA-CEDAR FALLS
250	TESTAMERICA-ORLANDO
400	TESTAMERICA-DAYTON
401	TESTAMERICA-DAYTON/NO UTC
425	EARTH EXPLORATION
430	HOOSIER MICROBIOLOGICAL LAB
440	ECCS
475	EMSL
635	TOWNSEND RESEARCH LABS
645	TRIANGLE LABS
700	TESTAMERICA-WATERTOWN

CHAIN OF CUSTODY IS ATTACHED

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: Clark Dietz Client #: _____
Address: 8445 Keystone Crossing, Suite 105
City/State/Zip Code: Indianapolis, IN 46240
Project Manager: Hans Peterson
Telephone Number: 317-259-4644 Fax: 317-259-46060
Sampler Name: (Print Name) Emily Wehmeyer
Sampler Signature: Emily Wehmeyer

Project Name: Cool Creek Watershed Study
Project #: H21010
Site/Location ID: 1-116th St Crossing State: IN
Report To: Hans Peterson
Invoice To: Clark Dietz
Quote #: 01-0122 PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix: SL - Sludge DW - Drinking Water GW - Groundwater S - Soil/Solid WW - Wastewater Specify Other	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	E Coli, Fecal, Strep	TKN, NH_4, Org N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cl, Diss Phos	Oil + Grease				REMARKS
1a-116th St Crossing	9/9/02	11:20							1				X										
1b-116th St Crossing	9/9/02	11:20										2		X									
1c-116th St Crossing	9/9/02	11:20							1						X								
1d-116th St Crossing	9/9/02	11:20						1								X							
1e-116th St Crossing	9/9/02	11:20				1											X						
1f-116th St Crossing	9/9/02	11:20									1							X					
1g-116th St Crossing	9/9/02	11:20							1										X				

Special Instructions:

Relinquished By: Emily Wehmeyer	Date: 9/9/02	Time: 11:55	Received By: [signature]	Date: 9-9-02	Time: 1155
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp: 13.3 on ice
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment:

TestAmerica
INCORPORATED

OCT - 1 2002

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/20/2002

Job Number: 02.04230

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
327740	2A-2G 146TH ST CROSSING	09/09/2002	11:00	09/09/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

6964 Hillsdale Ct. / Indianapolis, IN 46250 / 317-842-4261 / Fax: 317-842-4286

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/20/2002

Job No.: 02.04230

Date Received: 09/09/2002
Job Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
327740 2A-2G 146TH ST CROSSING			09/09/2002 11:00			
BOD - Five Day	<5		mg/L	lng 09/16/2002 09:30	EPA 405.1	<5.
BOD - Five Day (Prep)	Complete			lng 09/11/2002 08:10	EPA 405.1	Complete
Chromium, Hexavalent	<0.010		mg/L	bsb 09/10/2002 08:40	SM3500CrD	<0.010
COD	9.8		mg/L	tpd 09/11/2002 08:54	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl 09/13/2002 09:15		Complete
Cyanide, Total	<0.005		mg/L	jss 09/16/2002 10:51	EPA 335.4	<0.005
Nitrogen, Ammonia	<0.10		mg/L	jss 09/13/2002 15:13	EPA 350.1	<0.10
Nitrogen, Kjeldahl	0.54		mg/L	jss 09/18/2002 11:58	EPA 351.2	<0.30
Nitrogen, Nitrate	0.16		mg/L	jss 09/10/2002 09:34	EPA 353.2	<0.02
Nitrogen, Organic	0.49		mg/L	sld 09/20/2002 13:27	EPA 351-EPA	<0.10
Nitrogen, Total	0.70		mg/L	sld 09/20/2002 13:27	EPA 351+EPA	<0.10
Oil & Grease	<5.	1	mg/L	mhl 09/16/2002 09:00	EPA 1664A	<5.
pH	7.7		S.U.	bsb 09/09/2002 17:34	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl 09/10/2002 09:00		Complete
Phenol	<0.010		mg/L	jss 09/11/2002 14:26	EPA 420.2	<0.010
Phosphorus, Dissolved	<0.05		mg/L	tpd 09/11/2002 09:40	EPA 365.2	<0.05
Solids, Dissolved	430		mg/L	sld 09/11/2002 15:10	EPA 160.1	<20.
Solids, Suspended	<5		mg/L	lng 09/11/2002 13:15	EPA 160.2	<5.
Digestion, TKN	Complete			mhl 09/17/2002 09:30		Complete
Antimony, ICP	<0.10		mg/L	400 09/12/2002 21:45	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400 09/12/2002 21:45	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400 09/12/2002 21:45	EPA 200.7	<0.005
Cadmium, ICP	<0.030		mg/L	400 09/12/2002 21:45	EPA 200.7	<0.030
Chromium, ICP	<0.040		mg/L	400 09/12/2002 21:45	EPA 200.7	<0.040

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/20/2002

Job No.: 02.04230

Date Received: 09/09/2002
Job Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number / Sample I.D. / Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst	Date & Time Analyzed	Method	Reporting Limit
327740 2A-2G 146TH ST CROSSING			09/09/2002 11:00				
Copper, ICP	<0.020		mg/L	400	09/12/2002 21:45	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400	09/12/2002 21:45	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400	09/13/2002 11:09	EPA 245.1	<0.0002
Nickel, ICP	<0.010		mg/L	400	09/12/2002 21:45	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400	09/12/2002 21:45	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400	09/12/2002 21:45	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400	09/12/2002 21:45	EPA 200.7	<0.50
Zinc, ICP	<0.050		mg/L	400	09/12/2002 21:45	EPA 200.7	<0.050
E. coli	>1600		/100 mL	out	09/13/2002	SM9222G	<1
Coliform, Fecal	>1600		/100 mL	out	09/13/2002	SM9222D	<1
Fecal Streptococcus	<1		/100 mL	out	09/13/2002	SM9230C	<1

KEY TO ABBREVIATIONS

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

SUBCONTRACTED LABORATORY CODES

1	MISC
75	A & L GREATLAKES LABS
175	TESTAMERICA-NASHVILLE
200	TESTAMERICA-CEDAR FALLS
250	TESTAMERICA-ORLANDO
400	TESTAMERICA-DAYTON
401	TESTAMERICA-DAYTON/NO UTC
425	EARTH EXPLORATION
430	HOOSIER MICROBIOLOGICAL LAB
440	ECCS
475	EMSL
635	TOWNSEND RESEARCH LABS
645	TRIANGLE LABS
700	TESTAMERICA-WATERTOWN

CHAIN OF CUSTODY IS ATTACHED

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: Clark Dietz Client #: _____
Address: 8445 Keystone Crossing, Suite 105
City/State/Zip Code: Indianapolis, IN 46240
Project Manager: Hans Peterson
Telephone Number: 317-259-4644 Fax: 317-259-4660
Sampler Name: (Print Name) Emily Wehmeyer
Sampler Signature: Emily Wehmeyer

Project Name: Cool Creek Watershed Study
Project #: H21010
Site/Location ID: 2-146th St Crossing State: IN
Report To: Hans Peterson
Invoice To: Clark Dietz
Quote #: 01-0122 PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix: SL - Sludge, DW - Drinking Water, GW - Groundwater, S - Soil/Solid, WW - Wastewater, Specify Other	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Phenol	E Coli, Fecal, Strep	TKN, NH_4, Org. N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cl, Diss Phos	Oil & Grease				REMARKS
2a - 146th St Crossing	9/9/02	11:00							1				X											
2b - 146th St Crossing	9/9/02	11:00										2		X										
2c - 146th St Crossing	9/9/02	11:00							1						X									
2d - 146th St Crossing	9/9/02	11:00						1								X								
2e - 146th St Crossing	9/9/02	11:00				1											X							
2f - 146th St Crossing	9/9/02	11:00									1							X						
2g - 146th St Crossing	9/9/02	11:00							1										X					

Special Instructions:

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp: 13.3 on ice
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment:

	Date:	Time:		Date:	Time:
Relinquished By: Emily Wehmeyer	9/9/02	11:55	Received By:	9-9-02	11:55
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TestAmerica
INCORPORATED

OCT - 1 2002

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/19/2002

Job Number: 02.04228

Enclosed are the Analytical Results for the following samples submitted to TestAmerica, Inc. Indianapolis Division for analysis:

Project Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number	Sample Description	Date Taken	Time Taken	Date Received
327738	3A-3G 186TH ST CROSSING	09/09/2002	10:45	09/09/2002

TestAmerica, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

TestAmerica Incorporated-Indianapolis Division is in compliance with the National Environmental Laboratory Accreditation Program (NELAP) Standards.

Project Representative

6964 HILLSDALE CT. / INDIANAPOLIS, IN 46250 / 317-842-4261 / FAX: 317-842-4286

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/19/2002

Job No.: 02.04228

Date Received: 09/09/2002
Job Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number / Sample I.D. / Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst	Date & Time Analyzed	Method	Reporting Limit
327738 3A-3G 186TH ST CROSSING			09/09/2002 10:45				
BOD - Five Day	<5		mg/L	lng	09/16/2002 09:30	EPA 405.1	<5.
BOD - Five Day (Prep)	Complete			lng	09/11/2002 08:10	EPA 405.1	Complete
Chromium, Hexavalent	<0.010		mg/L	bsb	09/10/2002 08:40	SM3500CrD	<0.010
COD	11		mg/L	tpd	09/11/2002 08:54	EPA 410.4	<10.
Cyanide - Prep	Complete			mhl	09/13/2002 09:15		Complete
Cyanide, Total	<0.005		mg/L	jss	09/16/2002 10:51	EPA 335.4	<0.005
Nitrogen, Ammonia	<0.10	q	mg/L	jss	09/13/2002 15:13	EPA 350.1	<0.10
Nitrogen, Kjeldahl	0.69		mg/L	jss	09/12/2002 12:47	EPA 351.2	<0.30
Nitrogen, Nitrate	0.65	q	mg/L	jss	09/10/2002 09:34	EPA 353.2	<0.02
Nitrogen, Organic	0.66		mg/L	sld	09/17/2002	EPA 351-EPA	<0.10
Nitrogen, Total	1.3		mg/L	sld	09/17/2002	EPA 351+EPA	<0.10
Oil & Grease	<5.	l	mg/L	mhl	09/16/2002 09:00	EPA 1664A	<5.
pH	7.7		S.U.	bsb	09/09/2002 17:34	EPA 150.1	<0.1
Phenol - Prep	Complete			mhl	09/10/2002 09:00		Complete
Phenol	<0.010		mg/L	jss	09/11/2002 14:26	EPA 420.2	<0.010
Phosphorus, Dissolved	0.070		mg/L	tpd	09/11/2002 09:40	EPA 365.2	<0.05
Solids, Dissolved	490		mg/L	sld	09/11/2002 15:10	EPA 160.1	<20.
Solids, Suspended	10		mg/L	lng	09/11/2002 13:15	EPA 160.2	<5.
Digestion, TKN	Complete			mhl	09/11/2002 09:00		Complete
Antimony, ICP	<0.10		mg/L	400	09/12/2002 21:42	EPA 200.7	<0.10
Arsenic, ICP	<0.10		mg/L	400	09/12/2002 21:42	EPA 200.7	<0.10
Beryllium, ICP	<0.005		mg/L	400	09/12/2002 21:42	EPA 200.7	<0.005
Cadmium, ICP	<0.030		mg/L	400	09/12/2002 21:42	EPA 200.7	<0.030
Chromium, ICP	<0.040		mg/L	400	09/12/2002 21:42	EPA 200.7	<0.040

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Mr. Hans J. Peterson
CLARK DIETZ, INC.
8445 Keystone Crossing
Suite 105
Indianapolis, IN 46240

09/19/2002

Job No.: 02.04228

Date Received: 09/09/2002
Job Description: COOL CREEK WATERSHED STUDY/H21010

Sample Number / Sample I.D. Parameters	Wet Wt. Result	Flag	Sample Date/ Units	Analyst Date & Time Analyzed	Method	Reporting Limit
327738 3A-3G 186TH ST CROSSING			09/09/2002 10:45			
Copper, ICP	<0.020		mg/L	400 09/12/2002 21:42	EPA 200.7	<0.020
Lead, ICP	<0.080		mg/L	400 09/12/2002 21:42	EPA 200.7	<0.080
Mercury, CVAA	<0.0002		mg/L	400 09/13/2002 11:06	EPA 245.1	<0.0002
Nickel, ICP	<0.010		mg/L	400 09/12/2002 21:42	EPA 200.7	<0.010
Selenium, ICP	<0.10		mg/L	400 09/12/2002 21:42	EPA 200.7	<0.10
Silver, ICP	<0.040		mg/L	400 09/12/2002 21:42	EPA 200.7	<0.040
Thallium, ICP	<0.50		mg/L	400 09/12/2002 21:42	EPA 200.7	<0.50
Zinc, ICP	<0.050		mg/L	400 09/12/2002 21:42	EPA 200.7	<0.050
E. coli	>1600		/100 mL	out 09/13/2002	SM9222G	<1
Coliform, Fecal	>1600		/100 mL	out 09/13/2002	SM9222D	<1
Fecal Streptococcus	4		/100 mL	out 09/13/2002	SM9230C	<1

TestAmerica
INCORPORATED

PROJECT NARRATIVE

JOB NUMBER: 02.04228

SAMPLE: 327738

ANALYSIS: Ammonia

MS/MSD recovery values are below the acceptable limits. Matrix interference may be suppressing analyte recovery. Concentration values for this sample may be biased low due to the suspected matrix interference. All other quality control indicators are within acceptable limits.
jss 9/13/02.

KEY TO ABBREVIATIONS

<	Less than; when appearing in the result column, indicates analyte not detected at or above the Reporting Limit.
%	Percent; To convert ppm to %, divide result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Indicates the Reporting Limit is elevated due to insufficient sample volume.
mg/L	Part per million; Concentration in units of milligrams of analyte per Liter of aqueous sample.
ug/L	Part per billion; Concentration in units of micrograms of analyte per Liter of aqueous sample.
mg/kg	Part per million; Concentration in units of milligrams of analyte per kilogram of non-aqueous sample.
ug/kg	Part per billion; Concentration in units of micrograms of analyte per kilogram of non-aqueous sample.
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Sample resembles unknown Hydrocarbon.
dw	When indicated, the result is reported on a dry weight basis. The contribution of the moisture content in the sample has been subtracted when calculating the concentration.
d1	Indicates the analyte has elevated Reporting Limit due to high concentration.
d2	Indicates the analyte has elevated Reporting Limit due to matrix.
e	Indicates the reported concentration is estimated.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past recommended holding time.
i	Insufficient spike concentration due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS / LCS Duplicate provided for precision.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. The associated sample may exhibit similar matrix bias. All other quality control indicators are in control.
r	Indicates the sample was received past recommended holding time.
u	Indicates the sample was received improperly preserved and/or improperly contained.
uj	Indicates the result is below the Reporting Limit and is considered estimated.
z	Indicates the BOD dilution water blank depletion was between 0.2 and 0.5 mg/L.

SUBCONTRACTED LABORATORY CODES

1	MISC
75	A & L GREATLAKES LABS
175	TESTAMERICA-NASHVILLE
200	TESTAMERICA-CEDAR FALLS
250	TESTAMERICA-ORLANDO
400	TESTAMERICA-DAYTON
401	TESTAMERICA-DAYTON/NO UTC
425	EARTH EXPLORATION
430	HOOSIER MICROBIOLOGICAL LAB
440	ECCS
475	EMSL
635	TOWNSEND RESEARCH LABS
645	TRIANGLE LABS
700	TESTAMERICA-WATERTOWN

CHAIN OF CUSTODY IS ATTACHED

TestAmerica INCORPORATED

Indianapolis Division
69640 Hillsdale Court
Indianapolis, IN 46250

Phone: 317-842-4261
Fax: 317-842-4286

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: Clark Dietz Client #: _____
Address: 8445 Keystone Crossing, Suite 105
City/State/Zip Code: Indianapolis, IN 46240
Project Manager: Hans Peterson
Telephone Number: 317-259-4644 Fax: 317-259-4660
Sampler Name: (Print Name) Emily Wehmeyer
Sampler Signature: Emily Wehmeyer

Project Name: Cool Creek Watershed Study
Project #: H21010
Site/Location ID: 3-186th St Crossing State: IN
Report To: Hans Peterson
Invoice To: Clark Dietz
Quote #: 01-0122 PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N

Matrix: SL - Sludge, DW - Drinking Water, GW - Groundwater, S - Soil/Solid, WW - Wastewater, Specify Other
Preservation & # of Containers: HNO_3, HCl, NaOH, H_2SO_4, Methanol, None, Other (Specify)
Analyze For: Phenol; E Coli, Fecal, Strep; TKN, NH_4, Org N, COD, Total N; CN; Metals; pH, TDS, TSS, BOD, Nitrate, Cr6+, Diss Phos; Oil & Grease

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix	HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Phenol	E Coli, Fecal, Strep	TKN, NH_4, Org N, COD, Total N	CN	Metals	pH, TDS, TSS, BOD, Nitrate, Cr6+, Diss Phos	Oil & Grease	REMARKS
3a-186th St Crossing	9/9/02	10:45							1				X							
3b-186th St Crossing	9/9/02	10:45										2		X						
3c-186th St Crossing	9/9/02	10:45							1						X					
3d-186th St Crossing	9/9/02	10:45						1								X				
3e-186th St Crossing	9/9/02	10:45				1											X			
3f-186th St Crossing	9/9/02	10:45									1							X		
3g-186th St Crossing	9/9/02	10:45							1										X	

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

Special Instructions:

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp: 13.3 on ice
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment:

	Date:	Time:		Date:	Time:
Relinquished By: Emily Wehmeyer	9/9/02	11:55	Received By: Thomas	9-9-02	11:55
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

APPENDIX E

HEC-HMS MODEL

Cool Creek Watershed
HEC-HMS Summary Output
100-year, 24-hour Rainfall Event

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
C28	100.39		63.875	0.240
CM28	100.39		63.875	0.240
LR28	100.37		63.875	0.240
C20	300.51		204.12	0.780
CM20	300.51		204.12	0.780
C22	78.690		49.721	0.190
CM22	78.690		49.721	0.190
LR22	78.665		49.721	0.190
C23	232.82		161.56	0.650
CM22,23	304.62		211.28	0.840
CM20,23	605.11		415.40	1.620
LR20	605.05		415.40	1.620
C21	229.26		151.78	0.580
CM20,21	819.74		567.18	2.200
LR21	819.66		567.18	2.200
C16	78.164		49.721	0.190
CM16	78.164		49.721	0.190
LR16	78.155		49.721	0.190
C17	95.222		61.745	0.240
CM17	95.222		61.745	0.240
LR17	95.222		61.745	0.240
C10	470.35		313.13	1.000
	434.09		309.05	1.000
	396.24		306.72	1.000
CM10	396.24		306.72	1.000
LR10	396.08		306.65	1.000
C9	320.62		225.05	0.860
CM9,10	716.05		531.70	1.860
LR9,10	716.05		531.50	1.860
C8A	68.448		47.104	0.180
CM8A	68.448		47.104	0.180
LR8A	68.446		47.104	0.180
C5	610.64		459.76	1.950
CM5	610.64		459.76	1.950
LR5	610.60		459.76	1.950
C6-Split	114.73		73.276	0.300
Conrail	685.02		533.03	2.250
C4	331.51		228.97	0.890
CM4,5	982.84		762.00	3.140
LR4,5	982.80		762.00	3.140
C1	691.49		491.97	1.880

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
CM1	691.49	02 Nov 01 0510	491.97	1.880
LR1	691.38	02 Nov 01 0610	491.97	1.880
C2	393.32	02 Nov 01 0615	308.79	1.180
CM1,2	1084.7	02 Nov 01 0610	800.77	3.060
LR2	1084.5	02 Nov 01 0710	800.77	3.060
C6	35.280	02 Nov 01 0500	24.425	0.100
C3	395.98	02 Nov 01 0535	293.29	1.140
CM2,3,6	2444.7	02 Nov 01 0635	1880.5	7.440
LR6	2444.6	02 Nov 01 0800	1880.5	7.440
C8	231.22	02 Nov 01 0405	144.20	0.670
C7	536.89	02 Nov 01 0600	409.68	1.620
CM7,8	3043.3	02 Nov 01 0735	2481.5	9.910
LR8	3043.3	02 Nov 01 0800	2481.5	9.910
C11	61.372	02 Nov 01 0405	38.665	0.170
CM8,11	3555.8	02 Nov 01 0745	3051.6	11.940
LR11	3555.2	02 Nov 01 0810	3051.4	11.940
C12	79.399	02 Nov 01 0445	51.849	0.260
C13	237.23	02 Nov 01 0430	156.59	0.630
CM11,12,13	3704.5	02 Nov 01 0810	3259.8	12.830
LR13	3704.5	02 Nov 01 0825	3259.6	12.830
C14	366.77	02 Nov 01 0350	239.42	0.870
CM13,14	3820.0	02 Nov 01 0825	3499.0	13.700
LR14	3819.7	02 Nov 01 0850	3498.7	13.700
C18	81.887	02 Nov 01 0350	52.196	0.210
C15	262.41	02 Nov 01 0445	175.13	0.770
CM14-18	4011.1	02 Nov 01 0845	3837.5	15.110
LR18	4011.1	02 Nov 01 0855	3837.4	15.110
C24	187.14	02 Nov 01 0420	120.43	0.520
C19	60.616	02 Nov 01 0335	38.590	0.150
CM18,19,24	4524.6	02 Nov 01 0650	4563.6	17.980
LR24	4524.4	02 Nov 01 0715	4563.2	17.980
C25	184.94	02 Nov 01 0430	123.49	0.480
CM24,25	4640.3	02 Nov 01 0705	4686.7	18.460
LR25	4640.2	02 Nov 01 0730	4686.4	18.460
C26	123.45	02 Nov 01 0335	76.741	0.350
CM25,26	4694.1	02 Nov 01 0720	4763.2	18.810
LR26	4693.9	02 Nov 01 0755	4762.7	18.810
C27	150.08	02 Nov 01 0450	101.38	0.430
CM26,27	4783.9	02 Nov 01 0750	4864.1	19.240
LR27	4783.9	02 Nov 01 0800	4863.9	19.240
C29	128.86	02 Nov 01 0335	80.400	0.360
CM27,29	4868.0	02 Nov 01 0755	5008.2	19.840
LR29	4867.9	02 Nov 01 0835	5007.6	19.840
C30	352.61	02 Nov 01 0425	228.70	0.970
CM29,30	5004.0	02 Nov 01 0825	5236.3	20.810
LR30	5003.6	02 Nov 01 0835	5236.1	20.810
C31	110.36	02 Nov 01 0415	70.732	0.300
CM31	110.36	02 Nov 01 0415	70.732	0.300
LR31	110.35	02 Nov 01 0440	70.732	0.300
C32	200.73	02 Nov 01 0415	129.46	0.530
CM30,32	5117.9	02 Nov 01 0830	5436.3	21.640

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
LR32	5117.6	02 Nov 01 0910	5435.6	21.640
C33	109.19	02 Nov 01 0335	68.233	0.300
CM33	109.19	02 Nov 01 0335	68.233	0.300
LR33	109.18	02 Nov 01 0410	68.233	0.300
C34	176.15	02 Nov 01 0435	118.34	0.460
CM33,34	285.04	02 Nov 01 0435	186.58	0.760
LR34	284.99	02 Nov 01 0500	186.58	0.760
C35	177.63	02 Nov 01 0430	115.79	0.500
CM34,35	5284.7	02 Nov 01 0900	5738.0	22.900

Cool Creek Watershed
HEC-HMS Summary Output
50-year, 24-hour Rainfall Event

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
C28	85.290		53.265	0.240
CM28	85.290		53.265	0.240
LR28	85.284		53.265	0.240
C20	252.68		169.89	0.780
CM20	252.68		169.89	0.780
C22	66.780		41.384	0.190
CM22	66.780		41.384	0.190
LR22	66.732		41.384	0.190
C23	194.50		133.73	0.650
CM22,23	254.45		175.12	0.840
CM20,23	507.14		345.01	1.620
LR20	506.96		345.01	1.620
C21	192.85		126.33	0.580
CM20,21	687.93		471.34	2.200
LR21	687.77		471.34	2.200
C16	66.229		41.384	0.190
CM16	66.229		41.384	0.190
LR16	66.220		41.384	0.190
C17	79.992		51.297	0.240
CM17	79.992		51.297	0.240
LR17	79.984		51.297	0.240
C10	409.31		266.38	1.000
	347.74		262.45	1.000
	312.99		260.19	1.000
CM10	312.99		260.19	1.000
LR10	312.89		260.12	1.000
C9	269.56		187.32	0.860
CM9,10	577.55		447.44	1.860
LR9,10	577.55		447.25	1.860
C8A	57.557		39.206	0.180
CM8A	57.557		39.206	0.180
LR8A	57.544		39.206	0.180
C5	507.51		378.55	1.950
CM5	507.51		378.55	1.950
LR5	507.45		378.55	1.950
C6-Split	95.738		60.547	0.300
Conrail	568.01		439.10	2.250
C4	278.16		190.23	0.890
CM4,5	806.72		629.32	3.140
LR4,5	806.30		629.32	3.140
C1	581.44		409.49	1.880

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
CM1	581.44	02 Nov 01 0510	409.49	1.880
LR1	581.41	02 Nov 01 0610	409.49	1.880
C2	330.84	02 Nov 01 0615	257.02	1.180
CM1,2	912.02	02 Nov 01 0610	666.50	3.060
LR2	912.01	02 Nov 01 0710	666.50	3.060
C6	29.415	02 Nov 01 0505	20.182	0.100
C3	332.36	02 Nov 01 0540	243.66	1.140
CM2,3,6	2042.3	02 Nov 01 0650	1559.7	7.440
LR6	2041.9	02 Nov 01 0810	1559.7	7.440
C8	189.98	02 Nov 01 0350	117.72	0.670
C7	449.76	02 Nov 01 0605	339.74	1.620
CM7,8	2511.7	02 Nov 01 0800	2056.3	9.910
LR8	2511.7	02 Nov 01 0825	2056.3	9.910
C11	50.753	02 Nov 01 0400	31.726	0.170
CM8,11	2897.4	02 Nov 01 0820	2535.3	11.940
LR11	2896.4	02 Nov 01 0850	2535.0	11.940
C12	64.764	02 Nov 01 0445	42.055	0.260
C13	198.20	02 Nov 01 0430	129.62	0.630
CM11,12,13	2998.1	02 Nov 01 0845	2706.7	12.830
LR13	2997.4	02 Nov 01 0905	2706.5	12.830
C14	311.73	02 Nov 01 0345	200.41	0.870
CM13,14	3075.9	02 Nov 01 0905	2906.9	13.700
LR14	3075.1	02 Nov 01 0930	2906.6	13.700
C18	68.645	02 Nov 01 0345	43.206	0.210
C15	216.92	02 Nov 01 0445	143.70	0.770
CM14-18	3203.1	02 Nov 01 0930	3186.2	15.110
LR18	3203.1	02 Nov 01 0940	3186.1	15.110
C24	155.04	02 Nov 01 0420	98.983	0.520
C19	51.183	02 Nov 01 0330	32.061	0.150
CM18,19,24	3785.0	02 Nov 01 0705	3788.5	17.980
LR24	3784.9	02 Nov 01 0730	3788.2	17.980
C25	155.18	02 Nov 01 0430	102.59	0.480
CM24,25	3876.3	02 Nov 01 0725	3890.8	18.460
LR25	3876.2	02 Nov 01 0745	3890.5	18.460
C26	102.28	02 Nov 01 0330	62.755	0.350
CM25,26	3915.2	02 Nov 01 0740	3953.3	18.810
LR26	3915.0	02 Nov 01 0810	3952.9	18.810
C27	124.59	02 Nov 01 0450	83.475	0.430
CM26,27	3983.7	02 Nov 01 0805	4036.3	19.240
LR27	3983.5	02 Nov 01 0820	4036.1	19.240
C29	106.91	02 Nov 01 0330	65.858	0.360
CM27,29	4046.0	02 Nov 01 0815	4155.3	19.840
LR29	4045.8	02 Nov 01 0855	4154.7	19.840
C30	292.73	02 Nov 01 0420	188.30	0.970
CM29,30	4146.3	02 Nov 01 0850	4343.0	20.810
LR30	4146.1	02 Nov 01 0900	4342.8	20.810
C31	91.635	02 Nov 01 0410	58.239	0.300
CM31	91.635	02 Nov 01 0410	58.239	0.300
LR31	91.634	02 Nov 01 0440	58.239	0.300
C32	167.42	02 Nov 01 0410	106.97	0.530
CM30,32	4230.0	02 Nov 01 0855	4508.0	21.640

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
LR32	4229.6	02 Nov 01 0935	4507.4	21.640
C33	90.797	02 Nov 01 0330	55.987	0.300
CM33	90.797	02 Nov 01 0330	55.987	0.300
LR33	90.787	02 Nov 01 0405	55.987	0.300
C34	147.79	02 Nov 01 0435	98.319	0.460
CM33,34	237.71	02 Nov 01 0430	154.31	0.760
LR34	237.71	02 Nov 01 0455	154.31	0.760
C35	147.15	02 Nov 01 0430	95.176	0.500
CM34,35	4354.2	02 Nov 01 0925	4756.8	22.900

Cool Creek Watershed
HEC-HMS Summary Output
25-year, 24-hour Rainfall Event

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
C28	71.204		44.010	0.240
CM28	71.204		44.010	0.240
LR28	71.188		44.010	0.240
C20	210.71		140.09	0.780
CM20	210.71		140.09	0.780
C22	55.600		34.124	0.190
CM22	55.600		34.124	0.190
LR22	55.577		34.124	0.190
C23	161.12		109.61	0.650
CM22,23	210.97		143.74	0.840
CM20,23	421.68		283.82	1.620
LR20	421.62		283.82	1.620
C21	160.85		104.17	0.580
CM20,21	572.69		387.99	2.200
LR21	572.67		387.99	2.200
C16	55.137		34.124	0.190
CM16	55.137		34.124	0.190
LR16	55.131		34.124	0.190
C17	66.573		42.212	0.240
CM17	66.573		42.212	0.240
LR17	66.571		42.212	0.240
C10	350.46		225.07	1.000
	257.03		221.29	1.000
	228.97		219.12	1.000
CM10	228.97		219.12	1.000
LR10	228.87		219.06	1.000
C9	224.83		154.45	0.860
CM9,10	439.96		373.51	1.860
LR9,10	439.96		373.33	1.860
C8A	47.999		32.328	0.180
CM8A	47.999		32.328	0.180
LR8A	47.995		32.328	0.180
C5	417.44		308.51	1.950
CM5	417.44		308.51	1.950
LR5	417.44		308.51	1.950
C6-Split	79.166		49.531	0.300
Conrail	444.52		358.04	2.250
C4	231.42		156.54	0.890
CM4,5	611.19		514.58	3.140
LR4,5	610.40		514.58	3.140
C1	484.87		337.64	1.880

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
CM1	484.87	02 Nov 01 0515	337.64	1.880
LR1	484.80	02 Nov 01 0615	337.64	1.880
C2	275.71	02 Nov 01 0620	211.93	1.180
CM1,2	760.41	02 Nov 01 0615	549.57	3.060
LR2	760.35	02 Nov 01 0715	549.57	3.060
C6	24.310	02 Nov 01 0505	16.510	0.100
C3	276.45	02 Nov 01 0545	200.51	1.140
CM2,3,6	1606.5	02 Nov 01 0735	1281.2	7.440
LR6	1605.4	02 Nov 01 0900	1281.2	7.440
C8	154.91	02 Nov 01 0405	95.082	0.670
C7	373.18	02 Nov 01 0605	279.01	1.620
CM7,8	1930.0	02 Nov 01 0855	1687.6	9.910
LR8	1930.0	02 Nov 01 0920	1687.6	9.910
C11	41.627	02 Nov 01 0405	25.761	0.170
CM8,11	2243.4	02 Nov 01 0735	2086.7	11.940
LR11	2243.4	02 Nov 01 0800	2086.4	11.940
C12	52.351	02 Nov 01 0445	33.738	0.260
C13	164.21	02 Nov 01 0430	106.24	0.630
CM11,12,13	2357.3	02 Nov 01 0745	2226.4	12.830
LR13	2357.2	02 Nov 01 0805	2226.2	12.830
C14	261.64	02 Nov 01 0345	166.29	0.870
CM13,14	2456.7	02 Nov 01 0750	2392.5	13.700
LR14	2456.5	02 Nov 01 0815	2392.2	13.700
C18	56.813	02 Nov 01 0350	35.414	0.210
C15	177.79	02 Nov 01 0450	116.68	0.770
CM14-18	2625.1	02 Nov 01 0800	2620.7	15.110
LR18	2625.1	02 Nov 01 0810	2620.6	15.110
C24	127.35	02 Nov 01 0420	80.520	0.520
C19	42.518	02 Nov 01 0335	26.382	0.150
CM18,19,24	3107.7	02 Nov 01 0725	3115.4	17.980
LR24	3107.7	02 Nov 01 0750	3115.2	17.980
C25	129.12	02 Nov 01 0435	84.424	0.480
CM24,25	3177.4	02 Nov 01 0745	3199.6	18.460
LR25	3177.2	02 Nov 01 0805	3199.3	18.460
C26	83.286	02 Nov 01 0330	50.774	0.350
CM25,26	3206.0	02 Nov 01 0805	3250.1	18.810
LR26	3205.8	02 Nov 01 0835	3249.7	18.810
C27	102.53	02 Nov 01 0455	68.030	0.430
CM26,27	3256.1	02 Nov 01 0835	3317.7	19.240
LR27	3256.1	02 Nov 01 0845	3317.6	19.240
C29	87.252	02 Nov 01 0335	53.380	0.360
CM27,29	3301.8	02 Nov 01 0840	3414.9	19.840
LR29	3301.5	02 Nov 01 0920	3414.4	19.840
C30	240.99	02 Nov 01 0425	153.46	0.970
CM29,30	3374.3	02 Nov 01 0915	3567.8	20.810
LR30	3374.2	02 Nov 01 0925	3567.7	20.810
C31	75.450	02 Nov 01 0415	47.463	0.300
CM31	75.450	02 Nov 01 0415	47.463	0.300
LR31	75.435	02 Nov 01 0445	47.463	0.300
C32	138.43	02 Nov 01 0415	87.505	0.530
CM30,32	3435.2	02 Nov 01 0920	3702.6	21.640

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
LR32	3435.0	02 Nov 01 0955	3702.0	21.640
C33	74.249	02 Nov 01 0335	45.460	0.300
CM33	74.249	02 Nov 01 0335	45.460	0.300
LR33	74.237	02 Nov 01 0410	45.460	0.300
C34	122.96	02 Nov 01 0440	80.906	0.460
CM33,34	196.82	02 Nov 01 0435	126.37	0.760
LR34	196.82	02 Nov 01 0500	126.37	0.760
C35	120.85	02 Nov 01 0430	77.423	0.500
CM34,35	3532.7	02 Nov 01 0915	3905.8	22.900

Cool Creek Watershed
HEC-HMS Summary Output
10-year, 24-hour Rainfall Event

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
C28	55.339		33.619	0.240
CM28	55.339		33.619	0.240
LR28	55.330		33.619	0.240
C20	162.26		106.69	0.780
CM20	162.26		106.69	0.780
C22	43.085		25.988	0.190
CM22	43.085		25.988	0.190
LR22	43.052		25.988	0.190
C23	122.83		82.762	0.650
CM22,23	160.98		108.75	0.840
CM20,23	323.25		215.44	1.620
LR20	323.20		215.44	1.620
C21	123.88		79.332	0.580
CM20,21	439.90		294.77	2.200
LR21	439.79		294.77	2.200
C16	42.677		25.988	0.190
CM16	42.677		25.988	0.190
LR16	42.674		25.988	0.190
C17	51.115		32.054	0.240
CM17	51.115		32.054	0.240
LR17	51.109		32.054	0.240
C10	283.93		177.82	1.000
	143.54		174.25	1.000
	128.14		172.20	1.000
CM10	128.14		172.20	1.000
LR10	128.12		172.14	1.000
C9	173.14		117.63	0.860
CM9,10	267.82		289.77	1.860
LR9,10	267.82		289.59	1.860
C8A	36.963		24.620	0.180
CM8A	36.963		24.620	0.180
LR8A	36.957		24.620	0.180
C5	315.70		231.04	1.950
CM5	315.70		231.04	1.950
LR5	315.69		231.04	1.950
C6-Split	60.158		37.294	0.300
Conrail	217.23		268.34	2.250
C4	177.62		118.87	0.890
CM4,5	353.54		387.20	3.140
LR4,5	353.53		387.20	3.140
C1	373.44		257.15	1.880

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
CM1	373.44	02 Nov 01 0515	257.15	1.880
LR1	373.43	02 Nov 01 0615	257.15	1.880
C2	212.52	02 Nov 01 0625	161.40	1.180
CM1,2	585.80	02 Nov 01 0620	418.55	3.060
LR2	585.71	02 Nov 01 0715	418.55	3.060
C6	18.475	02 Nov 01 0510	12.431	0.100
C3	212.29	02 Nov 01 0550	152.26	1.140
CM2,3,6	1140.7	02 Nov 01 0650	970.44	7.440
LR6	1140.6	02 Nov 01 0810	970.44	7.440
C8	115.12	02 Nov 01 0400	70.314	0.670
C7	285.76	02 Nov 01 0610	211.26	1.620
CM7,8	1456.8	02 Nov 01 0740	1276.6	9.910
LR8	1456.8	02 Nov 01 0805	1276.6	9.910
C11	31.224	02 Nov 01 0405	19.193	0.170
CM8,11	1720.3	02 Nov 01 0750	1585.4	11.940
LR11	1720.2	02 Nov 01 0815	1585.2	11.940
C12	38.526	02 Nov 01 0450	24.719	0.260
C13	125.15	02 Nov 01 0430	80.216	0.630
CM11,12,13	1800.0	02 Nov 01 0805	1690.1	12.830
LR13	1799.8	02 Nov 01 0820	1689.9	12.830
C14	204.30	02 Nov 01 0345	127.81	0.870
CM13,14	1869.5	02 Nov 01 0810	1817.8	13.700
LR14	1869.4	02 Nov 01 0840	1817.5	13.700
C18	43.392	02 Nov 01 0345	26.739	0.210
C15	133.38	02 Nov 01 0450	86.931	0.770
CM14-18	1985.6	02 Nov 01 0815	1989.2	15.110
LR18	1985.6	02 Nov 01 0825	1989.1	15.110
C24	95.810	02 Nov 01 0420	60.143	0.520
C19	32.763	02 Nov 01 0330	20.034	0.150
CM18,19,24	2318.6	02 Nov 01 0735	2364.1	17.980
LR24	2318.6	02 Nov 01 0805	2363.8	17.980
C25	99.089	02 Nov 01 0435	64.107	0.480
CM24,25	2374.0	02 Nov 01 0730	2427.9	18.460
LR25	2373.9	02 Nov 01 0755	2427.7	18.460
C26	62.353	02 Nov 01 0330	37.640	0.350
CM25,26	2397.2	02 Nov 01 0745	2465.3	18.810
LR26	2397.2	02 Nov 01 0820	2464.9	18.810
C27	77.402	02 Nov 01 0455	50.948	0.430
CM26,27	2440.8	02 Nov 01 0805	2515.9	19.240
LR27	2440.8	02 Nov 01 0815	2515.7	19.240
C29	65.474	02 Nov 01 0330	39.669	0.360
CM27,29	2483.3	02 Nov 01 0800	2589.0	19.840
LR29	2483.3	02 Nov 01 0840	2588.5	19.840
C30	181.88	02 Nov 01 0425	114.93	0.970
CM29,30	2555.8	02 Nov 01 0825	2703.4	20.810
LR30	2555.7	02 Nov 01 0835	2703.3	20.810
C31	56.947	02 Nov 01 0415	35.545	0.300
CM31	56.947	02 Nov 01 0415	35.545	0.300
LR31	56.935	02 Nov 01 0445	35.545	0.300
C32	105.16	02 Nov 01 0415	65.886	0.530
CM30,32	2619.2	02 Nov 01 0825	2804.7	21.640

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
LR32	2619.1	02 Nov 01 0905	2804.1	21.640
C33	55.899	02 Nov 01 0330	33.869	0.300
CM33	55.899	02 Nov 01 0330	33.869	0.300
LR33	55.894	02 Nov 01 0405	33.869	0.300
C34	94.362	02 Nov 01 0440	61.436	0.460
CM33,34	149.69	02 Nov 01 0435	95.306	0.760
LR34	149.68	02 Nov 01 0500	95.306	0.760
C35	90.926	02 Nov 01 0435	57.830	0.500
CM34,35	2714.4	02 Nov 01 0850	2957.3	22.900

Cool Creek Watershed
HEC-HMS Summary Output
2-year, 24-hour Rainfall Event

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
C28	32.094		19.267	0.240
CM28	32.094		19.267	0.240
LR28	32.088		19.267	0.240
C20	94.670		60.757	0.780
CM20	94.670		60.757	0.780
C22	24.753		14.800	0.190
CM22	24.753		14.800	0.190
LR22	24.743		14.800	0.190
C23	70.133		46.291	0.650
CM22,23	92.281		61.091	0.840
CM20,23	186.95		121.85	1.620
LR20	186.91		121.85	1.620
C21	72.387		45.178	0.580
CM20,21	255.25		167.03	2.200
LR21	255.21		167.03	2.200
C16	24.680		14.800	0.190
CM16	24.680		14.800	0.190
LR16	24.680		14.800	0.190
C17	29.699		18.142	0.240
CM17	29.699		18.142	0.240
LR17	29.692		18.142	0.240
C10	179.66		109.92	1.000
	82.024		107.57	1.000
	81.043		106.43	1.000
CM10	81.043		106.43	1.000
LR10	81.043		106.40	1.000
C9	100.91		66.988	0.860
CM9,10	173.82		173.39	1.860
LR9,10	173.82		173.29	1.860
C8A	21.557		14.021	0.180
CM8A	21.557		14.021	0.180
LR8A	21.555		14.021	0.180
C5	176.53		127.11	1.950
CM5	176.53		127.11	1.950
LR5	176.51		127.11	1.950
C6-Split	34.324		20.742	0.300
Conrail	164.30		147.85	2.250
C4	102.83		67.275	0.890
CM4,5	238.56		215.13	3.140
LR4,5	238.56		215.13	3.140
C1	217.52		146.44	1.880

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
CM1	217.52	02 Nov 01 0525	146.44	1.880
LR1	217.50	02 Nov 01 0625	146.44	1.880
C2	123.47	02 Nov 01 0630	91.914	1.180
CM1,2	340.87	02 Nov 01 0625	238.35	3.060
LR2	340.86	02 Nov 01 0725	238.35	3.060
C6	10.480	02 Nov 01 0515	6.9140	0.100
C3	122.64	02 Nov 01 0555	86.173	1.140
CM2,3,6	698.86	02 Nov 01 0705	546.57	7.440
LR6	698.78	02 Nov 01 0825	546.57	7.440
C8	63.439	02 Nov 01 0415	37.736	0.670
C7	163.84	02 Nov 01 0620	118.85	1.620
CM7,8	876.01	02 Nov 01 0755	717.18	9.910
LR8	876.01	02 Nov 01 0820	717.18	9.910
C11	17.431	02 Nov 01 0420	10.451	0.170
CM8,11	1032.7	02 Nov 01 0805	900.92	11.940
LR11	1032.7	02 Nov 01 0835	900.78	11.940
C12	20.630	02 Nov 01 0455	13.033	0.260
C13	71.627	02 Nov 01 0440	44.867	0.630
CM11,12,13	1077.0	02 Nov 01 0825	958.68	12.830
LR13	1076.9	02 Nov 01 0840	958.59	12.830
C14	121.84	02 Nov 01 0410	74.228	0.870
CM13,14	1118.7	02 Nov 01 0830	1032.8	13.700
LR14	1118.7	02 Nov 01 0855	1032.7	13.700
C18	24.889	02 Nov 01 0415	14.956	0.210
C15	73.987	02 Nov 01 0500	47.335	0.770
CM14-18	1183.9	02 Nov 01 0835	1127.9	15.110
LR18	1183.9	02 Nov 01 0845	1127.8	15.110
C24	53.588	02 Nov 01 0430	32.916	0.520
C19	18.910	02 Nov 01 0410	11.339	0.150
CM18,19,24	1382.5	02 Nov 01 0735	1339.1	17.980
LR24	1382.4	02 Nov 01 0805	1339.0	17.980
C25	57.450	02 Nov 01 0445	36.283	0.480
CM24,25	1413.6	02 Nov 01 0800	1375.3	18.460
LR25	1413.6	02 Nov 01 0820	1375.1	18.460
C26	34.392	02 Nov 01 0410	20.296	0.350
CM25,26	1426.1	02 Nov 01 0820	1395.4	18.810
LR26	1426.0	02 Nov 01 0850	1395.2	18.810
C27	43.414	02 Nov 01 0505	28.029	0.430
CM26,27	1447.8	02 Nov 01 0845	1423.2	19.240
LR27	1447.7	02 Nov 01 0900	1423.2	19.240
C29	36.311	02 Nov 01 0410	21.494	0.360
CM27,29	1467.1	02 Nov 01 0855	1463.9	19.840
LR29	1467.0	02 Nov 01 0935	1463.6	19.840
C30	102.26	02 Nov 01 0435	63.229	0.970
CM29,30	1497.4	02 Nov 01 0930	1526.9	20.810
LR30	1497.4	02 Nov 01 0940	1526.8	20.810
C31	32.062	02 Nov 01 0425	19.555	0.300
CM31	32.062	02 Nov 01 0425	19.555	0.300
LR31	32.057	02 Nov 01 0455	19.555	0.300
C32	59.916	02 Nov 01 0425	36.644	0.530
CM30,32	1523.9	02 Nov 01 0920	1583.0	21.640

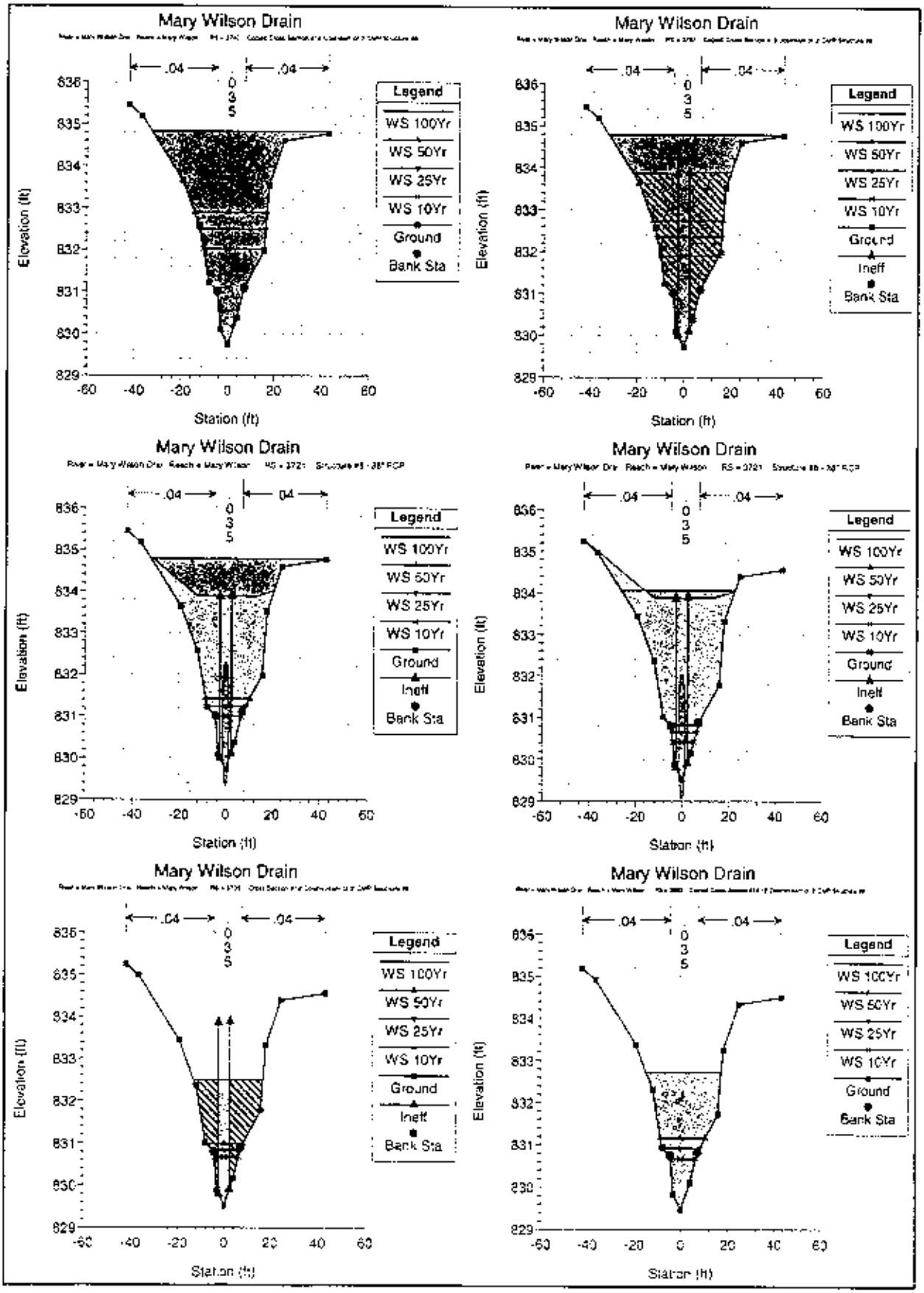
Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
LR32	1523.8	02 Nov 01 1000	1582.7	21.640
C33	31.129	02 Nov 01 0410	18.442	0.300
CM33	31.129	02 Nov 01 0410	18.442	0.300
LR33	31.127	02 Nov 01 0445	18.442	0.300
C34	54.689	02 Nov 01 0450	34.772	0.460
CM33,34	85.811	02 Nov 01 0445	53.214	0.760
LR34	85.806	02 Nov 01 0510	53.214	0.760
C35	50.796	02 Nov 01 0440	31.650	0.500
CM34,35	1570.8	02 Nov 01 0920	1667.5	22.900

APPENDIX F

HEC-RAS MODELS

MARY WILSON DRAIN

HEC-RAS CROSS-SECTIONS AND PROFILE SUMMARY TABLE


Mary Wilson Drain
.04
.04
0.035
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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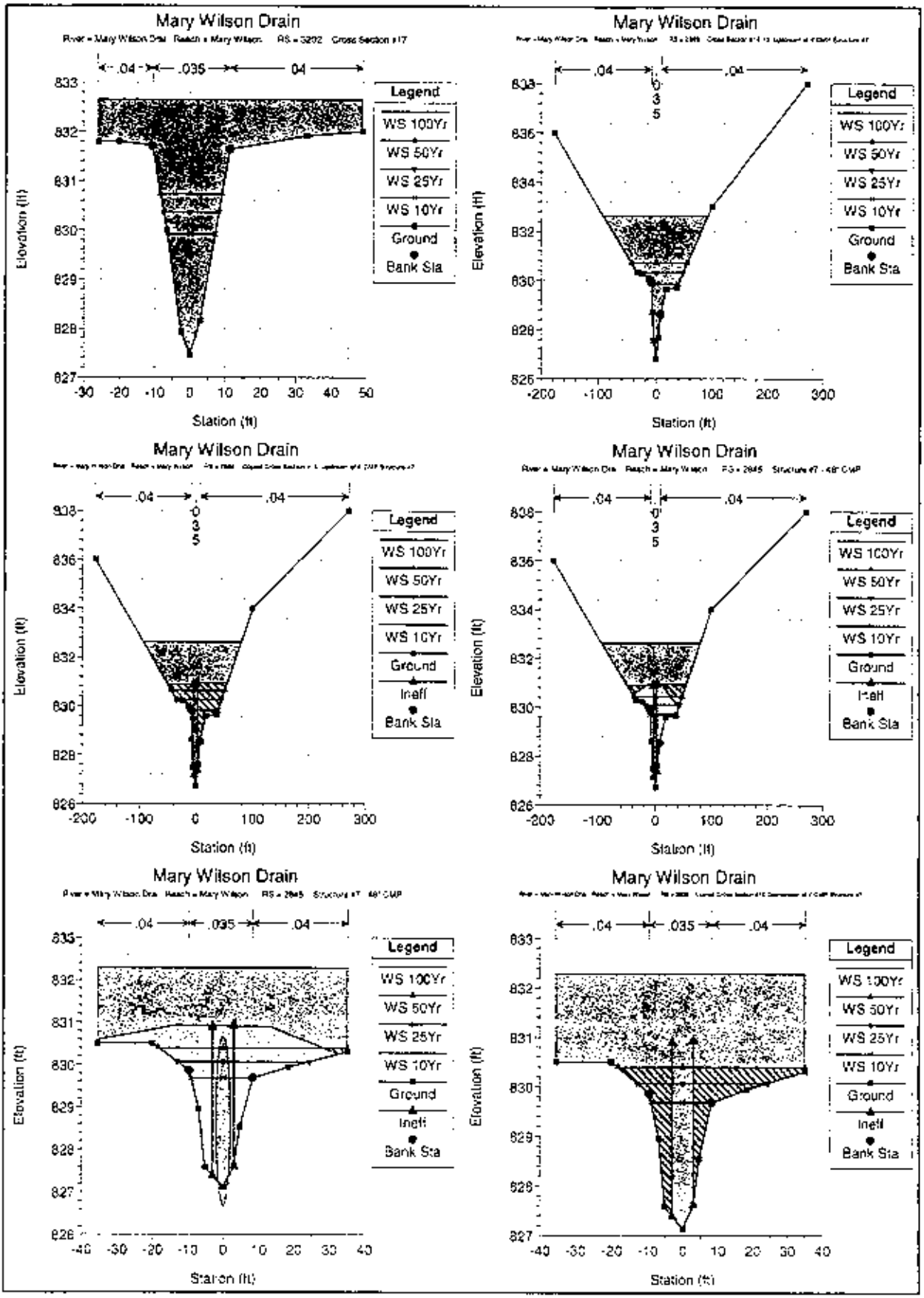
835
834
833
832
831
830
829
-60
-40
-20
0
20
40
60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.035
.04
Legend
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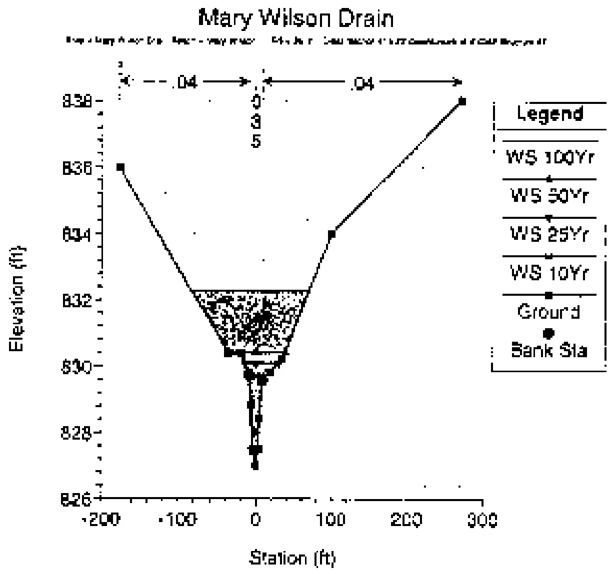
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
.04
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
.04
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
.04
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
.04
.035
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
.04
.035
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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.04
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0
3
5
Legend
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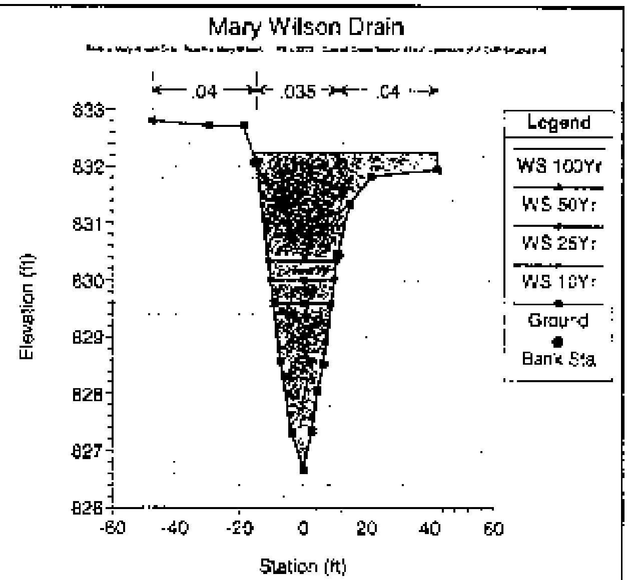
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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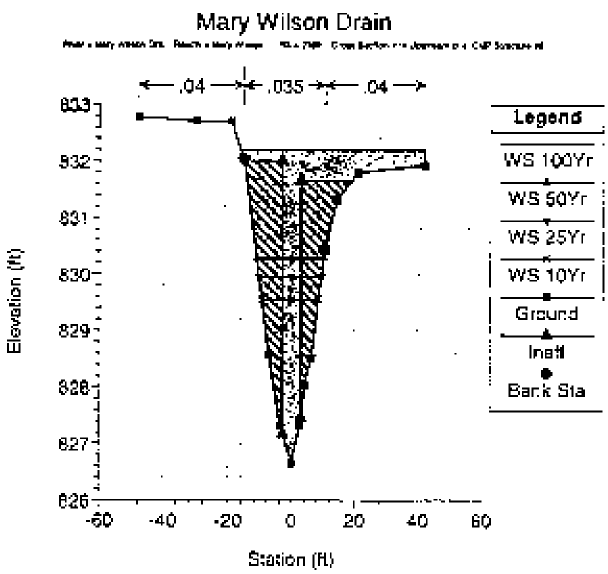
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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.04
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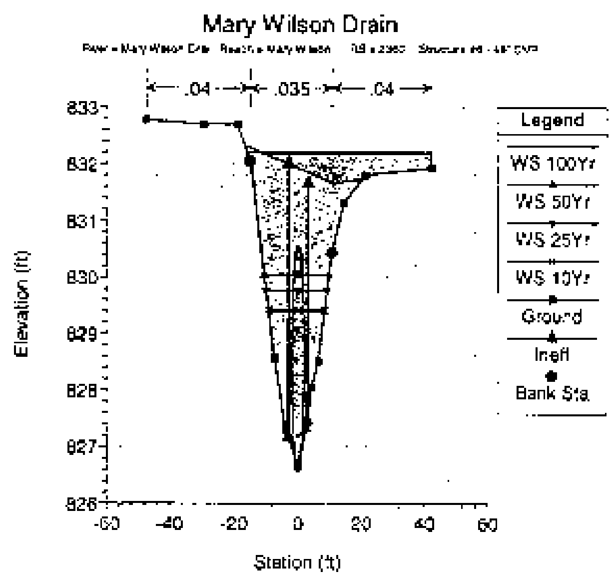
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Legend
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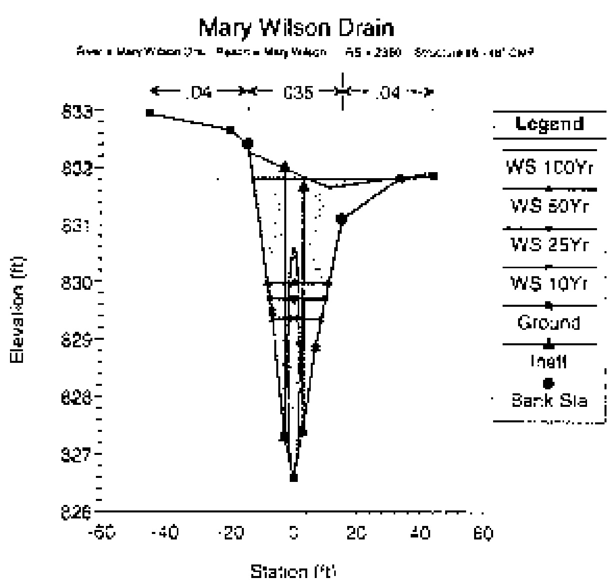
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
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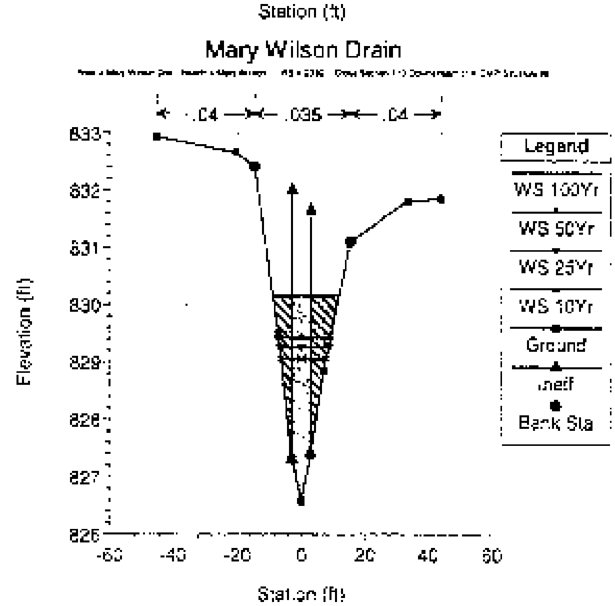
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
.035
.04
Legend
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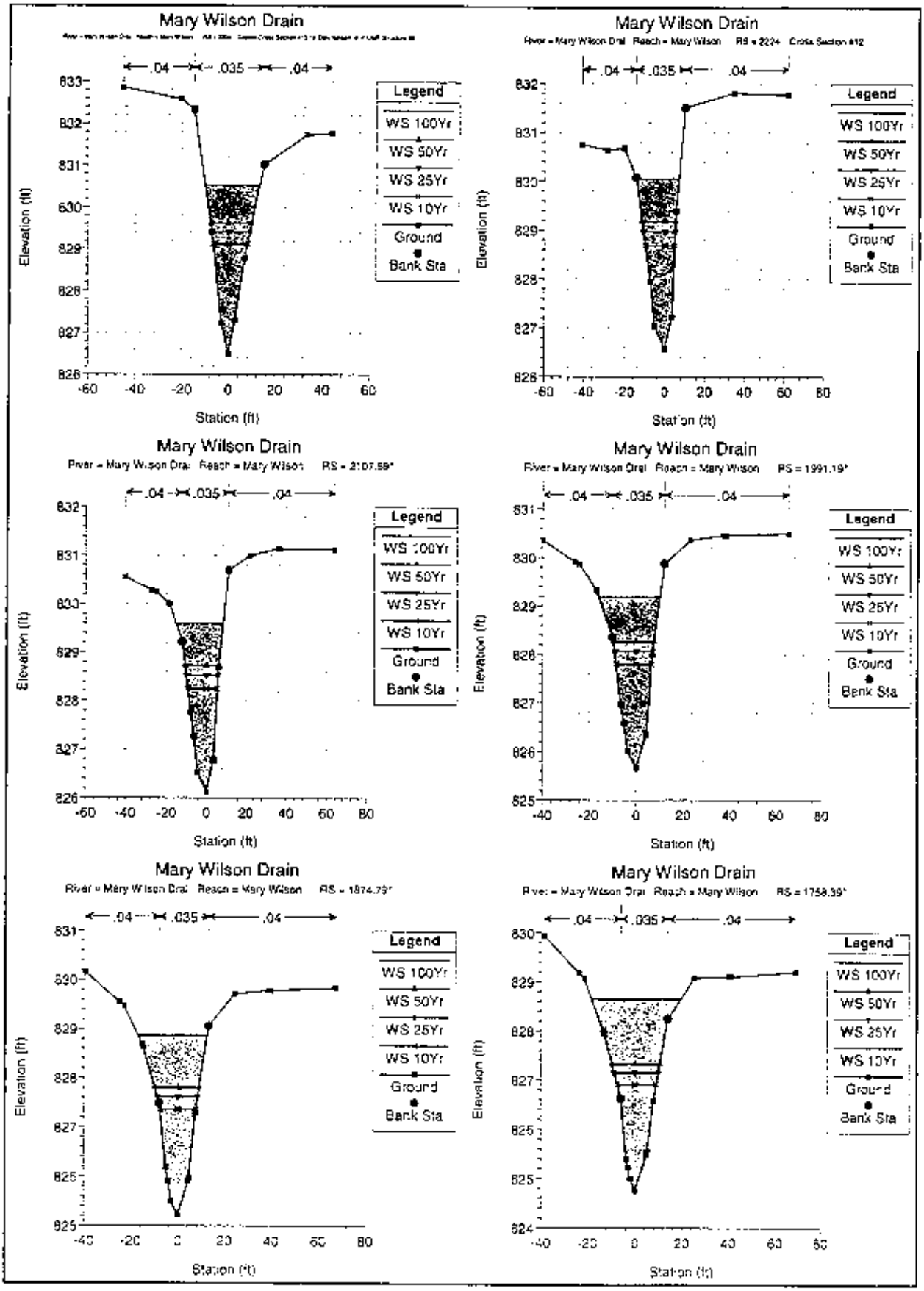
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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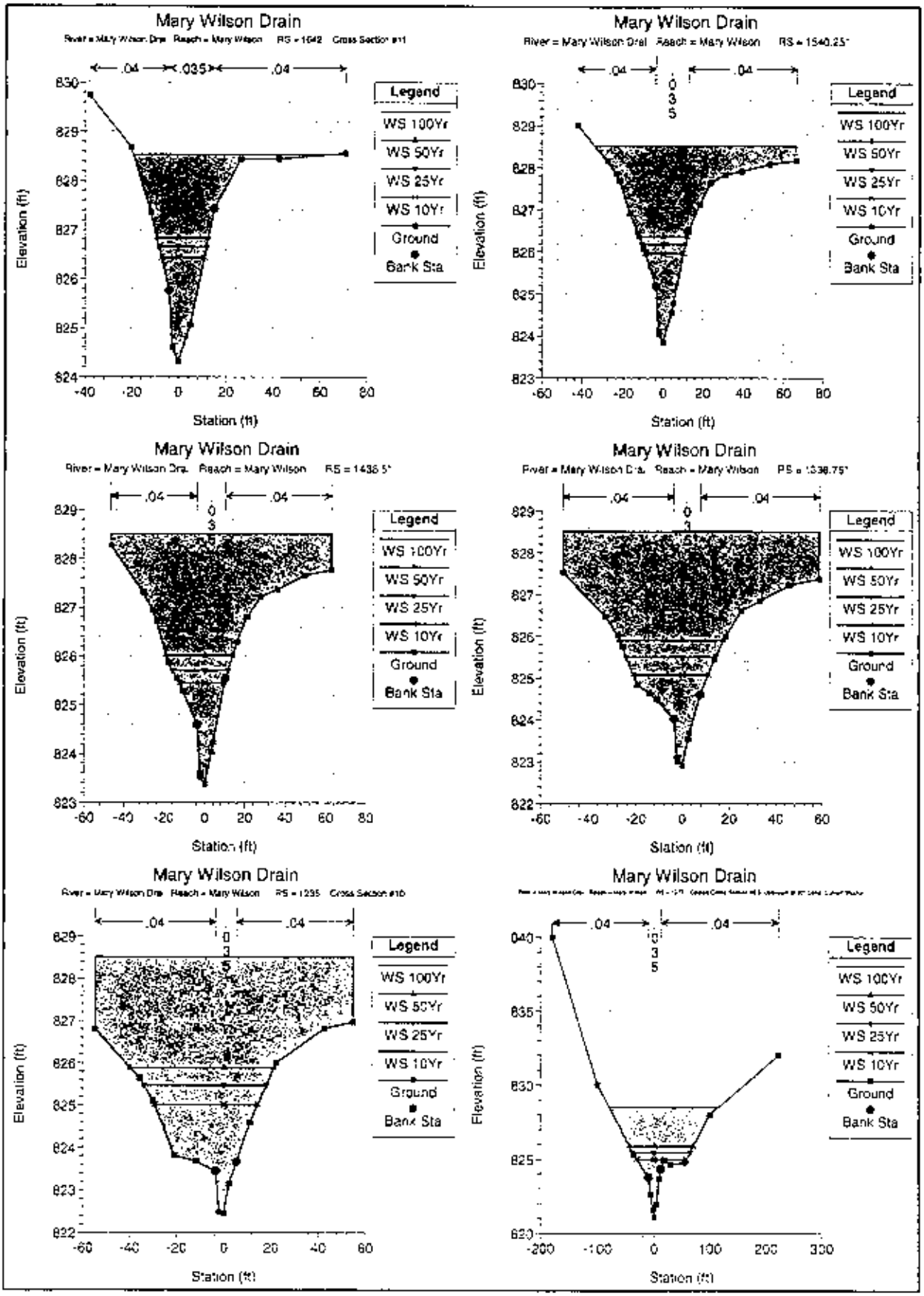
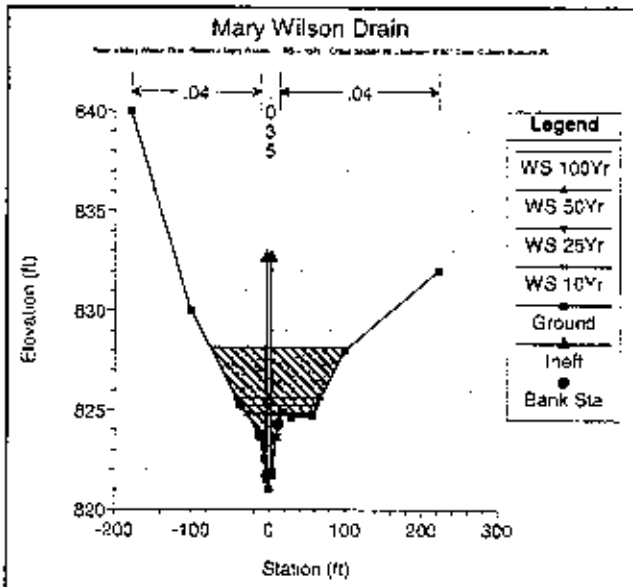
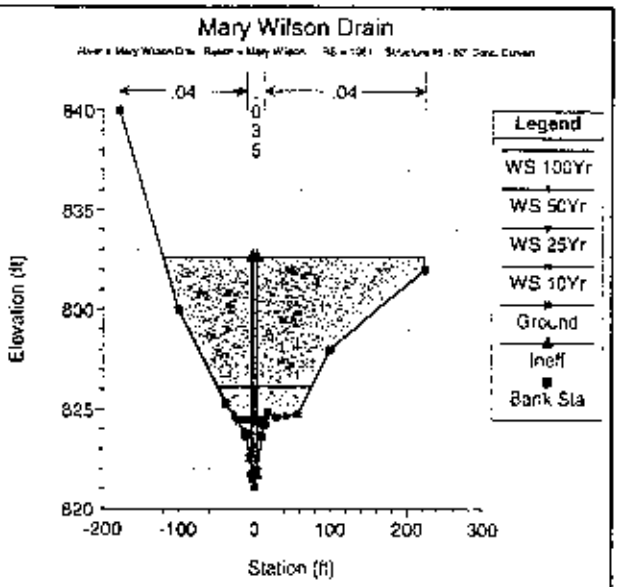
.04 .035 .04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 2107.59*
.04 .035 .04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 1991.19*
.04 .035 .04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 1874.79*
.04 .035 .04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 1758.39*
.04 .035 .04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 1642 Cross Section #11
.04
.035
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 1540.25*
.04
.04
0
3
5
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 1438.5*
.04
.04
0
3
5
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 1336.75*
.04
.04
0
3
5
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
River = Mary Wilson Drai Reach = Mary Wilson RS = 1235 Cross Section #10
.04
.04
0
3
5
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Mary Wilson Drain
.04
.04
0
3
5
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
.04
0
3
5
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
.04
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3
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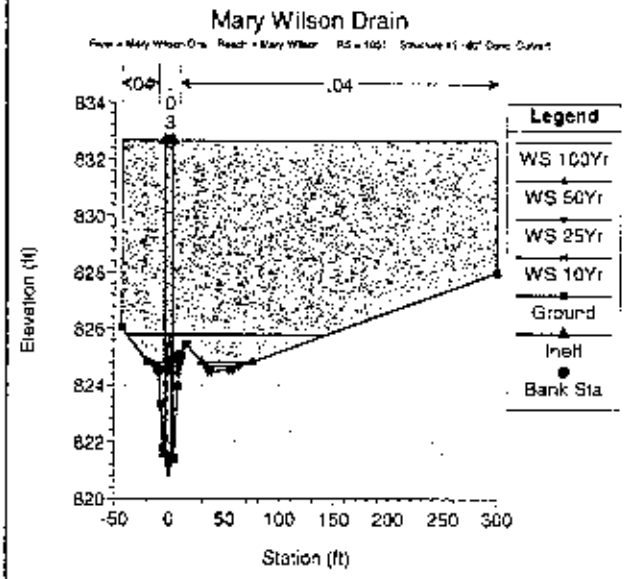
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
.04
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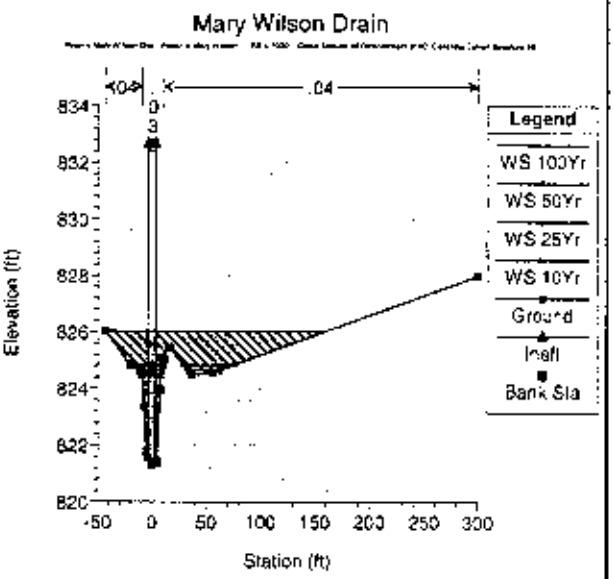
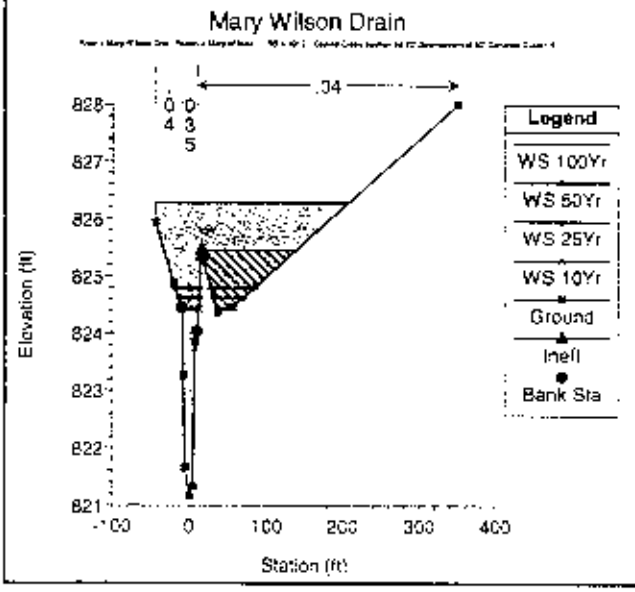
3
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
.04
0
3
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
0
4
3
5
Legend
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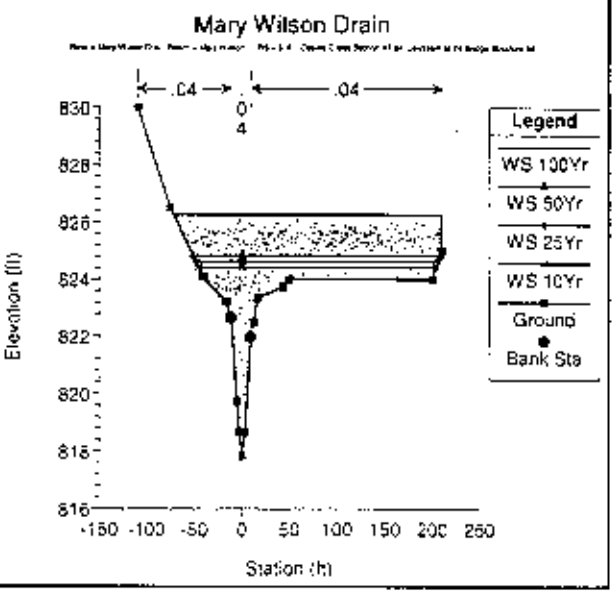
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
.04
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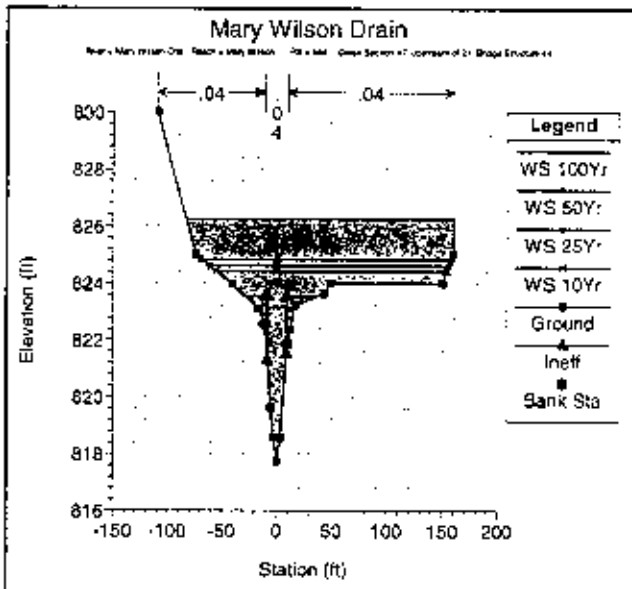
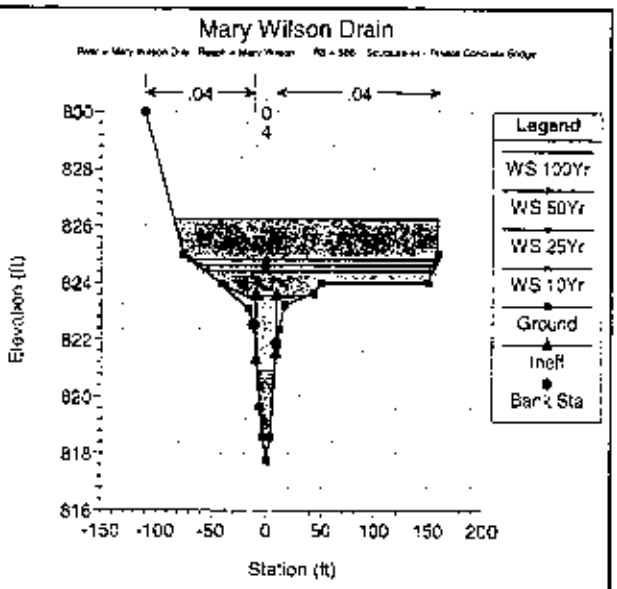
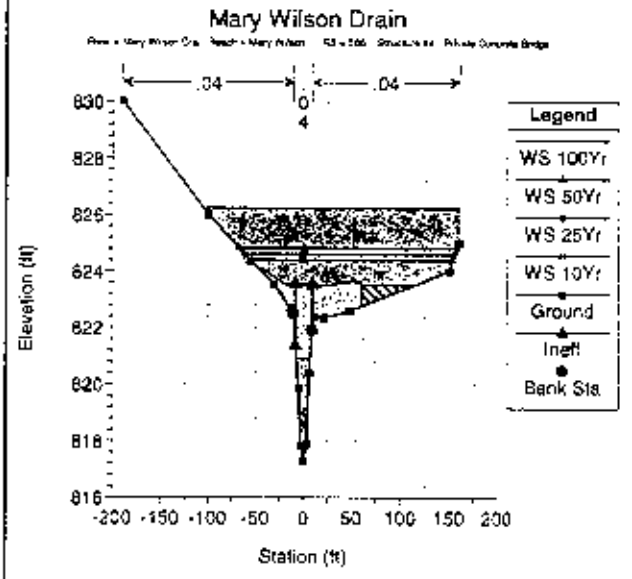
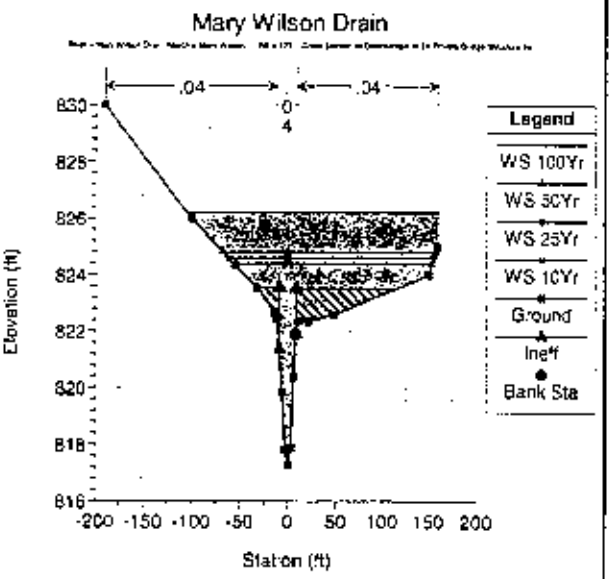
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
.04
.04
0
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
830
828
826
824
822
820
818
816
-150 -100 -50 0 50 100 150 200
Station (ft)


Mary Wilson Drain
.04
.04
0
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
830
828
826
824
822
820
818
816
-150 -100 -50 0 50 100 150 200
Station (ft)


Mary Wilson Drain
.04
.04
0
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
830
828
826
824
822
820
818
816
-200 -150 -100 -50 0 50 100 150 200
Station (ft)


Mary Wilson Drain
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4
Legend
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WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
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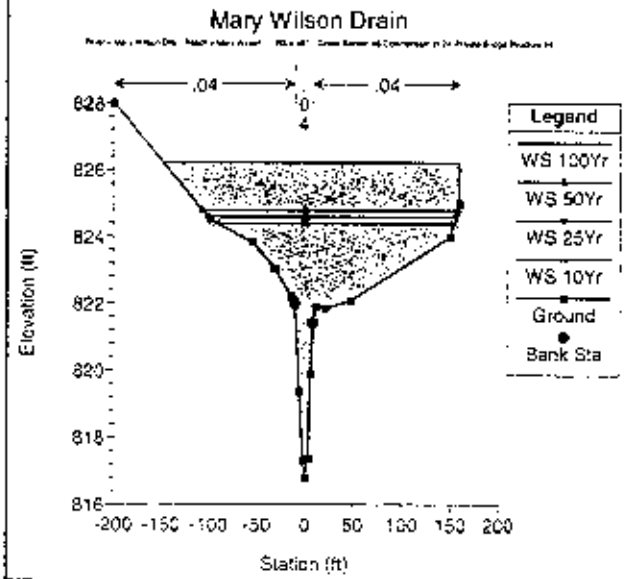
828
826
824
822
820
818
816
-200 -150 -100 -50 0 50 100 150 200
Station (ft)


Mary Wilson Drain
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4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
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824
822
820
818
816
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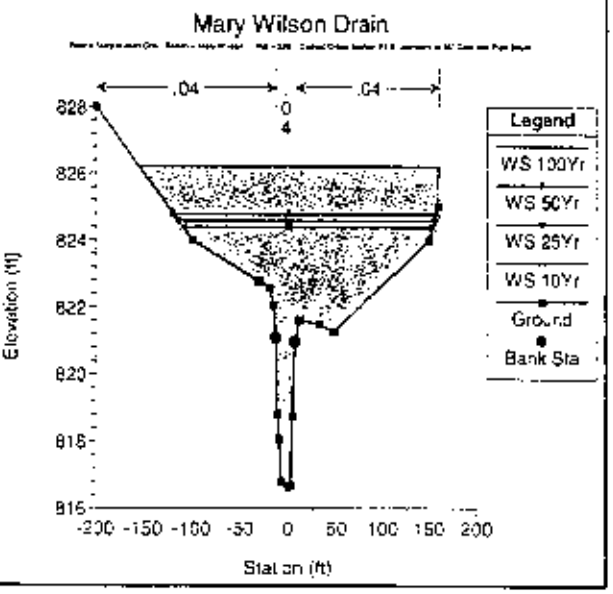
Station (ft)


Mary Wilson Drain
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Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
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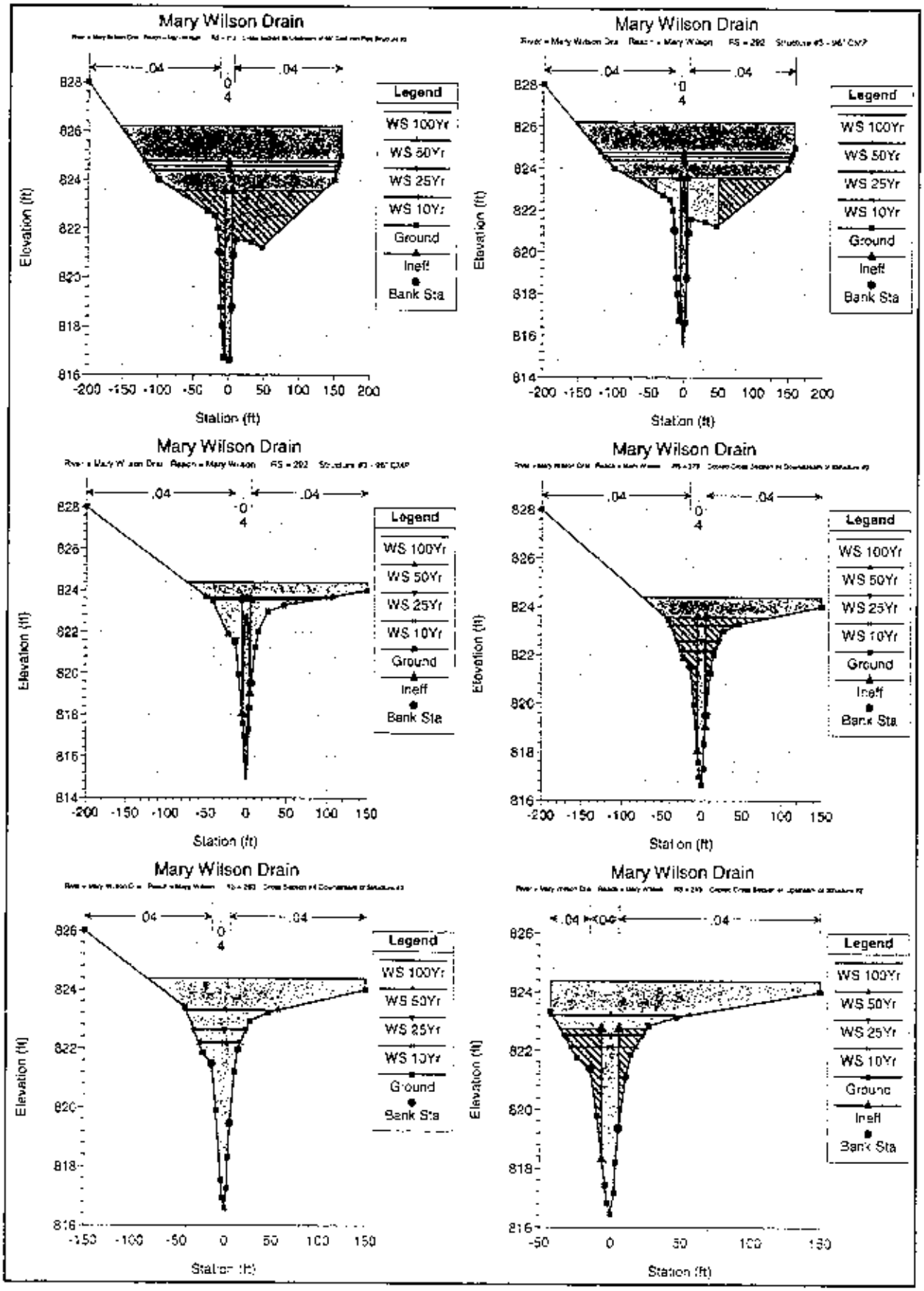
824
822
820
818
816
-200 -150 -100 -50 0 50 100 150 200
Station (ft)


Mary Wilson Drain
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Legend
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WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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822
820
818
816
814
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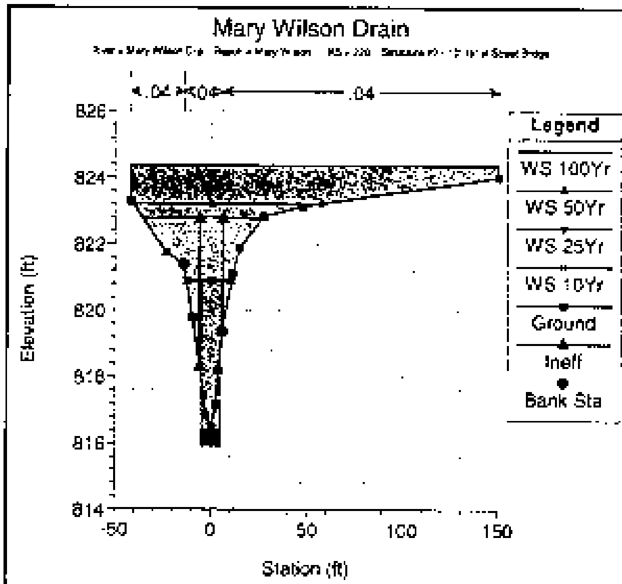
200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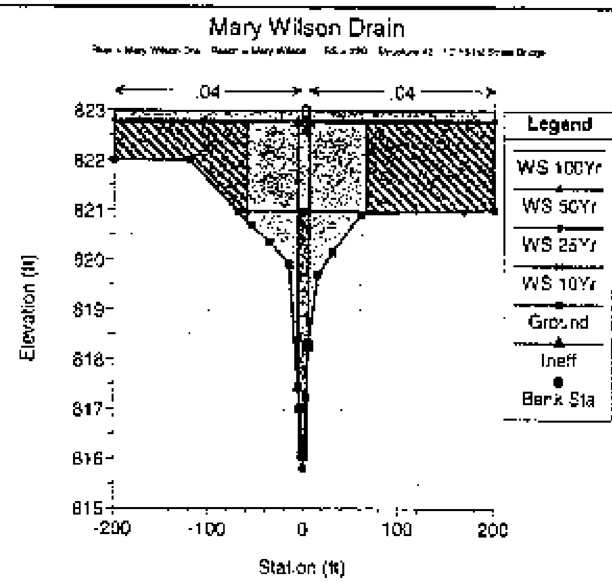
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
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Legend
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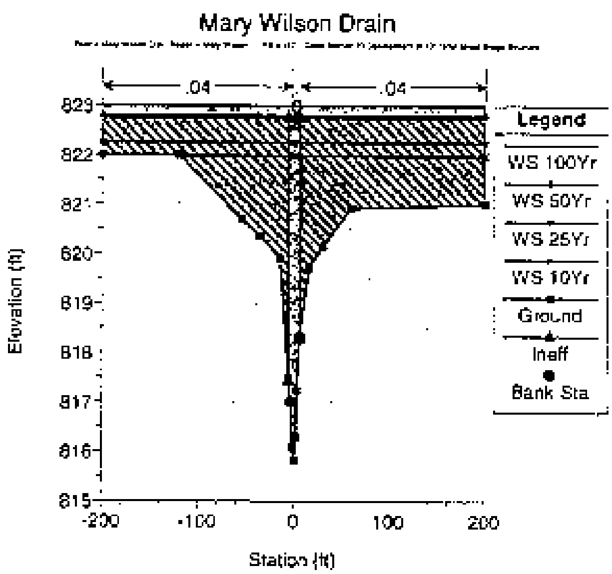
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
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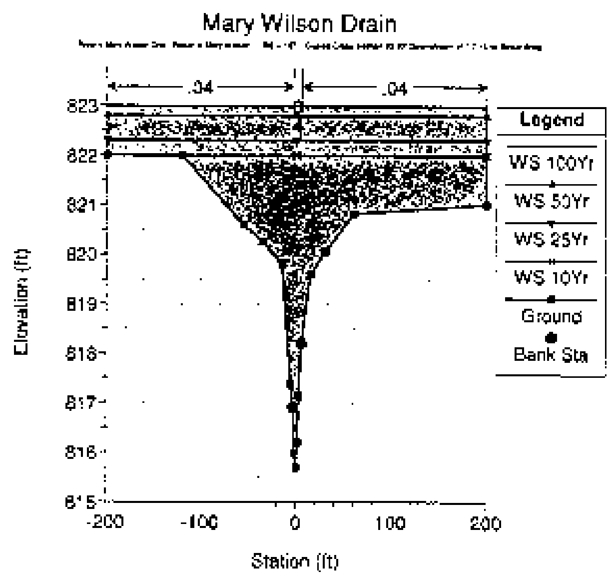
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
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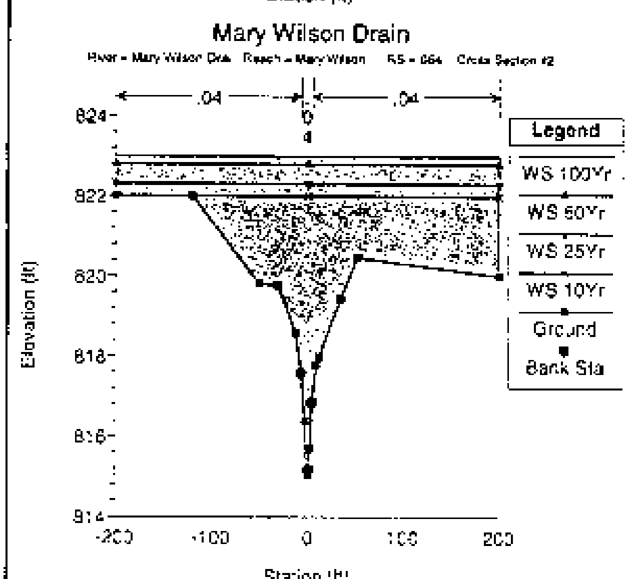
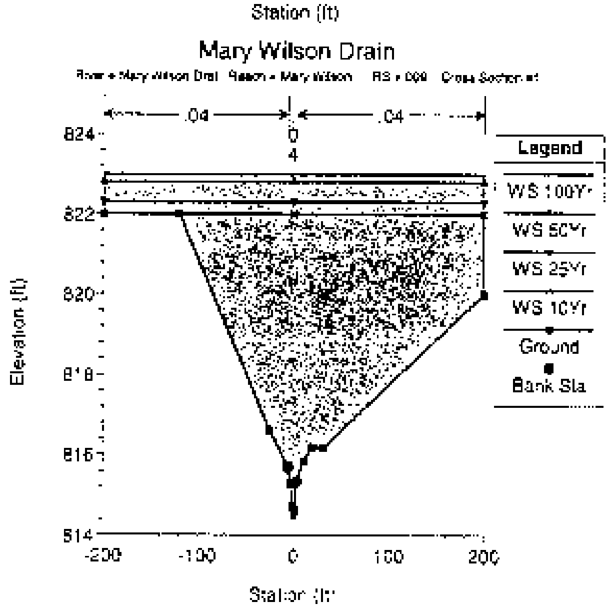
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
Cross Section #2
.04
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Mary Wilson Drain
Reach = Mary Wilson
.04
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)

HEC-RAS Plan: Plan 01 River: Mary Wilson Drai Reach: Mary Wilson

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mary Wilson	3740	80.00	829.73	834.93		834.84	0.000083	0.91	139.99	75.59	0.07
Mary Wilson	3740	42.00	829.73	832.90		832.91	0.000151	0.97	54.35	31.46	0.11
Mary Wilson	3740	35.00	829.73	832.50		832.51	0.000205	1.02	42.36	28.55	0.12
Mary Wilson	3740	27.00	829.73	832.02		832.04	0.000329	1.10	29.34	26.50	0.15
Mary Wilson	3737	80.00	829.72	834.79	831.98	834.83	0.000592	1.90	65.50	75.20	0.21
Mary Wilson	3737	42.00	829.72	832.74	831.18	832.87	0.001209	2.95	14.24	30.24	0.31
Mary Wilson	3737	35.00	829.72	832.36	831.04	832.48	0.001365	2.84	12.31	27.95	0.32
Mary Wilson	3737	27.00	829.72	831.99	830.85	832.01	0.001597	2.69	10.05	25.32	0.33
Mary Wilson	3721	Culvert									
Mary Wilson	3705	80.00	829.52	832.51	831.68	833.01	0.004506	5.66	14.13	30.08	0.59
Mary Wilson	3705	42.00	829.52	830.99	830.98	831.64	0.018587	6.47	6.50	15.87	1.00
Mary Wilson	3705	35.00	829.52	830.84	830.84	831.41	0.017304	6.09	5.75	12.19	1.00
Mary Wilson	3705	27.00	829.52	830.67	830.65	831.14	0.017314	5.49	4.92	10.67	0.98
Mary Wilson	3693	80.00	829.46	832.73		832.77	0.000470	1.76	57.60	32.26	0.19
Mary Wilson	3693	42.00	829.46	831.16		831.28	0.003955	2.90	15.67	19.30	0.47
Mary Wilson	3693	35.00	829.46	830.92	830.59	831.07	0.009168	3.13	11.48	16.07	0.57
Mary Wilson	3693	27.00	829.46	830.67	830.46	830.84	0.009328	3.29	8.21	11.01	0.67
Mary Wilson	3202	80.00	827.45	832.65		832.66	0.000102	0.80	116.42	74.50	0.09
Mary Wilson	3202	42.00	827.45	830.74		830.76	0.000448	1.29	32.54	17.61	0.17
Mary Wilson	3202	35.00	827.45	830.36		830.39	0.000549	1.33	26.28	15.62	0.18
Mary Wilson	3202	27.00	827.45	829.92		829.95	0.000696	1.37	19.78	13.75	0.20
Mary Wilson	2869	80.00	826.81	832.64		832.65	0.000009	0.35	385.94	165.66	0.03
Mary Wilson	2869	42.00	826.81	830.72		830.72	0.000047	0.57	110.31	100.30	0.06
Mary Wilson	2869	35.00	826.81	830.32		830.32	0.000071	0.64	73.95	78.41	0.07
Mary Wilson	2869	27.00	826.81	829.87		829.87	0.000108	0.69	47.10	48.98	0.08
Mary Wilson	2854	80.00	826.73	832.63	828.76	832.64	0.000044	0.57	235.13	173.77	0.06
Mary Wilson	2854	42.00	826.73	830.65	828.15	830.70	0.000374	1.92	21.86	95.78	0.18
Mary Wilson	2854	35.00	826.73	830.26	828.02	830.31	0.000377	1.79	19.54	80.32	0.17
Mary Wilson	2854	27.00	826.73	829.82	827.85	829.86	0.000362	1.60	16.92	48.69	0.17
Mary Wilson	2845	Culvert									
Mary Wilson	2835	80.00	827.12	832.29	829.07	832.30	0.000031	0.59	185.20	70.70	0.05
Mary Wilson	2835	42.00	827.12	830.40	828.45	830.48	0.000642	2.27	18.52	53.60	0.23
Mary Wilson	2835	35.00	827.12	830.07	828.32	830.14	0.000649	2.11	16.55	37.30	0.22
Mary Wilson	2835	27.00	827.12	829.53	828.16	829.74	0.000636	1.90	14.25	17.59	0.22
Mary Wilson	2812	80.00	827.01	832.28		832.28	0.000021	0.48	274.45	150.95	0.04
Mary Wilson	2812	42.00	827.01	830.42		830.43	0.000148	0.68	61.30	75.36	0.10
Mary Wilson	2812	35.00	827.01	830.09		830.10	0.000201	0.93	42.81	45.33	0.11
Mary Wilson	2812	27.00	827.01	829.70		829.71	0.000260	0.92	29.66	22.76	0.13
Mary Wilson	2373	80.00	826.67	832.25		832.26	0.000075	0.62	110.20	58.43	0.08
Mary Wilson	2373	42.00	826.67	830.35		830.36	0.000181	0.91	46.42	21.91	0.11
Mary Wilson	2373	35.00	826.67	830.01		830.02	0.000200	0.89	39.18	20.39	0.11
Mary Wilson	2373	27.00	826.67	829.59		829.60	0.000225	0.87	31.08	19.53	0.12
Mary Wilson	2369	80.00	826.65	832.20	828.72	832.25	0.001282	1.68	50.44	58.31	0.27
Mary Wilson	2369	42.00	826.65	830.27	828.1	830.34	0.000522	2.12	19.84	21.66	0.2
Mary Wilson	2369	35.00	826.65	829.94	827.98	830.00	0.000514	1.95	17.87	20.22	0.20
Mary Wilson	2369	27.00	826.65	829.64	827.82	829.59	0.000498	1.75	15.46	18.41	0.19
Mary Wilson	2360	Culvert									
Mary Wilson	2350	196.00	826.56	830.16	830.16	831.78	0.012851	10.52	19.19	20.93	1.04
Mary Wilson	2350	104.00	826.56	829.42	829.09	830.19	0.009751	7.27	14.72	16.28	0.82
Mary Wilson	2350	97.00	826.56	829.27	828.93	829.88	0.007561	6.30	13.81	15.43	0.73
Mary Wilson	2350	87.00	826.56	829.05	828.53	829.50	0.006205	5.35	12.63	14.22	0.66
Mary Wilson	2334	196.00	826.50	830.52		830.78	0.003725	4.03	48.63	33.73	0.50
Mary Wilson	2334	104.00	826.50	829.62		829.81	0.003744	3.49	29.82	18.03	0.48
Mary Wilson	2334	97.00	826.50	829.41		829.56	0.003696	3.34	26.07	16.67	0.47
Mary Wilson	2334	87.00	826.50	829.12		829.27	0.003637	3.12	21.49	15.24	0.46

HEC-RAS Plan: Plan 01 River: Mary Wilson Drai Reach: Mary Wilson (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mary Wilson	2224	196.00	826.57	830.05		830.35	0.004125	4.31	45.53	21.29	0.52
Mary Wilson	2224	104.00	826.57	829.19		829.39	0.003901	3.60	28.86	16.94	0.49
Mary Wilson	2224	87.00	826.57	828.97		829.16	0.003875	3.42	25.41	16.07	0.48
Mary Wilson	2224	67.00	826.57	828.69		828.85	0.003875	3.19	21.03	14.89	0.47
Mary Wilson	2107.59*	196.00	826.12	829.60		829.88	0.003842	4.28	48.30	23.66	0.51
Mary Wilson	2107.59*	104.00	826.12	828.73		828.93	0.003878	3.59	29.00	17.22	0.49
Mary Wilson	2107.59*	87.00	826.12	828.52		828.70	0.003856	3.41	25.52	16.33	0.48
Mary Wilson	2107.59*	67.00	826.12	828.24		828.40	0.003891	3.18	21.09	15.17	0.47
Mary Wilson	1991.19*	196.00	825.66	829.20		829.46	0.003361	4.13	49.19	26.05	0.48
Mary Wilson	1991.19*	104.00	825.66	828.27		828.47	0.003930	3.58	29.04	17.61	0.49
Mary Wilson	1991.19*	87.00	825.66	828.07		828.25	0.003819	3.39	25.68	16.58	0.48
Mary Wilson	1991.19*	67.00	825.66	827.80		827.95	0.003762	3.13	21.37	15.37	0.47
Mary Wilson	1874.79*	196.00	825.21	828.87		829.09	0.002748	3.84	54.67	29.54	0.44
Mary Wilson	1874.79*	104.00	825.21	827.80		828.01	0.003903	3.67	29.02	19.09	0.49
Mary Wilson	1874.79*	87.00	825.21	827.62		827.80	0.003850	3.40	25.63	17.40	0.48
Mary Wilson	1874.79*	67.00	825.21	827.36		827.51	0.003781	3.13	21.39	15.53	0.47
Mary Wilson	1758.39*	196.00	824.75	828.66		828.82	0.001915	3.36	55.73	38.00	0.35
Mary Wilson	1758.39*	104.00	824.75	827.33		827.54	0.004027	3.67	29.25	20.62	0.50
Mary Wilson	1758.39*	87.00	824.75	827.15		827.34	0.003934	3.46	25.72	19.01	0.49
Mary Wilson	1758.39*	67.00	824.75	826.91		827.06	0.003832	3.17	21.33	18.82	0.47
Mary Wilson	1642	196.00	824.30	828.54		828.64	0.001056	2.82	87.54	64.42	0.29
Mary Wilson	1642	104.00	824.30	826.83		827.05	0.004937	3.78	29.14	21.91	0.53
Mary Wilson	1642	87.00	824.30	826.66		826.85	0.004515	3.60	25.39	20.29	0.52
Mary Wilson	1642	67.00	824.30	826.44		826.60	0.004284	3.28	21.15	18.29	0.50
Mary Wilson	1540.25*	196.00	823.84	828.52		828.57	0.000451	2.11	143.02	101.00	0.19
Mary Wilson	1540.25*	104.00	823.84	826.36		826.58	0.004733	3.82	29.84	24.35	0.54
Mary Wilson	1540.25*	87.00	823.84	826.18		826.38	0.004846	3.56	25.58	22.23	0.54
Mary Wilson	1540.25*	67.00	823.84	825.95		826.14	0.004669	3.39	21.03	19.78	0.52
Mary Wilson	1438.5*	196.00	823.38	828.52		828.54	0.000189	1.50	210.95	109.45	0.13
Mary Wilson	1438.5*	104.00	823.38	826.01		826.17	0.003134	3.41	36.79	33.30	0.45
Mary Wilson	1438.5*	87.00	823.38	825.71		825.89	0.004646	3.86	27.38	27.55	0.53
Mary Wilson	1438.5*	67.00	823.38	825.45		825.63	0.005387	3.94	21.03	22.56	0.56
Mary Wilson	1336.75*	196.00	822.91	828.51		828.52	0.000083	1.09	283.10	109.68	0.09
Mary Wilson	1336.75*	104.00	822.91	825.91		825.97	0.001258	2.35	59.93	44.95	0.27
Mary Wilson	1336.75*	87.00	822.91	825.51		825.59	0.001715	2.64	43.31	38.61	0.34
Mary Wilson	1336.75*	67.00	822.91	825.08		825.20	0.003130	3.01	28.12	32.60	0.43
Mary Wilson	1235	196.00	822.45	828.51		828.52	0.000042	0.63	357.47	109.90	0.06
Mary Wilson	1235	104.00	822.45	825.88		825.91	0.000345	1.56	99.54	61.19	0.18
Mary Wilson	1235	87.00	822.45	825.47		825.50	0.000470	1.65	75.41	52.21	0.19
Mary Wilson	1235	67.00	822.45	825.01		825.04	0.000654	1.75	53.24	44.10	0.22
Mary Wilson	1077	196.00	821.10	828.51		828.51	0.000015	0.54	580.21	195.70	0.04
Mary Wilson	1077	104.00	821.10	825.87		825.88	0.000085	0.86	177.34	116.32	0.08
Mary Wilson	1077	87.00	821.10	825.45		825.46	0.000120	0.94	130.97	105.12	0.10
Mary Wilson	1077	67.00	821.10	824.97		824.99	0.000175	1.01	84.22	91.05	0.11
Mary Wilson	1072	196.00	821.07	828.17	824.29	828.43	0.000783	4.14	47.34	180.82	0.28
Mary Wilson	1072	104.00	821.07	825.63	823.30	825.82	0.001031	3.52	29.57	110.56	0.30
Mary Wilson	1072	87.00	821.07	825.25	823.09	825.41	0.000985	3.33	26.93	100.45	0.29
Mary Wilson	1072	67.00	821.07	824.83	822.81	824.95	0.000557	2.79	24.01	84.73	0.27
Mary Wilson	1051	Culvert									
Mary Wilson	1030	196.00	821.27	826.24	824.27	826.62	0.002530	5.01	32.63	235.35	0.49
Mary Wilson	1030	104.00	821.27	824.92	823.27	825.11	0.001997	4.21	24.11	76.15	0.47
Mary Wilson	1030	87.00	821.27	824.66	823.06	824.88	0.001643	3.79	22.95	53.79	0.37
Mary Wilson	1030	67.00	821.27	824.45	822.79	824.60	0.001209	3.11	21.51	16.45	0.31
Mary Wilson	1010	592.00	821.17	826.89	824.58	826.33	0.000471	2.22	222.58	251.86	0.19
Mary Wilson	1010	309.00	821.17	824.79	823.53	825.04	0.002690	4.36	53.35	58.12	0.45

HEC-RAS Plan: Plan 01 River: Mary Wilson Drai Reach: Mary Wilson (Continued)

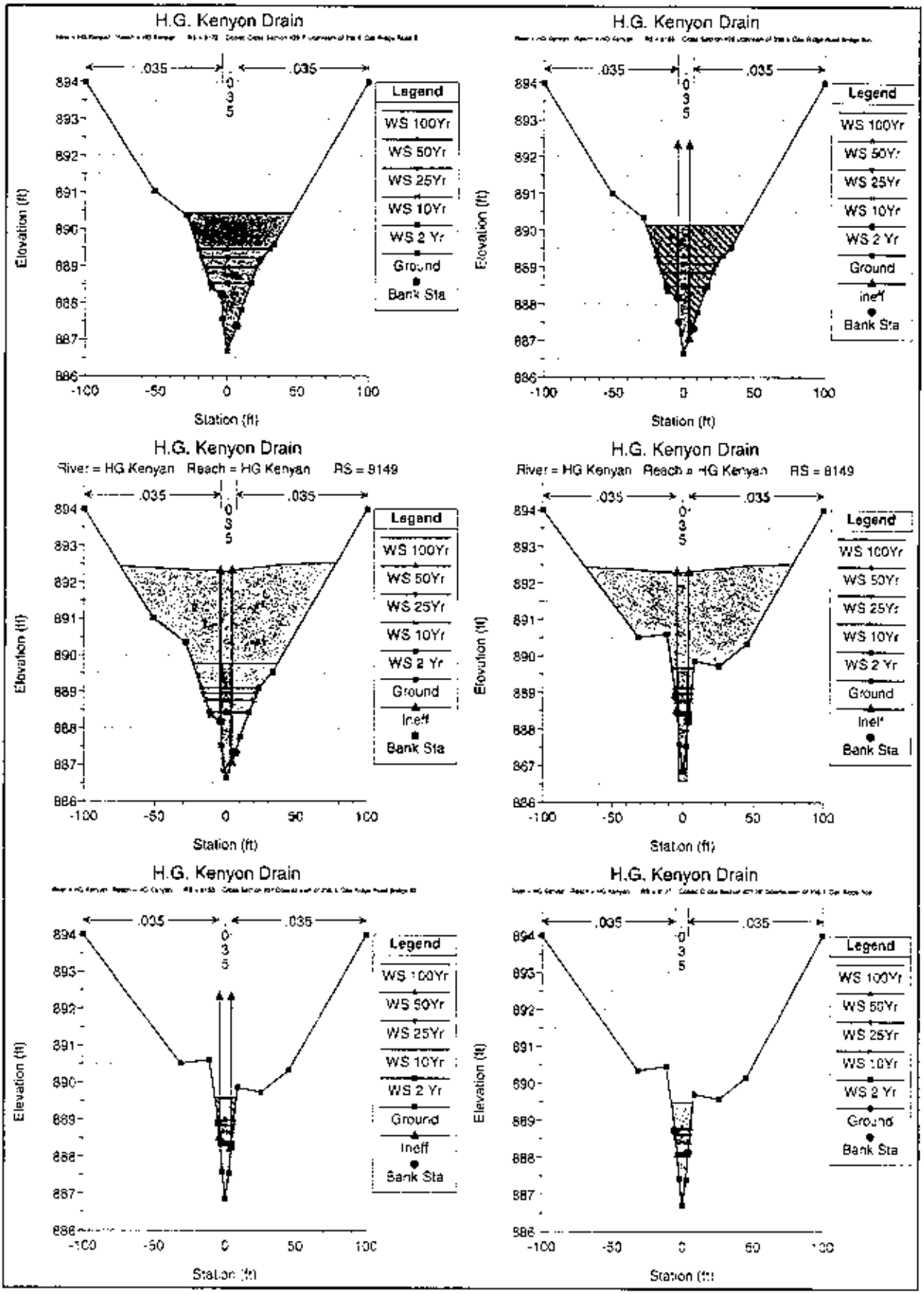
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mary Wilson	1010	174.00	821.17	824.62	823.30	824.83	0.002869	3.66	48.35	65.36	0.42
Mary Wilson	1010	134.00	821.17	824.43	823.01	824.58	0.002106	3.38	43.76	37.06	0.37
Mary Wilson	619	392.00	817.86	826.27		826.27	0.000052	0.86	724.99	281.74	0.06
Mary Wilson	619	208.00	817.86	824.63		824.84	0.000116	1.11	335.07	259.83	0.09
Mary Wilson	619	174.00	817.86	824.63		824.64	0.000119	1.10	281.67	254.83	0.09
Mary Wilson	619	134.00	817.86	824.42		824.44	0.000104	1.00	230.86	249.99	0.08
Mary Wilson	595	392.00	817.74	826.26	821.70	826.27	0.000069	1.00	525.99	243.83	0.07
Mary Wilson	595	208.00	817.74	824.63	820.73	824.84	0.000154	1.26	285.22	227.63	0.10
Mary Wilson	595	174.00	817.74	824.62	820.48	824.63	0.000156	1.23	238.66	218.70	0.10
Mary Wilson	595	134.00	817.74	824.42	820.16	824.43	0.000133	1.11	195.61	210.11	0.09
Mary Wilson	586	Bridge									
Mary Wilson	577	392.00	817.28	826.24	821.45	826.24	0.000039	0.77	774.22	265.37	0.05
Mary Wilson	577	208.00	817.28	824.61	820.33	824.61	0.000059	0.81	420.47	226.02	0.06
Mary Wilson	577	174.00	817.28	824.60	820.07	824.61	0.000056	0.77	374.95	218.47	0.06
Mary Wilson	577	134.00	817.28	824.40	819.72	824.41	0.000045	0.67	332.13	211.13	0.05
Mary Wilson	481	392.00	816.78	826.23		826.23	0.000025	0.65	936.52	309.47	0.04
Mary Wilson	481	208.00	816.78	824.79		824.80	0.000036	0.67	521.59	266.36	0.05
Mary Wilson	481	174.00	816.78	824.60		824.60	0.000033	0.63	469.38	259.69	0.05
Mary Wilson	481	134.00	816.78	824.40		824.40	0.000026	0.54	418.90	247.13	0.04
Mary Wilson	320	392.00	816.61	826.22		826.23	0.000016	0.57	1077.52	315.60	0.03
Mary Wilson	320	208.00	816.61	824.78		824.79	0.000018	0.53	648.69	277.40	0.04
Mary Wilson	320	174.00	816.61	824.59		824.59	0.000016	0.49	595.04	270.64	0.03
Mary Wilson	320	134.00	816.61	824.39		824.39	0.000012	0.42	543.04	263.70	0.03
Mary Wilson	312	392.00	816.57	826.22	820.49	826.22	0.000052	0.79	771.77	315.41	0.06
Mary Wilson	312	208.00	816.57	824.77	819.24	824.78	0.000140	1.08	342.21	278.98	0.09
Mary Wilson	312	174.00	816.57	824.58	818.97	824.59	0.000149	1.08	289.07	270.18	0.09
Mary Wilson	312	134.00	816.57	824.38	818.61	824.39	0.000139	1.02	236.18	263.24	0.09
Mary Wilson	292	Culvert,									
Mary Wilson	273	392.00	816.52	824.40	820.99	824.44	0.000303	1.95	347.62	224.91	0.14
Mary Wilson	273	208.00	816.52	823.23	819.74	823.42	0.000972	3.55	58.67	83.90	0.26
Mary Wilson	273	174.00	816.52	822.58	819.45	822.75	0.001004	3.33	52.20	53.94	0.26
Mary Wilson	273	134.00	816.52	822.18	819.13	822.29	0.000787	2.79	48.02	43.54	0.22
Mary Wilson	263	392.00	816.57	824.39		824.43	0.000289	1.94	357.93	233.08	0.14
Mary Wilson	263	208.00	816.57	823.30		823.34	0.000317	1.77	160.96	98.90	0.14
Mary Wilson	263	174.00	816.57	822.54		822.59	0.000419	1.84	114.03	56.47	0.16
Mary Wilson	263	134.00	816.57	822.20		822.24	0.000399	1.67	91.61	45.64	0.15
Mary Wilson	243	392.00	816.47	824.37	820.66	824.42	0.000540	2.32	282.11	192.40	0.19
Mary Wilson	243	208.00	816.47	823.20	819.53	823.31	0.001259	2.70	95.60	98.16	0.25
Mary Wilson	243	174.00	816.47	822.52	819.30	822.65	0.000766	2.88	60.92	56.10	0.22
Mary Wilson	243	134.00	816.47	822.13	818.95	822.22	0.000595	2.39	56.16	46.31	0.19
Mary Wilson	220	Culvert									
Mary Wilson	197	392.00	815.91	823.00	820.02	823.00	0.000052	0.85	954.06	400.00	0.06
Mary Wilson	197	208.00	815.91	822.90	818.91	822.60	0.000020	0.61	774.20	400.00	0.04
Mary Wilson	197	174.00	815.91	822.25	818.69	822.36	0.000602	2.67	65.31	400.00	0.20
Mary Wilson	197	134.00	815.91	821.98	818.38	822.05	0.000424	2.16	62.05	318.87	0.17
Mary Wilson	157	392.00	815.70	823.00		823.00	0.000048	0.82	875.91	400.00	0.05
Mary Wilson	157	208.00	815.70	822.90		822.60	0.000018	0.59	795.76	400.00	0.04
Mary Wilson	157	174.00	815.70	822.30		822.30	0.000031	0.67	595.71	400.00	0.05
Mary Wilson	157	134.00	815.70	822.00		822.00	0.000029	0.58	475.71	319.87	0.04
Mary Wilson	064	392.00	815.04	823.00		823.00	0.000024	0.62	1070.71	400.00	0.04
Mary Wilson	064	208.00	815.04	822.90		822.60	0.000009	0.37	993.65	400.00	0.03
Mary Wilson	064	174.00	815.04	822.30		822.30	0.000012	0.47	799.60	400.00	0.03
Mary Wilson	064	134.00	815.04	822.00		822.00	0.000010	0.36	673.61	319.99	0.03
Mary Wilson	009	392.00	814.51	822.00	817.10	823.00	0.000006	0.34	1664.74	400.00	0.02

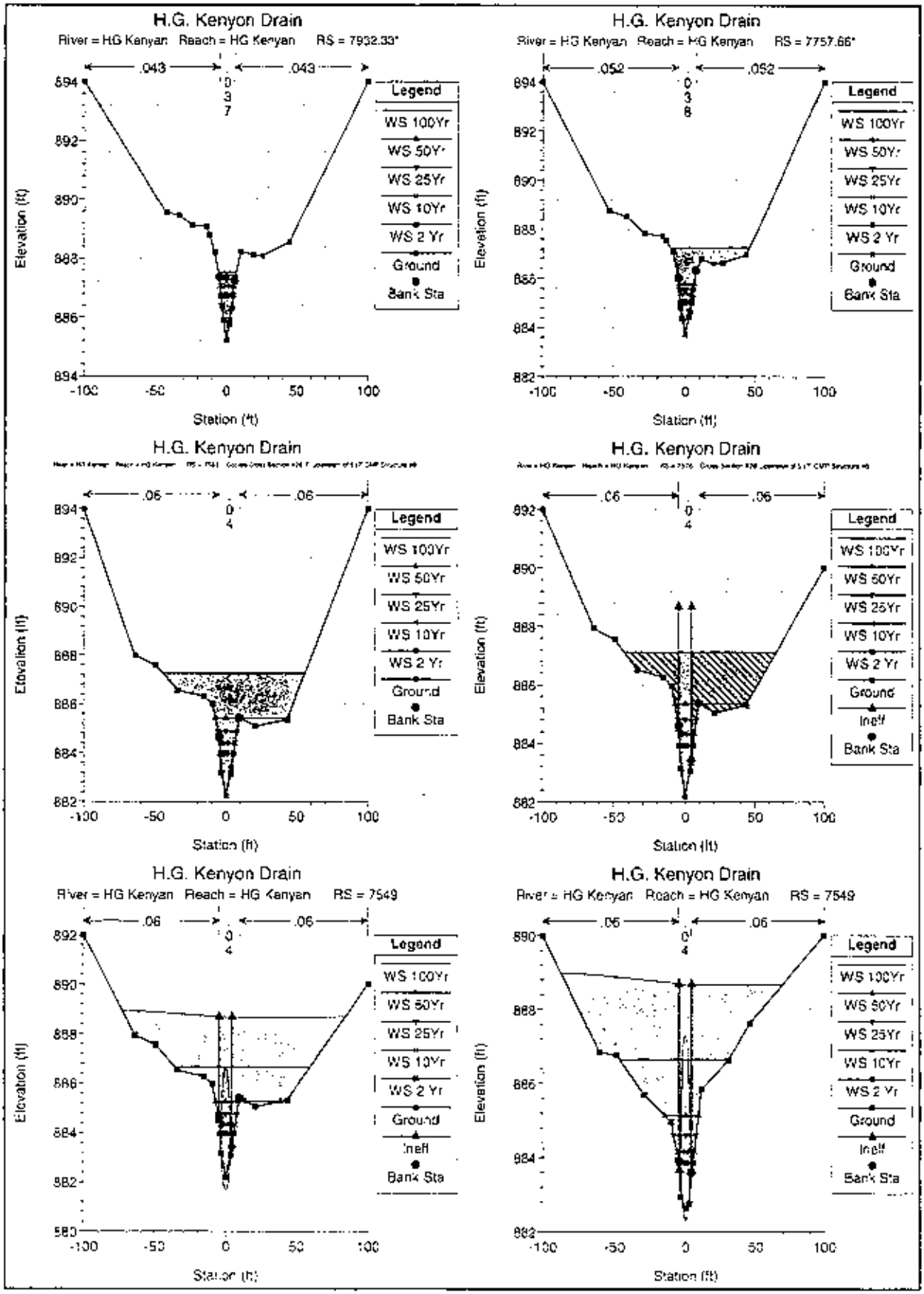
HEC-RAS Plan: Plan 01 River: Mary Wilson Drai Reach: Mary Wilson (Continued)

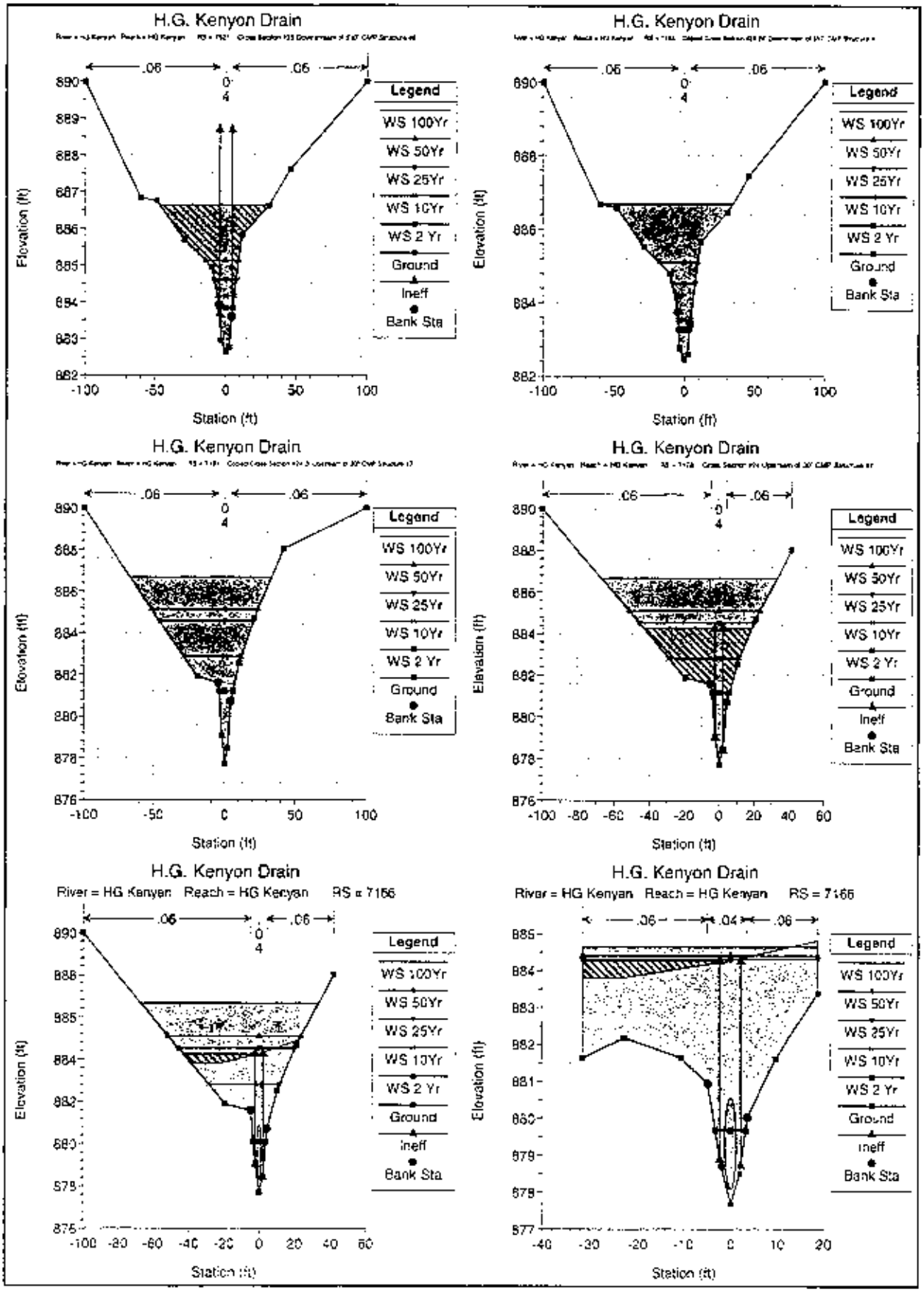
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Mary Wilson	009	208.00	814.51	822.60	816.73	822.80	0.000002	0.19	1584.74	400.00	0.01
Mary Wilson	009	174.00	814.51	822.30	816.64	822.30	0.000002	0.19	1384.74	400.00	0.01
Mary Wilson	009	134.00	814.51	822.00	816.52	822.00	0.000001	0.16	1264.74	320.00	0.01

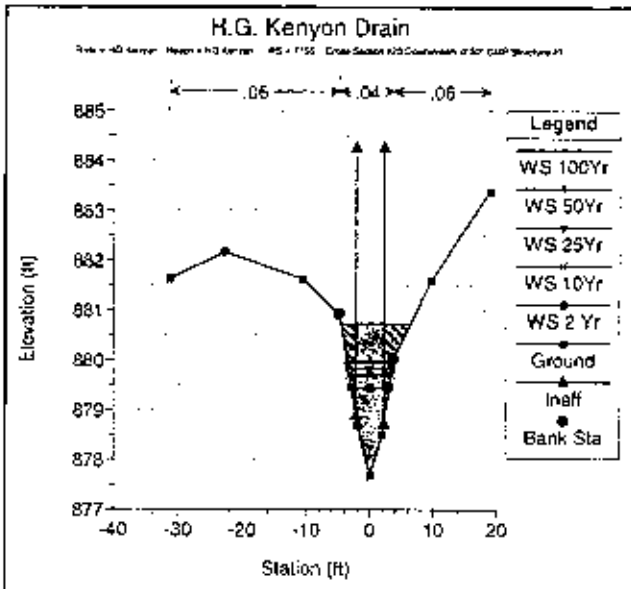
H.G. KENYON DRAIN

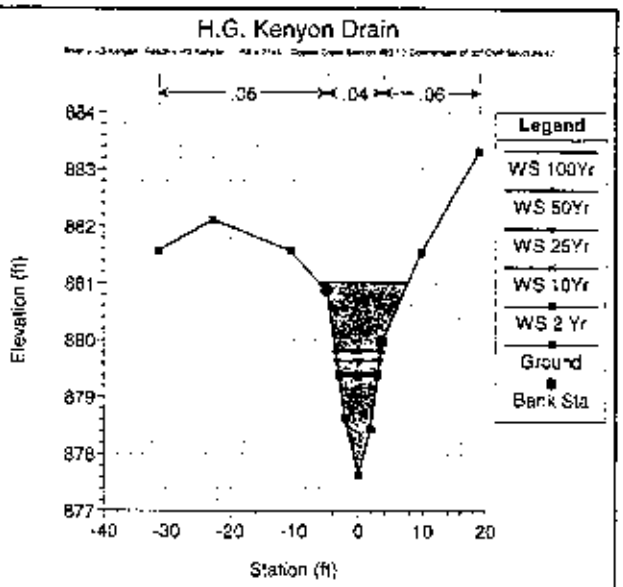
HEC-RAS CROSS-SECTIONS AND PROFILE SUMMARY TABLE

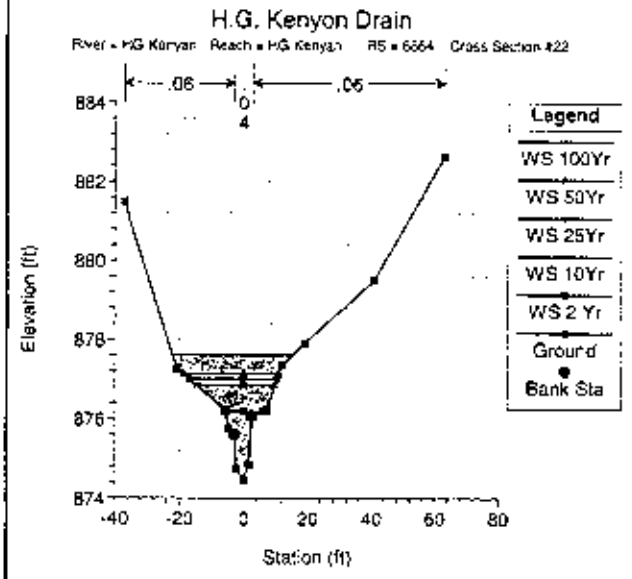

H.G. Kenyon Drain
.035
.035
0
3
5
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
894
893
892
891
890
889
888
887
886
-100
-50
0
50
100

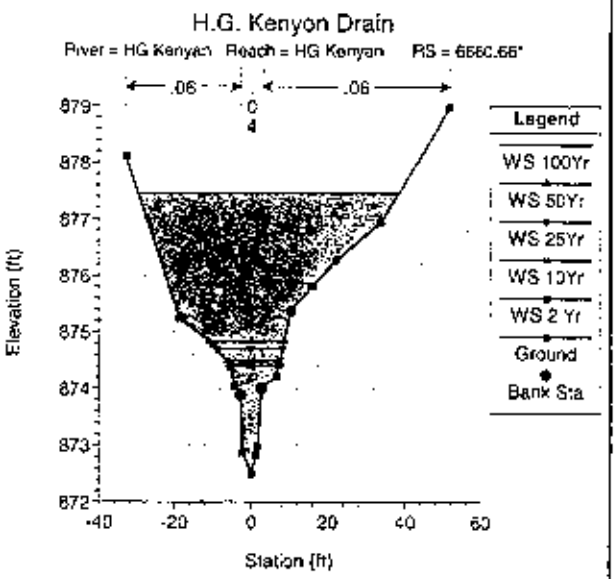

H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 7932.33*
.043
.043
0.037
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 7757.66*
.052
.052
0.038
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
.06
.06
0.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
.06
.06
0.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 7549
.06
.06
0.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 7549
.06
.06
0.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

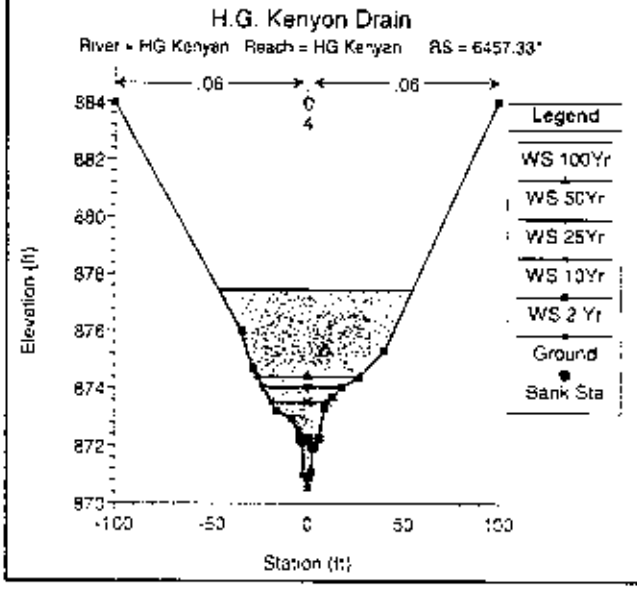

H.G. Kenyon Drain
.06
.06
0
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
.06
.06
0
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
.06
.06
0
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
.06
.06
0
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 7166
.06
.06
0
4
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 7166
.06
.04
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

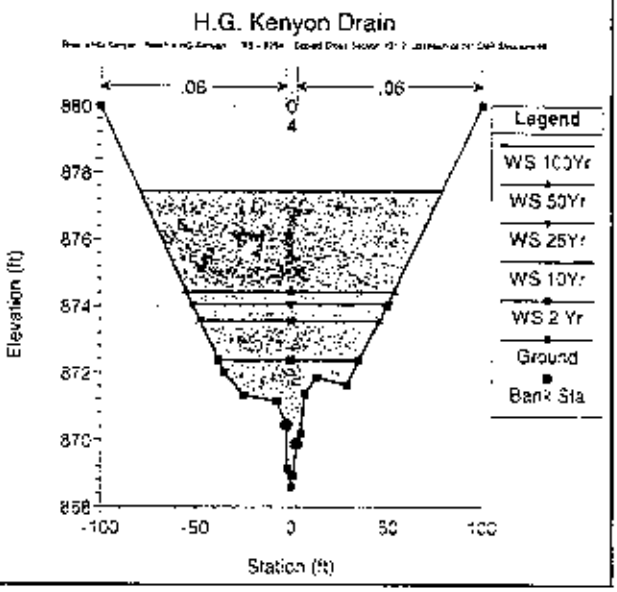

H.G. Kenyon Drain
.06
.04
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

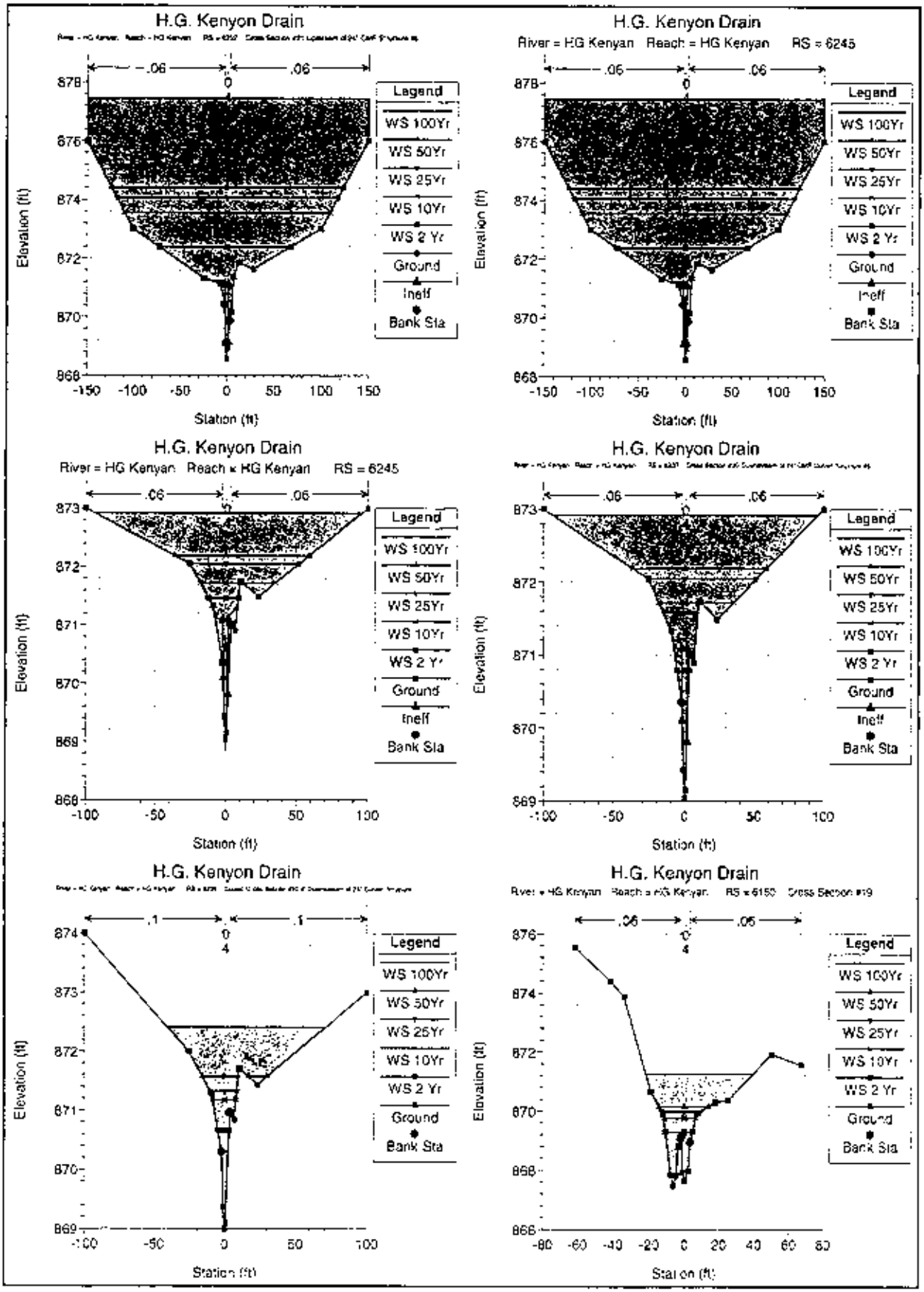

H.G. Kenyon Drain
.06
.04
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

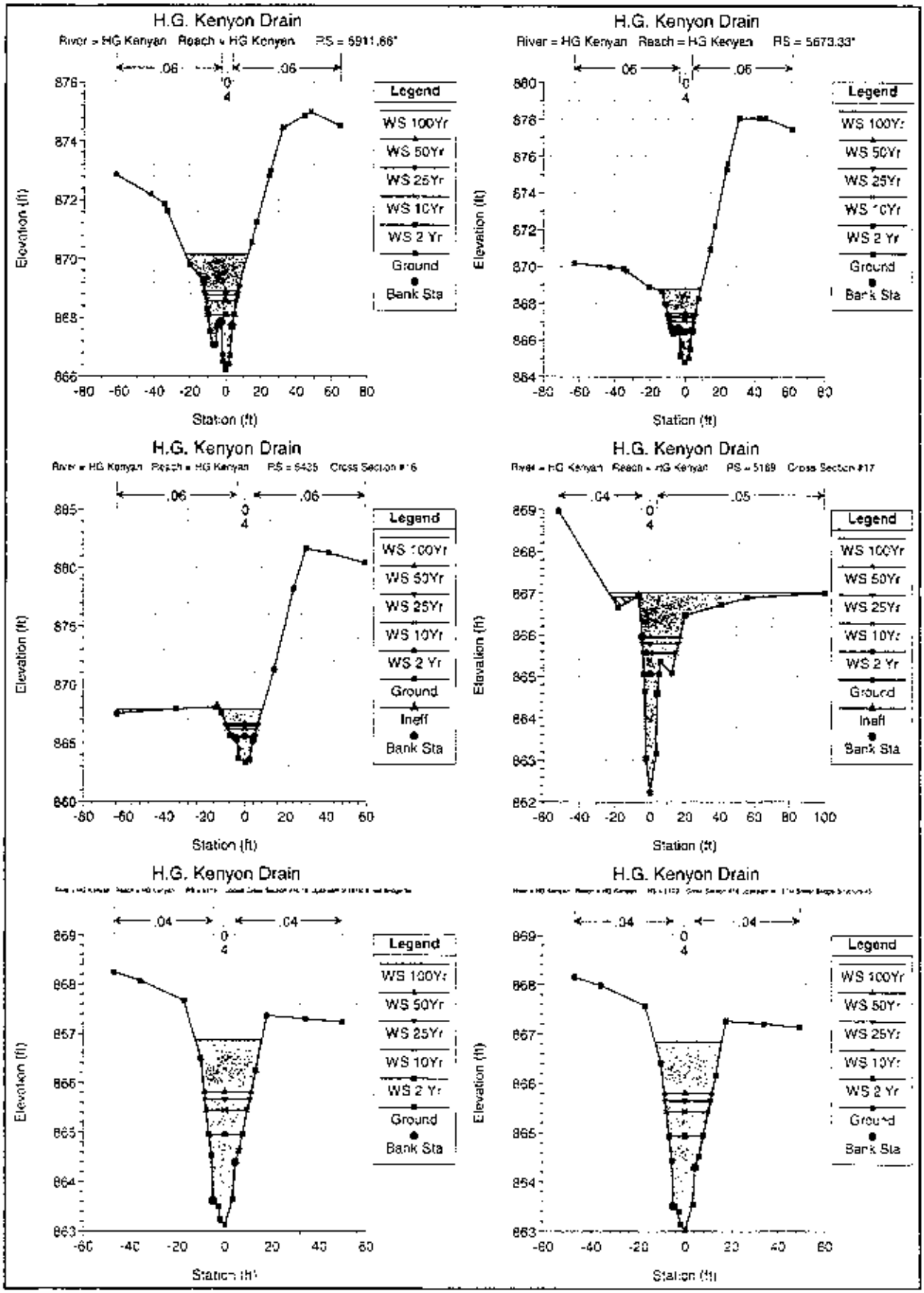

H.G. Kenyon Drain
River = HG Kenyon Reach = HG Kenyon RS = 6664 Cross Section #22
.06
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

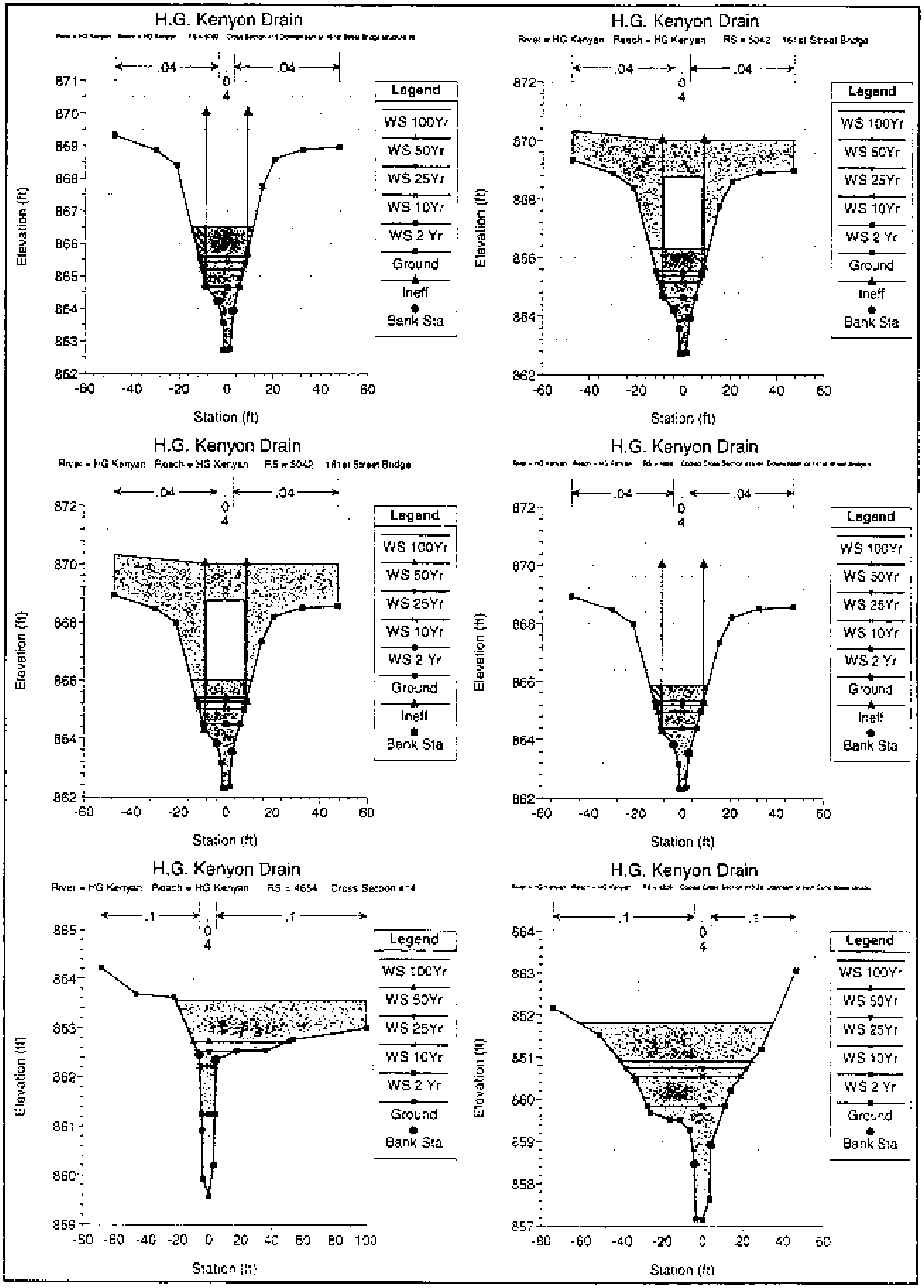

H.G. Kenyon Drain
River = HG Kenyon Reach = HG Kenyon RS = 6660.66*
.06
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

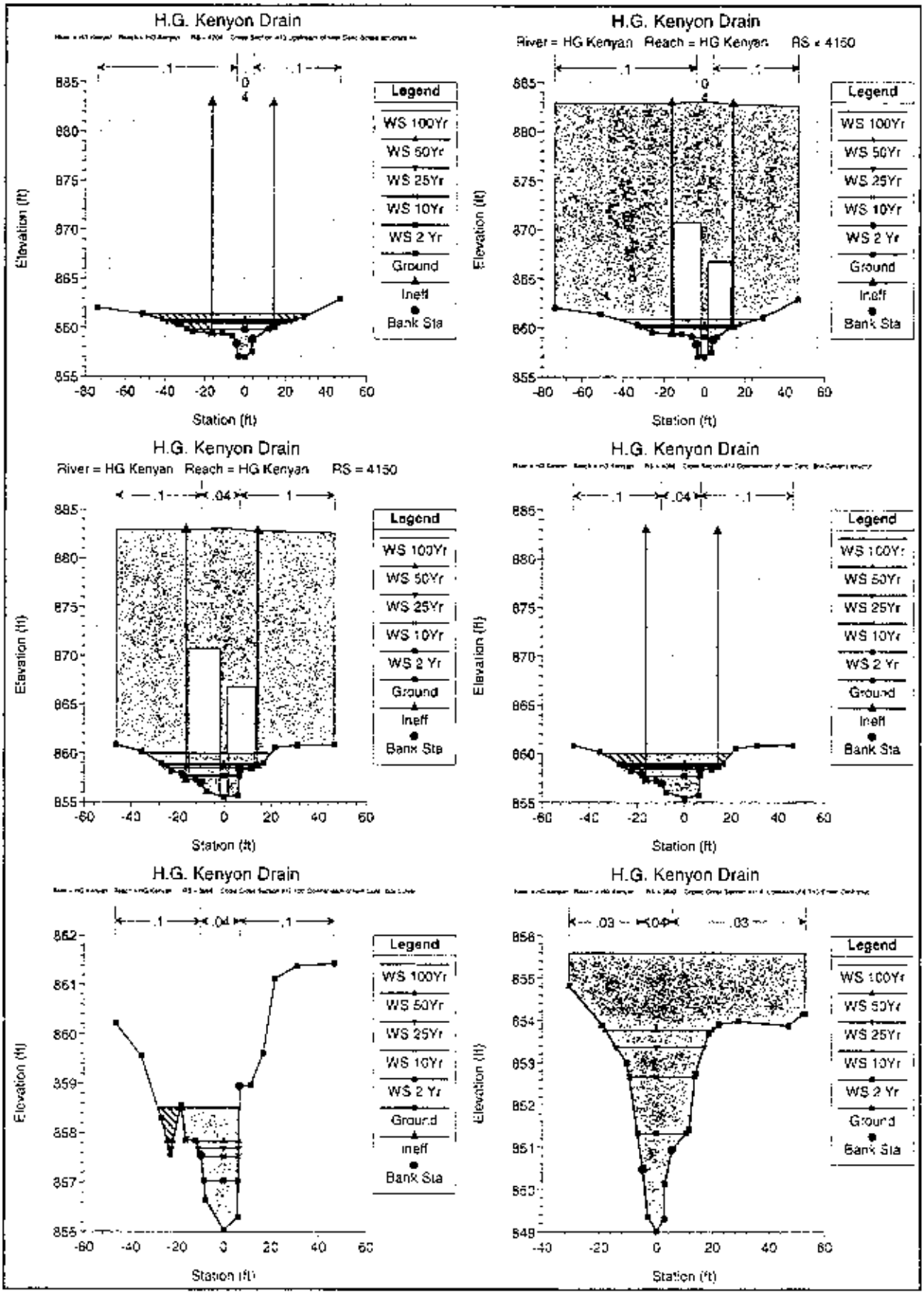

H.G. Kenyon Drain
River = HG Kenyon Reach = HG Kenyon RS = 6457.33*
.06
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

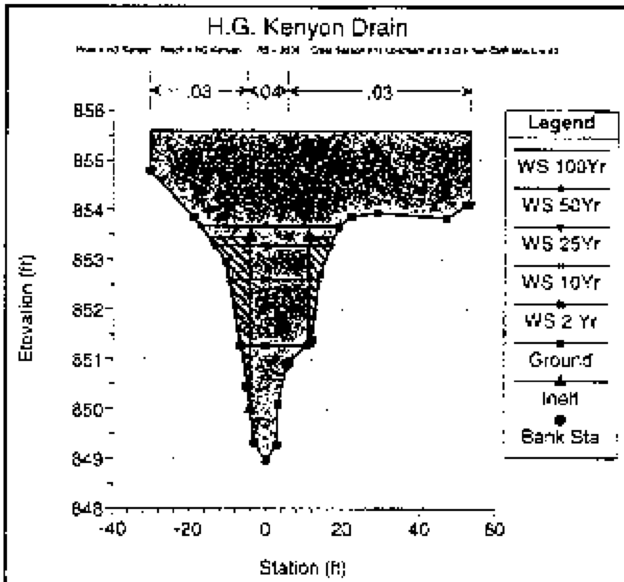

H.G. Kenyon Drain
.06
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

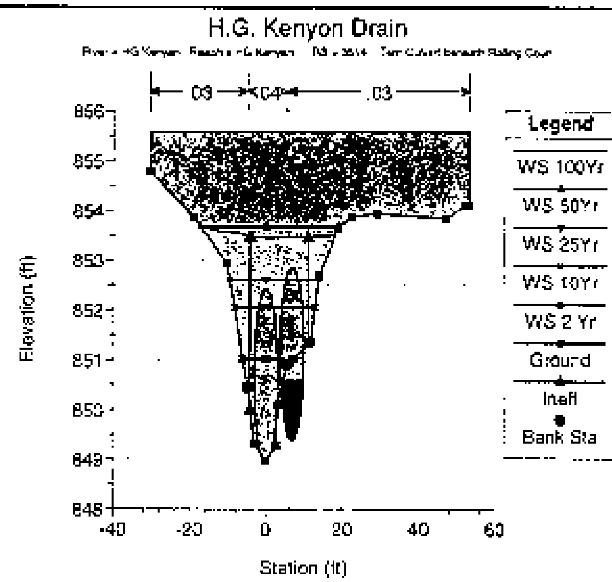

H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 6245
Elevation (ft)
Station (ft)
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
.06
.1
0
4

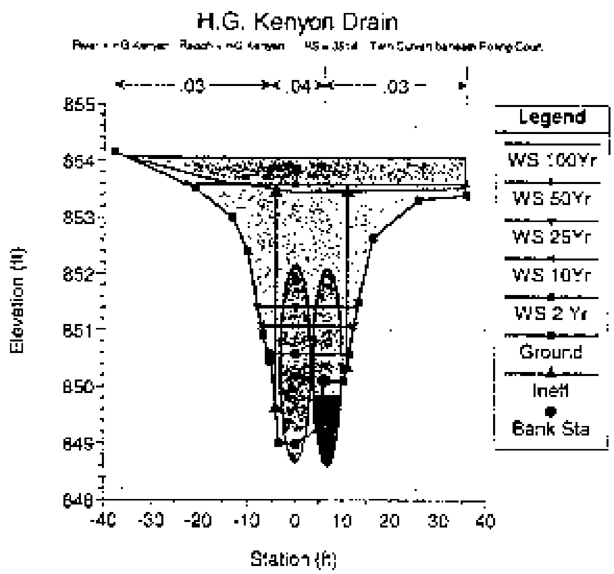

H.G. Kenyon Drain
River = HG Kenyon Reach = HG Kenyon RS = 5911.66*
.06
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyon Reach = HG Kenyon RS = 5673.33*
.05
.05
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyon Reach = HG Kenyon RS = 5425 Cross Section #16
.06
.06
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyon Reach = HG Kenyon RS = 5169 Cross Section #17
.04
.05
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
.04
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
.04
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

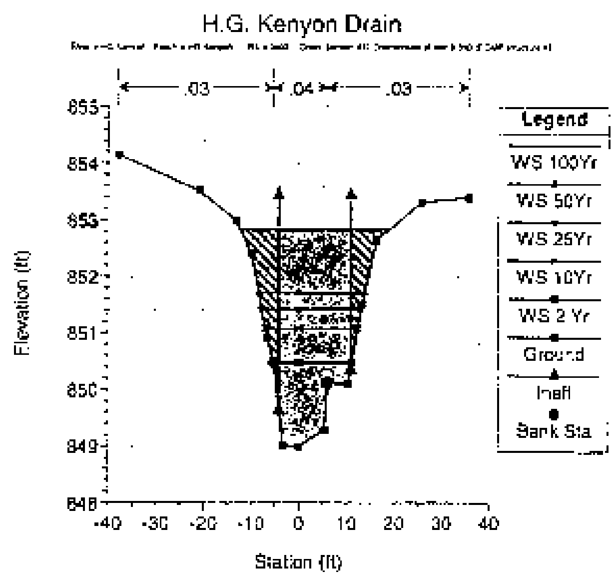

H.G. Kenyon Drain
River = HG Kenyon Reach = HG Kenyon RS = 5042 161st Street Bridge
River = HG Kenyon Reach = HG Kenyon RS = 4654 Cross Section #14
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

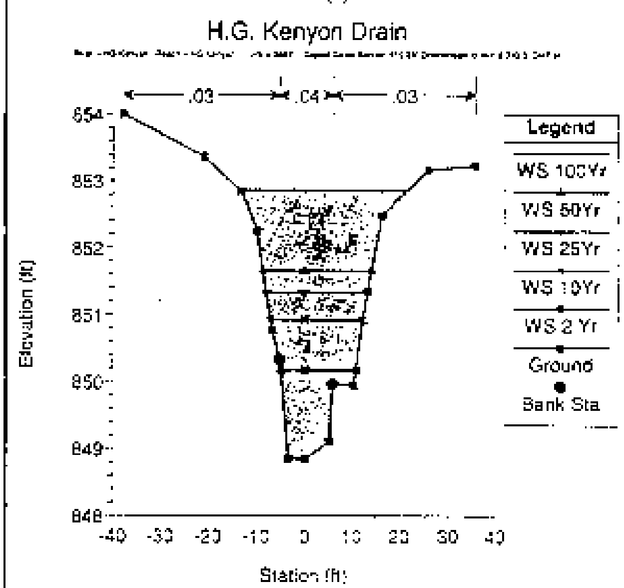

H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 4150
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

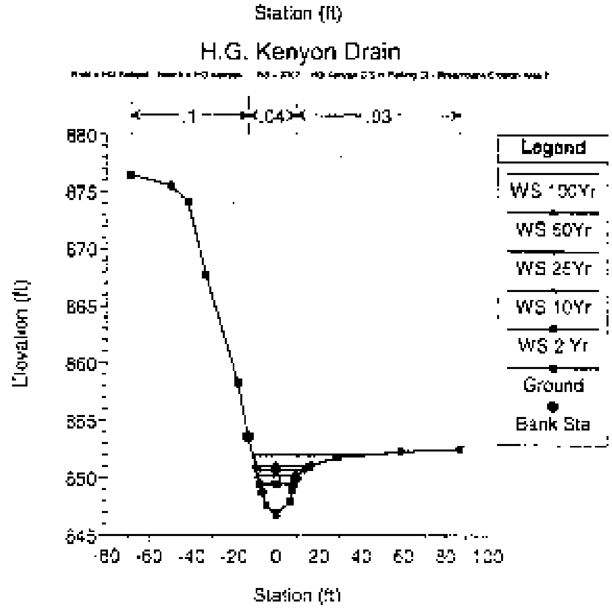

H.G. Kenyon Drain
.03
.04
.03
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

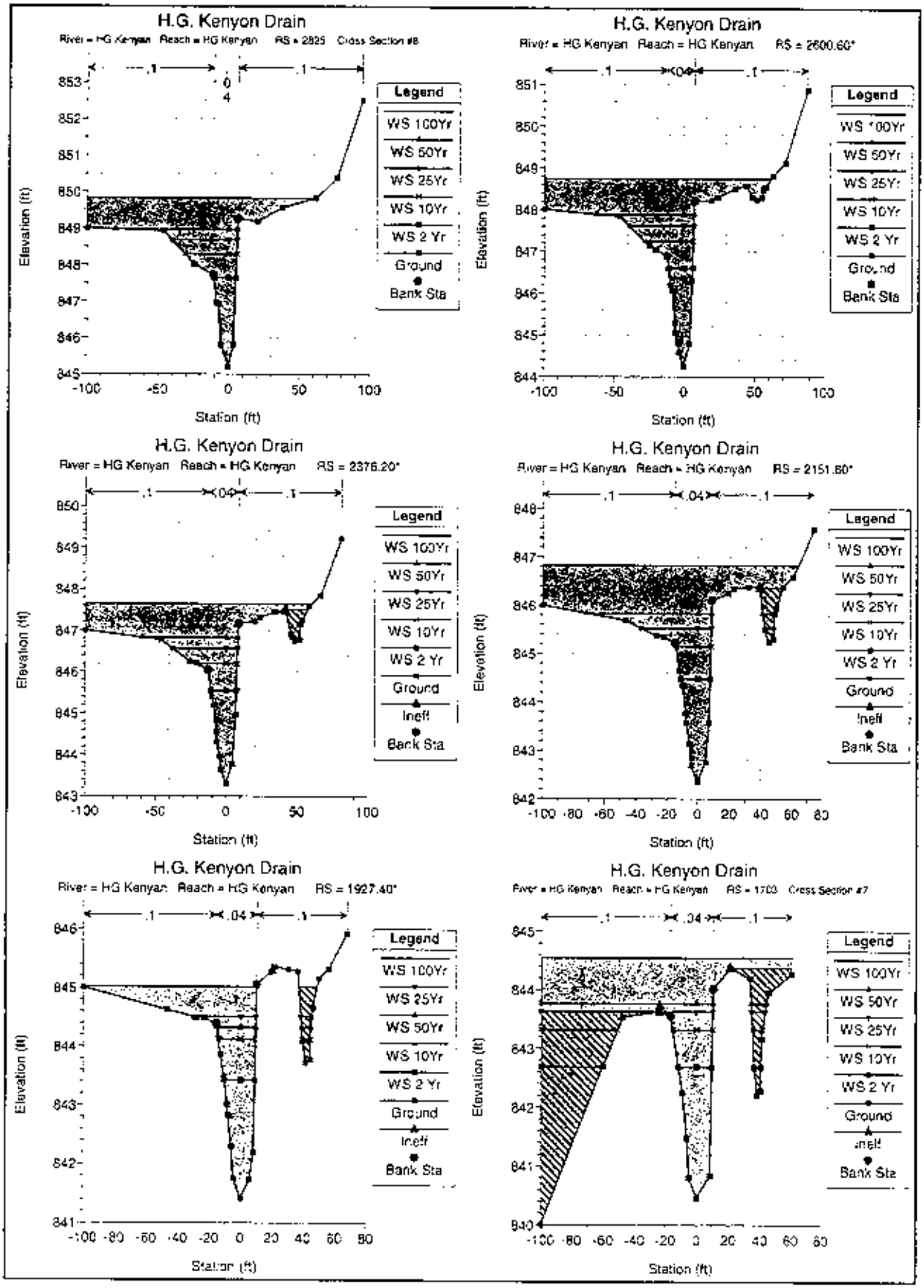

H.G. Kenyon Drain
.03
.04
.03
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

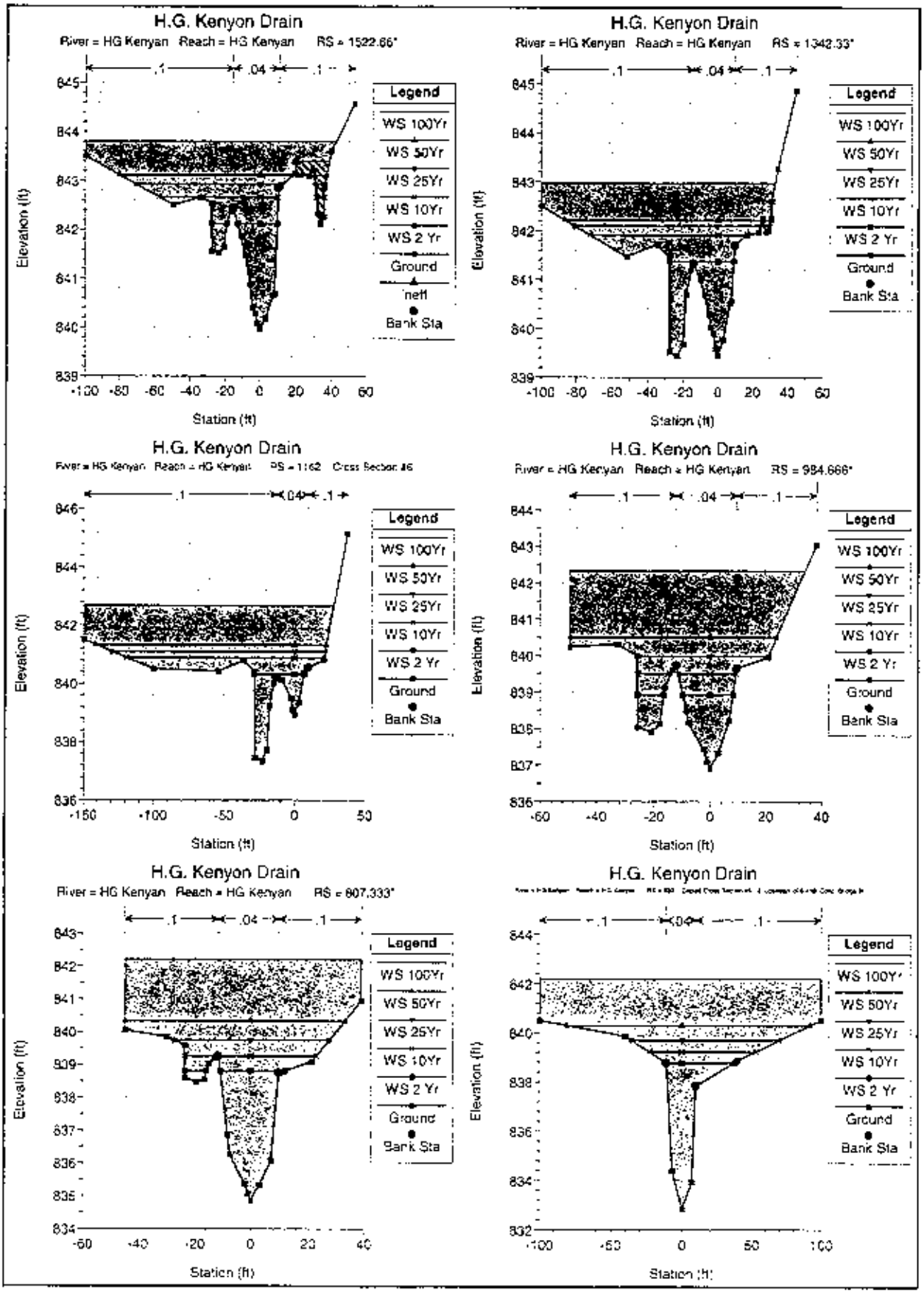

H.G. Kenyon Drain
.03
.04
.03
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

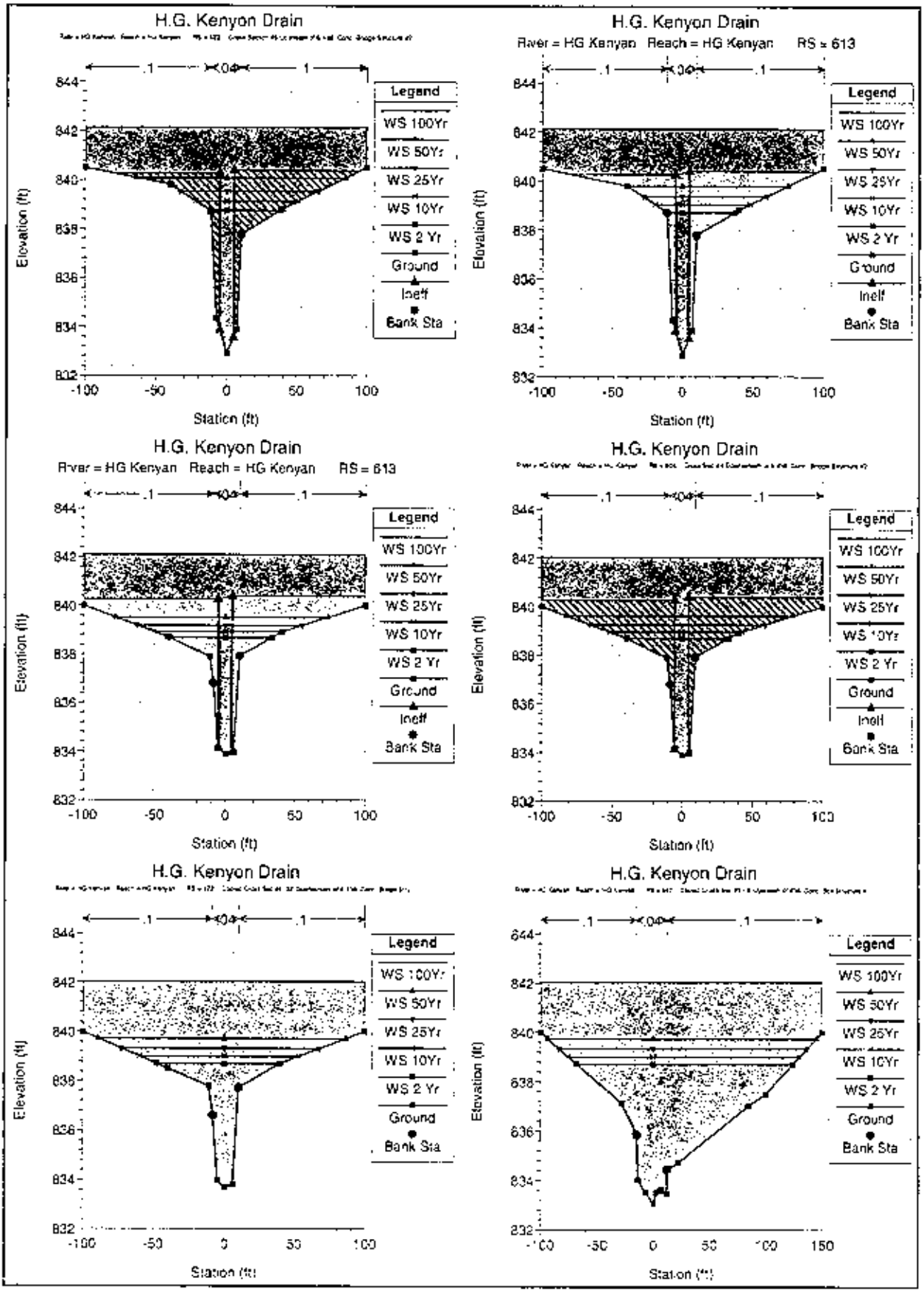

H.G. Kenyon Drain
.03
.04
.03
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

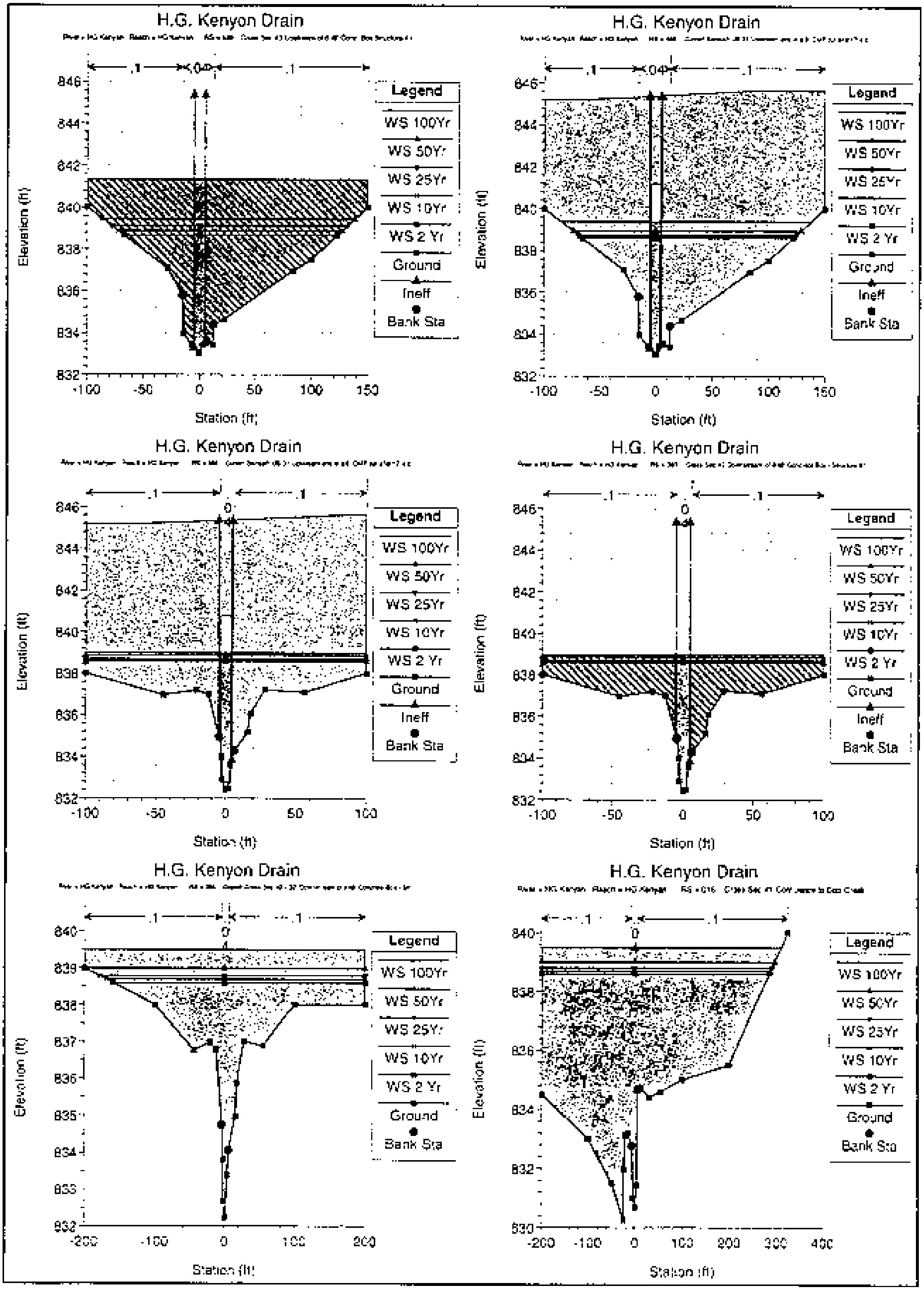

H.G. Kenyon Drain
.03
.04
.03
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


H.G. Kenyon Drain
.1
.04
.03
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 2825 Cross Section #8
Elevation (ft)
Station (ft)
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 2600.60*
Elevation (ft)
Station (ft)
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 2376.20*
Elevation (ft)
Station (ft)
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 2151.80*
Elevation (ft)
Station (ft)
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 1927.40*
Elevation (ft)
Station (ft)
Legend
WS 100Yr
WS 25Yr
WS 50Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 1703 Cross Section #7
Elevation (ft)
Station (ft)
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta


H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 1522.66*
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 1342.33*
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 1162 Cross Section #6
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 984.666*
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 807.333*
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 613
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
River = HG Kenyan Reach = HG Kenyan RS = 613
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
H.G. Kenyon Drain
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
WS 2 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

HEC-RAS Plan: Exist Cond. River: HG Kenyan Reach: HG Kenyan

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HG Kenyan	8172	104.00	886.68	890.44		890.46	0.000173	1.24	122.86	77.35	0.12
HG Kenyan	8172	58.00	886.68	889.43		889.47	0.000332	1.34	59.60	57.42	0.15
HG Kenyan	8172	48.00	886.68	889.22		889.24	0.000364	1.31	48.65	43.97	0.16
HG Kenyan	8172	37.00	886.68	886.96		886.98	0.000397	1.25	37.95	37.69	0.16
HG Kenyan	8172	22.00	886.68	888.52		888.54	0.000457	1.12	29.29	29.63	0.17
HG Kenyan	8165	104.00	886.64	890.15	888.67	890.39	0.001972	3.91	26.65	69.79	0.39
HG Kenyan	8165	58.00	886.64	889.29	888.13	889.43	0.001769	2.99	19.39	47.54	0.35
HG Kenyan	8165	48.00	886.64	889.10	887.99	889.21	0.001638	2.71	17.71	41.14	0.33
HG Kenyan	8165	37.00	886.64	888.87	887.83	889.05	0.001441	2.35	15.74	36.73	0.30
HG Kenyan	8165	22.00	886.64	888.48	887.57	888.53	0.001111	1.77	12.45	29.52	0.26
HG Kenyan	8149	Culvert									
HG Kenyan	8133	104.00	886.85	889.58	889.46	890.12	0.007819	5.89	17.65	15.68	0.72
HG Kenyan	8133	58.00	886.85	889.09	889.03	889.31	0.007690	4.62	12.54	11.79	0.67
HG Kenyan	8133	48.00	886.85	888.83	888.49	889.11	0.007428	4.24	11.31	10.86	0.65
HG Kenyan	8133	37.00	886.85	888.66	888.32	888.68	0.006971	3.75	9.86	10.03	0.61
HG Kenyan	8133	22.00	886.85	888.34	888.02	888.49	0.006599	3.06	7.19	8.49	0.58
HG Kenyan	8107	104.00	886.69	889.49	889.03	889.85	0.005841	4.99	22.94	16.14	0.62
HG Kenyan	8107	58.00	886.69	886.77		889.09	0.008870	4.59	12.98	11.40	0.70
HG Kenyan	8107	48.00	886.69	886.61		888.90	0.009047	4.34	11.26	10.57	0.70
HG Kenyan	8107	37.00	886.69	888.42		888.67	0.008060	3.99	9.35	9.64	0.69
HG Kenyan	8107	22.00	886.69	888.06		888.27	0.005884	3.47	6.34	8.01	0.58
HG Kenyan	7932.33*	104.00	885.20	887.53	887.49	888.18	0.017499	6.48	16.27	12.01	0.95
HG Kenyan	7932.33*	58.00	885.20	887.41	886.98	887.65	0.007381	3.96	14.70	13.02	0.61
HG Kenyan	7932.33*	48.00	885.20	887.28	886.84	887.49	0.007016	3.64	13.21	11.18	0.59
HG Kenyan	7932.33*	37.00	885.20	887.06		887.24	0.007182	3.59	10.96	10.24	0.59
HG Kenyan	7932.33*	22.00	885.20	886.74		885.85	0.005489	2.93	7.79	8.97	0.53
HG Kenyan	7757.66*	104.00	883.71	887.27		887.35	0.001591	2.72	55.59	57.34	0.30
HG Kenyan	7757.66*	58.00	883.71	886.72	885.48	885.07	0.011257	4.63	13.09	10.96	0.72
HG Kenyan	7757.66*	48.00	883.71	885.56	885.34	885.86	0.012679	4.39	10.93	10.22	0.75
HG Kenyan	7757.66*	37.00	883.71	885.39	885.16	885.64	0.012044	4.00	9.24	9.59	0.72
HG Kenyan	7757.66*	22.00	883.71	885.03	884.88	885.24	0.014136	3.65	6.03	8.20	0.75
HG Kenyan	7583	104.00	882.22	887.25		887.27	0.000156	1.06	171.07	120.64	0.10
HG Kenyan	7583	58.00	882.22	885.42		885.48	0.001359	2.00	35.59	51.83	0.25
HG Kenyan	7583	48.00	882.22	884.67		884.96	0.002520	2.39	20.29	13.65	0.33
HG Kenyan	7583	37.00	882.22	884.38		884.49	0.003935	2.58	14.33	11.25	0.40
HG Kenyan	7583	22.00	882.22	883.96		884.04	0.003858	2.22	9.90	9.72	0.39
HG Kenyan	7576	104.00	882.18	887.13	884.46	887.24	0.000883	2.71	38.33	108.60	0.23
HG Kenyan	7576	58.00	882.18	885.35	883.91	885.45	0.001662	2.60	22.33	50.79	0.29
HG Kenyan	7576	48.00	882.18	884.81	883.77	884.95	0.002579	2.75	17.47	13.52	0.35
HG Kenyan	7576	37.00	882.18	884.33	883.61	884.45	0.003797	2.60	13.19	11.21	0.41
HG Kenyan	7576	22.00	882.18	883.93	883.33	884.01	0.003450	2.26	9.72	9.75	0.37
HG Kenyan	7549	Culvert									
HG Kenyan	7521	104.00	882.63	886.65	884.50	886.80	0.001264	3.09	33.80	77.71	0.26
HG Kenyan	7521	58.00	882.63	885.13	883.96	885.26	0.002212	2.90	20.10	24.25	0.34
HG Kenyan	7521	48.00	882.63	884.80	883.95	884.75	0.003658	3.13	15.36	16.17	0.42
HG Kenyan	7521	37.00	882.63	884.16	883.70	884.32	0.005996	3.26	11.36	12.36	0.51
HG Kenyan	7521	22.00	882.63	883.84	883.44	883.94	0.005607	2.60	8.46	9.91	0.47
HG Kenyan	7493	104.00	882.46	886.69		886.72	0.000359	1.76	122.20	94.69	0.19
HG Kenyan	7493	58.00	882.46	885.15		885.18	0.001383	2.36	32.36	28.59	0.27
HG Kenyan	7493	48.00	882.46	884.53		884.64	0.002704	2.74	22.17	17.05	0.36
HG Kenyan	7493	37.00	882.46	883.53	883.53	883.93	0.026756	5.10	7.27	9.30	1.00
HG Kenyan	7493	22.00	882.46	883.27	883.27	883.57	0.029716	5.43	4.97	8.32	1.01
HG Kenyan	7181	104.00	877.73	886.69		886.69	0.000023	0.59	332.36	100.69	0.04
HG Kenyan	7181	58.00	877.73	885.13		885.13	0.000035	0.63	135.41	75.52	0.04
HG Kenyan	7181	48.00	877.73	884.58		884.58	0.000029	0.52	156.18	66.75	0.04
HG Kenyan	7181	37.00	877.73	882.87		882.88	0.000124	0.95	63.65	41.25	0.08
HG Kenyan	7181	22.00	877.73	881.20		881.22	0.000448	1.18	19.77	10.50	0.14

HEC-RAS Plan: Exst. Cond. River: HG Kenyan Reach: HG Kenyan (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HG Kenyan	7178	104.00	877.71	886.68	880.76	886.69	0.000117	1.05	193.27	100.75	0.08
HG Kenyan	7178	58.00	877.71	885.11	879.85	885.13	0.000299	1.33	73.48	75.35	0.12
HG Kenyan	7178	48.00	877.71	884.54	879.74	884.57	0.000504	1.55	42.52	66.34	0.15
HG Kenyan	7178	37.00	877.71	882.81	879.49	882.85	0.000347	1.79	20.66	43.74	0.15
HG Kenyan	7178	22.00	877.71	881.17	879.12	881.22	0.000534	1.85	13.30	10.48	0.17
HG Kenyan	7166	Culvert									
HG Kenyan	7155	104.00	877.67	880.73	880.73	882.02	0.020217	9.10	11.43	11.07	1.21
HG Kenyan	7155	58.00	877.67	879.98	879.91	880.79	0.020501	7.23	8.02	7.31	0.95
HG Kenyan	7155	48.00	877.67	879.84	879.71	880.49	0.018319	6.48	7.41	6.98	0.89
HG Kenyan	7155	37.00	877.67	879.71	879.47	880.16	0.014390	5.43	6.81	6.67	0.79
HG Kenyan	7155	22.00	877.67	879.45	879.09	879.69	0.009400	3.86	5.66	6.05	0.61
HG Kenyan	7145	104.00	877.61	881.02	880.49	881.46	0.009775	5.42	20.79	13.84	0.66
HG Kenyan	7145	58.00	877.61	879.82	879.82	880.47	0.027771	8.461	8.98	7.08	1.01
HG Kenyan	7145	48.00	877.61	879.64	879.64	880.24	0.026372	8.20	7.75	6.65	1.01
HG Kenyan	7145	37.00	877.61	879.42	879.42	879.95	0.029126	8.94	6.34	6.12	1.01
HG Kenyan	7145	22.00	877.61	879.37		879.58	0.011680	3.63	6.05	6.01	0.64
HG Kenyan	6884	200.00	874.45	877.62		878.18	0.012849	7.43	45.92	37.51	0.76
HG Kenyan	6884	86.00	874.45	877.13	876.76	877.36	0.006371	4.61	29.50	30.15	0.53
HG Kenyan	6884	75.00	874.45	877.01	876.64	877.25	0.006950	4.44	25.94	27.98	0.53
HG Kenyan	6884	61.00	874.45	876.85	876.43	877.06	0.006103	4.13	21.65	24.87	0.51
HG Kenyan	6884	35.00	874.45	876.18		876.44	0.010756	4.22	9.19	11.90	0.64
HG Kenyan	6660.66*	200.00	872.49	877.46		877.52	0.000892	2.85	135.57	68.28	0.24
HG Kenyan	6660.66*	86.00	872.49	874.83	874.63	875.40	0.016147	6.50	17.85	19.98	0.82
HG Kenyan	6660.66*	75.00	872.49	874.70	874.70	875.25	0.018472	6.27	15.47	17.53	0.82
HG Kenyan	6660.66*	61.00	872.49	874.49	874.49	875.03	0.018424	6.10	12.04	14.32	0.85
HG Kenyan	6660.66*	35.00	872.49	874.41	873.92	874.61	0.007487	3.75	10.91	13.08	0.54
HG Kenyan	6457.33*	200.00	870.54	877.45		877.46	0.000129	1.20	308.14	101.79	0.09
HG Kenyan	6457.33*	86.00	870.54	874.41		874.46	0.001063	2.43	66.61	53.79	0.23
HG Kenyan	6457.33*	75.00	870.54	874.05		874.12	0.001459	2.84	48.48	41.12	0.27
HG Kenyan	6457.33*	61.00	870.54	873.51		873.63	0.002572	3.09	30.61	29.83	0.34
HG Kenyan	6457.33*	35.00	870.54	872.27		872.59	0.013715	4.55	8.22	9.95	0.71
HG Kenyan	6254	200.00	868.58	877.45		877.45	0.000019	0.53	669.21	158.02	0.04
HG Kenyan	6254	86.00	868.58	874.42		874.42	0.000043	0.65	265.54	108.09	0.05
HG Kenyan	6254	75.00	868.58	874.06		874.06	0.000049	0.66	228.30	102.26	0.05
HG Kenyan	6254	61.00	868.58	873.56		873.56	0.000061	0.69	178.76	93.67	0.06
HG Kenyan	6254	35.00	868.58	872.39		872.39	0.000152	0.89	80.75	73.67	0.09
HG Kenyan	6252	200.00	868.58	877.45	872.20	877.45	0.000004	0.27	1392.50	300.00	0.02
HG Kenyan	6252	86.00	868.58	874.42	871.70	874.42	0.000015	0.38	524.18	247.21	0.03
HG Kenyan	6252	75.00	868.58	874.06	871.60	874.06	0.000019	0.38	438.75	235.41	0.03
HG Kenyan	6252	61.00	868.58	873.56	870.70	873.56	0.000029	0.44	324.00	218.56	0.04
HG Kenyan	6252	35.00	868.58	872.39	870.15	872.39	0.000169	0.65	102.85	140.59	0.09
HG Kenyan	6245	Culvert									
HG Kenyan	6237	200.00	869.05	872.92	872.39	872.98	0.002186	3.24	160.87	169.92	0.53
HG Kenyan	6237	86.00	869.05	872.19	871.89	872.28	0.002629	3.18	61.40	98.12	0.56
HG Kenyan	6237	75.00	869.05	872.05	871.95	872.15	0.002565	3.17	48.25	79.25	0.57
HG Kenyan	6237	61.00	869.05	871.72	871.62	871.83	0.004823	3.71	27.43	52.76	0.47
HG Kenyan	6237	35.00	869.05	870.79	870.71	871.39	0.020747	6.22	5.63	9.31	0.92
HG Kenyan	6229	200.00	869.00	872.41	872.41	872.84	0.010594	6.60	88.42	112.84	0.73
HG Kenyan	6229	86.00	869.00	871.57	871.57	872.11	0.014790	6.58	22.89	40.40	0.81
HG Kenyan	6229	75.00	869.00	871.33	871.33	871.94	0.019849	6.62	15.12	19.93	0.91
HG Kenyan	6229	61.00	869.00	871.16	871.16	871.71	0.018999	6.08	13.36	17.49	0.88
HG Kenyan	6229	35.00	869.00	870.86	870.66	871.15	0.025495	5.64	9.64	9.57	0.97
HG Kenyan	6150	200.00	867.65	871.57		871.40	0.003452	4.19	89.71	92.06	0.41
HG Kenyan	6150	86.00	867.65	870.15		870.50	0.004851	3.77	33.95	29.05	0.45
HG Kenyan	6150	75.00	867.65	869.98		870.11	0.004862	3.57	29.46	22.59	0.45
HG Kenyan	6150	61.00	867.65	869.76		869.88	0.004777	3.27	25.12	19.10	0.43
HG Kenyan	6150	35.00	867.65	869.29		869.37	0.004863	2.70	15.81	18.12	0.42

HEC-RAS Plan: Exst. Cond. River: HG Kenyan Reach: HG Kenyan (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HG Kenyan	5911.66*	200.00	866.22	870.15		870.43	0.004731	5.24	61.90	36.56	0.49
HG Kenyan	5911.66*	86.00	866.22	868.90		869.10	0.005069	4.07	28.63	19.32	0.47
HG Kenyan	5911.66*	75.00	866.22	868.75		868.94	0.005012	3.87	25.91	18.54	0.46
HG Kenyan	5911.66*	61.00	866.22	868.56	867.86	868.72	0.004913	3.60	22.31	17.46	0.45
HG Kenyan	5911.66*	35.00	866.22	868.10	867.55	868.21	0.004812	2.97	14.73	15.04	0.43
HG Kenyan	5673.33*	200.00	864.76	868.60		869.20	0.005499	5.72	49.82	26.97	0.53
HG Kenyan	5673.33*	86.00	864.76	867.43		867.72	0.005577	4.55	22.69	16.27	0.54
HG Kenyan	5673.33*	75.00	864.78	867.25		867.53	0.006952	4.42	20.07	15.49	0.54
HG Kenyan	5673.33*	61.00	864.78	867.01		867.27	0.007982	4.24	16.38	14.33	0.56
HG Kenyan	5673.33*	35.00	864.78	866.64		866.86	0.009314	3.74	9.45	8.79	0.59
HG Kenyan	5435	200.00	863.35	867.91	866.43	868.20	0.003141	4.71	55.11	52.09	0.41
HG Kenyan	5435	86.00	863.35	866.64	865.25	866.79	0.002441	3.25	30.91	16.52	0.34
HG Kenyan	5435	75.00	863.35	866.46	865.11	866.60	0.002376	3.07	28.33	15.82	0.33
HG Kenyan	5435	61.00	863.35	866.21	864.91	866.32	0.002295	2.82	24.12	14.67	0.32
HG Kenyan	5435	35.00	863.35	865.98	864.49	865.66	0.002251	2.28	15.63	11.63	0.30
HG Kenyan	5169	200.00	862.22	867.02	865.82	867.28	0.003767	4.58	79.93	123.36	0.41
HG Kenyan	5169	86.00	862.22	865.95	864.43	866.09	0.002901	3.17	32.56	21.92	0.34
HG Kenyan	5169	75.00	862.22	865.79	864.28	865.92	0.002684	3.02	29.25	20.98	0.33
HG Kenyan	5169	61.00	862.22	865.57	864.08	865.68	0.002504	2.81	24.70	19.36	0.32
HG Kenyan	5169	35.00	862.22	865.06	863.64	865.13	0.001729	2.11	16.93	8.98	0.26
HG Kenyan	5119	200.00	863.12	866.87		867.12	0.002933	4.47	56.41	29.29	0.43
HG Kenyan	5119	86.00	863.12	865.82		865.96	0.002494	3.23	31.21	20.22	0.37
HG Kenyan	5119	75.00	863.12	865.66		865.80	0.002469	3.07	28.23	19.21	0.36
HG Kenyan	5119	61.00	863.12	865.44		865.56	0.002468	2.86	24.15	17.73	0.35
HG Kenyan	5119	35.00	863.12	864.95		865.03	0.002366	2.32	16.23	14.43	0.33
HG Kenyan	5103	200.00	863.02	866.84		867.07	0.002684	4.34	58.46	28.99	0.41
HG Kenyan	5103	86.00	863.02	865.79		865.92	0.002192	3.09	32.78	20.74	0.35
HG Kenyan	5103	75.00	863.02	865.64		865.76	0.002156	2.94	29.72	19.72	0.34
HG Kenyan	5103	61.00	863.02	865.42		865.52	0.002132	2.73	25.52	18.24	0.33
HG Kenyan	5103	35.00	863.02	864.83		865.00	0.001978	2.19	17.34	14.93	0.31
HG Kenyan	5062	200.00	862.71	866.53	865.79	866.89	0.005045	5.27	43.04	26.54	0.51
HG Kenyan	5062	86.00	862.71	865.59	864.58	865.78	0.004278	3.89	26.22	20.36	0.44
HG Kenyan	5062	75.00	862.71	865.44	864.89	865.62	0.004393	3.76	23.59	19.40	0.45
HG Kenyan	5062	61.00	862.71	865.20	864.72	865.38	0.004514	3.55	19.89	17.89	0.46
HG Kenyan	5062	35.00	862.71	864.67	864.18	864.84	0.006305	3.39	11.57	13.96	0.50
HG Kenyan	5042	Bridge									
HG Kenyan	4998	200.00	862.31	865.67	865.39	866.53	0.007237	5.98	38.42	24.84	0.60
HG Kenyan	4998	86.00	862.31	865.36	864.56	865.53	0.003164	3.48	29.09	21.41	0.39
HG Kenyan	4998	75.00	862.31	865.20	864.49	865.35	0.003169	3.35	26.47	20.49	0.38
HG Kenyan	4998	61.00	862.31	864.96	864.32	865.13	0.003384	3.22	22.35	19.94	0.39
HG Kenyan	4998	35.00	862.31	864.59	863.78	864.52	0.004479	3.01	13.37	15.22	0.42
HG Kenyan	4654	300.00	859.58	863.67	863.42	863.93	0.006700	5.79	125.71	121.91	0.57
HG Kenyan	4654	159.00	859.58	862.72	862.20	863.26	0.010707	5.97	34.34	61.14	0.69
HG Kenyan	4654	138.00	859.58	862.53	861.99	863.05	0.011314	5.80	24.87	24.17	0.69
HG Kenyan	4654	112.00	859.58	862.22	861.73	862.69	0.011774	5.49	20.40	10.53	0.70
HG Kenyan	4654	53.00	859.58	861.25	860.99	861.60	0.014602	4.77	11.11	8.69	0.74
HG Kenyan	4229	300.00	857.14	861.83		862.05	0.002375	4.86	159.47	97.26	0.41
HG Kenyan	4229	159.00	857.14	860.80		861.08	0.002783	4.02	84.99	65.53	0.38
HG Kenyan	4229	138.00	857.14	860.74		860.91	0.002623	3.78	75.17	60.55	0.36
HG Kenyan	4229	112.00	857.14	860.64		860.69	0.002335	3.42	63.51	53.97	0.34
HG Kenyan	4229	53.00	857.14	859.85		859.93	0.001675	2.45	31.97	38.78	0.28
HG Kenyan	4204	300.00	856.99	861.43	860.58	861.85	0.005351	6.27	61.79	66.18	0.54
HG Kenyan	4204	159.00	856.99	860.78	859.71	860.99	0.003153	4.01	61.30	65.93	0.41
HG Kenyan	4204	138.00	856.99	860.63	859.52	860.83	0.002823	3.95	57.44	61.84	0.38
HG Kenyan	4204	112.00	856.99	860.48	859.07	860.62	0.002347	3.49	52.16	56.25	0.34
HG Kenyan	4204	53.00	856.99	859.81	858.32	859.96	0.001436	2.31	32.56	40.65	0.26
HG Kenyan	4150	Bridge									

HEC-RAS Plan: Exst. Cond. River: HG Kenyan Reach: HG Kenyan (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HG Kenyan	4096	300.00	855.43	860.24	857.98	860.24	0.001780	3.77	103.95	54.91	0.32
HG Kenyan	4096	159.00	855.43	858.96	857.21	859.07	0.001472	2.81	68.00	43.83	0.26
HG Kenyan	4096	138.00	855.43	858.76	857.08	858.86	0.001403	2.63	62.00	41.04	0.27
HG Kenyan	4096	112.00	855.43	858.48	856.90	858.57	0.001522	2.39	53.86	37.20	0.26
HG Kenyan	4096	53.00	855.43	857.71	856.42	857.75	0.000931	1.64	35.19	24.47	0.2
HG Kenyan	3996	300.00	856.03	858.51	858.51	859.55	0.021432	8.32	42.48	34.97	1.0
HG Kenyan	3996	159.00	856.03	857.82	857.82	859.52	0.022346	6.71	23.98	21.38	0.99
HG Kenyan	3996	138.00	856.03	857.69	857.69	858.35	0.023342	6.451	21.48	18.85	1.00
HG Kenyan	3996	112.00	856.03	857.52	857.52	858.08	0.023973	6.00	18.66	16.32	0.99
HG Kenyan	3996	53.00	856.03	857.03	857.03	857.39	0.027152	4.83	10.98	15.03	0.99
HG Kenyan	3542	300.00	849.01	855.60		855.63	0.000229	1.73	220.68	83.80	0.12
HG Kenyan	3542	159.00	849.01	853.77		853.84	0.000694	2.36	79.72	37.95	0.20
HG Kenyan	3542	138.00	849.01	853.37		853.451	0.000909	2.39	66.20	37.23	0.22
HG Kenyan	3542	112.00	849.01	852.87		852.76	0.001253	2.58	47.49	23.57	0.26
HG Kenyan	3542	53.00	849.01	851.53		851.46	0.003379	2.88	19.46	17.35	0.59
HG Kenyan	3536	300.00	848.97	855.59	852.44	855.63	0.000295	1.93	202.68	83.80	0.14
HG Kenyan	3536	159.00	848.97	853.67	851.66	853.81	0.001377	3.19	57.63	36.44	0.28
HG Kenyan	3536	138.00	848.97	853.29	851.51	853.41	0.001165	2.87	48.24	30.58	0.26
HG Kenyan	3536	112.00	848.97	852.60	851.25	852.74	0.001713	3.04	37.84	23.46	0.31
HG Kenyan	3536	53.00	848.97	851.28	850.43	851.42	0.003798	3.09	17.77	17.14	0.41
HG Kenyan	3514	Culvert									
HG Kenyan	3492	300.00	848.99	852.93	851.74	853.37	0.004411	5.67	51.27	31.52	0.52
HG Kenyan	3492	159.00	848.99	851.71	850.97	852.04	0.004811	4.65	34.19	22.32	0.51
HG Kenyan	3492	138.00	848.99	851.42	850.85	851.75	0.005724	4.69	29.80	20.98	0.55
HG Kenyan	3492	112.00	848.99	851.07	850.67	851.40	0.007137	4.68	24.55	19.57	0.59
HG Kenyan	3492	53.00	848.99	850.48	850.06	850.67	0.006881	3.60	15.50	18.49	0.55
HG Kenyan	3467	300.00	848.84	852.87		853.14	0.002882	4.61	75.04	35.25	0.42
HG Kenyan	3467	159.00	848.84	851.66		851.89	0.003539	3.98	42.44	22.81	0.44
HG Kenyan	3467	138.00	848.84	851.33		851.58	0.004830	4.14	35.27	21.25	0.48
HG Kenyan	3467	112.00	848.84	850.92		851.20	0.006902	4.42	26.77	19.55	0.57
HG Kenyan	3467	53.00	848.84	850.17		850.42	0.011405	4.08	13.55	15.98	0.68
HG Kenyan	3307	484.00	846.86	852.06		852.51	0.004645	5.67	97.78	55.43	0.51
HG Kenyan	3307	246.00	846.86	851.04		851.31	0.003508	4.24	60.06	26.23	0.43
HG Kenyan	3307	203.00	846.86	850.70		850.95	0.003529	4.00	51.78	23.15	0.43
HG Kenyan	3307	151.00	846.86	850.27		850.47	0.003389	3.67	42.48	19.59	0.41
HG Kenyan	3307	85.00	846.86	849.51		849.64	0.003106	2.91	29.23	16.04	0.38
HG Kenyan	2825	484.00	845.19	849.83		850.20	0.004978	5.63	186.08	161.75	0.52
HG Kenyan	2825	246.00	845.19	848.97		849.31	0.004983	4.80	74.89	86.88	0.51
HG Kenyan	2825	203.00	845.19	848.68		848.97	0.004813	4.44	59.59	46.85	0.49
HG Kenyan	2825	151.00	845.19	848.30		848.55	0.004764	4.04	43.38	37.25	0.48
HG Kenyan	2825	85.00	845.19	847.64		847.81	0.004727	3.30	25.74	16.08	0.46
HG Kenyan	2600.60*	484.00	844.24	848.75		849.12	0.004756	5.49	182.65	161.79	0.52
HG Kenyan	2600.60*	246.00	844.24	847.89		848.20	0.004829	4.61	71.27	75.06	0.50
HG Kenyan	2600.60*	203.00	844.24	847.62		847.90	0.004741	4.31	57.08	46.98	0.49
HG Kenyan	2600.60*	151.00	844.24	847.25		847.48	0.004699	3.89	41.75	35.46	0.48
HG Kenyan	2600.60*	85.00	844.24	846.60		846.76	0.004639	3.20	26.53	17.01	0.46
HG Kenyan	2376.20*	484.00	843.30	847.55	847.22	848.02	0.004956	5.47	174.24	160.11	0.53
HG Kenyan	2376.20*	246.00	843.30	846.83	845.68	847.13	0.004733	4.47	68.88	79.25	0.50
HG Kenyan	2376.20*	203.00	843.30	846.57	845.65	846.93	0.004694	4.17	55.14	46.80	0.49
HG Kenyan	2376.20*	151.00	843.30	846.20	845.34	846.42	0.004685	3.76	40.78	29.57	0.48
HG Kenyan	2376.20*	85.00	843.30	845.55	844.81	845.70	0.004734	3.15	27.02	18.86	0.46
HG Kenyan	2151.80*	484.00	842.35	846.85	846.12	847.09	0.003307	4.60	213.43	164.61	0.44
HG Kenyan	2151.80*	246.00	842.35	846.03	844.92	846.19	0.004521	4.21	71.47	88.13	0.48
HG Kenyan	2151.80*	203.00	842.35	845.53	844.60	845.76	0.004648	4.04	59.61	51.94	0.48
HG Kenyan	2151.80*	151.00	842.35	845.16	844.26	845.36	0.004717	3.85	41.32	22.80	0.48
HG Kenyan	2151.80*	85.00	842.35	844.48	843.78	844.64	0.004750	3.14	27.09	19.08	0.46
HG Kenyan	1927.40*	484.00	841.41	845.02	844.95	845.77	0.011680	7.12	92.59	121.95	0.75
HG Kenyan	1927.40*	246.00	841.41	844.03	843.75	844.74	0.008871	5.18	47.61	30.94	0.66

HEC-RAS Plan: Exst. Cond. River: HG Kenyan Reach: HG Kenyan (Continued)

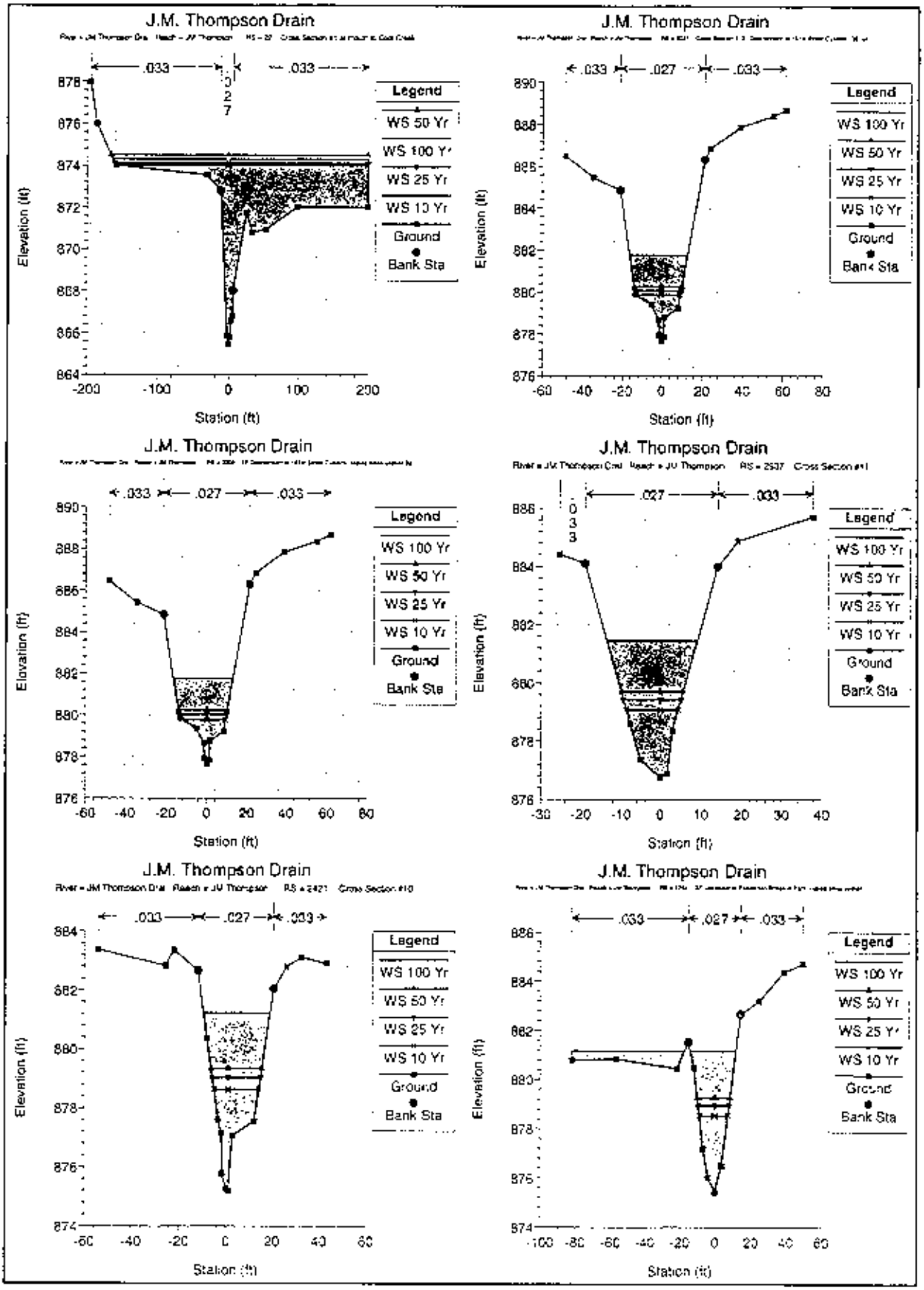
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HG Kenyan	1927.40*	203.00	841.41	844.51	843.53	844.74	0.004570	3.89	52.83	46.86	0.46
HG Kenyan	1927.40*	151.00	841.41	844.12	843.21	844.33	0.004564	3.55	42.51	29.19	0.47
HG Kenyan	1927.40*	85.00	841.41	843.42	842.74	843.57	0.004735	3.11	27.33	19.42	0.46
HG Kenyan	1703	484.00	840.46	844.55	843.72	844.69	0.002072	3.35	290.86	161.10	0.34
HG Kenyan	1703	246.00	840.46	843.76	842.69	843.84	0.001892	2.64	172.38	120.94	0.31
HG Kenyan	1703	203.00	840.46	843.53	842.46	843.82	0.003537	3.50	58.30	119.79	0.43
HG Kenyan	1703	151.00	840.46	843.32	842.15	843.45	0.003117	3.06	49.42	81.97	0.39
HG Kenyan	1703	85.00	840.46	842.69	841.69	842.78	0.002620	2.47	34.39	66.40	0.35
HG Kenyan	1522.66*	484.00	839.95	843.90	843.24	844.09	0.004652	4.94	190.90	142.66	0.52
HG Kenyan	1522.66*	246.00	839.95	843.11	842.31	843.33	0.004295	3.95	94.34	110.49	0.47
HG Kenyan	1522.66*	203.00	839.95	842.93	842.11	843.12	0.004205	3.58	77.31	89.56	0.46
HG Kenyan	1522.66*	151.00	839.95	842.66	841.84	842.82	0.004307	3.28	57.43	72.68	0.44
HG Kenyan	1522.66*	85.00	839.95	842.12	841.34	842.23	0.003662	2.86	35.29	32.06	0.41
HG Kenyan	1342.33*	484.00	839.44	842.98		843.21	0.004897	4.95	206.77	132.91	0.53
HG Kenyan	1342.33*	246.00	839.44	842.21		842.42	0.005860	4.21	108.23	116.71	0.55
HG Kenyan	1342.33*	203.00	839.44	842.10		842.27	0.005213	3.81	99.17	108.89	0.51
HG Kenyan	1342.33*	151.00	839.44	841.91		842.05	0.004572	3.30	76.13	89.63	0.47
HG Kenyan	1342.33*	85.00	839.44	841.37		841.46	0.004900	2.62	42.81	37.46	0.45
HG Kenyan	1162	484.00	838.93	842.68		842.74	0.001369	2.77	401.33	177.64	0.29
HG Kenyan	1162	246.00	838.93	841.23		841.43	0.004856	3.44	165.67	164.24	0.49
HG Kenyan	1162	203.00	838.93	841.10		841.21	0.006458	3.55	129.71	151.41	0.55
HG Kenyan	1162	151.00	838.93	840.88		840.99	0.007526	3.40	96.91	139.54	0.57
HG Kenyan	1162	85.00	838.93	840.32		840.38	0.007283	2.52	43.68	34.64	0.51
HG Kenyan	984.666*	484.00	836.90	842.33		842.48	0.001403	3.61	241.30	83.51	0.31
HG Kenyan	984.666*	246.00	836.90	840.50		840.70	0.003377	3.89	97.56	73.28	0.43
HG Kenyan	984.666*	203.00	836.90	839.98		840.20	0.004974	4.24	66.24	46.99	0.50
HG Kenyan	984.666*	151.00	836.90	839.52		839.72	0.006621	4.01	47.36	32.92	0.56
HG Kenyan	984.666*	85.00	836.90	838.92		839.09	0.007267	3.49	29.99	27.70	0.56
HG Kenyan	807.333*	484.00	834.86	842.21		842.21	0.000606	2.93	289.17	83.74	0.20
HG Kenyan	807.333*	246.00	834.86	840.33		840.42	0.000761	2.51	142.18	77.82	0.22
HG Kenyan	807.333*	203.00	834.86	839.74		839.85	0.000962	2.52	101.22	55.23	0.23
HG Kenyan	807.333*	151.00	834.86	839.26		839.33	0.000912	2.22	77.20	46.73	0.22
HG Kenyan	807.333*	85.00	834.86	838.80		838.93	0.000484	1.49	59.15	30.85	0.16
HG Kenyan	630	484.00	832.83	842.20		842.21	0.000190	1.79	639.36	200.00	0.11
HG Kenyan	630	246.00	832.83	840.29		840.33	0.000246	1.70	259.78	172.99	0.12
HG Kenyan	630	203.00	832.83	839.70		839.74	0.000272	1.66	179.00	106.58	0.13
HG Kenyan	630	151.00	832.83	839.22		839.25	0.000221	1.40	139.26	76.54	0.11
HG Kenyan	630	85.00	832.83	838.78		838.79	0.000130	0.89	107.54	49.12	0.07
HG Kenyan	622	484.00	832.88	842.16	837.48	842.19	0.000767	2.71	424.90	200.00	0.21
HG Kenyan	622	246.00	832.88	840.07	835.95	840.28	0.000759	2.63	67.77	148.22	0.25
HG Kenyan	622	203.00	832.88	839.53	835.62	839.70	0.000682	2.26	62.36	96.63	0.23
HG Kenyan	622	151.00	832.88	839.12	835.21	839.23	0.000473	1.89	58.27	73.27	0.19
HG Kenyan	622	85.00	832.88	838.75	834.60	838.78	0.000187	1.56	54.50	50.21	0.12
HG Kenyan	613	Bridge									
HG Kenyan	604	484.00	832.88	842.04	838.14	842.07	0.000800	1.82	683.26	200.00	0.12
HG Kenyan	604	246.00	832.88	839.62	835.61	839.91	0.001361	4.35	56.57	161.75	0.32
HG Kenyan	604	203.00	832.88	839.25	834.29	839.48	0.001163	3.84	52.84	124.23	0.29
HG Kenyan	604	151.00	832.88	838.96	833.88	839.10	0.000777	3.02	49.93	94.92	0.24
HG Kenyan	604	85.00	832.88	838.69	833.27	838.74	0.000295	1.60	47.24	73.03	0.16
HG Kenyan	572	484.00	833.68	842.04		842.07	0.000179	1.75	709.69	200.00	0.11
HG Kenyan	572	246.00	833.68	839.72		839.77	0.000409	2.26	246.04	175.65	0.16
HG Kenyan	572	203.00	833.68	839.31		839.37	0.000419	2.20	184.19	143.89	0.16
HG Kenyan	572	151.00	833.68	838.99		839.03	0.000321	1.97	142.91	112.66	0.14
HG Kenyan	572	85.00	833.68	838.70		838.71	0.000135	1.24	113.60	87.78	0.09
HG Kenyan	557	484.00	833.06	842.05		842.06	0.000059	0.93	1259.35	250.00	0.06
HG Kenyan	557	246.00	833.06	839.75		839.78	0.000249	0.94	684.52	238.75	0.09
HG Kenyan	557	203.00	833.06	839.35		839.38	0.000246	0.76	591.91	220.87	0.08
HG Kenyan	557	151.00	833.06	839.01		839.03	0.000233	0.64	520.76	205.72	0.08

HEC-RAS Plan: Exst. Cond. River: HG Kenyan Reach: HG Kenyan (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HG Kenyan	557	85.00	833.06	838.71		838.71	0.000014	0.39	459.86	191.96	0.03
HG Kenyan	549	484.00	833.01	841.34	837.41	841.69	0.001801	5.98	80.97	252.00	0.37
HG Kenyan	549	246.00	833.01	839.44	835.89	839.69	0.001009	3.97	61.96	225.07	0.26
HG Kenyan	549	203.00	833.01	839.11	835.57	839.30	0.000824	3.48	58.69	210.52	0.25
HG Kenyan	549	151.00	833.01	838.87	835.15	838.98	0.000524	2.68	56.29	199.68	0.20
HG Kenyan	549	85.00	833.01	838.66	834.55	838.70	0.000189	1.57	54.15	190.38	0.12
HG Kenyan	468	Culvert									
HG Kenyan	387	484.00	832.43	838.39	837.39	840.11	0.006117	8.55	57.92	200.00	0.62
HG Kenyan	387	246.00	832.43	838.87	835.86	839.17	0.001695	4.44	58.70	200.00	0.33
HG Kenyan	387	203.00	832.43	838.70	835.52	838.92	0.001272	3.72	55.08	200.00	0.29
HG Kenyan	387	151.00	832.43	838.65	835.08	838.77	0.000727	2.83	54.50	200.00	0.21
HG Kenyan	387	85.00	832.43	838.59	834.38	838.65	0.000239	1.61	53.91	200.00	0.12
HG Kenyan	355	484.00	832.23	839.50		839.53	0.000377	2.28	802.48	400.00	0.16
HG Kenyan	355	246.00	832.23	839.99		839.01	0.000204	1.59	600.23	399.44	0.11
HG Kenyan	355	203.00	832.23	838.79		838.81	0.000168	1.49	521.95	379.93	0.11
HG Kenyan	355	151.00	832.23	838.70		838.71	0.000121	1.18	485.26	366.53	0.09
HG Kenyan	355	85.00	832.23	838.60		838.60	0.000045	0.71	449.78	359.81	0.05
HG Kenyan	016	484.00	830.69	839.50	832.92	839.50	0.000017	0.55	2481.43	511.11	0.03
HG Kenyan	016	246.00	830.69	839.00	832.32	839.00	0.000008	0.31	2229.35	497.22	0.02
HG Kenyan	016	203.00	830.69	838.80	832.15	838.80	0.000005	0.27	2130.45	491.67	0.02
HG Kenyan	016	151.00	830.69	838.70	831.92	838.70	0.000003	0.20	2081.44	488.89	0.01
HG Kenyan	016	85.00	830.69	838.60	831.50	838.60	0.000001	0.12	2032.67	486.11	0.01

J.M. THOMPSON DRAIN

HEC-RAS CROSS-SECTIONS AND PROFILE SUMMARY TABLE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WS 100 Yr
WS 25 Yr
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
.033
.027
.033
Legend
WS 100 Yr
WS 50 Yr
WS 25 Yr
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
.033
.027
.033
Legend
WS 100 Yr
WS 50 Yr
WS 25 Yr
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
.027
.033
Legend
WS 100 Yr
WS 50 Yr
WS 25 Yr
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
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.027
.033
Legend
WS 100 Yr
WS 50 Yr
WS 25 Yr
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
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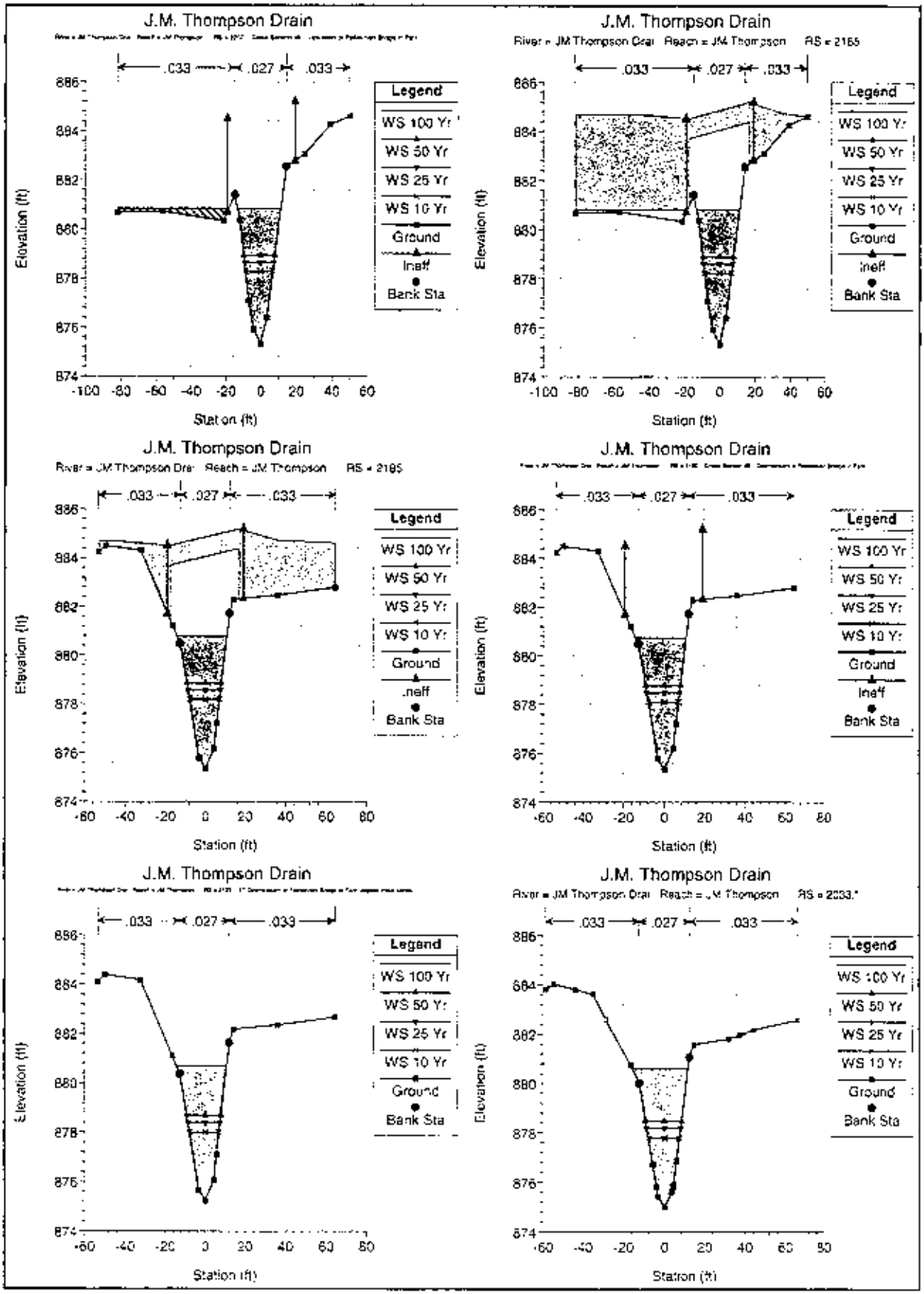
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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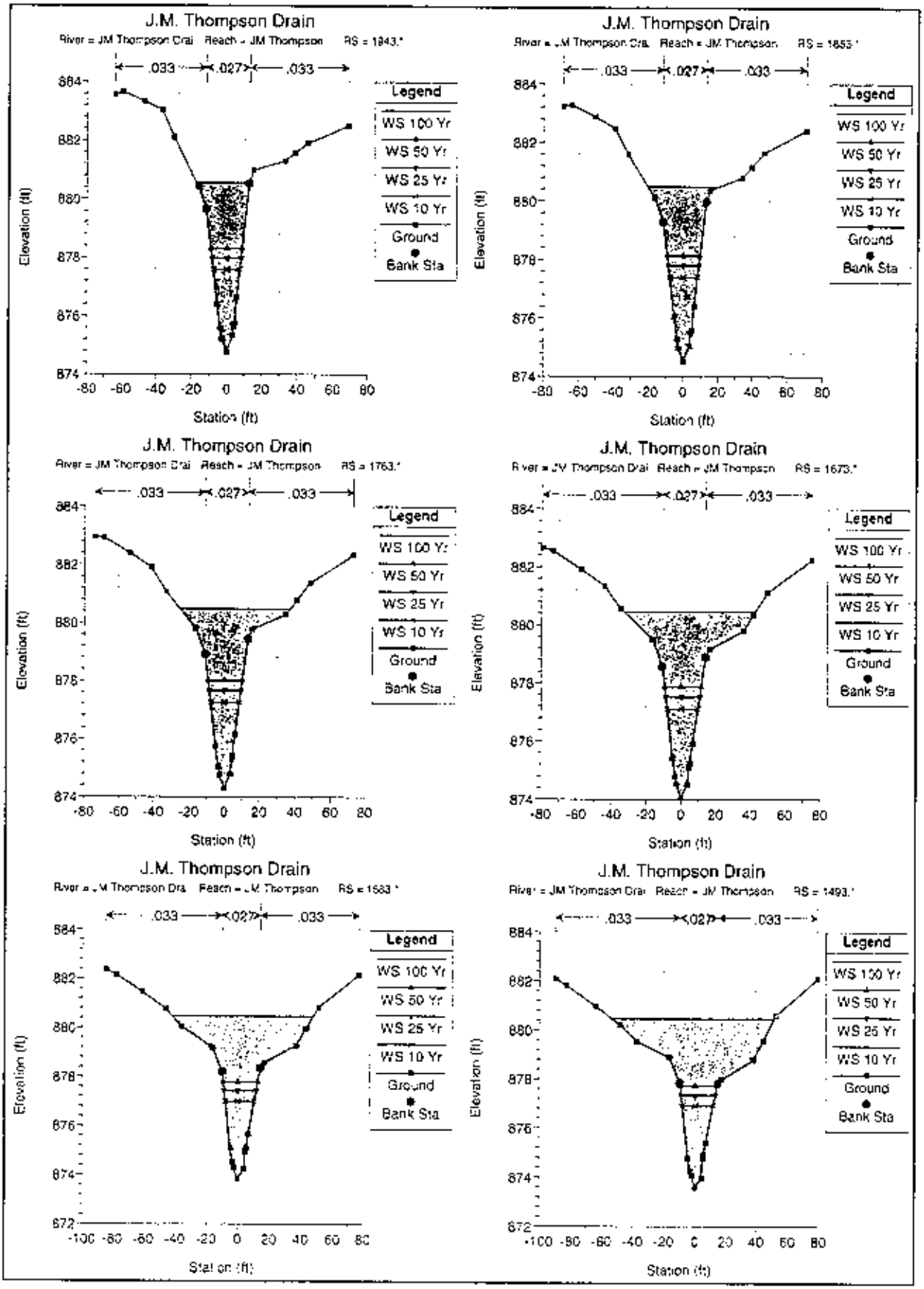
.027
.033
Legend
WS 100 Yr
WS 50 Yr
WS 25 Yr
WS 10 Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
River = JM Thompson Drai Reach = JM Thompson RS = 2165
J.M. Thompson Drain
River = JM Thompson Drai Reach = JM Thompson RS = 2195
J.M. Thompson Drain
J.M. Thompson Drain
River = JM Thompson Drai Reach = JM Thompson RS = 2033.*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.027
.033
Legend
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WS 50 Yr
WS 25 Yr
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
River = JM Thompson Drai Reach = JM Thompson RS = 1763.*
J.M. Thompson Drain
River = JM Thompson Drai Reach = JM Thompson RS = 1683.*
J.M. Thompson Drain
River = JM Thompson Drai Reach = JM Thompson RS = 1583.*
J.M. Thompson Drain
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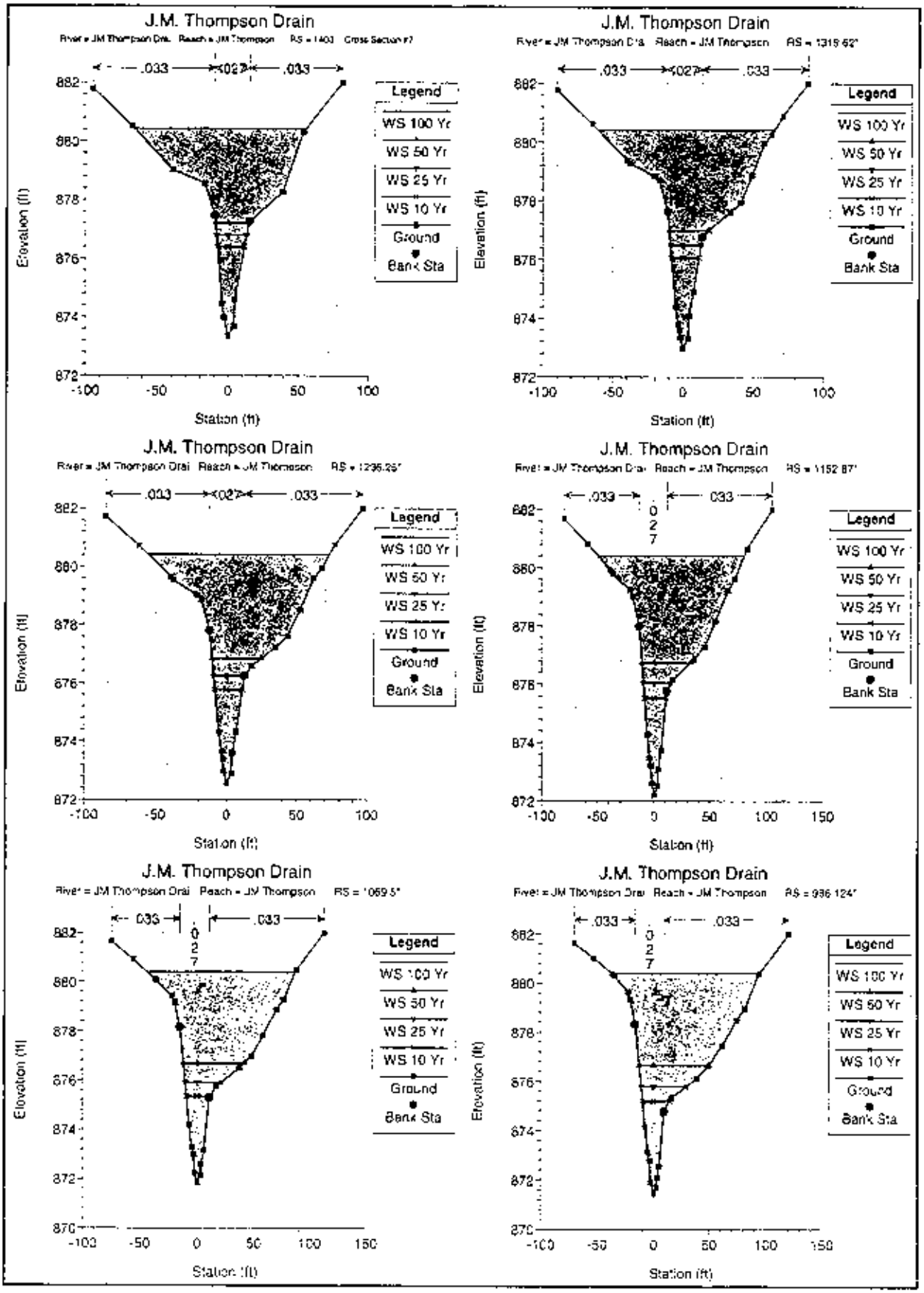
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.033
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WS 50 Yr
WS 25 Yr
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
River = JM Thompson Drain Reach = JM Thompson RS = 1319.62
J.M. Thompson Drain
River = JM Thompson Drain Reach = JM Thompson RS = 1235.29
J.M. Thompson Drain
River = JM Thompson Drain Reach = JM Thompson RS = 1152.87
J.M. Thompson Drain
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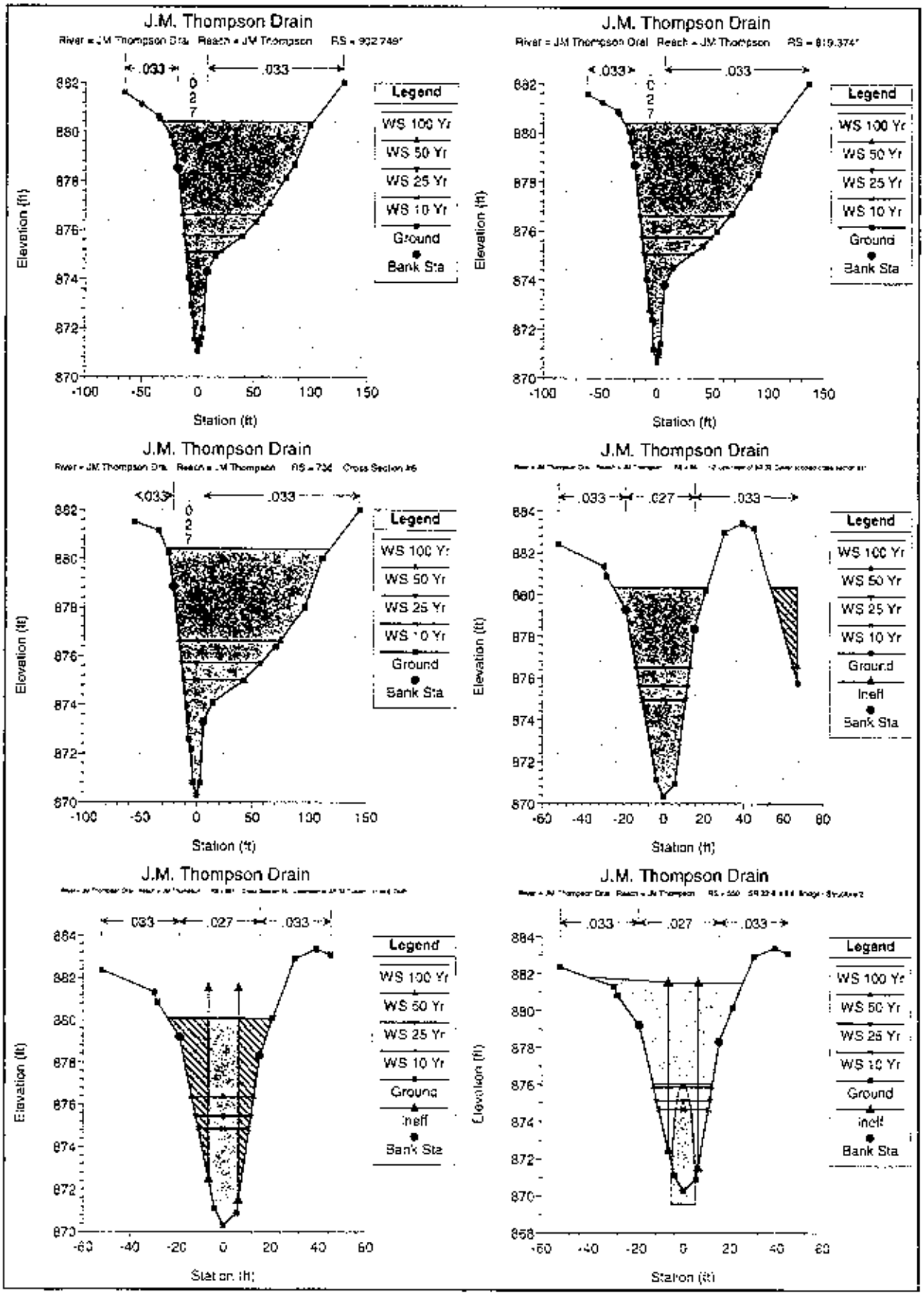
J.M. Thompson Drain
River = JM Thompson Drain Reach = JM Thompson RS = 986.124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WS 25 Yr
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Ground
Bank Sta
Elevation (ft)
Station (ft)
J.M. Thompson Drain
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WS 100 Yr
WS 50 Yr
WS 25 Yr
WS 10 Yr
Ground
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Elevation (ft)
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J.M. Thompson Drain
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Elevation (ft)
Station (ft)
J.M. Thompson Drain
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Elevation (ft)
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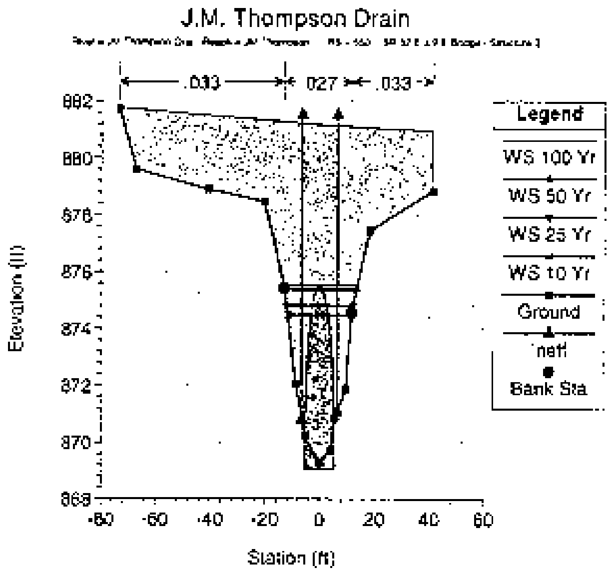
Elevation (ft)
Station (ft)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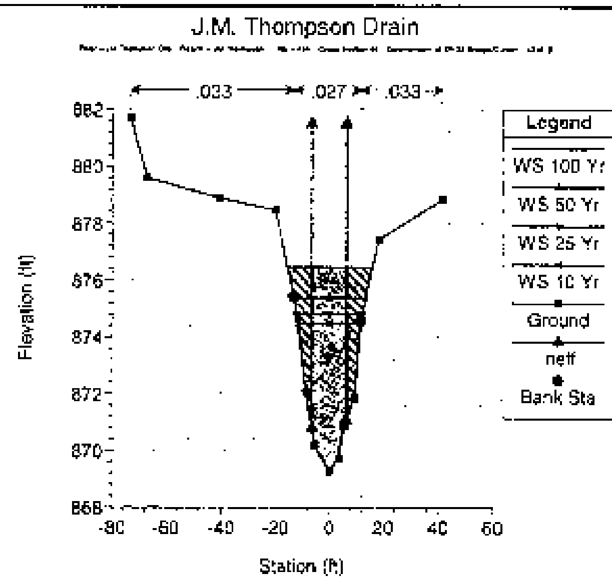
Elevation (ft)
Station (ft)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Elevation (ft)
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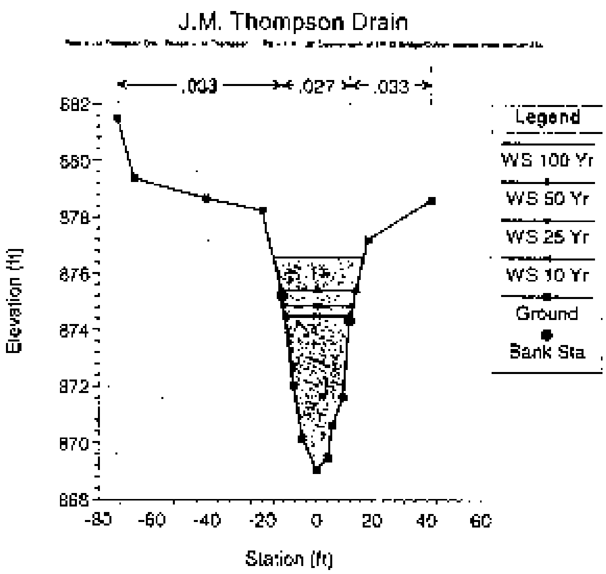
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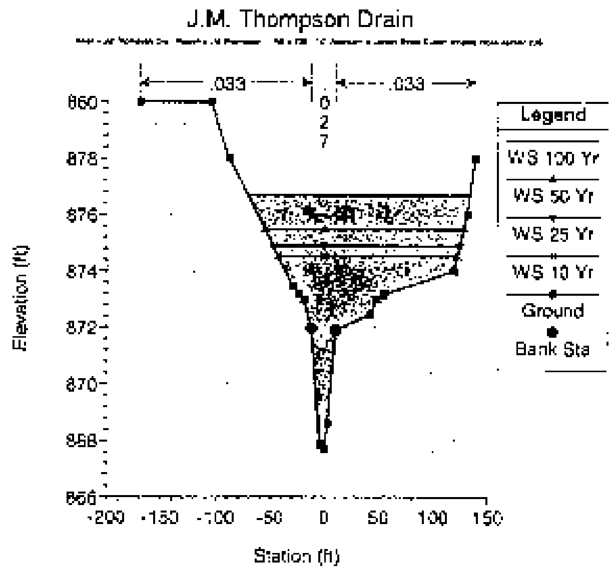
Bank Sta
Elevation (ft)
Station (ft)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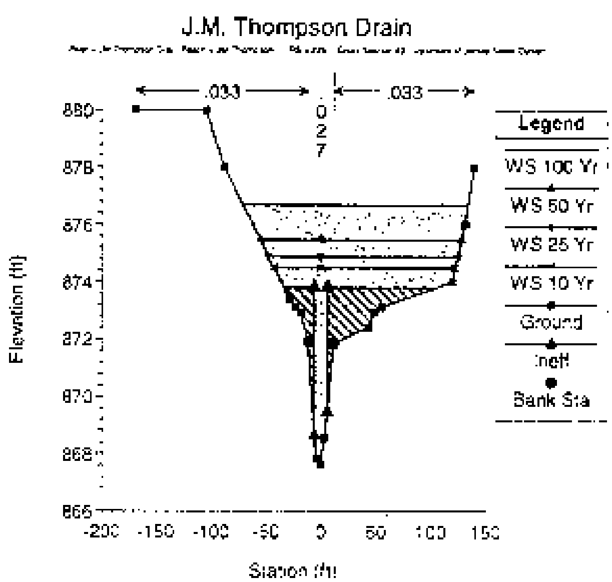
Ground
Bank Sta
Elevation (ft)
Station (ft)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Elevation (ft)
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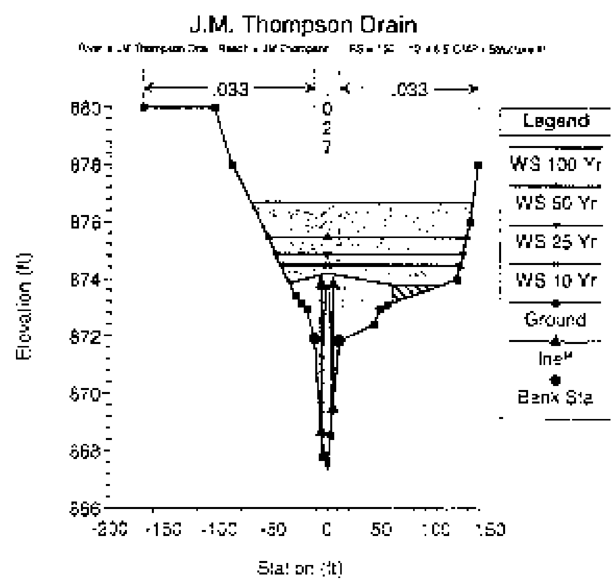
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Ground
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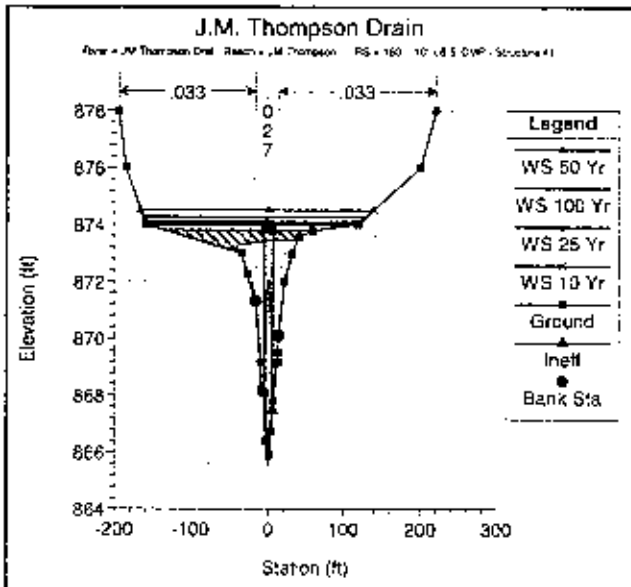
Elevation (ft)
Station (ft)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WS 50 Yr
WS 100 Yr
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Ground
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Bank Sta
Elevation (ft)
Station (ft)
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866
864
-200
-100
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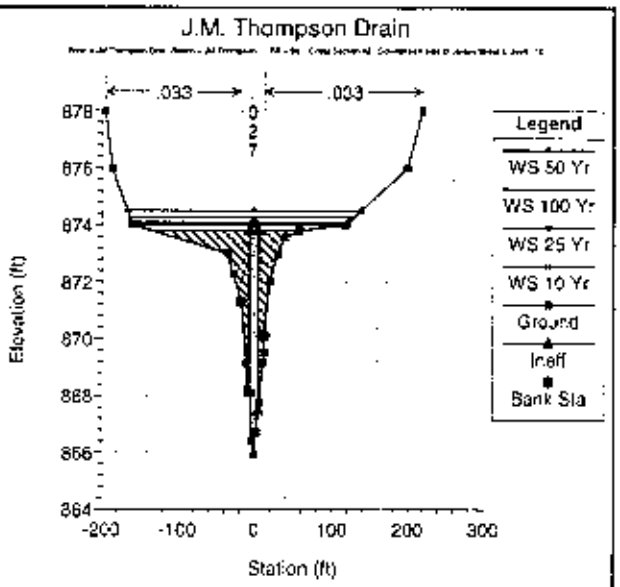
100
200
300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Legend
WS 50 Yr
WS 100 Yr
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Ground
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Bank Sta
Elevation (ft)
Station (ft)
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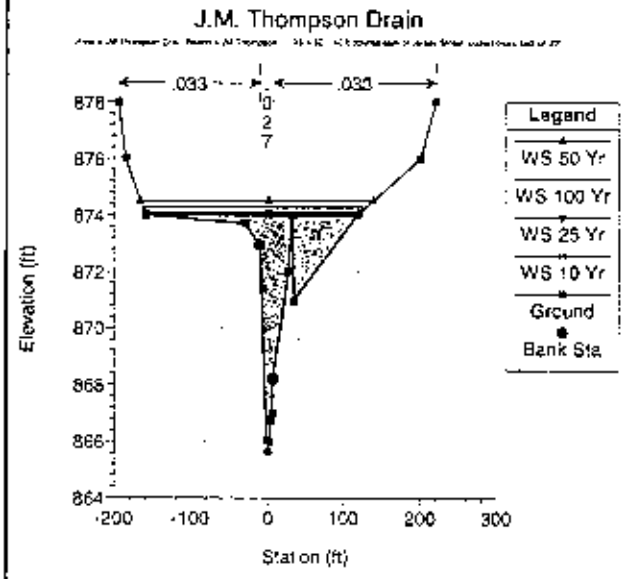
J.M. Thompson Drain
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Legend
WS 50 Yr
WS 100 Yr
WS 25 Yr
WS 10 Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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874
872
870
868
866
864
-200
-100
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100
200
300

HEC-RAS Plan: Proposed River: JM Thompson Cre Reach: JM Thompson

Reach	River Sta	Q Total	Min Ch El	W S Elev	Crit W.S	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
JM Thompson	3221	200.00	877.69	881.77		881.91	0.001054	2.98	66.95	29.34	0.36
JM Thompson	3221	84.00	877.69	880.27		880.42	0.003177	3.15	26.63	24.29	0.53
JM Thompson	3221	70.00	877.69	880.09		880.24	0.003880	3.15	22.23	23.67	0.57
JM Thompson	3221	53.00	877.69	879.87		880.02	0.004852	3.06	17.29	22.72	0.62
JM Thompson	3209	200.00	877.65	881.76		881.90	0.001054	2.95	67.81	29.44	0.34
JM Thompson	3209	84.00	877.65	880.23		880.38	0.003173	3.15	26.64	24.29	0.53
JM Thompson	3209	70.00	877.65	880.03		880.19	0.004142	3.22	21.77	23.60	0.59
JM Thompson	3209	53.00	877.65	879.77	879.53	879.94	0.006046	3.34	15.85	21.50	0.69
JM Thompson	2937	200.00	876.76	881.46		881.62	0.000977	3.17	63.10	22.65	0.34
JM Thompson	2937	84.00	876.76	879.79		879.85	0.001398	2.90	28.99	15.76	0.38
JM Thompson	2937	70.00	876.76	879.42		879.55	0.001476	2.92	24.81	14.68	0.38
JM Thompson	2937	52.00	876.76	879.07		879.18	0.001535	2.66	19.92	13.27	0.38
JM Thompson	2421	200.00	875.20	881.23		881.33	0.000370	2.13	93.92	28.88	0.21
JM Thompson	2421	84.00	875.20	879.34		879.40	0.000609	1.34	45.60	22.24	0.22
JM Thompson	2421	70.00	875.20	879.03		879.08	0.000686	1.60	36.78	21.11	0.22
JM Thompson	2421	52.00	875.20	878.62		878.67	0.000668	1.74	30.47	19.65	0.25
JM Thompson	2244	200.00	875.42	881.17		881.24	0.000350	2.15	115.66	90.51	0.21
JM Thompson	2244	84.00	875.42	879.26		879.31	0.000428	1.90	44.12	18.63	0.22
JM Thompson	2244	70.00	875.42	878.94		878.99	0.000435	1.82	38.39	17.58	0.22
JM Thompson	2244	53.00	875.42	878.53		878.57	0.000432	1.68	31.47	16.23	0.21
JM Thompson	2207	350.00	875.31	880.85	878.96	881.14	0.001473	4.53	80.81	68.27	0.42
JM Thompson	2207	168.00	875.31	876.84	877.88	879.21	0.002193	4.17	40.31	17.94	0.49
JM Thompson	2207	140.00	875.31	876.65	877.66	878.89	0.002205	3.97	35.22	16.98	0.49
JM Thompson	2207	107.00	875.31	876.27	877.39	878.48	0.002178	3.67	29.16	15.75	0.48
JM Thompson	2185	Bridge									
JM Thompson	2160	350.00	875.34	880.75	878.94	881.06	0.001525	4.46	78.63	24.90	0.43
JM Thompson	2160	168.00	875.34	876.78	877.84	879.09	0.002615	4.45	37.79	17.35	0.53
JM Thompson	2160	140.00	875.34	876.49	877.62	878.77	0.002855	4.25	32.86	16.36	0.53
JM Thompson	2160	107.00	875.34	876.10	877.34	878.35	0.002721	3.99	26.80	15.04	0.53
JM Thompson	2123	350.00	875.23	880.73		881.00	0.001443	4.38	80.15	25.30	0.42
JM Thompson	2123	168.00	875.23	878.69		878.99	0.002547	4.40	38.16	17.43	0.52
JM Thompson	2123	140.00	875.23	878.43		878.67	0.002595	4.22	33.16	16.42	0.52
JM Thompson	2123	107.00	875.23	878.01		878.25	0.002664	3.98	27.01	15.08	0.52
JM Thompson	2033.*	350.00	874.99	880.61		880.88	0.001203	4.12	85.86	27.45	0.39
JM Thompson	2033.*	168.00	874.99	878.49		878.78	0.002373	4.27	39.30	17.39	0.51
JM Thompson	2033.*	140.00	874.99	878.18		878.45	0.002459	4.12	33.95	16.30	0.51
JM Thompson	2033.*	107.00	874.99	877.79		878.02	0.002543	3.88	27.56	15.41	0.51
JM Thompson	1943.*	350.00	874.76	880.55		880.78	0.000991	3.84	92.86	30.41	0.36
JM Thompson	1943.*	168.00	874.76	878.31		878.57	0.002174	4.12	40.79	18.45	0.49
JM Thompson	1943.*	140.00	874.76	877.96		878.23	0.002312	4.01	34.98	17.26	0.50
JM Thompson	1943.*	107.00	874.76	877.58		877.90	0.002380	3.77	28.37	15.62	0.50
JM Thompson	1853.*	350.00	874.52	880.50		880.70	0.000766	3.56	102.87	47.90	0.32
JM Thompson	1853.*	168.00	874.52	878.14		878.36	0.001950	3.93	42.71	19.17	0.46
JM Thompson	1853.*	140.00	874.52	877.91		878.03	0.002071	3.83	36.55	17.90	0.47
JM Thompson	1853.*	107.00	874.52	877.40		877.61	0.002166	3.61	29.62	16.36	0.47
JM Thompson	1763.*	350.00	874.29	880.48		880.64	0.000572	3.23	123.31	62.91	0.28
JM Thompson	1763.*	168.00	874.29	878.00		878.22	0.001898	3.71	45.29	20.06	0.44
JM Thompson	1763.*	140.00	874.29	877.66		877.86	0.001870	3.63	38.60	18.67	0.44
JM Thompson	1763.*	107.00	874.29	877.24		877.43	0.001893	3.43	31.20	17.02	0.45
JM Thompson	1673.*	350.00	874.05	880.47		880.56	0.000404	2.85	152.04	75.78	0.24
JM Thompson	1673.*	168.00	874.05	877.99		878.07	0.001447	3.47	48.48	21.14	0.40
JM Thompson	1673.*	140.00	874.05	877.62		877.70	0.001562	3.40	41.18	19.61	0.41
JM Thompson	1673.*	107.00	874.05	877.15		877.26	0.001623	3.21	33.31	17.83	0.41
JM Thompson	1583.*	350.00	873.82	880.47		880.55	0.000374	2.46	190.35	89.80	0.23
JM Thompson	1583.*	168.00	873.82	877.79		877.95	0.001192	3.19	52.71	22.57	0.37
JM Thompson	1583.*	140.00	873.82	877.42		877.57	0.001286	3.13	44.72	20.69	0.38
JM Thompson	1583.*	107.00	873.82	877.00		877.13	0.001329	2.95	36.23	18.94	0.38

HEC-RAS Plan: Proposed River: JM Thompson Drai Reach: JM Thompson (Continued)

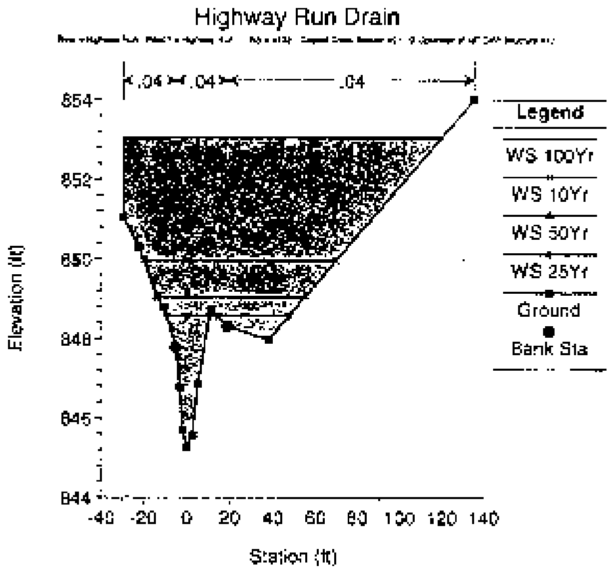
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
JM Thompson	1493.*	350.00	873.58	880.47		880.52	0.000184	2.11	236.79	105.50	0.16
JM Thompson	1493.*	168.30	873.58	877.71		877.85	0.000960	2.90	57.92	24.34	0.33
JM Thompson	1493.*	140.30	873.58	877.34		877.47	0.001036	2.85	49.13	22.48	0.34
JM Thompson	1493.*	107.00	873.58	876.91		877.02	0.001058	2.65	39.91	20.35	0.34
JM Thompson	1403	488.00	873.35	880.42		880.50	0.000248	2.53	266.35	121.74	0.19
JM Thompson	1403	276.00	873.35	877.21		877.64	0.003457	5.24	53.04	24.24	0.62
JM Thompson	1403	231.00	873.35	876.80		877.24	0.004095	5.31	43.47	21.96	0.67
JM Thompson	1403	177.00	873.35	876.39		876.79	0.004304	5.06	34.96	19.72	0.67
JM Thompson	1319.62*	488.00	872.97	880.42		880.48	0.000196	2.34	309.73	128.16	0.17
JM Thompson	1319.62*	276.00	872.97	877.00		877.37	0.002741	4.90	57.24	29.45	0.56
JM Thompson	1319.62*	231.00	872.97	876.50		876.91	0.003546	5.11	45.19	22.23	0.63
JM Thompson	1319.62*	177.00	872.97	876.06		876.44	0.003984	4.93	35.90	19.96	0.65
JM Thompson	1236.25*	488.00	872.58	880.42		880.47	0.000150	2.12	339.66	129.77	0.15
JM Thompson	1236.25*	276.00	872.58	876.94		877.15	0.002043	4.56	64.27	35.44	0.49
JM Thompson	1236.25*	231.00	872.58	876.25		876.61	0.003099	4.85	47.66	22.47	0.59
JM Thompson	1236.25*	177.00	872.58	875.77		876.12	0.003503	4.73	37.46	20.16	0.61
JM Thompson	1152.67*	488.00	872.22	880.42		880.46	0.000115	1.88	375.70	130.57	0.13
JM Thompson	1152.67*	276.00	872.22	876.74		876.99	0.001478	4.35	75.70	44.59	0.42
JM Thompson	1152.67*	231.00	872.22	876.05		876.37	0.002427	4.54	51.38	25.67	0.53
JM Thompson	1152.67*	177.00	872.22	875.53		875.84	0.002928	4.46	39.70	20.92	0.56
JM Thompson	1069.5*	488.00	871.82	880.42		880.45	0.000087	1.68	418.22	131.65	0.12
JM Thompson	1069.5*	276.00	871.82	876.68		876.87	0.001036	3.59	90.89	54.26	0.36
JM Thompson	1069.5*	231.00	871.82	875.97		876.18	0.001842	4.19	57.33	32.08	0.46
JM Thompson	1069.5*	177.00	871.82	875.34		875.61	0.002317	4.14	42.73	21.16	0.50
JM Thompson	986.124*	488.00	871.43	880.42		880.44	0.000066	1.49	467.07	131.80	0.10
JM Thompson	986.124*	276.00	871.43	876.85		876.79	0.000704	3.12	111.92	63.38	0.30
JM Thompson	986.124*	231.00	871.43	875.82		876.04	0.001350	3.80	67.19	41.86	0.40
JM Thompson	986.124*	177.00	871.43	875.21		875.43	0.001714	3.81	47.34	24.84	0.44
JM Thompson	902.749*	488.00	871.05	880.42		880.44	0.000051	1.32	522.23	135.25	0.09
JM Thompson	902.749*	276.00	871.05	876.64		876.73	0.000479	2.68	136.81	71.55	0.25
JM Thompson	902.749*	231.00	871.05	875.76		875.93	0.000965	3.38	81.76	62.97	0.34
JM Thompson	902.749*	177.00	871.05	875.11		875.30	0.001274	3.49	54.04	32.36	0.38
JM Thompson	819.374*	488.00	870.66	880.42		880.43	0.000040	1.17	583.22	139.18	0.08
JM Thompson	819.374*	276.00	870.66	876.63		876.69	0.000329	2.30	165.97	81.25	0.21
JM Thompson	819.374*	231.00	870.66	875.73		875.85	0.000660	2.92	101.62	62.15	0.29
JM Thompson	819.374*	177.00	870.66	875.06		875.20	0.000918	3.12	65.22	43.70	0.33
JM Thompson	736	488.00	870.28	880.42		880.43	0.000031	1.03	649.84	144.79	0.07
JM Thompson	736	276.00	870.28	876.62		876.66	0.000228	1.96	199.52	90.75	0.17
JM Thompson	736	231.00	870.28	875.72		875.79	0.000460	2.50	125.55	71.46	0.24
JM Thompson	736	177.00	870.28	875.01		875.12	0.000652	2.75	81.50	55.56	0.29
JM Thompson	661	488.00	870.34	880.35	874.34	880.42	0.000142	2.13	238.80	80.76	0.15
JM Thompson	661	276.00	870.34	876.52	873.35	876.62	0.000455	2.67	104.22	29.42	0.24
JM Thompson	661	231.00	870.34	875.62	873.08	875.75	0.000619	2.85	81.08	24.22	0.27
JM Thompson	661	177.00	870.34	874.96	872.73	875.07	0.000645	2.70	65.65	22.10	0.28
JM Thompson	651	488.00	870.29	880.10	874.41	880.36	0.000302	4.07	119.83	45.14	0.24
JM Thompson	651	276.00	870.29	876.35	873.50	876.59	0.000562	3.91	71.09	26.71	0.29
JM Thompson	651	231.00	870.29	875.43	873.22	875.71	0.000592	3.87	59.69	22.92	0.30
JM Thompson	651	177.00	870.29	874.85	872.67	875.04	0.000657	3.42	51.66	21.96	0.32
JM Thompson	590	Culvert									
JM Thompson	454	488.00	869.27	875.47	873.39	876.98	0.002927	5.72	85.60	31.56	0.53
JM Thompson	454	276.00	869.27	875.36	872.30	875.61	0.000561	3.89	71.09	26.67	0.29
JM Thompson	454	231.00	869.27	874.82	872.01	875.03	0.000542	3.80	64.80	24.71	0.29
JM Thompson	454	177.00	869.27	874.47	871.67	874.61	0.000495	3.57	59.65	23.60	0.24
JM Thompson	416	488.00	869.04	875.60		876.79	0.002477	5.47	146.66	30.30	0.26
JM Thompson	416	276.00	869.04	875.43		875.53	0.000348	2.55	110.31	27.91	0.21
JM Thompson	416	231.00	869.04	874.86		874.96	0.000370	2.42	95.67	25.54	0.22
JM Thompson	416	177.00	869.04	874.50		874.55	0.000252	2.04	86.79	24.21	0.19

HEC-RAS Plan: Proposed River: JM Thompson Drai Reach: JM Thompson (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	sq ft)	(ft)	
JM Thompson	238	488.00	867.68	876.70		876.71	0.000032	1.12	719.03	205.77	0.07
JM Thompson	238	278.00	867.68	875.48		875.49	0.000031	0.87	479.53	184.41	0.07
JM Thompson	238	231.00	867.68	874.90		874.92	0.000039	1.03	376.87	173.59	0.08
JM Thompson	238	177.00	867.68	874.52		874.53	0.000036	0.94	312.02	166.39	0.07
JM Thompson	228	488.00	867.62	876.70	871.92	876.71	0.000070	1.39	574.41	226.68	0.10
JM Thompson	228	278.00	867.62	875.47	870.75	875.48	0.000087	1.40	336.76	184.62	0.12
JM Thompson	228	231.00	867.62	874.88	870.44	874.91	0.000166	1.66	232.94	173.62	0.15
JM Thompson	228	177.00	867.62	874.49	870.07	874.52	0.000197	1.69	187.62	166.33	0.16
JM Thompson	150	Culvert									
JM Thompson	90	488.00	865.91	874.29	870.44	874.33	0.000135	2.03	413.25	294.17	0.14
JM Thompson	90	278.00	865.91	874.50	869.24	874.51	0.000094	1.04	478.26	305.76	0.07
JM Thompson	90	231.00	865.91	874.09	868.93	874.11	0.000039	1.06	358.20	263.93	0.08
JM Thompson	90	177.00	865.91	874.00	868.56	874.00	0.000025	0.85	330.68	277.10	0.06
JM Thompson	50	488.00	865.63	874.29		874.33	0.000148	2.08	442.98	294.38	0.15
JM Thompson	50	278.00	865.63	874.50		874.51	0.000097	1.07	506.81	305.76	0.07
JM Thompson	50	231.00	865.63	874.09		874.11	0.000041	1.08	367.27	284.27	0.08
JM Thompson	50	177.00	865.63	874.00		874.00	0.000025	0.84	359.63	277.46	0.06
JM Thompson	22	488.00	865.46	874.30	870.04	874.31	0.000245	1.18	753.66	363.90	0.09
JM Thompson	22	278.00	865.46	874.50	868.97	874.50	0.000112	0.61	825.71	366.53	0.04
JM Thompson	22	231.00	865.46	874.10	868.64	874.10	0.000113	0.62	681.14	361.30	0.04
JM Thompson	22	177.00	865.46	874.00	868.22	874.00	0.000059	0.50	645.08	360.00	0.03

HIGHWAY RUN DRAIN

HEC-RAS CROSS-SECTIONS AND PROFILE SUMMARY TABLE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WS 10Yr
WS 50Yr
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Station (ft)
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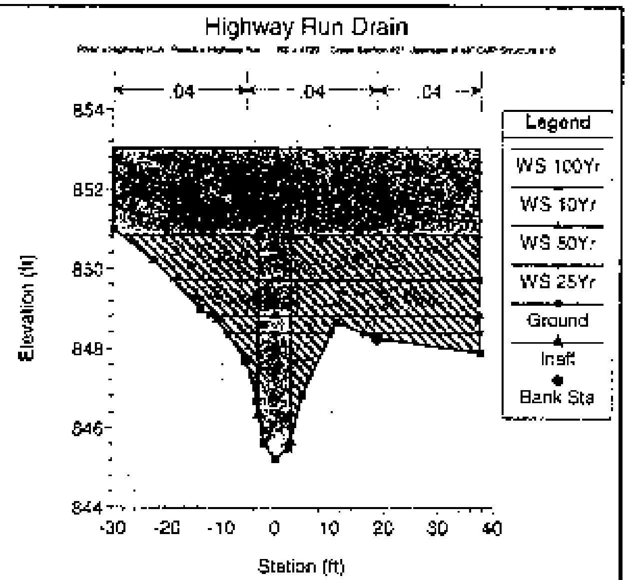
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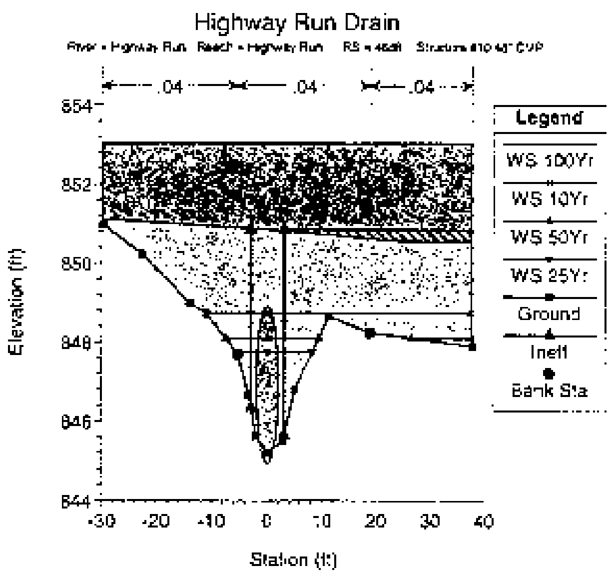
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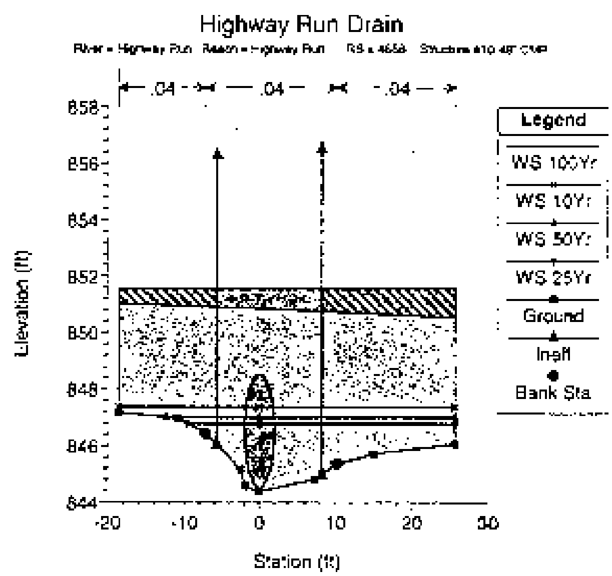
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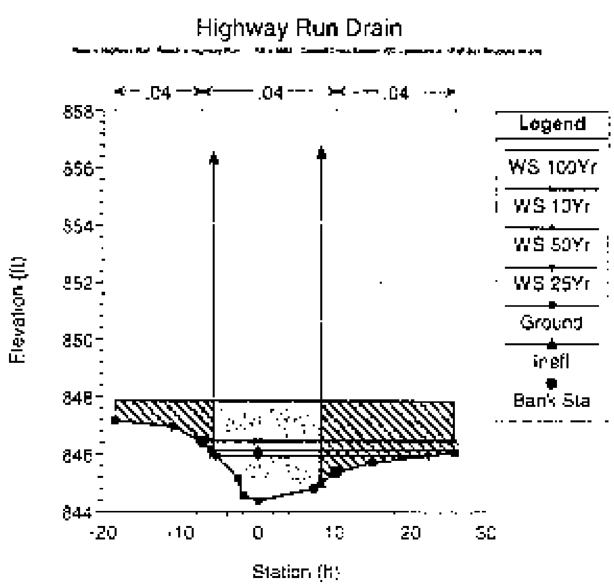
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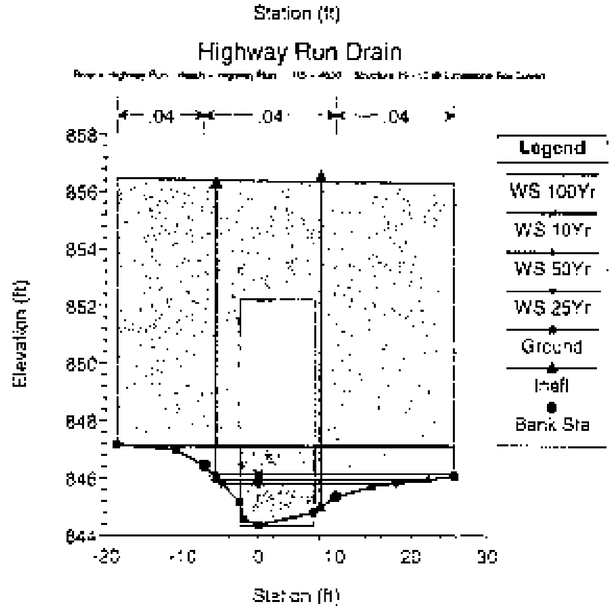
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Ineff
Bank Sta
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Station (ft)
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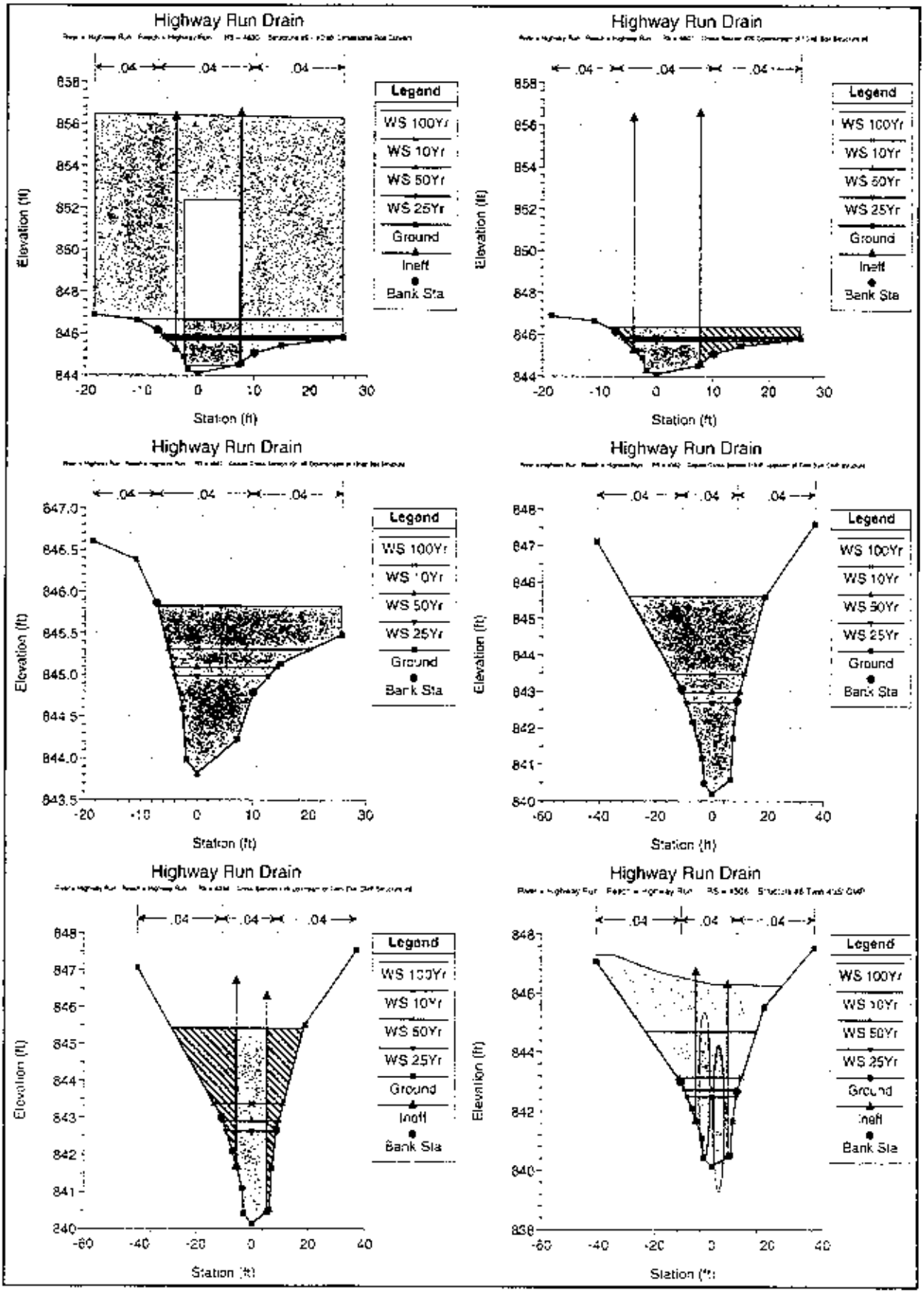
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Bank Sta
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Station (ft)
Highway Run Drain
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Legend
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Ground
Ineff
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Elevation (ft)
Station (ft)
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Highway Run Drain
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Legend
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WS 25Yr
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Station (ft)
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Legend
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WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
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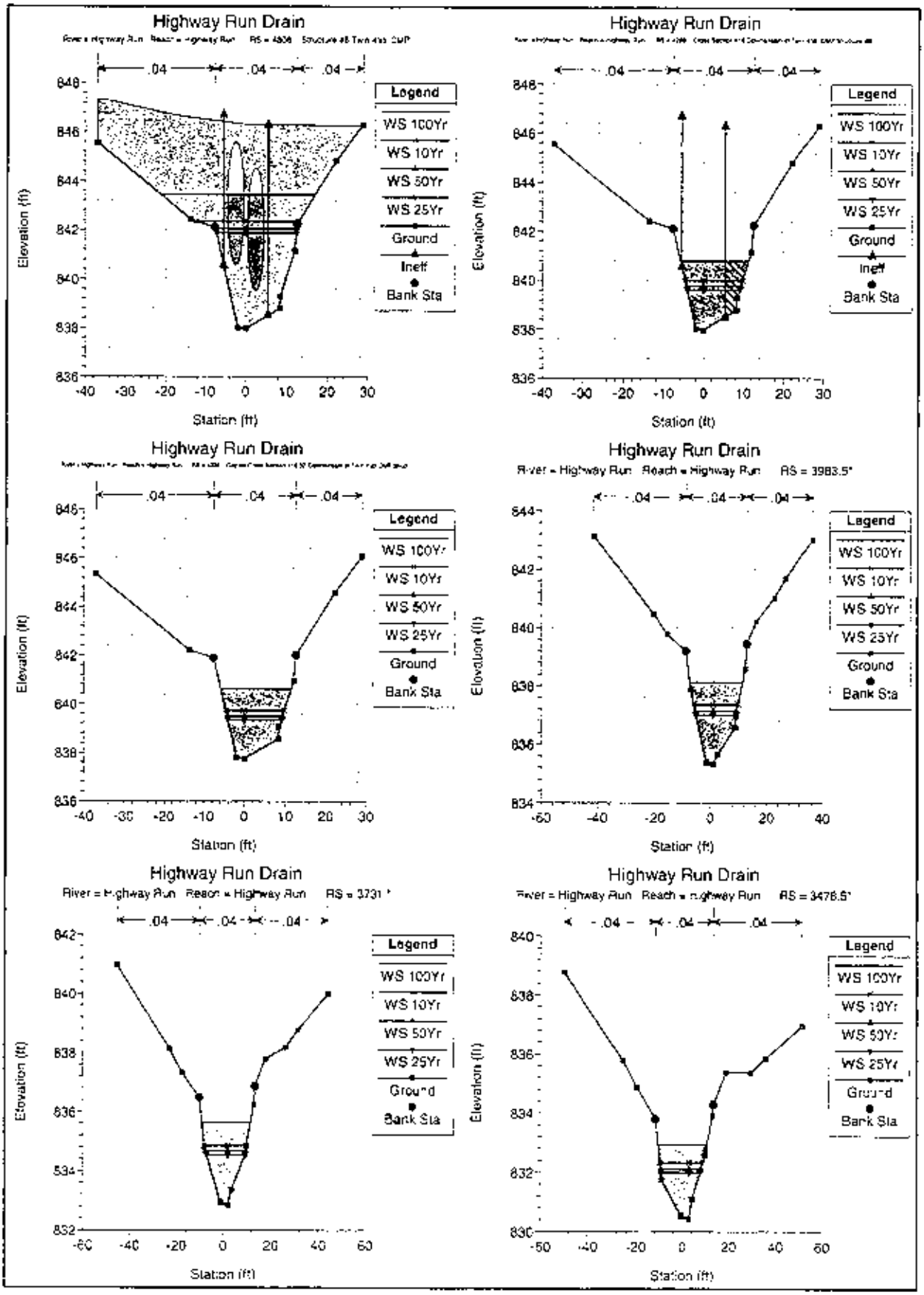
Station (ft)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Ineff
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Station (ft)
Highway Run Drain
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Highway Run Drain
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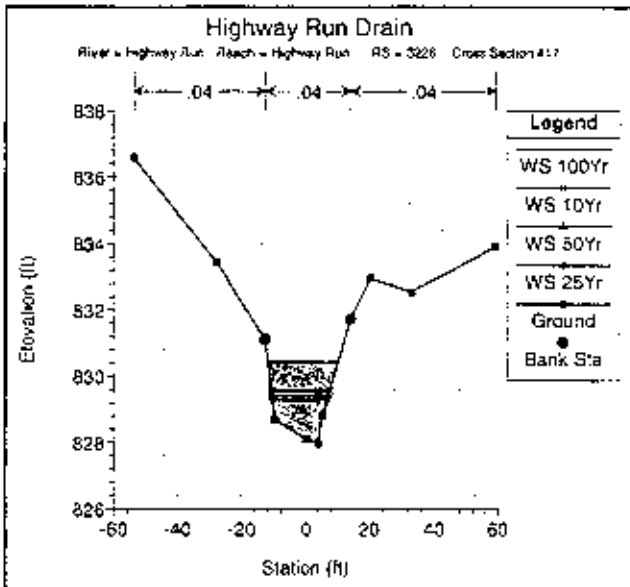
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Bank Sta
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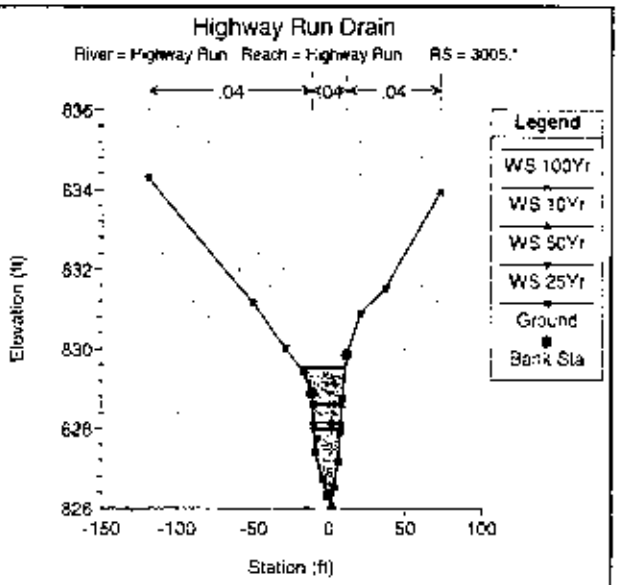
Station (ft)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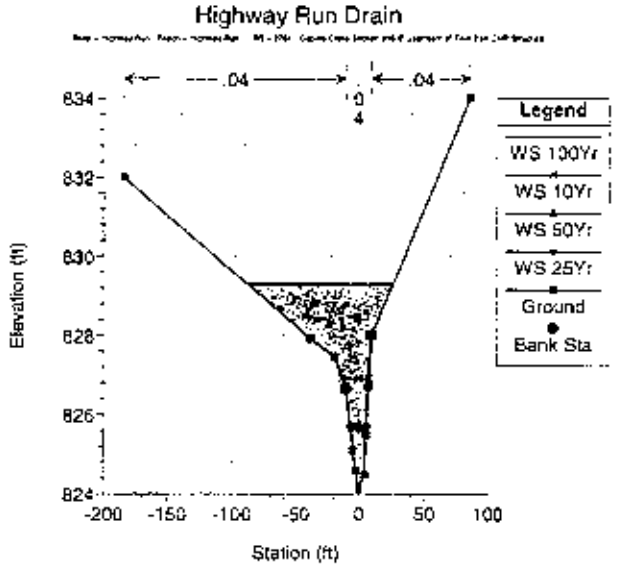
Station (ft)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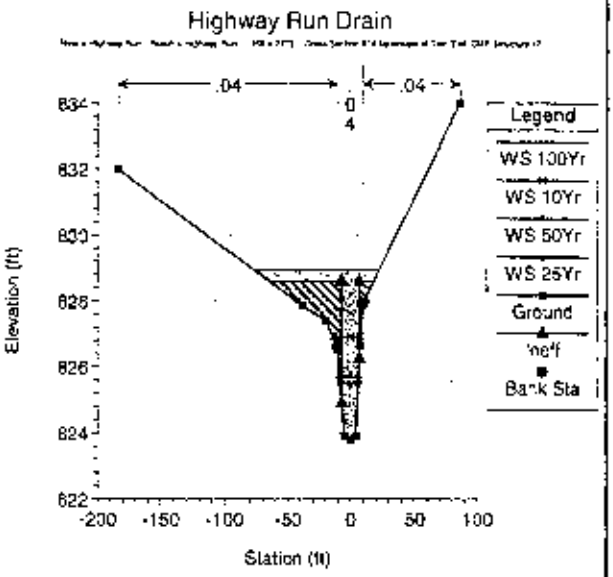
Station (ft)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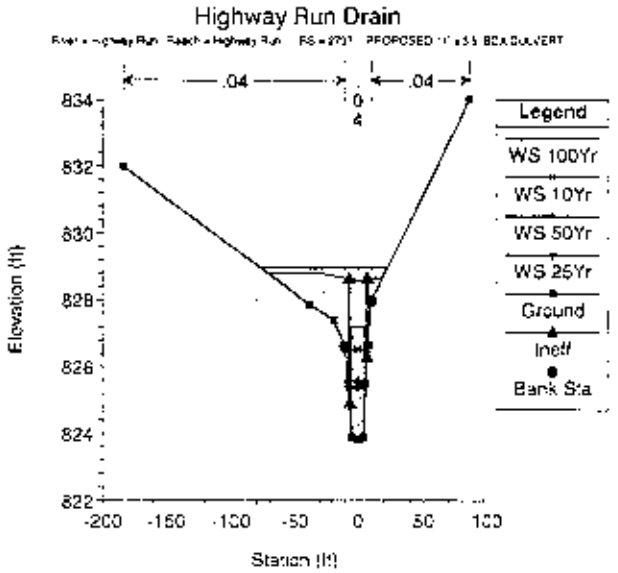
Station (ft)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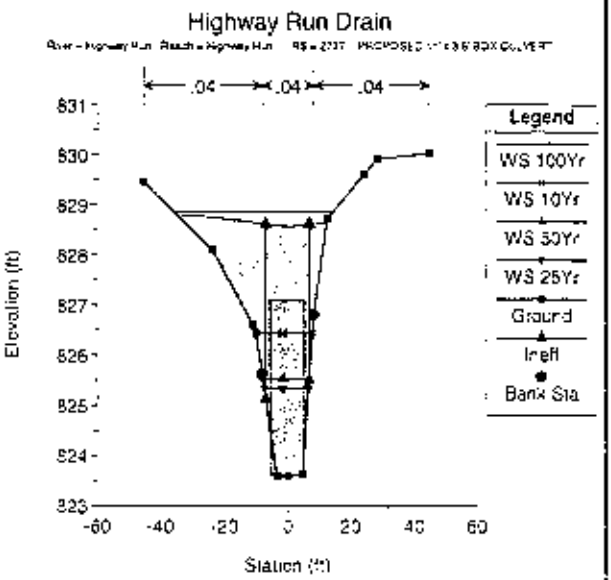
Station (ft)


Highway Run Drain
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WS 25Yr
Ground
Ineff
Bank Sta
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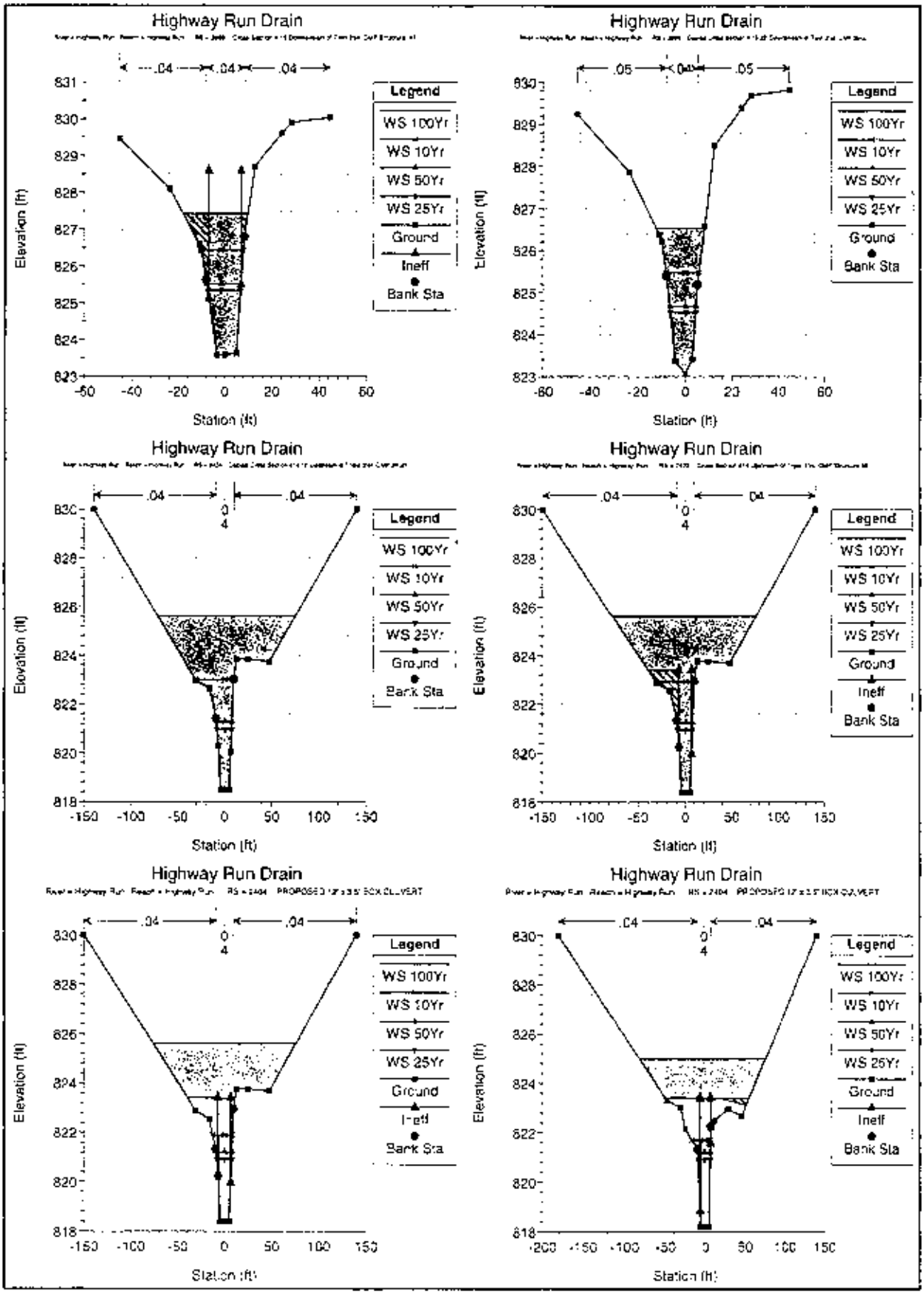
Station (ft)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Ground
Ineff
Bank Sta
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Station (ft)
Highway Run Drain
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Legend
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WS 25Yr
Ground
Bank Sta
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Station (ft)
Highway Run Drain
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Bank Sta
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Highway Run Drain
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Bank Sta
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Station (ft)
Highway Run Drain
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Legend
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Ground
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Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
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Ineff
Bank Sta
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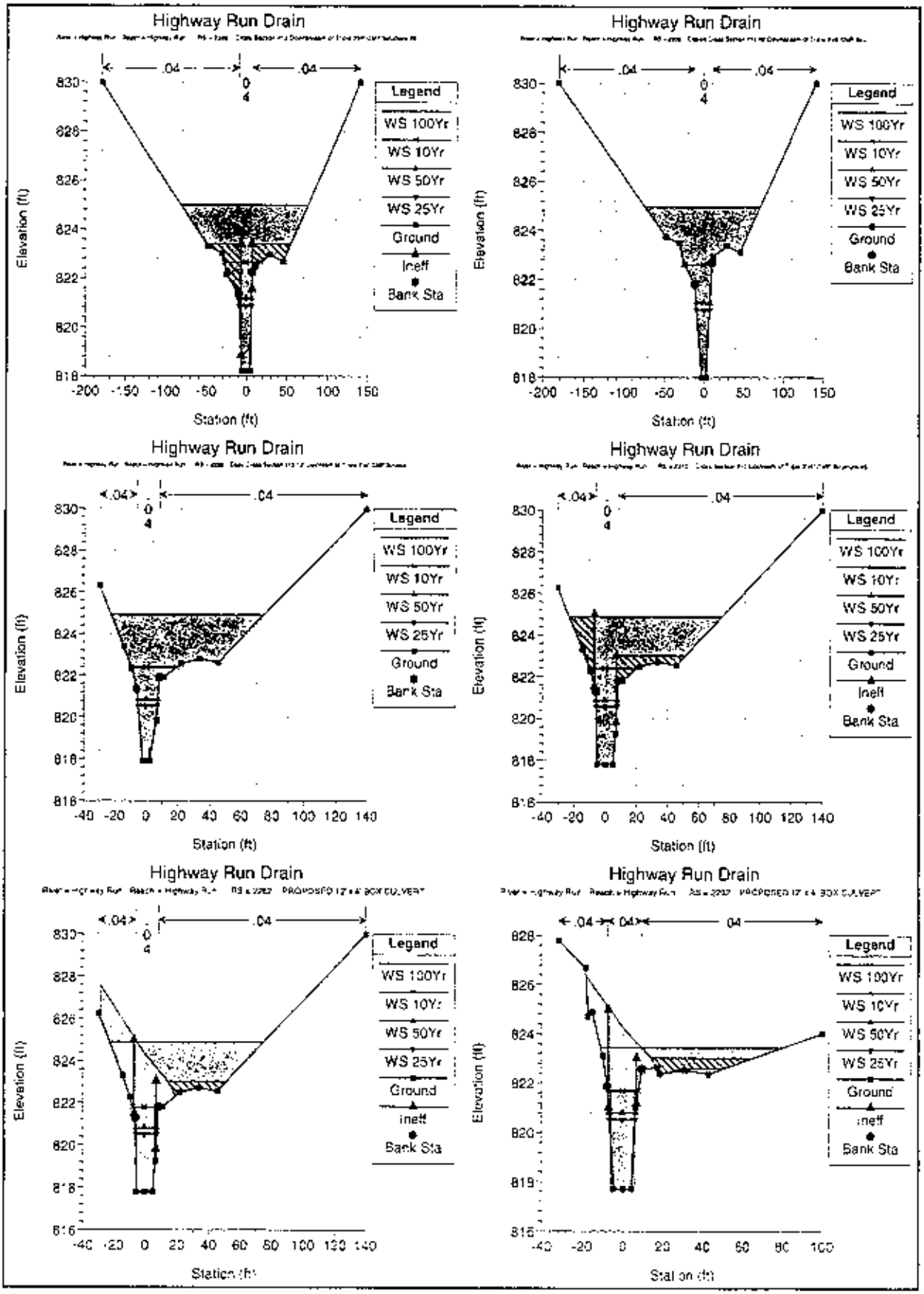
Station (ft)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WS 50Yr
WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
0
4
.04
Legend
WS 100Yr
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
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4
.04
Legend
WS 100Yr
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
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.04
Legend
WS 100Yr
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
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Legend
WS 100Yr
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
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Ineff
Bank Sta
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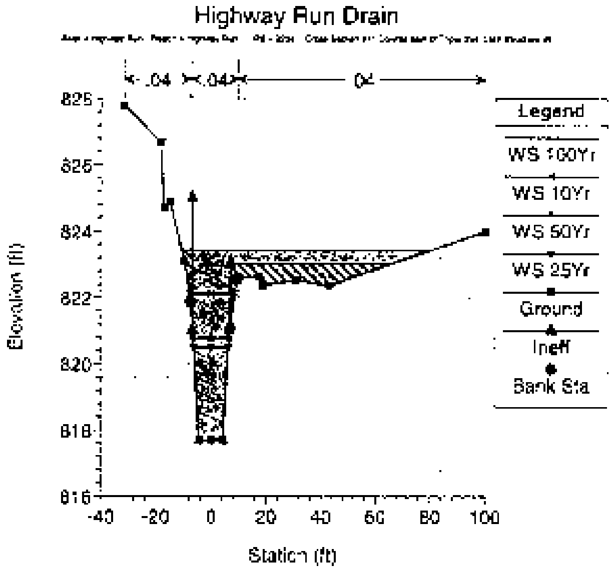
Station (ft)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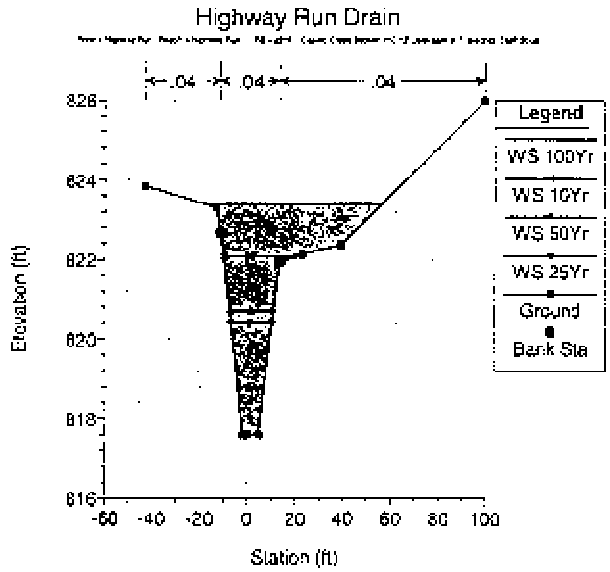
Station (ft)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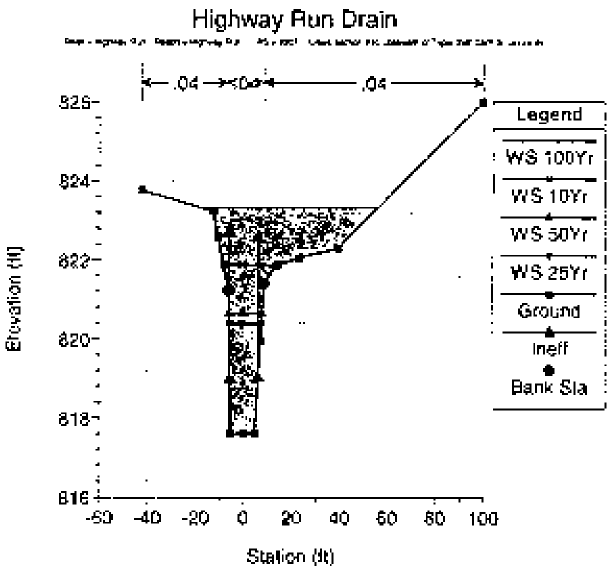
Station (ft)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Ineff
Bank Sta
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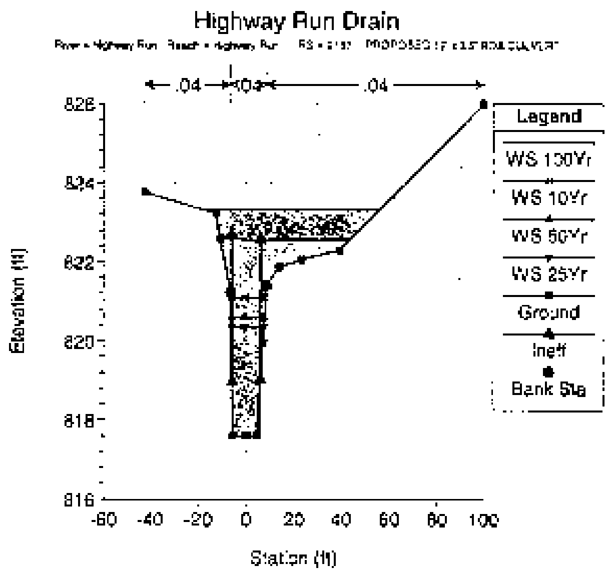
Station (ft)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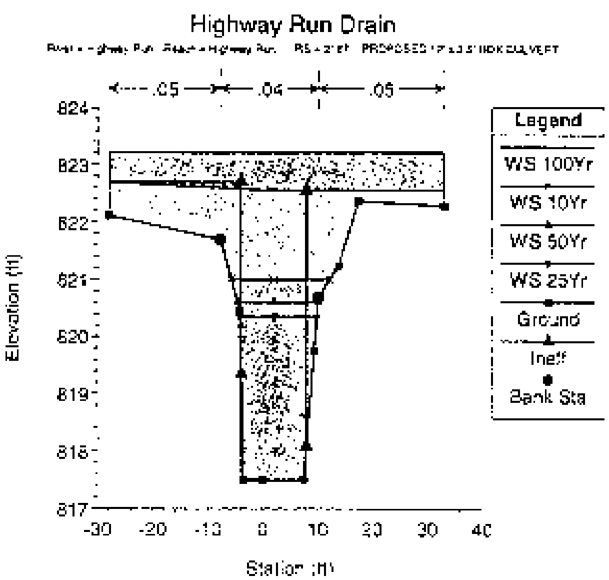
Station (ft)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Ineff
Bank Sta
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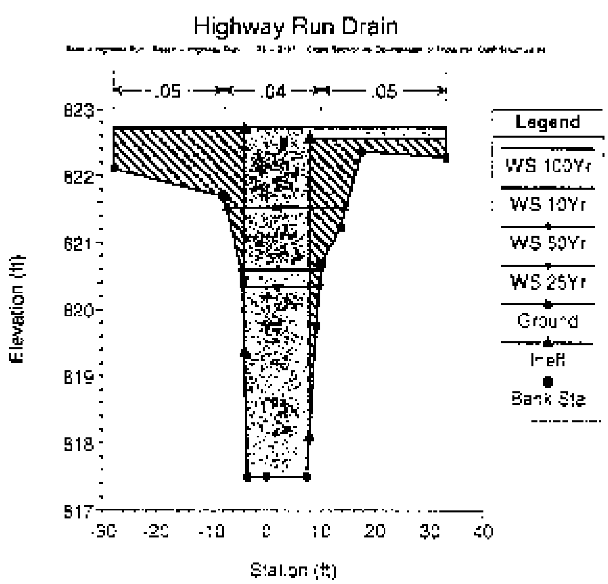
Station (ft)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Ineff
Bank Sta
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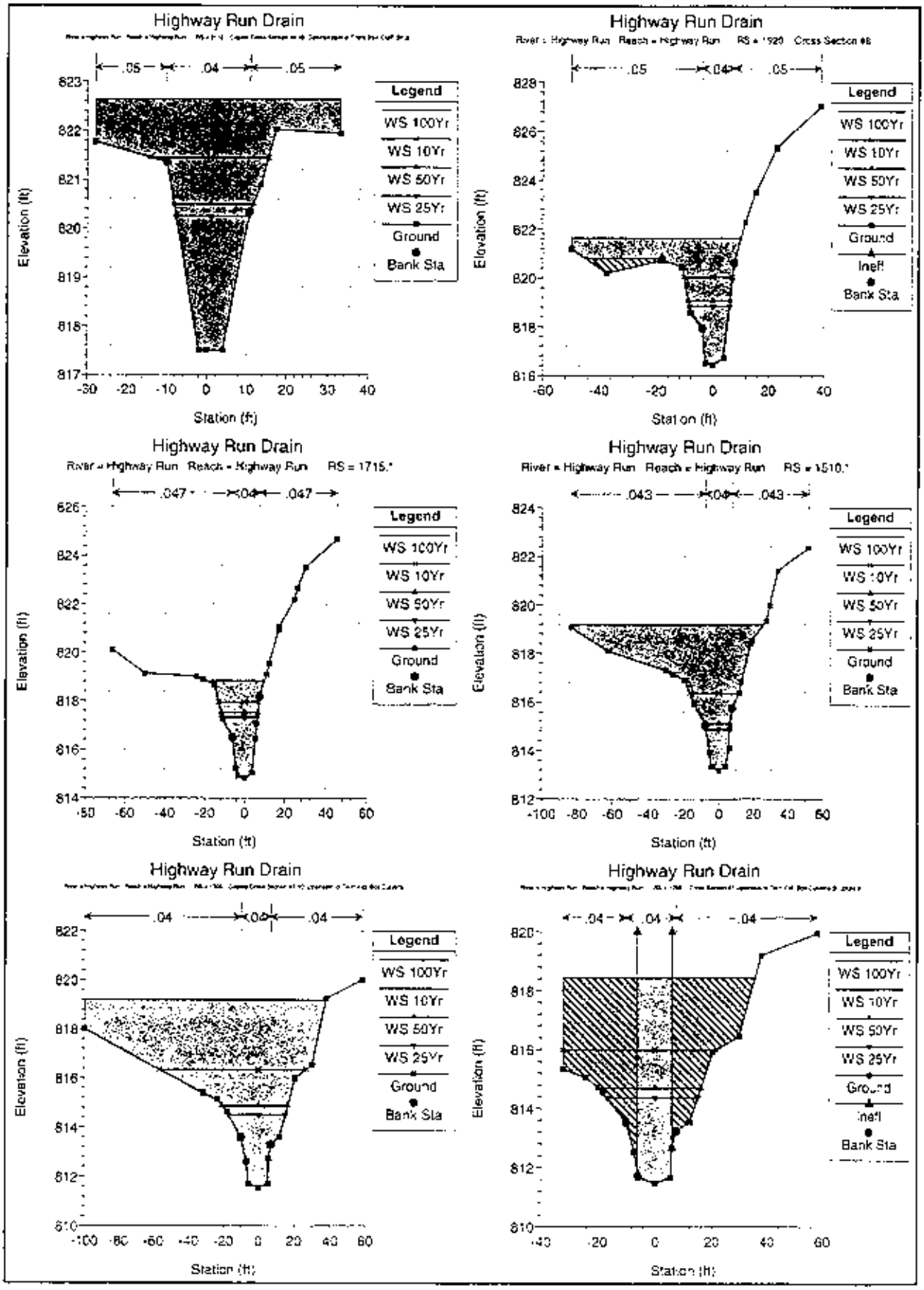
Station (ft)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WS 25Yr
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Bank Sta
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Station (ft)
Highway Run Drain
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.05
.04
.05
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WS 10Yr
WS 50Yr
WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
River = Highway Run Reach = Highway Run RS = 1715.*
.047
.04
.047
Legend
WS 100Yr
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
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.043
.04
.043
Legend
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WS 10Yr
WS 50Yr
WS 25Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
.04
.04
Legend
WS 100Yr
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
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Ineff
Bank Sta
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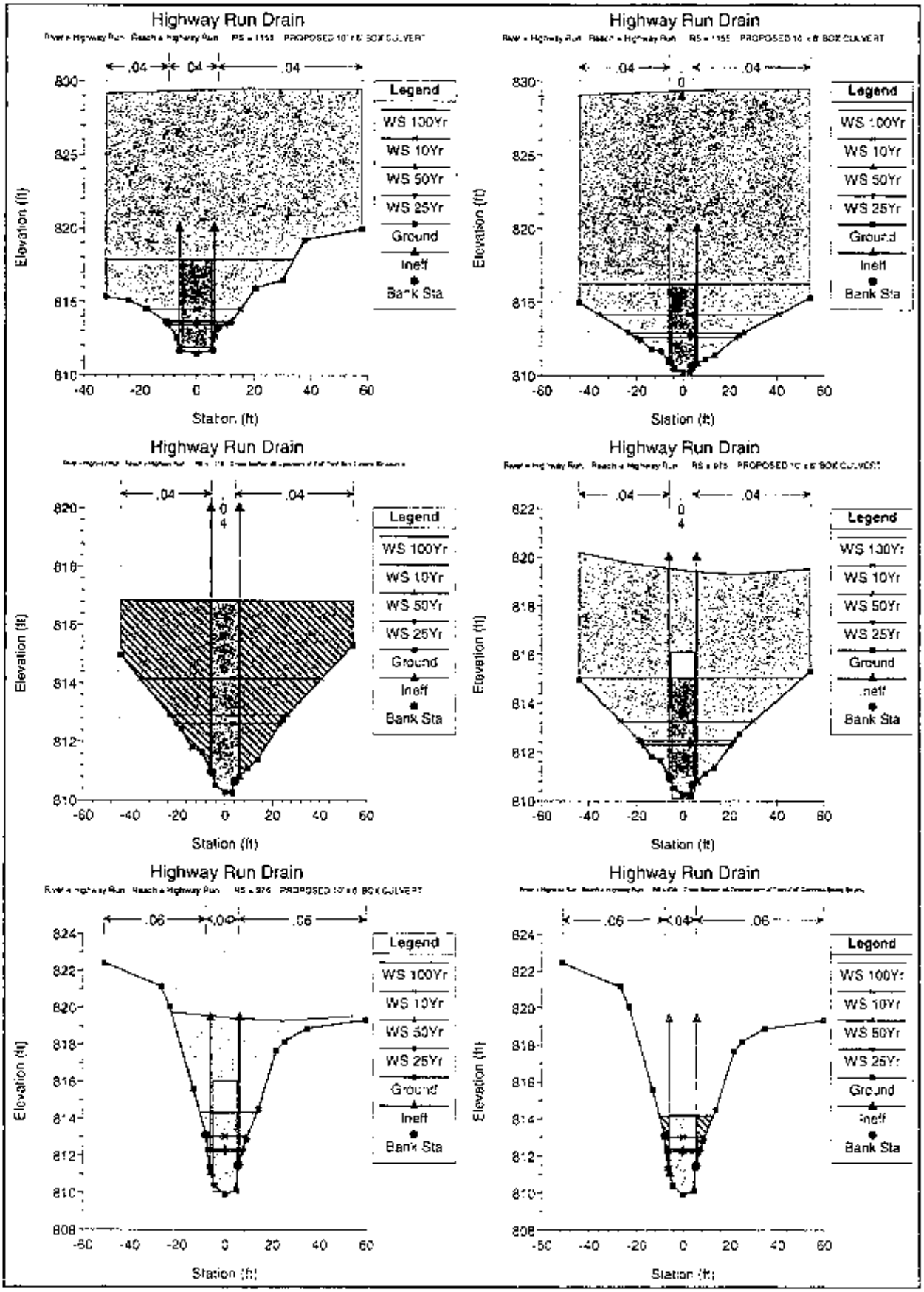
Station (ft)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Legend
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Ground
Ineff
Bank Sta
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Station (ft)
Highway Run Drain
.04
.04
.04
Legend
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WS 10Yr
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WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
.04
Legend
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WS 10Yr
WS 50Yr
WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
.04
Legend
WS 100Yr
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.06
.04
.06
Legend
WS 100Yr
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.06
.04
.06
Legend
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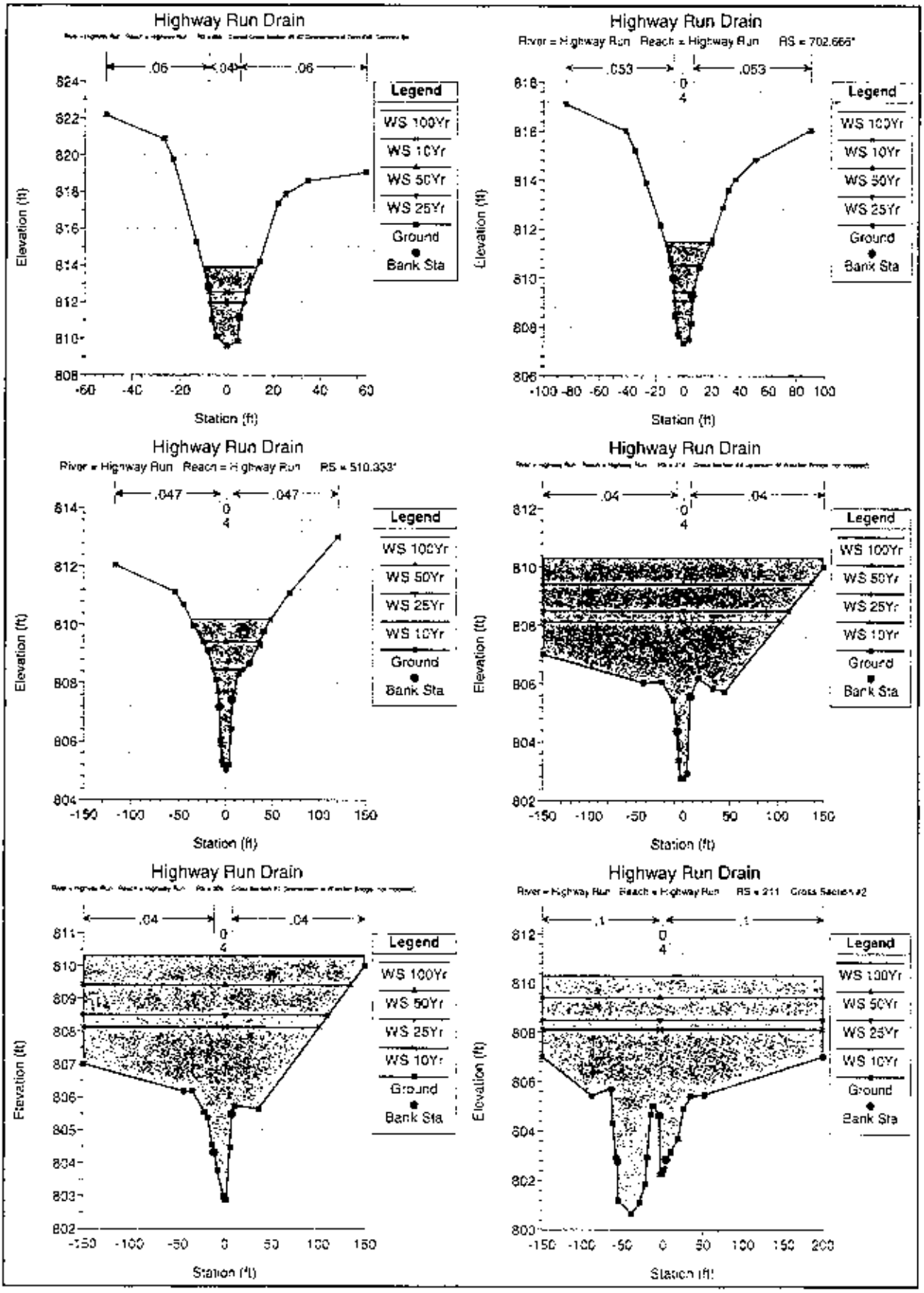
WS 10Yr
WS 50Yr
WS 25Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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.06
.04
.06
Legend
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WS 10Yr
WS 50Yr
WS 25Yr
Ground
Bank Sta
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Station (ft)
Highway Run Drain
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.053
.053
Legend
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WS 10Yr
WS 50Yr
WS 25Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
River = Highway Run Reach = Highway Run RS = 510.333*
.047
.047
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
.04
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
.04
.04
Legend
WS 100Yr
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WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Highway Run Drain
River = Highway Run Reach = Highway Run RS = 211 Gross Section #2
.1
.1
Legend
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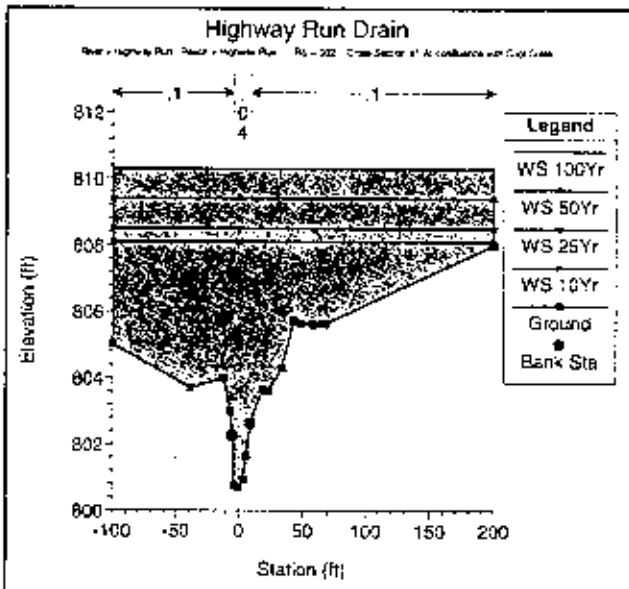
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Highway Run Drain
1
1
0
4
812
810
808
806
804
802
800
-100
-50
0
50
100
150
200
Elevation (ft)
Station (ft)
Legend
WS 100Yr
WS 50Yr
WS 25Yr
WS 10Yr
Ground
Bank Sta

HEC-RAS Plan: Proposed River: Highway Run Reach: Highway Run

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Highway Run	4753	186.00	845.28	853.06		853.08	0.000018	0.45	527.89	149.61	0.03
Highway Run	4733	67.00	845.28	849.04		849.05	0.000452	1.11	73.90	68.89	0.15
Highway Run	4733	56.00	845.28	848.58		848.61	0.001008	1.49	45.18	54.37	0.21
Highway Run	4733	88.00	845.28	849.96		849.97	0.000113	0.75	147.48	90.30	0.08
Highway Run	4723	186.00	845.21	853.04	848.57	852.05	0.000226	1.25	179.29	67.52	0.12
Highway Run	4723	67.00	845.21	848.62	847.04	848.00	0.001743	3.34	20.07	49.93	0.32
Highway Run	4723	56.00	845.21	848.39	846.67	848.55	0.001935	3.21	17.46	41.25	0.33
Highway Run	4723	88.00	845.21	849.73	847.36	849.91	0.001354	3.45	25.49	56.90	0.30
Highway Run	4688	Culvert									
Highway Run	4652	186.00	844.39	847.88	846.60	848.18	0.003291	4.40	42.31	64.40	0.44
Highway Run	4652	67.00	844.39	846.15	845.66	846.36	0.007090	3.88	18.21	31.93	0.57
Highway Run	4652	56.00	844.39	845.95	845.57	846.15	0.008294	3.62	15.47	27.73	0.60
Highway Run	4652	88.00	844.39	846.48	845.89	846.71	0.005776	3.86	22.81	33.25	0.53
Highway Run	4630	Culvert									
Highway Run	4607	186.00	844.09	846.37	846.37	847.37	0.019328	8.30	73.25	54.65	1.00
Highway Run	4607	67.00	844.09	845.80	845.39	846.05	0.007874	4.06	16.49	31.76	0.60
Highway Run	4607	56.00	844.09	845.58	845.28	845.89	0.007299	3.70	15.15	28.94	0.57
Highway Run	4607	88.00	844.09	845.90	845.59	846.29	0.010941	4.86	17.75	32.14	0.71
Highway Run	4567	186.00	843.81	845.83	845.83	846.34	0.017630	6.13	34.44	32.88	0.91
Highway Run	4567	67.00	843.81	845.09	845.09	845.45	0.022358	5.15	13.46	18.82	0.97
Highway Run	4567	56.00	843.81	844.98	844.98	845.36	0.024581	4.92	11.60	17.02	0.97
Highway Run	4567	88.00	843.81	845.31	845.31	845.71	0.019302	5.22	19.25	25.62	0.90
Highway Run	4352	186.00	840.19	845.61		845.65	0.000349	1.77	125.23	49.71	0.15
Highway Run	4352	67.00	840.19	842.97		843.03	0.001378	1.98	34.79	20.36	0.26
Highway Run	4352	56.00	840.19	842.69		842.75	0.001541	1.91	29.35	18.24	0.27
Highway Run	4352	88.00	840.19	843.47		843.53	0.001037	1.98	46.14	25.47	0.23
Highway Run	4344	186.00	840.13	845.43	842.57	845.61	0.000878	3.44	54.06	47.24	0.27
Highway Run	4344	67.00	840.13	842.91	841.64	843.01	0.001538	2.54	26.34	20.30	0.29
Highway Run	4344	56.00	840.13	842.64	841.40	842.72	0.001602	2.42	23.36	18.26	0.29
Highway Run	4344	88.00	840.13	843.38	841.76	843.50	0.001451	2.79	31.58	25.15	0.29
Highway Run	4306	Culvert									
Highway Run	4268	186.00	837.96	843.79	840.58	841.65	0.014643	7.44	25.00	17.24	0.87
Highway Run	4268	67.00	837.96	839.76	839.43	843.11	0.011115	4.76	14.07	15.88	0.76
Highway Run	4268	56.00	837.96	839.62	839.29	839.92	0.010657	4.42	12.68	13.42	0.68
Highway Run	4268	88.00	837.96	840.00	839.68	842.44	0.012001	5.25	16.44	14.55	0.74
Highway Run	4236	186.00	837.74	840.58		841.07	0.009419	5.36	34.89	17.41	0.67
Highway Run	4236	67.00	837.74	839.49		839.73	0.009387	3.95	16.97	13.71	0.63
Highway Run	4236	56.00	837.74	839.34		839.56	0.009452	3.75	14.95	13.23	0.62
Highway Run	4236	88.00	837.74	839.70		840.02	0.009466	4.31	20.43	14.51	0.64
Highway Run	3983.5*	186.00	835.30	928.13		938.58	0.010362	5.38	34.55	18.08	0.71
Highway Run	3983.5*	67.00	835.30	837.13		937.36	0.009360	3.84	17.45	15.06	0.63
Highway Run	3983.5*	56.00	835.30	837.00		837.20	0.009112	3.60	15.56	14.51	0.61
Highway Run	3983.5*	88.00	835.30	837.37		837.64	0.009312	4.16	21.17	16.09	0.64
Highway Run	3731*	186.00	832.65	835.65		926.06	0.009515	5.41	36.43	20.71	0.68
Highway Run	3731*	67.00	832.65	834.67		834.99	0.010186	3.76	17.82	17.21	0.65
Highway Run	3731*	56.00	832.65	834.54		834.74	0.010441	3.59	15.59	16.52	0.65
Highway Run	3731*	88.00	832.65	834.96		835.15	0.010617	4.17	21.10	17.92	0.68
Highway Run	3478.5*	186.00	830.41	832.94	832.62	833.39	0.021916	5.40	34.43	21.28	0.75
Highway Run	3478.5*	67.00	830.41	832.10		832.32	0.010184	3.72	18.02	17.75	0.65
Highway Run	3478.5*	56.00	830.41	831.99	831.71	832.18	0.009820	3.47	16.15	17.22	0.63
Highway Run	3478.5*	88.00	830.41	832.23	831.89	832.57	0.009519	3.97	22.17	18.90	0.65
Highway Run	3226	186.00	827.97	830.46	829.94	830.82	0.008813	4.84	38.39	22.30	0.65
Highway Run	3226	67.00	827.97	829.41		829.62	0.011187	3.79	17.66	17.93	0.67
Highway Run	3226	56.00	827.97	829.29	829.05	829.49	0.011605	3.62	15.46	17.40	0.68
Highway Run	3226	88.00	827.97	829.57		829.85	0.012106	4.27	20.61	18.62	0.72
Highway Run	3005.1*	186.00	826.05	829.55		829.73	0.005283	3.39	56.55	30.60	0.39
Highway Run	3005.1*	67.00	826.05	828.15	827.48	828.28	0.005377	2.59	24.90	15.74	0.41
Highway Run	3005.1*	56.00	826.05	828.00	827.39	828.10	0.005784	2.54	22.04	15.21	0.41

HEC-RAS Plan: Proposed River: Highway Run Reach: Highway Run (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Highway Run	3005.*	89.00	826.05	828.62	827.65	829.72	0.002602	2.59	34.90	25.35	0.55
Highway Run	2784	350.00	824.13	829.21		829.40	0.001031	2.65	177.75	114.69	0.25
Highway Run	2784	85.00	824.13	825.76	825.76	826.30	0.024752	5.92	14.36	13.46	1.01
Highway Run	2784	71.00	824.13	825.62	825.62	826.11	0.025408	5.67	12.52	12.78	1.01
Highway Run	2784	180.00	824.13	826.91		827.37	0.010630	5.46	33.29	21.08	0.72
Highway Run	2778	350.00	823.80	828.97	825.62	829.33	0.003815	4.75	99.95	100.67	0.46
Highway Run	2778	85.00	823.80	825.71	825.11	825.94	0.005122	3.86	22.01	15.04	0.59
Highway Run	2778	71.00	823.80	825.49	824.58	825.78	0.005675	3.72	19.08	14.37	0.55
Highway Run	2778	180.00	823.80	826.91	825.84	827.25	0.004497	4.65	38.71	21.96	0.69
Highway Run	2737	Culvert									
Highway Run	2698	350.00	823.58	827.44	826.60	828.22	0.007581	7.12	49.17	27.93	0.67
Highway Run	2698	85.00	823.58	825.52	824.92	825.75	0.006177	3.80	22.37	14.93	0.53
Highway Run	2698	71.00	823.58	825.34	824.78	825.54	0.006294	3.58	19.84	14.30	0.53
Highway Run	2698	180.00	823.58	826.44	825.64	826.84	0.006125	5.12	35.19	16.20	0.57
Highway Run	2668	350.00	823.06	826.54	826.54	827.75	0.016146	8.92	42.03	20.85	0.94
Highway Run	2668	85.00	823.06	824.68	824.68	825.28	0.024582	6.78	13.67	11.56	1.01
Highway Run	2668	71.00	823.06	824.53	824.53	825.08	0.025082	6.93	11.57	11.11	1.01
Highway Run	2668	180.00	823.06	825.48	825.48	826.36	0.021777	7.58	28.89	14.31	1.00
Highway Run	2434	350.00	818.50	825.65		825.67	0.000188	1.57	340.03	148.37	0.11
Highway Run	2434	85.00	818.50	821.28		821.36	0.001629	2.31	36.80	17.28	0.28
Highway Run	2434	71.00	818.50	820.97		821.05	0.001718	2.24	31.66	16.26	0.28
Highway Run	2434	180.00	818.50	823.90		823.10	0.001010	2.52	78.70	41.59	0.24
Highway Run	2422	350.00	818.40	825.60	821.35	825.66	0.000266	1.76	359.93	153.29	0.12
Highway Run	2422	85.00	818.40	821.26	819.65	821.34	0.001258	2.35	36.20	17.48	0.26
Highway Run	2422	71.00	818.40	820.96	819.51	821.03	0.001336	2.22	31.99	16.47	0.26
Highway Run	2422	180.00	818.40	822.94	820.39	823.08	0.001073	3.01	59.74	41.87	0.26
Highway Run	2404	Culvert									
Highway Run	2386	400.00	818.20	825.03	821.38	825.02	0.000253	1.76	353.93	157.64	0.12
Highway Run	2386	113.00	818.20	821.17	819.57	821.30	0.001871	2.90	37.99	16.28	0.31
Highway Run	2386	91.00	818.20	820.88	819.41	820.99	0.001785	2.67	34.09	15.95	0.30
Highway Run	2386	220.00	818.20	822.65	820.36	822.87	0.001824	3.75	58.73	46.78	0.32
Highway Run	2338	400.00	818.00	824.96		825.01	0.000345	2.01	297.56	145.48	0.15
Highway Run	2338	110.00	818.00	821.06		821.19	0.002717	2.95	37.35	16.46	0.36
Highway Run	2338	91.00	818.00	820.76		820.88	0.002921	2.84	32.04	17.25	0.37
Highway Run	2338	220.00	818.00	822.60		822.75	0.001726	3.68	75.35	36.00	0.31
Highway Run	2322	400.00	817.90	824.93		824.99	0.000515	2.45	236.87	97.70	0.19
Highway Run	2322	110.00	817.90	820.84		821.11	0.005943	4.16	26.43	12.99	0.51
Highway Run	2322	91.00	817.90	820.56		820.80	0.006063	3.99	22.80	12.39	0.52
Highway Run	2322	220.00	817.90	822.39		822.69	0.003552	4.43	53.63	29.07	0.43
Highway Run	2310	400.00	817.80	824.85	821.08	824.96	0.000746	2.89	192.59	88.02	0.20
Highway Run	2310	110.00	817.80	820.87	819.26	821.00	0.002120	2.95	37.26	12.77	0.31
Highway Run	2310	91.00	817.80	820.58	819.09	820.70	0.002014	2.71	33.64	13.62	0.30
Highway Run	2310	220.00	817.80	822.40	820.06	822.62	0.002054	3.82	58.18	30.64	0.32
Highway Run	2292	Culvert									
Highway Run	2255	400.00	817.70	823.44	821.25	823.68	0.002298	4.25	128.35	81.45	0.35
Highway Run	2255	110.00	817.70	820.78	819.29	820.94	0.002747	3.78	34.62	13.39	0.35
Highway Run	2255	91.00	817.70	820.51	819.10	820.64	0.002557	3.53	31.02	12.51	0.33
Highway Run	2255	220.00	817.70	822.12	820.15	822.38	0.002793	4.13	53.01	16.93	0.37
Highway Run	2219	400.00	817.60	823.41		823.57	0.001451	3.41	143.90	75.59	0.26
Highway Run	2219	110.00	817.60	820.71		820.89	0.002382	3.62	39.21	19.60	0.34
Highway Run	2219	91.00	817.60	820.43		820.54	0.002380	3.69	29.96	17.52	0.34
Highway Run	2219	220.00	817.60	822.09		822.25	0.002040	3.21	68.98	31.09	0.33
Highway Run	2207	400.00	817.50	823.33	820.95	823.52	0.001875	4.03	154.01	75.00	0.31
Highway Run	2207	110.00	817.50	820.61	819.06	820.80	0.001985	3.12	35.29	14.09	0.29
Highway Run	2207	91.00	817.50	820.39	818.91	820.51	0.001849	2.93	32.17	13.76	0.32
Highway Run	2207	220.00	817.50	821.98	819.85	822.19	0.002465	4.09	58.12	23.45	0.39
Highway Run	2187	Culvert									

HEC-RAS Plan: Proposed River: Highway Run Reach: Highway Run (Continued)

Reach	River Sta	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
Highway Run	2167	400.00	817.50	822.74	820.85	823.04	0.002938	4.87	109.48	61.10	0.40
Highway Run	2167	110.00	817.50	820.59	818.92	820.73	0.001781	3.01	36.48	14.51	0.30
Highway Run	2167	91.00	817.50	820.34	818.75	820.46	0.001620	2.72	33.50	14.18	0.29
Highway Run	2167	220.00	817.50	821.53	819.73	821.66	0.002908	4.61	47.75	22.07	0.41
Highway Run	2119	400.00	817.50	822.65		822.88	0.002219	4.18	122.77	61.10	0.37
Highway Run	2119	110.00	817.50	820.50		820.62	0.002581	2.87	38.41	20.02	0.36
Highway Run	2119	91.00	817.50	820.35		820.36	0.002597	2.71	33.63	19.47	0.35
Highway Run	2119	220.00	817.50	821.45		821.66	0.002950	5.77	60.58	29.79	0.43
Highway Run	1920	510.00	816.44	821.64	820.45	822.14	0.005789	6.65	114.45	60.08	0.56
Highway Run	1920	137.00	816.44	819.08	818.74	819.58	0.010937	5.85	26.55	15.15	0.70
Highway Run	1920	114.00	816.44	818.94	818.50	819.31	0.011148	5.57	22.04	14.55	0.70
Highway Run	1920	241.00	816.44	820.04	819.46	820.84	0.009415	6.52	41.27	17.53	0.68
Highway Run	1715.*	510.00	814.81	818.85	818.76	820.19	0.016056	9.60	61.33	30.12	0.94
Highway Run	1715.*	137.00	814.81	817.53	816.83	817.85	0.005347	4.66	31.72	19.04	0.55
Highway Run	1715.*	114.00	814.81	817.33	816.62	817.61	0.005005	4.32	29.58	18.28	0.53
Highway Run	1715.*	241.00	814.81	817.95	817.62	818.58	0.010626	6.59	40.26	20.72	0.73
Highway Run	1510.*	510.00	813.17	818.19		819.31	0.000976	3.41	234.88	109.00	0.26
Highway Run	1510.*	137.00	813.17	815.10		815.73	0.016852	6.26	21.88	14.89	0.82
Highway Run	1510.*	114.00	813.17	814.86	814.82	815.47	0.021478	6.27	18.19	13.74	0.86
Highway Run	1510.*	241.00	813.17	816.56		816.81	0.006813	5.54	46.29	28.55	0.60
Highway Run	1305	510.00	811.54	819.20		819.22	0.000127	1.49	486.40	137.69	0.10
Highway Run	1305	137.00	811.54	814.87		814.96	0.001152	2.42	65.40	37.69	0.25
Highway Run	1305	114.00	811.54	814.51		814.60	0.001375	2.41	52.77	32.56	0.27
Highway Run	1305	241.00	811.54	816.34		816.40	0.000573	2.25	148.60	83.48	0.18
Highway Run	1295	510.00	811.47	818.44	815.41	819.04	0.002310	6.20	82.29	58.35	0.42
Highway Run	1295	137.00	811.47	814.89	813.17	814.30	0.002343	3.58	37.23	35.94	0.37
Highway Run	1295	114.00	811.47	814.37	812.99	814.55	0.002338	3.42	33.37	31.72	0.36
Highway Run	1295	241.00	811.47	815.98	813.90	816.31	0.002268	4.57	52.76	54.03	0.38
Highway Run	1155	Culvert									
Highway Run	1016	510.00	810.24	816.83	814.27	817.52	0.002770	5.70	76.49	58.40	0.47
Highway Run	1016	137.00	810.24	812.91	812.35	813.24	0.004840	4.72	29.38	49.54	0.63
Highway Run	1016	114.00	810.24	812.62	811.97	812.92	0.005058	4.46	25.96	43.80	0.63
Highway Run	1016	241.00	810.24	814.15	812.78	814.61	0.003801	5.48	44.36	76.74	0.56
Highway Run	978	Culvert									
Highway Run	935	510.00	809.87	814.19	814.07	816.01	0.014819	10.87	47.46	23.48	0.96
Highway Run	935	137.00	809.87	812.35	811.82	812.81	0.008461	5.43	25.40	15.10	0.65
Highway Run	935	114.00	809.87	812.21	811.69	812.57	0.007273	4.85	23.71	14.67	0.60
Highway Run	935	241.00	809.87	813.02	812.56	813.64	0.010820	7.28	33.46	17.32	0.76
Highway Run	895	510.00	809.59	813.90		815.20	0.013108	9.41	61.47	25.42	0.96
Highway Run	895	137.00	809.59	811.98	811.65	812.44	0.010167	5.43	25.95	14.83	0.69
Highway Run	895	114.00	809.59	811.82	811.55	812.26	0.007797	4.67	24.94	14.64	0.60
Highway Run	895	241.00	809.59	812.53		813.35	0.014059	7.32	34.48	16.51	0.83
Highway Run	732.666*	510.00	807.31	811.48	811.48	812.88	0.012519	9.18	66.94	33.17	0.85
Highway Run	732.666*	137.00	807.31	809.45		810.03	0.015417	6.12	22.44	14.27	0.93
Highway Run	732.666*	114.00	807.31	809.09	809.09	809.73	0.023505	6.69	17.27	12.98	1.00
Highway Run	732.666*	241.00	807.31	810.53	809.98	811.13	0.008789	6.29	41.11	21.92	0.68
Highway Run	510.333*	510.00	805.03	810.19		810.50	0.002876	6.22	152.75	86.56	0.43
Highway Run	510.333*	137.00	805.03	809.41		809.46	0.000554	2.22	94.87	82.42	0.19
Highway Run	510.333*	114.00	805.03	809.46		809.56	0.001360	2.64	46.94	22.94	0.27
Highway Run	510.333*	241.00	805.03	807.70	807.07	809.56	0.018335	7.58	31.24	18.23	0.96
Highway Run	318	510.00	802.75	810.32		810.33	0.000021	0.67	1095.16	350.00	0.04
Highway Run	318	137.00	802.75	809.42		809.42	0.000005	0.25	829.94	285.78	0.02
Highway Run	318	114.00	802.75	809.31		809.31	0.000005	0.22	576.31	283.21	0.02
Highway Run	318	241.00	802.75	809.13		809.14	0.000070	0.54	481.25	253.97	0.07
Highway Run	309	510.00	802.67	810.32		810.32	0.000021	0.67	1095.47	350.00	0.05
Highway Run	309	137.00	802.67	809.42		809.42	0.000004	0.25	827.77	284.72	0.02
Highway Run	309	114.00	802.67	809.30		809.30	0.000005	0.21	579.69	281.99	0.02
Highway Run	309	241.00	802.67	809.12		809.13	0.000067	0.50	482.34	254.24	0.07

HEC-RAS Plan: Proposed River: Highway Run Reach: Highway Run (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Highway Run	211	510.00	802.23	810.31		810.31	0.000037	0.80	1795.58	350.00	0.05
Highway Run	211	137.00	802.23	809.41		809.41	0.000005	0.27	1480.46	350.00	0.02
Highway Run	211	114.00	802.23	808.50		808.50	0.000007	0.30	1163.51	350.00	0.02
Highway Run	211	241.00	802.23	808.11		808.11	0.000047	0.72	1027.39	350.00	0.05
Highway Run	002	510.00	800.68	810.30	804.72	810.30	0.000042	1.30	1509.52	300.00	0.05
Highway Run	002	137.00	800.68	809.40	802.62	809.40	0.000005	0.34	1239.63	300.00	0.02
Highway Run	002	114.00	800.68	808.50	802.44	808.50	0.000007	0.38	989.62	300.00	0.02
Highway Run	002	241.00	800.68	808.10	803.22	808.10	0.000047	0.88	849.61	300.00	0.05

APPENDIX G

DETAILED COST ESTIMATES

Project Cost Estimates
Cool Creek Watershed Management Plan

Description	Unit	Quantity	Unit Price	Total
151st Street				
Roadway Elevation Modification	TN	150	$40	$6,000
Milling, Striping, Surface Restoration, Traffic Control	LS	1	n/a	$1,000
			Subtotal	$7,000
			Contingency (20%)	$1,400
			Total Estimated Construction	$8,400
			Engineering, Legal, Administration (20%)	$1,680
			151st Street Project Total	**$10,080**
			SAY	**$10,000**
171st Street				
Roadway Elevation Modification	TN	750	$40	$30,000
Milling, Striping, Surface restoration, Traffic Control	LS	1	n/a	$3,000
Superstructure Removal	LS	1	n/a	$60,000
Superstructure	LS	1	n/a	$175,000
Roadway Approaches	LS	1	n/a	$40,000
New Abutments and Pier (including removal of existing)	LS	1	n/a	$175,000
Soil Borings	LS	1	n/a	$5,000
			Subtotal	$488,000
			Contingency (20%)	$97,600
			Total Estimated Construction	$585,600
			Engineering, Legal, Administration (20%)	$117,120
			171st Street Project Total	**$702,720**
			SAY	**$700,000**
Gurley Street				
Superstructure Removal	LS	1	n/a	$20,000
Superstructure	LS	1	n/a	$60,000
Roadway Approaches	LS	1	n/a	$40,000
New Abutments (including removal of existing)	LS	1	n/a	$70,000
Soil Borings	LS	1	n/a	$5,000
			Subtotal	$195,000
			Contingency (20%)	$39,000
			Total Estimated Construction	$234,000
			Engineering, Legal, Administration (20%)	$46,800
			Gurley Street Project Total	**$280,800**
			SAY	**$280,000**

Project Cost Estimates
Cool Creek Watershed Management Plan

Description	Unit	Quantity	Unit Price	Total
Cherry Street				
Superstructure Removal	LS	1	n/a	$30,000
Superstructure	LS	1	n/a	$60,000
Roadway Approaches	LS	1	n/a	$40,000
Widening Abutments	LS	1	n/a	$100,000
Soil Borings	LS	1	n/a	$5,000
			Subtotal	$235,000
			Contingency (20%)	$47,000
			Total Estimated Construction	$282,000
			Engineering, Legal, Administration (20%)	$56,400
			Cherry Street Project Total	**$338,400**
			SAY	**$340,000**
Carmel Drive Overtopping (Hot Lick Creek)				
10' x 4' Concrete Box Culvert	LF	120	$350	$42,000
45^0 Wingwall	EA	2	$5,000	$10,000
Pavement Restoration	SY	70	$50	$3,500
Channel Regrading and Shaping	LS	1	n/a	$6,000
			Subtotal	$61,500
			Contingency (20%)	$12,300
			Total Estimated Construction	$73,800
			Engineering, Legal, Administration (20%)	$14,760
			Cherry Street Project Total	**$88,560**
			SAY	**$90,000**
Swimming Pool Inundation (Hot Lick Creek)				
Channel Regrading and Shaping	LS	1	n/a	$6,000
			Subtotal	$6,000
			Contingency (20%)	$1,200
			Total Estimated Construction	$7,200
			Engineering, Legal, Administration (20%)	$1,440
			Cherry Street Project Total	**$8,640**
			SAY	**$10,000**

Project Cost Estimates
Cool Creek Watershed Management Plan

Description	Unit	Quantity	Unit Price	Total
Streambank Erosion D/S of Stonehedge Drive (Highway Run)				
Streambank Restoration/Improvements	LF	100	$35	$3,500
			Subtotal	$3,500
			Contingency (20%)	$700
			Total Estimated Construction	$4,200
			Engineering, Legal, Administration (20%)	$840
			Cherry Street Project Total	**$5,040**
			SAY	**$5,000**
Streambank Erosion D/S of Rolling Court (H.G. Kenyan)				
Streambank Restoration/Improvements	LF	250	$40	$10,000
			Subtotal	$10,000
			Contingency (20%)	$2,000
			Total Estimated Construction	$12,000
			Engineering, Legal, Administration (20%)	$2,400
			Cherry Street Project Total	**$14,400**
			SAY	**$15,000**
Streambank Erosion U/S of Confluence with White River				
Streambank Restoration/Improvements	LF	1500	$140	$210,000
			Subtotal	$210,000
			Contingency (20%)	$42,000
			Total Estimated Construction	$252,000
			Engineering, Legal, Administration (20%)	$50,400
			Cherry Street Project Total	**$302,400**
			SAY	**$300,000**

Project Cost Estimates
Cool Creek Watershed Management Plan

Description	Unit	Quantity	Unit Price	Total
Streambank Erosion D/S of Gray Road				
Streambank Restoration/Improvements	LF	200	$250	$50,000
			Subtotal	$50,000
			Contingency (20%)	$10,000
			Total Estimated Construction	$60,000
			Engineering, Legal, Administration (20%)	$12,000
			Cherry Street Project Total	**$72,000**
			SAY	**$75,000**
Streambank Erosion Near Hot Lick Creek Confluence				
Streambank Restoration/Improvements	LF	575	$150	$86,250
			Subtotal	$86,250
			Contingency (20%)	$17,250
			Total Estimated Construction	$103,500
			Engineering, Legal, Administration (20%)	$20,700
			Cherry Street Project Total	**$124,200**
			SAY	**$125,000**
Streambank Erosion U/S of 131st Street				
Streambank Restoration/Improvements	LF	150	$90	$13,500
			Subtotal	$13,500
			Contingency (20%)	$2,700
			Total Estimated Construction	$16,200
			Engineering, Legal, Administration (20%)	$3,240
			Cherry Street Project Total	**$19,440**
			SAY	**$20,000**
Streambank Erosion U/S of Keystone Avenue				
Streambank Restoration/Improvements	LF	100	$180	$18,000
			Subtotal	$18,000
			Contingency (20%)	$3,600
			Total Estimated Construction	$21,600
			Engineering, Legal, Administration (20%)	$4,320
			Cherry Street Project Total	**$25,920**
			SAY	**$30,000**

Project Cost Estimates
Cool Creek Watershed Management Plan

Description	Unit	Quantity	Unit Price	Total
171st Street Regional Stormwater Detention Pond				
Pond Construction/Excavation	CF	4,374,000	$0.35	$1,530,900
Inlet/Outlet Structure	EA	2	$10,000	$20,000
			Subtotal	$1,550,900
			Contingency (20%)	$310,180
			Total Estimated Construction	$1,861,080
			Engineering, Legal, Administration (20%)	$372,216
			Land Acquisition	$330,000
			Cherry Street Project Total	**$2,563,296**
			SAY	**$2,600,000**
Grassy Branch Road Regional Stormwater Detention Pond				
Pond Construction/Excavation	CF	2,646,000	$0.35	$926,100
Inlet/Outlet Structure	EA	2	$10,000	$20,000
			Subtotal	$946,100
			Contingency (20%)	$189,220
			Total Estimated Construction	$1,135,320
			Engineering, Legal, Administration (20%)	$227,064
			Land Acquisition	$480,000
			Cherry Street Project Total	**$1,842,384**
			SAY	**$1,800,000**
Existing Pond Retrofit - Anna Kendall Drain - Railroad Impoundment				
Soil Analysis - Existing Embankment	LS	1	$15,000	$15,000
Dambreak Analysis (Pre-design requirement)	LS	1	$15,000	$15,000
Obtain IDNR Dam Safety Permit	LS	1	$12,000	$12,000
Clearing and Grubbing	LS	1	$10,000	$10,000
Remove Existing Embankment	CY	6000	$8.00	$48,000
Construct New Embankment (Engineered Fill)	CY	12000	$15.00	$180,000
Primary Outlet Structure	LS	1	$30,000	$30,000
Primary Outlet Pipe (72" - 84" diam.)	LF	180	$300.00	$54,000
Emergency Spillway	LS	1	$50,000	$50,000
Restoration and Erosion Control	LS	1	$17,500	$17,500
			Subtotal	$431,500
			Contingency (20%)	$86,300
			Total Estimated Construction	$517,800
			Engineering, Legal, Administration (20%)	$103,560
			Land Acquisition	$75,000
			Anna Kendall Pond Retrofit Project Total	**$696,360**
			SAY	**$700,000**

Project Cost Estimates
Cool Creek Watershed Management Plan

Description	Unit	Quantity	Unit Price	Total
Private Drive Culvert Replacement - Immediately Downstream of US 31 (Highway Run)				
Remove and dispose of existing culvert	LS	1	$4,000	$4,000
Construct new 10' x 6' box culvert (includes excavation)	LF	76	$500	$38,000
Headwall/wingwall	EA	2	$7,500	$15,000
Riprap (w/geotextile fabric)	CY	75	$50	$3,750
Driveway regrading and restoration	LS	1	$7,500	$7,500
			Subtotal	$68,250
			Contingency (20%)	$13,650
			Total Estimated Construction	$81,900
			Engineering, Legal, Administration (20%)	$16,380
			Private Drive @ US 31 Project Total	**$98,280**
			SAY	**$100,000**
US 31 Culvert Replacement (Highway Run)				
Channel Reshaping near culverts	LS	1	$10,000	$10,000
Bore and Jack 84" Casing, 60" RCP	LF	270	$1,600	$432,000
Headwall/wingwall	EA	2	$15,000	$30,000
Riprap w/geotextile fabric	CY	100	$50	$5,000
Restoration	LS	1	$7,500	$7,500
			Subtotal	$484,500
			Contingency (20%)	$96,900
			Total Estimated Construction	$581,400
			Engineering, Legal, Administration (20%)	$116,280
			US 31 Project Total	**$697,680**
			SAY	**$700,000**
Walter Street / Walter Court / Private Crossing Culvert Replacements (Highway Run)				
Sawcut Roadways, Driveways	LF	150	$4	$600
Remove and dispose of existing culverts	EA	3	$2,000	$6,000
Channel reshaping	LF	400	$60	$24,000
12' x 4' Reinforced Concrete Box Culvert	LF	135	$400	$54,000
Headwall/wingwall	EA	6	$5,000	$30,000
Riprap (replace existing riprap in channel)	CY	75	$50	$3,750
Roadway/Driveway Patches	EA	3	$2,000	$6,000
Restoration	LS	1	$10,000	$10,000
			Subtotal	$134,350
			Contingency (20%)	$26,870
			Total Estimated Construction	$161,220
			Engineering, Legal, Administration (20%)	$32,244
			Walter Street Area Culvert Replacement Project Total	**$193,464**
			SAY	**$200,000**

Project Cost Estimates
Cool Creek Watershed Management Plan

Description	Unit	Quantity	Unit Price	Total
Thornberry Drive Culvert Replacement (Highway Run)				
Channel Reshaping near culvert	LS	1	$2,000	$2,000
Sawcut pavement, excavation, culvert removal	LS	1	$4,000	$4,000
11' x 3.5' Reinforced Concrete Box Culvert	LF	78	$400	$31,200
Headwall/wingwall	EA	2	$6,000	$12,000
Riprap w/geotextile fabric	CY	50	$50	$2,500
Pavement patch	SF	600	$5	$3,000
Restoration	LS	1	$3,000	$3,000
			Subtotal	$57,700
			Contingency (20%)	$11,540
			Total Estimated Construction	$69,240
			Engineering, Legal, Administration (20%)	$13,848
			US 31 Project Total	**$83,088**
			SAY	**$80,000**
SR 32 (Main Street) Culvert Replacement (J.M. Thompson Drain)				
Channel Reshaping near culvert	LS	1	$5,000	$5,000
Sawcut pavement, excavation, culvert removal	LS	1	$15,000	$15,000
12' x 8' Reinforced Concrete Box Culvert	LF	200	$650	$130,000
Headwall/wingwall	EA	2	$20,000	$40,000
Riprap w/geotextile fabric	CY	100	$50	$5,000
Pavement patch	SF	1500	$5	$7,500
Traffic Control	LS	1	$5,000	$5,000
Restoration	LS	1	$5,000	$5,000
			Subtotal	$212,500
			Contingency (20%)	$42,500
			Total Estimated Construction	$255,000
			Engineering, Legal, Administration (20%)	$51,000
			US 31 Project Total	**$306,000**
			SAY	**$310,000**

TOTAL OF ALL COST ESTIMATES	**$8,490,000**