REPORT

Little Weiser River Project Modification Report Section 1135(b), Water Resources Development Act of 1986, As Amended

Prepared for

U.S. Army Corps of Engineers

JANUARY 1997

CH2M HILL

Contents

Contents, Continued

Acronyms

Corps	U.S. Army Corps of Engineers
EA	Environmental Assessment
HEP	Habitat Evaluation Procedure
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HSI	Habitat Suitability Index
HU	Habitat Units
SI	Suitability Index

Study Authority

Under Section 1135(b), Water Resources Development Act of 1986, as amended, the Secretary of the Army Corps of Engineers is authorized to carry out a program for the purpose of making such modifications in the structures and operations of water resources projects constructed by the Secretary, which the Secretary determines 1) are feasible and consistent with the authorized project purposes, and 2) will improve the quality of the environment in the public interest. The non-Federal share of the cost of any modifications carried out under this authorization shall be 25 percent. No modifications shall be carried out under this section without specific authorization by Congress if the estimated cost exceeds $5,000,000.

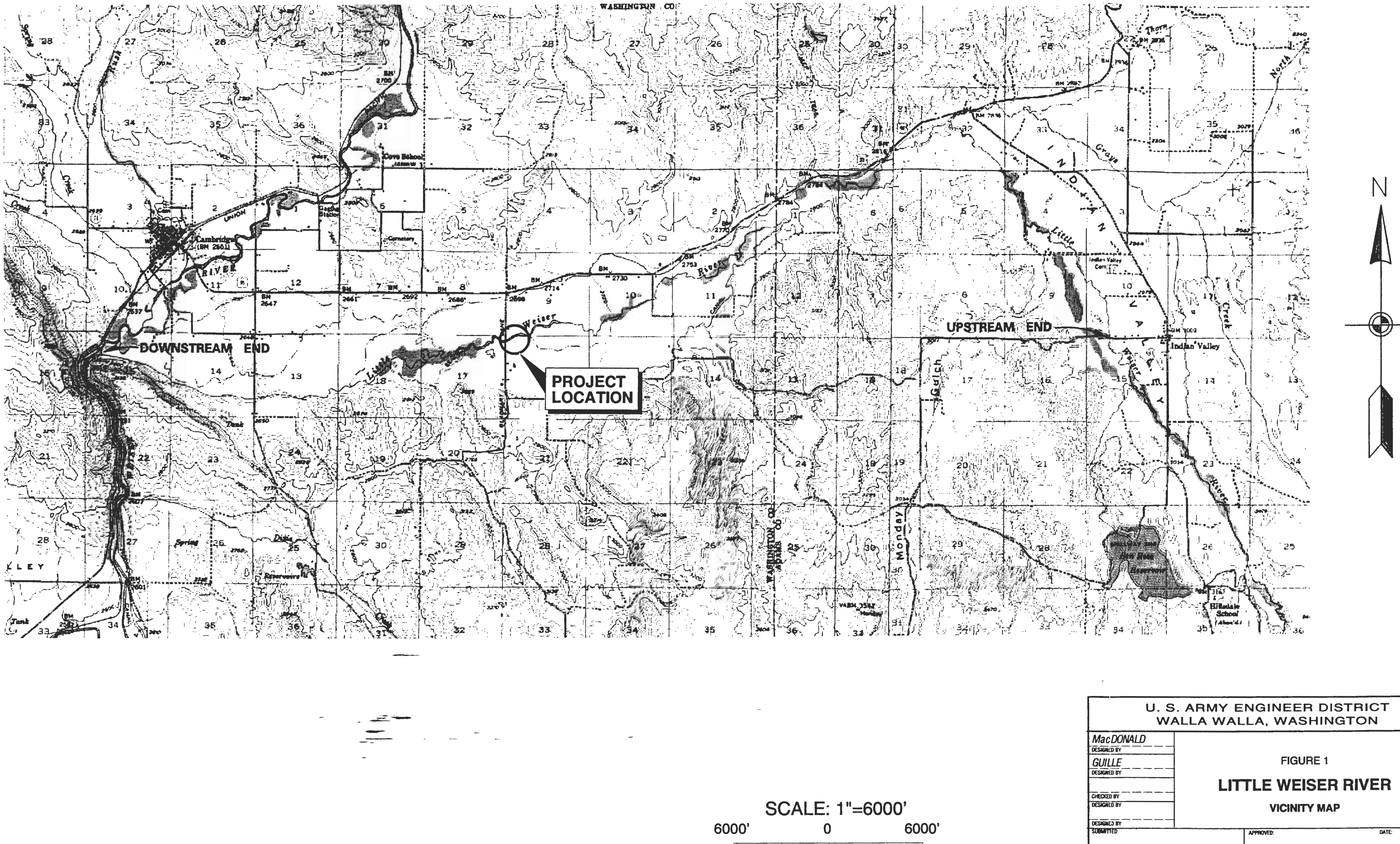
Purpose and Scope

The intent of the Little Weiser River project is to initiate restoration efforts on a section of the Little Weiser River in Idaho, labeled as "Project Location" in Figure 1. The Little Weiser is a tributary of the Weiser River, which is in turn a tributary of the Snake River.

The labels "upstream end" and "downstream end" in Figure 1 define a reach of the Little Weiser River where clearing and snagging projects were conducted by the U.S. Army Corps of Engineers (Corps) during the 1960s and 1970s. This earlier Little Weiser River flood control project has been identified as an area with strong potential for environmental improvement through selected local treatment. A section of the river will be improved to restore or rehabilitate riparian habitat and modify the channel pattern. The Weiser River Flood Control District No. 3 is the local sponsor of the proposed project, and total project cost will not exceed $5,000,000.

Prior Studies, Reports, and Existing Water Projects

The Little Weiser River, approximately 15 miles in length, underwent channel snagging and clearing work by the Corps in 1965 and 1978 for flood control purposes.



U. S. ARMY ENGINEER DISTRICT
WALLA WALLA, WASHINGTON

MacDONALD (DESIGNED BY)	FIGURE 1
GUILLE (DESIGNED BY)	LITTLE WEISER RIVER
CHECKED BY	VICINITY MAP
DESIGNED BY	
SUBMITTED	APPROVED: DATE:
CHIEF	SCALE AS SHOWN
RECOMMENDED:	INV. NO. PLATE NO.

Plan Formulation

Resource Problems and Opportunities

Existing Conditions. In the past, the Little Weiser had a well-vegetated riparian zone and supported trout and salmon populations. A combination of snagging and clearing, channelization, and removal of riparian vegetation throughout a significant portion of at least 15 miles of the Little Weiser River has contributed to an unstable channel with less meanders and higher gradients through straightened reaches.

Portions of the Little Weiser contain stable reaches with well-established, high-quality riparian vegetation. Other sections are experiencing active bank erosion associated with the unstable channel, which has contributed to a loss of riparian zone and subsequent decrease in habitat.

Future Without Project Conditions. Without the proposed action, this stretch of the Little Weiser River channel will remain degraded. Changes in dimension, pattern, and profile have caused a general lack of stability in the conveyance system of the river. Active bank erosion, point bar (inside bend) cutoffs, removal of riparian vegetation, sediment deposition, and channel pattern irregularities are present. Although these features tend to be intermixed with stable, well-vegetated reaches, the capacity of the river system to effectively transport sediment has been reduced, stream gradient has increased in straightened reaches, aquatic and riparian habitat has diminished, and the river's ability to contain and pass flood flows has been altered. These processes would likely persist or continue to magnify as changing flow regimes trigger changes to channel morphology.

Problems and Opportunities. Riparian habitat has been degraded as a result of the unstable channel conditions and eroded banks.

Because of the river widening and shallowing, pump intakes to many irrigation systems are no longer submerged. As a result, some farmers are creating in-stream, temporary diversion structures made of river gravel and cobble. The purpose of these structures is to create enough backwater to divert water for irrigation; the construction and maintenance of these in-stream structures is another in-stream disturbance. These structures have been created at numerous locations within the study area identified in Figure 1; however, no such structures exist within the project location.

Portions of the river have a strong potential for environmental improvement through selected local treatment that would halt the pattern of degradation. Enhancement or restoration of the riparian habitat and modification of the channel pattern in unstable reaches will provide an opportunity to link stable reaches together into longer stretches of quality riparian habitat.

Planning Constraints

The proposed action involves the selection of a site along the 15-mile Little Weiser River that would benefit by channel stabilization and accompanying habitat restoration. The site would also provide a long-range benefit by providing a good example of a long-term solution to channel instability.

The primary constraint centers on budgetary limitations and real estate and easement issues that must be settled before construction. The implementation of selected local treatment offered the opportunity to obtain channel benefits within an adjustable budget. The site for the treatment includes two property owners that have expressed interest in the project in the past.

Alternative Plans

Measures. The pre-project Little Weiser River had a well-vegetated riparian zone that supported trout and salmon populations. Revetment of degraded stretches using natural material would stabilize the channel, allowing the reintroduction or enhancement of riparian habitat.

Reasons for Selecting and Combining Measures. The Weiser River Flood Control District No. 3, the local sponsor, is interested in stabilizing the channel of the Little Weiser River and improving riparian habitat. The Corps identified the opportunity of using Section 1135 to assist the Flood Control District in stabilizing the river channel and halting further degradation of the habitat environment. The most appropriate measures were those that would provide long-term opportunities for achieving habitat enhancement and restoration of a more stable channel. The proposed alternatives were also limited by the funding available for the project.

Screening of Alternative Plans. The approaches selected for analysis were natural revetment and riprap approaches to channel stabilization. The steps taken to develop and screen the alternatives included the following:

1. The problem reach was surveyed to establish the current cross sections.
2. Field inspection by hydrologists and engineers familiar with the natural revetment method as well as traditional channel stabilization methods determined that a section of river immediately upstream of the project reach was relatively stable. This determination was based on the following observations: stream banks in the upstream reach are well vegetated, and compared to the problem reach, the river channel is narrow, water depths are substantially greater, and the banks are not actively eroding. This stable section served as a model for the desired condition relative to channel configuration within the selected problem reach. It was also determined that if the restoration is implemented, this section would provide a good tie-in location to a stable reach. This should provide some protection to the project reach from the active instability prevalent throughout much of the lower Little Weiser.
3. The stable reach was also surveyed to determine typical cross sections and meander patterns (see Figure 2).
4. A new channel based on features of the stable reach was designed for the problem reach. Channel width, depth, and meander patterns would be similar to those present within the stable reach.
5. The Natural Revetment and Riprap Alternatives were developed to fit the specific land and stream conditions that would be created within the problem reach.

Evaluation of Final Alternatives

Two action alternatives and the No Action Alternative were evaluated to compare costs, benefits, and disadvantages or risks. At the conclusion of the evaluation, the Natural

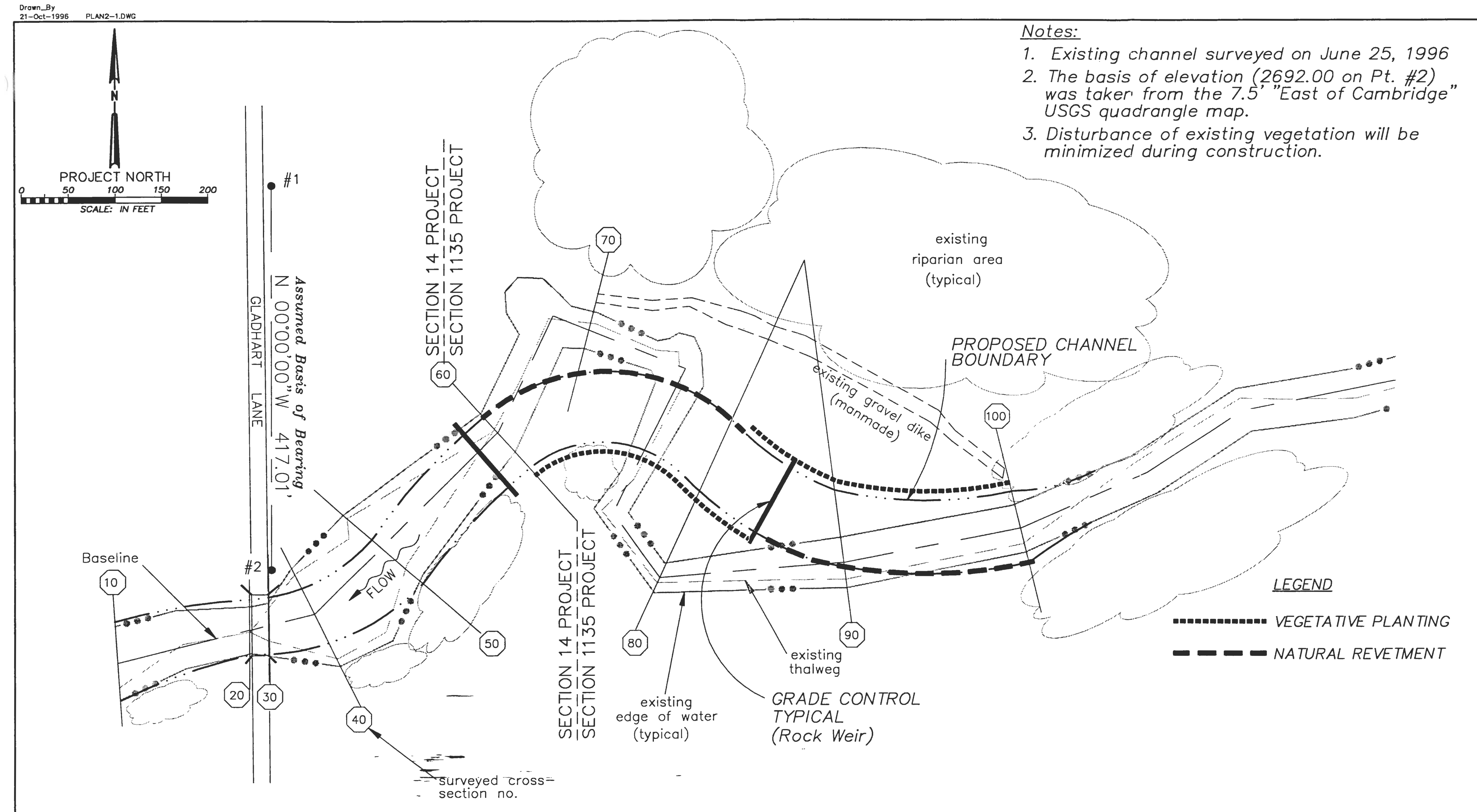


FIGURE 2
SITE PLAN FOR
PREFERRED ALTERNATIVE
LITTLE WEISER RIVER
SECTION 1135

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Revetment Alternative was selected as the Preferred Alternative. The selection was chosen for several reasons, as provided in the following list:

- Consistency with Section 1135 program objectives of environmental enhancement
- Greater fish and wildlife habitat gains
- Aesthetic benefits achieved through a more natural appearance and increased vegetation
- Lower cost
- Long-term stability

Trade-off Analyses

Table 1 presents the alternatives comparison that analyzes the costs, benefits, and disadvantages or risks associated with the Natural Revetment, Riprap, and No Action Alternatives. The results indicate that the Natural Revetment Alternative will achieve the greatest benefit for riparian habitat restoration and environmental enhancement, primary objectives of the Section 1135 program. The area of riparian vegetation and wildlife habitat units that would be gained through the implementation of this alternative are significantly higher than would be obtained through the Riprap Alternative. Table 2 presents an economic analysis of the cost of project construction with habitat units gained for the alternatives.

Final Plan Selection

As stated in ER 1105-2-100, the purpose for the implementation of Section 1135(b) is to modify water resource projects to improve the quality of the environment in the public interest. This is a primary rationale for selecting the Natural Revetment Alternative as the Preferred Alternative.

Existing riparian communities support only limited numbers of wildlife species because of their small size and disjunct nature. The Preferred Alternative would greatly enhance the fisheries habitat and allow more riparian habitat development, as evidenced by the results of the Habitat Evaluation Procedure (HEP), which is described in this section.

TABLE 1
Alternative Comparison

Item Description	Alternatives: Natural Revetment	Alternatives: Riprap	Alternatives: No Action
Costs			
Construction	$420,000	$455,000	0
Operation and Maintenance:			
Year 1 and 2	$5,360	$5,360	$0
Annual Maintenance	$560	$560	$0
Benefits			
Area of riparian vegetation gained	+1.2 acres	+0.3 acres	N/A
Wildlife habitat units gained	2.22	0.48	0
Fisheries habitat benefits[a]	Very good	Minimal	0
Channel stabilization	Very stable over long term	Stable over long term	Very low
Widely used technology	No	Yes	NA
Aesthetic benefits	Very good; natural appearance and greater vegetation	Poor; less natural appearance	None
Recreation benefits	Yes	Minimal	None
Disadvantages or risks			
Short-term bank stability	Stable but a very large flood event may pose problems	Very stable but a very large flood event may pose problems	None
Long-term channel stability	Very stable, at least as stable as riprap after riparian vegetation is established	Same as above	None
Consistency with Section 1135 program objectives	Very good	Moderate	N/A

NA=does not apply
[a] See Section IV of the Environmental Assessment (Appendix A) for detailed list of fisheries habitat benefits. Significant benefits will be gained for aquatic habitat. However, a study was not performed to measure the Habitat Evaluation Procedure (HEP) values likely to be achieved.

TABLE 2
Cost-Effectiveness of Alternatives—Habitat Units

	Natural Revetment	Riprap	No Action
Total Project Cost	$504,000	$614,600	$0
Habitat Units Gained	2.2	.48	0
Cost per Benefit (Habitat Unit)	$227,027	$1,280,416	$0

Long-term effects to the project area resulting from the restoration of the river bank include the addition of 1.2 acres of riparian vegetation consisting of a forested/shrub riparian community along the entire length of the project. The enhanced riparian area is expected to benefit wildlife species that use riparian habitats. Increasing the abundance, structural diversity, contiguity, and plant diversity within the riparian zone will provide greater amounts of roosting and nesting locations for birds, and denning sites for mammals. Restoration of natural river meanders may permit a very small amount of emergent wetland vegetation, primarily sedges (*Carex* spp.) and rushes (*Juncus* spp.) to become established along the relatively flat inside bends of meanders. This will provide habitat for wetland-dependent species, including amphibians and some reptiles. This potential benefit is uncertain and would occur on such a small scale that the potential wildlife benefits are not considered in the HEP analysis.

The HEP is a formalized, quantitative method of evaluating wildlife habitat quality. The measure of habitat quality is combined with the affected acreage of various cover types to determine impacts or benefits associated with water and land development projects. HEP is also used to assess future changes expected to result from implementation of mitigation measures.

HEP uses habitat suitability models to evaluate habitat quality by defining a relationship between selected, measurable habitat variables, such as canopy closure and tree height, with corresponding habitat ratings or scores called a suitability index (SI). These relationships are based on published literature concerning the habitat requirements of the evaluation species. SIs range from 1.0 (optimum habitat value) to 0.0 (no habitat value). SIs for each individual evaluation species variable are combined in an established formula representing the relative importance of the habitat variables. The outcome of this calculation is a habitat suitability index (HSI) value specific to a particular evaluation species and cover type. As with SI values, HSI values also range from 1.0 to 0.0. HSI values (habitat quality) are multiplied by acres of available cover type (area) to determine the number of habitat units (HUs) available for each species in each cover type.

Selection of evaluation species was based on the cover types that would benefit from the proposed project. This includes forest/shrub riparian communities consisting of an overstory of cottonwoods and an understory of willows and hawthorns. The yellow warbler and the song sparrow were selected as evaluation species for the Little Weiser River project. The published models for these species indicate that the yellow warbler model may be applied in deciduous shrubland and scrub/shrub wetland (riparian) and that the song sparrow is appropriately used in deciduous shrubland and shrub-dominated wetland (riparian).

The HEP results presented below are based on a site visit, review of the evaluation species models, and an assessment of the habitat conditions expected to develop within the project area over a period of 10 to 20 years following project implementation. During that time, the willows are expected to form dense stands up to 3 meters in height for both the action alternatives. Cottonwoods are expected to grow to a height of 8 to 12 meters, and the hawthorns should attain a height of 4 meters under the Natural Revetment Alternative. The willows and hawthorns will form dense tall shrub stands under the cottonwoods. The expected values of the variables and the SI values used to derive HSI values for the song sparrow and yellow warbler are shown in Table 3.

The HEP values shown in Table 4 reflect these expected future conditions accounting for the growth of trees and shrubs.

Habitat quality (as expressed by HSI values) for the riparian community under the Natural Revetment Alternative that is expected to develop over time would be quite high because of the dense planting and fencing to exclude livestock. Less opportunity for riparian habitat development exists under the Riprap Alternative, which is reflected

TABLE 3
Estimated Values of Evaluation Species Variables and Corresponding Suitability Index Values

Species/Variable	Natural Revetment Variable Value	Natural Revetment SI	Riprap Variable Value	Riprap SI
Song Sparrow				
Distance to water	2 meters	1.0	2 meters	1.0
Height of overstory shrubs	4 meters	0.9	4 meters	0.9
Shrub crown cover	75%	1.0	40%	1.0
Yellow Warbler				
Shrub crown cover	75%	1.0	40%	0.5
Height of shrub canopy	4 meters	1.0	4 meters	1.0
Percent canopy cover of hydrophytic shrubs	75%	0.8	40%	0.5

TABLE 4
Projected Future HEP Values for Shrub/Forest Riparian Communities in the Little Weiser River Project Area

Alternative	Expected Acreage	Expected HSI Value SS	Expected HSI Value YW	Increase in Habitat Units SS	Increase in Habitat Units YW
Natural Revetment	+1.2	0.95	0.9	1.14	1.08
Riprap	+0.3	0.95	0.5	0.29	0.15
No Action	No change	0	0	0	0

SS=Song Sparrow
YW=Yellow Warbler

by the lower number of HUs that would develop over time (Table 4). The Natural Revetment and Riprap Alternatives would result in increases of 2.22 and 0.48 HUs respectively for the two evaluation species, compared to the No Action Alternative or current conditions (gravel/mud bar).

Description of Selected Plan

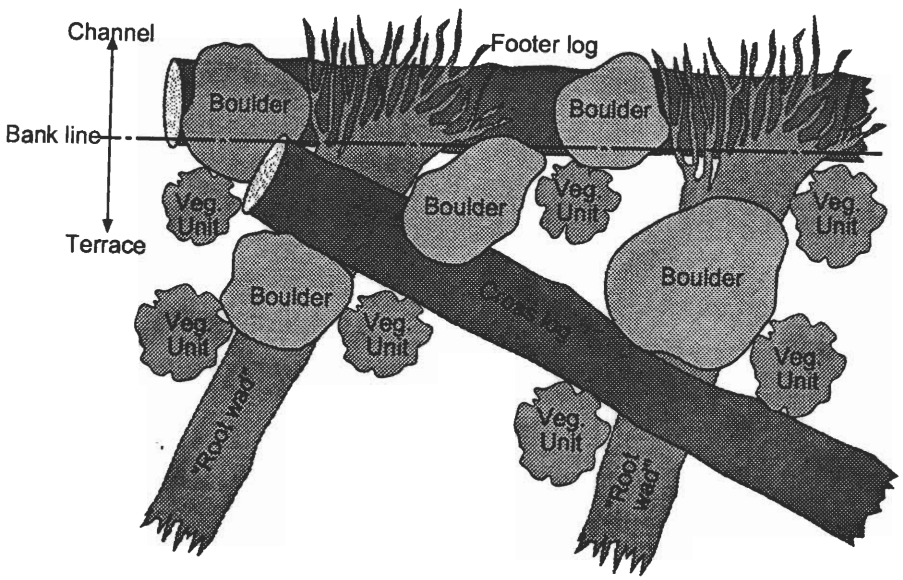
Plan Components

The Natural Revetment Alternative (Figure 2) will modify the cross-sectional geometry and meander pattern of the existing channel, stabilize stream banks with natural material revetments and dense planting, and establish grade control within the channel. Bank erosion would be controlled and riparian and fish habitat would be re-established.

Natural revetment include the use of large diameter logs, root wads, rocks, and dense planting of riparian vegetation. Stabilization features would be designed to function as an integral part of the river system and would include the following:

- Reconfiguration of the existing channel through excavation and backfill to create a meander pattern similar to the more natural, stable reaches of the river. Resulting widths and depths would assist in the management of sediment transport and provide additional stability.
- Natural material revetments to provide bank protection and stabilization. The total shoreline length to be revetted is 621 feet, or about 50 percent of the total shoreline through the project reach. A conceptual view of a natural materials revetment is shown in Figure 3.
- Rock weirs to provide grade control without causing upstream lateral migration, bank erosion, and aggradation. These structures also provide the following: fish cover, deepened feeding areas in the riffle reaches, and a wider range of velocities for fish-holding water at high flow. These benefits are obtained without causing sediment deposition or significant backwater. They also maintain a low width-to-depth ratio that reduces the likelihood of bar deposition and maintains the sediment transport capacity of the stream. Large, 2- to 4-foot-diameter rocks would be placed as shown in Figure 4. The boulders above the channel invert are spaced apart to maintain sediment transport. The footer rocks are placed immediately downstream to prevent local bed scour.
- Re-establishment of riparian vegetation along the river banks to provide long-term channel stability. Plantings will be incorporated as part of the bank stabilization and are described more fully below.

As measured along the stream centerline, the existing channel reach is 954 feet long; the improved channel length would be 600 feet long. Although the improved channel reach is shorter than the existing unstable reach, it more closely replicates the meander curvature of nearby stable river reaches. The existing reach is longer only because the channel banks have extensively eroded in a lateral direction and the local sediment transport capacity of the river has diminished.



PLAN VIEW
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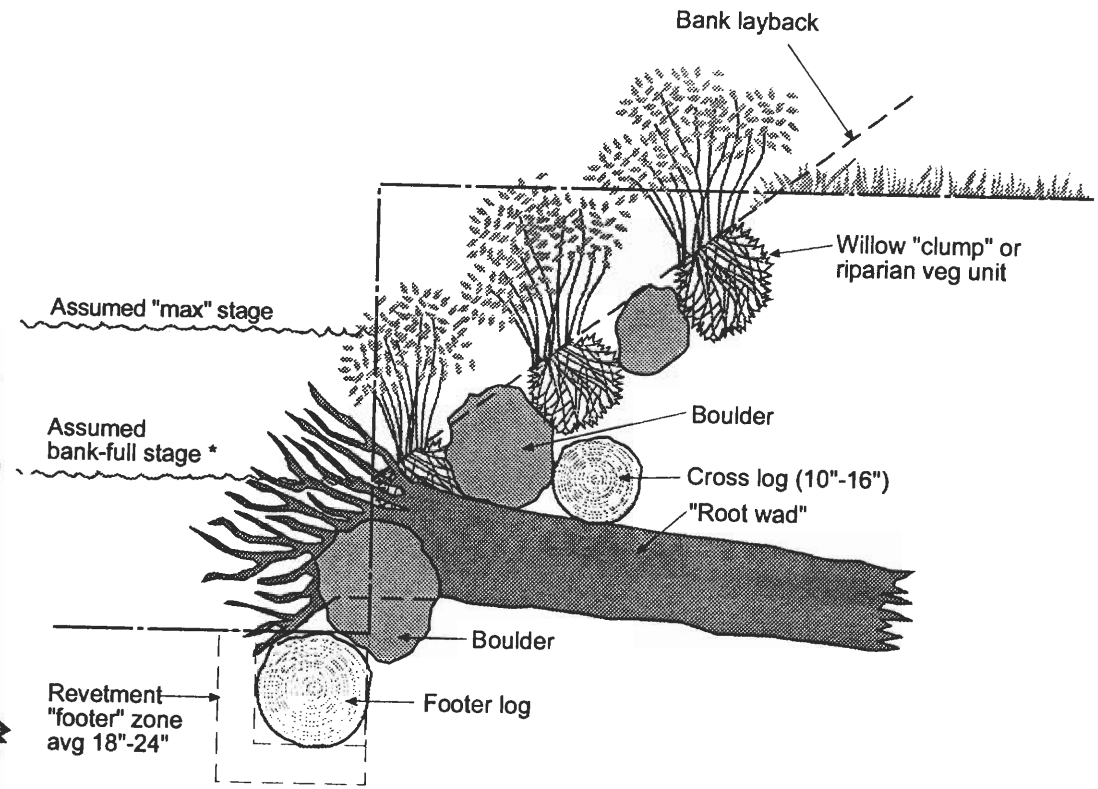

CROSS SECTION VIEW
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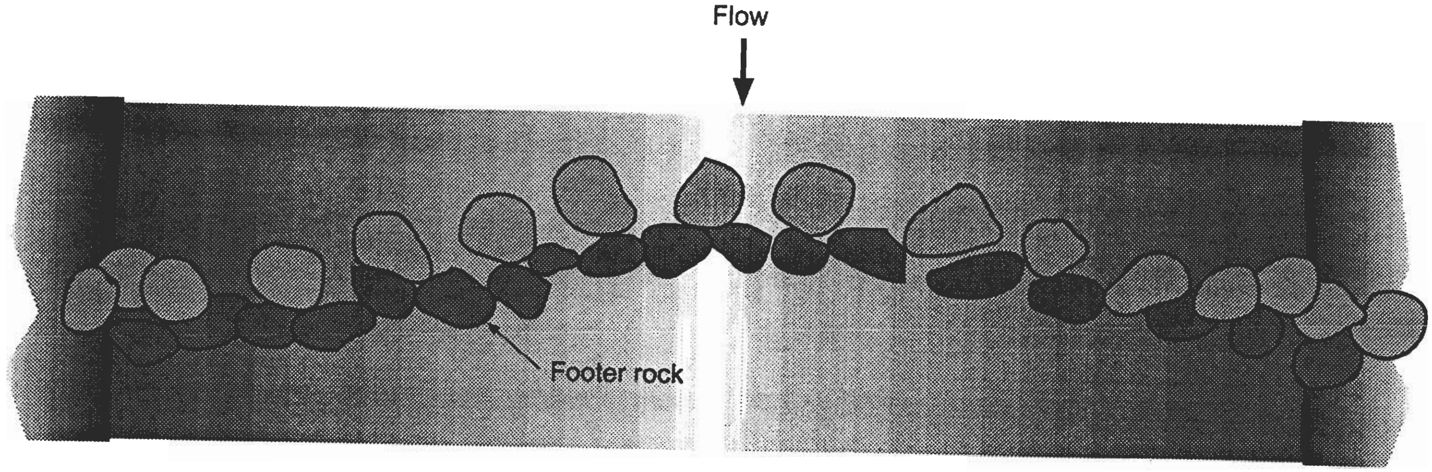
NOTE: * Defined in Section II.

Figure 3
CONCEPTUAL VIEW OF A NATURAL MATERIAL REVETMENT



PLAN
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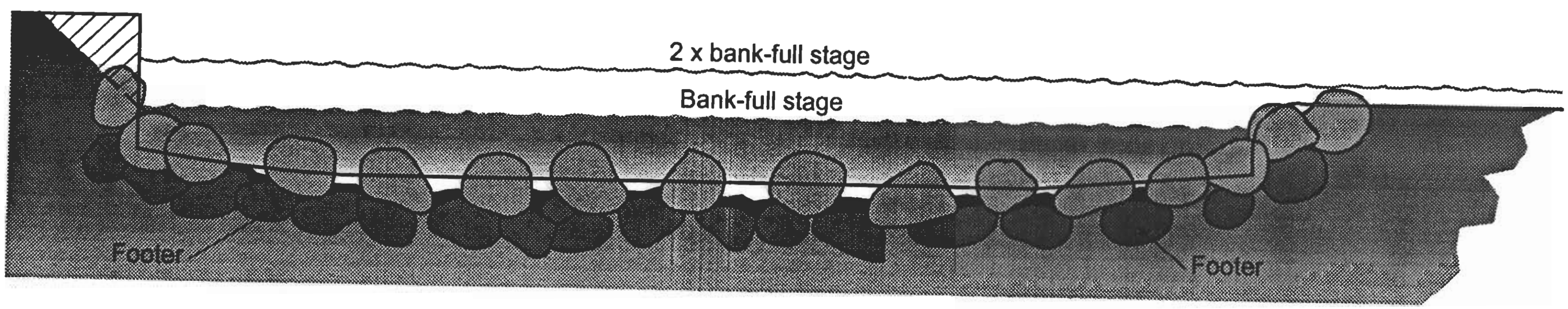

SECTION
NOT TO SCALE

Figure 4
CONCEPTUAL VIEW OF A ROCK WEIR

A riparian community would be re-established along the entire length of the reconfigured channel. This would be split approximately evenly between planting as part of the natural revetment and planting along the inside bends of meanders. The planting design for both consists of the following:

- Equal numbers of sandbar willow (*Salix exigua*) and Pacific willow (*Salix lasiandra*) will be planted at a rate if 80 plants per 100 feet of stream bank. A single row of black cottonwoods (*Populus trichocarpa*) will be planted on 20-foot centers (average distance between plants) on the upland side of the willows. Actual distances between cottonwoods would vary from 10 to 30 feet to achieve a more irregular, natural-appearing distribution of trees. An average of two black hawthorn (*Cretaegus douglasii*) will be planted between each of the cottonwoods. The actual number would vary from one to four between each pair of cottonwoods to mimic natural conditions. Willows will be planted along the sloping bank within the revetted sections. All cottonwoods and willows will be placed within 10 lateral feet of the water's edge during normal bank-full conditions. Plants that die during the first 3 years after planting will be replaced.

- Willows and cottonwoods will be placed so that the roots are immersed into fully saturated soils at the time of planting following the peak of spring runoff. All plants will be irrigated on a weekly basis for two full growing seasons (May through October). Competing weeds will be controlled around the plantings during these 2 years. Plants will be grown from local genotypes. Willows and cottonwoods may consist of cuttings or rooted stock, depending on site conditions determined during the design. Cutting size will also be determined during design but will consist of at least 2-year-old stock.

- All plantings will be protected from beaver depredation.

- The entire length of the revetted and planted stream banks will be fenced to permanently exclude livestock. Fences will be placed 30 feet from the top of the bank of the reconfigured channel. The fenced area will be hydroseeded with a mix of local native grasses and forbs. Over time, the entire fenced area is expected to have a riparian shrub/forest canopy.

Design and Construction Considerations

A description of the alternative is presented in the preceding section, in the Environmental Assessment (EA, Appendix A) and in the Feasibility Design Study for the proposed action (included in Appendix B). The purpose of the design is to initiate restoration efforts on this section of the river by constructing stabilization features that return the river system to a more natural, dynamic equilibrium. By doing so, riparian and aquatic habitat within this reach of the Little Weiser will be enhanced or restored, and the quality of the environment will be improved.

Total estimated cost for the proposed project modification is $504,000 (excluding annual operation and maintenance). Table 5 summarizes the estimated cost.

TABLE 5
Project Modification Costs and Cost Sharing

Project Modification Costs	
Land and Damages	$8,400
Facilities	$420,000
Planning, Engineering, Design	$42,000
Construction Management	$33,600
Total Project Cost	**$504,000**
Project Cost Sharing	
Federal (75%)	$378,000
Non-Federal (25%)	$126,000
Estimated Annual Operation and Maintenance	$5,360 (year 1 and 2) $560 (following years)

Operation and Maintenance Considerations

A local sponsor for project cost sharing is required by Section 1135 of the 1986 Water Resources Development Act, as amended. The local sponsor, the Weiser River Flood Control District No. 3, will provide 25 percent of the implementation costs, including report costs. All normal operation and maintenance costs will be the responsibility of the local sponsor.

Plan Accomplishments

The proposed project modification will allow the re-establishment of riparian and aquatic habitat, and the control of bank erosion. Excessive lateral migration of the river channel would be halted and grade control would be established.

As presented in Table 4, the Natural Revetment Alternative would result in the greatest amount of environmental benefit for the area. Riparian vegetation would be planted along the entire length of the reconfigured channel, resulting in a future gain of approximately 1.2 acres of riparian area over current conditions.

Summary of Economic, Environmental, and Other Effects

Described throughout this Project Modification Report, the Natural Revetment Alternative is the Preferred Alternative for the following reasons:

- It meets the intent of Section 1135(b) for a stream restoration initiative that would improve the quality of the environment
- More habitat benefits will occur through implementation of this alternative, specifically in riparian vegetation
- It is more cost-effective than the Riprap Alternative

Plan Implementation

Institutional Requirements

An EA has been drafted to assess the impacts from implementing the proposed modification on the human environment. Section 404 of the Clean Water Act coordination will be conducted as project design parameters are fully developed.

The schedule for accomplishment is as follows:

- Project Approval, Plans and Specifications Funds received—March 29, 1995

- Final Environmental Assessment submitted to the Corps for submittal to appropriate agencies—November 15, 1996
- Final Project Modification Report submitted to Corps headquarters (HQUSACE)—November 15, 1996
- Complete Plans and Specifications—February 29, 1997
- Construction Funds Received—April 26, 1997
- Award Contract, Receive Flood Control District No. 3 Funds—July 1, 1997
- Complete Construction—September 30, 1997
- Final Evaluation Report—October 31, 1997

Division of Plan Responsibilities

As Local Sponsor, the Weiser River Flood Control District No. 3 is required to provide 25 percent of the study and implementation costs, which includes the value of lands required to complete the project. In addition, the Local Sponsor is required to pay 100 percent of the incremental operation, maintenance, repair, rehabilitation, and replacement costs associated with project modifications. The Corps is responsible for 75 percent of the project costs, including design and engineering, report preparation, facilities, and construction.

Views of Local Sponsor and Other Implementing Agencies

Copies of the draft EA were distributed to several local and state agencies for review, and comments were incorporated into the draft. Prior to project implementation, a cost share agreement was to be approved by the Flood Control District and the Corps.

After reviewing the proposed project, the local sponsor requested that the Little Weiser Section 1135 study be terminated because the Flood Control District is not able to provide the required 25 percent cost share. See Appendix D for a copy of the letter received from the Weiser Flood Control District.

The sponsor is interested in a less costly approach that would require greater maintenance and may be subject to a higher probability of failure. The sponsor is willing to accept more risk to reduce cost. The sponsor is also hopeful that a future highway improvement project may provide an inexpensive source of rock, which could be used as "in kind services" towards the project cost share.

Summary of Coordination

Several Federal agencies reviewed the scope for the environmental assessment, including the U.S. Fish and Wildlife Service and the U.S. Natural Resources Conservation Service.

Coordination has taken place with the State Historic Preservation Office to search cultural and historic records, and aquatic information was obtained from the Idaho Department of Fish and Game. The Idaho Department of Water Resources reviewed the scope of the EA, as did the Idaho Department of Health and Welfare Division of Environmental Quality.

The Weiser River Flood Control District No. 3 was contacted by the Corps to discuss Local Sponsor responsibilities. The County Planner for Washington County was consulted regarding how the proposed action conformed with adopted plans and to collect background information.

Recommendations

I recommend the proposed project modification for the Little Weiser River be terminated as a Federal project under authority of Section 1135(b) of the Water Resources Development Act of 1986, as amended. The Local Sponsor, the Weiser River Flood Control District No. 3, requested that the study be terminated because they are not able to provide the required 25 percent share of the estimated $504,000 construction cost. Project costs exceeded the anticipated costs for two primary reasons: the extensive amount of earth moving required to implement the project, and the lack of availability of local rock, necessitating the transport of rock to the site.

The recommendations contained herein reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect program and budgeting priorities inherent in the local and state programs or in the formulation of a national Civil Works construction program.

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Corps of Engineers, Commanding Officer

Appendix A
Environmental Assessment

REPORT

Draft Little Weiser River Restoration Environmental Assessment Section 1135(b), Water Resources Development Act of 1986, As Amended

Prepared for

U.S. Army Corps of Engineers

NOVEMBER 1996

CH2M HILL

Contents

Contents, Continued

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Acronyms

amsl	Above Mean Sea Level
BMPs	Best Management Practices
cfs	Cubic Feet per Second
Corps	U.S. Army Corps of Engineers
DEQ	Idaho Division of Environmental Quality
EA	Environmental Assessment
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FWS	U.S. Fish and Wildlife Service
HEP	Habitat Evaluation Procedure
HSI	Habitat Suitability Index
HU	Habitat Units
IDFG	Idaho Department of Fish and Game
IDWR	Idaho Department of Water Resources
IMACS	Intermountain Antiquities Computer System
NEPA	National Environmental Policy Act
NRCS	National Resources Conservation Service
NWI	National Wetland Inventory
SHPO	State Historic Preservation Office
SI	Suitability Index
TMDL	Total Maximum Daily Load
USGS	U.S. Geological Survey

I. Purpose and Need

Introduction

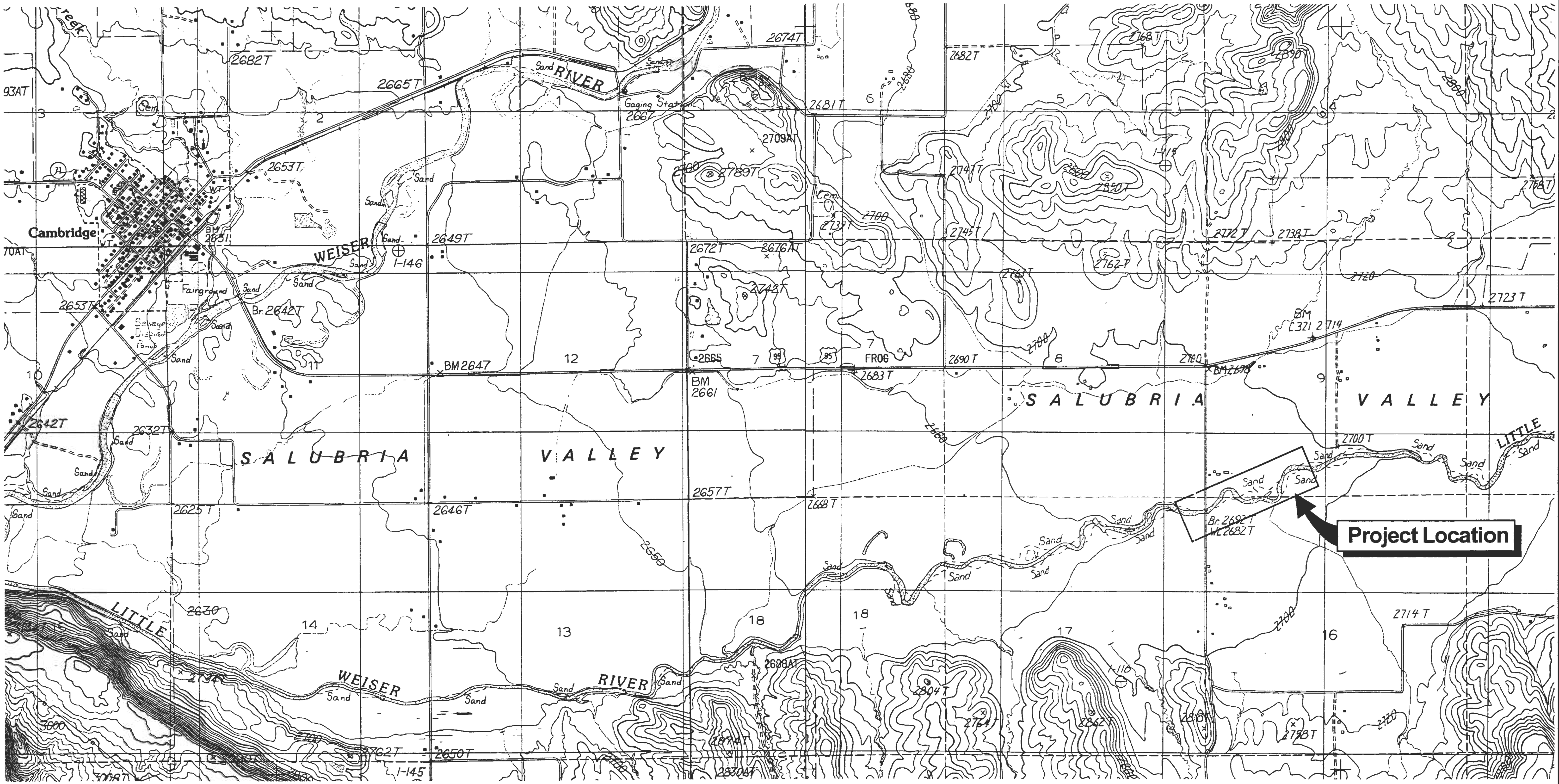
This environmental assessment (EA) considers the effects of a stream restoration initiative proposed for a section of the Little Weiser River in Washington County, Idaho. As required by the National Environmental Policy Act (NEPA) of 1969, and subsequent implementing regulations announced by the Council on Environmental Quality, this assessment is prepared to determine whether the stream initiative proposed by the U.S. Army Corps of Engineers (Corps) constitutes a "...major Federal action significantly affecting the quality of the human environment..." and whether an environmental impact statement is required.

Project Purpose and Need

The Little Weiser River in Idaho is a tributary of the Weiser River, which is in turn a tributary of the Snake River. A map of the study area is shown in Figure 1-1. The labels "upstream end" and "downstream end" in Figure 1-1 define a reach of the Little Weiser River where clearing and snagging projects were conducted by the Corps during the 1960s and 1970s. The intent of the currently proposed project is to initiate environmental restoration efforts along a section of this reach, labeled "Project Location" in Figure 1-1.

In the past, the Little Weiser had a well-vegetated riparian zone and supported trout and salmon populations. The combination of snagging and clearing, channelization, and removal of riparian vegetation throughout a significant portion of at least 15 miles of the lower Little Weiser River has contributed to an unstable channel with fewer meanders and higher gradients through straightened reaches. A description of the effects of channelization in the EPA (1994) document *Biological Criteria—Technical Guidance for Streams and Small Rivers* provides insight to the processes and current condition throughout much of the lower Little Weiser River today:

> Because channelization produces an increase in flow velocity or scour, active bed degradation occurs, causing the movement of substrate particles down



SOURCE: "Cambridge, Idaho" and "East of Cambridge, Idaho" USGS 7.5' Quadrangle Maps, 1986.

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Figure 1-1
LITTLE WEISER RIVER VICINITY MAP

stream. As bed degradation continues, degradation of lower streambanks begins, eventually producing bank failure and concave upward banks. During the period of severe instability, the channel is rapidly (in a geologic sense) becoming wider and the water level shallower, sometimes producing a braided flow pattern. Channel widening causes persistent bank failure in the downstream areas and results in losses of canopy cover (riparian vegetation) and detrital input (p. 84).

Because the physical structure of the stream environment is critical to the ecological health of the resource, alterations to the channel can result in significant impacts on aquatic and riparian biota. In 1988, the Idaho Department of Fish and Game (IDFG) published a report on the impact of channel alterations on trout in the Big Wood River (Thurow, 1988). In 1986 and 1987, trout densities were found to be eight to ten times higher in unaltered reaches where cover components, such as riparian vegetation and in-stream large, woody debris, were present than in reaches with no cover or with rock revetments. The most significant channel alterations cited included channel relocation, diking, channel clearance, and installation of riprap.

Another IDFG report, cited in the 1988 study, concluded that undisturbed stream reaches outproduced altered areas with 1.5 to 112 times the biomass of game fish. Unaltered reaches supported seven times more catchable-sized trout and eight times the biomass of trout. Alterations reduced fish production by 80 to 90 percent. Within Idaho, the study area included portions of 45 streams, totaling 1,137 miles.

Extensive research has also been conducted on the biological impacts associated with damaged riparian habitat (Carothers 1977; Gaines 1977; Hehnke and Stone 1979). Based on the extensive research documenting the biological impact of channel alterations, many of which have occurred in the Little Weiser River, it is likely that the biological integrity of this river system has been reduced.

In addition to impacts on aquatic and riparian habitats, channel alterations and instability throughout the lower Little Weiser have created numerous problems for farmers along the river. Many farm fields adjacent to the river have been and continue to be severely eroded. Some farmers have also expressed the need to irrigate more often. As evidenced by the physical condition of the river, channel degradation has likely contributed to this problem by lowering the groundwater table in the vicinity of the stream.

Lower water surface elevations have also resulted in farmers moving or constructing new, temporary, in-stream diversion structures of river gravel and cobble. These temporary structures create a backwater to divert water for irrigation; their construction and maintenance is yet another in-stream disturbance contributing to channel instability and habitat degradation. These structures have been created at numerous locations within the study area identified in Figure 1-1; however, no such structures exist within the project location.

Unless features that return the river system to a more natural, dynamic equilibrium are constructed, all the above problems associated with channel over-widening, bank failure, excessive degradation and aggradation, and loss of riparian and aquatic habitat will continue.

Authority

Under Section 1135(b), Water Resources Development Act of 1986, as amended, the Secretary (of the Army Corps) is authorized to carry out a program for the purpose of making such modifications in the structures and operations of water resources projects constructed by the Secretary, which the Secretary determines 1) are feasible and consistent with the authorized project purposes, and 2) will improve the quality of the environment in the public interest. The non-Federal share of the cost of any modifications carried out under this authorization shall be 25 percent. No modifications shall be carried out under this section without specific authorization by Congress if the estimated cost exceeds $5,000,000.

The previous Little Weiser River Corps project, which consisted of clearing and snagging throughout the lower Little Weiser River, has been identified as an area with strong potential for environmental improvement through selected local treatment. A section of the river will be improved to restore or rehabilitate riparian and aquatic habitat and modify the channel pattern. The Weiser River Flood Control District No. 3 is the local sponsor of the proposed project, and total project cost will not exceed $5,000,000.

A second project is proposed in the immediate vicinity of this proposed action that would stabilize a critical area in order to preserve the structural integrity of a bridge. It is the subject of a separate environmental assessment and is proposed under separate authority.

II. Alternatives

Proposed Project Background

Several potential alternatives that could address the problems of the Little Weiser River were considered. Alternatives must address channel stability problems while providing fish and wildlife habitat benefits consistent with the requirements of Section 1135(b). Potential alternatives were also limited by funding available for the project.

The process followed to assess the problem and develop potential solutions included the following steps:

1. A 15-mile section of the lower Little Weiser River was inspected during a helicopter flight conducted in May 1996. Participants included Corps personnel and CH2M HILL hydrologists familiar with both standard and new stream stabilization methods. Specific problem areas were identified for consideration for the project.
2. Problem reaches of the river were evaluated to determine those reaches most suitable for implementation of stabilization measures based on professional judgment, the presence of stable reaches above and below problem reaches, and budget considerations. Problem reaches generally lack riparian vegetation, are broad and shallow, may have a braided channel, and have actively eroding banks.
3. The Corps determined that they wanted to implement the most advanced bio-engineering techniques (natural revetment) available for channel stabilization since these offered the greatest potential biological habitat gains, which is consistent with the intent of Section 1135(b).
4. Discussions with Corps personnel in July 1996 indicated the need to consider other more traditional methods of channel stabilization that may also be compatible with goals of Section 1135(b). Channel modification with riprap revetment and willow plantings was identified as another alternative to be considered in the EA.

A 2,000-foot reach of the Little Weiser River approximately 4.5 miles southeast of Cambridge, Idaho, and just upstream of Gladhart Bridge was selected for further study based on this assessment (see "Project Location" in Figure 1-1). The natural revetment and riprap approaches to stream stabilization were applied to the selected reach as follows:

1. The problem reach was surveyed to establish the current cross sections.
2. Field inspection by hydrologists and engineers familiar with the natural revetment method as well as traditional channel stabilization methods determined that a section of river immediately upstream of the project reach is relatively stable. This determination was based on the following observations: stream banks in the upstream reach are well-vegetated and, compared to the problem reach, the river channel is narrow, water depths are substantially greater, and the banks are not actively eroding. This stable section served as a model for the desired condition relative to channel configuration within the selected problem reach. It was also determined that if the restoration is implemented, this section would provide a good "tie-in" location to a stable reach. This should provide some protection to the project reach from the otherwise "active" instability prevalent throughout much of the lower Little Weiser.
3. The stable reach was also surveyed to determine typical cross sections and meander patterns.
4. A new channel based on features of the stable reach was designed for the problem reach. Channel width, depth, and meander patterns would be similar to those present within the stable reach.
5. The natural revetment and riprap approaches were developed to fit the specific conditions that would be created within the problem reach.

Based on the process described above, the two potential action alternatives selected for analysis in the EA include the natural revetment and riprap approaches to channel stabilization. These alternatives are described below.

Preferred Alternative—Natural Revetment

Natural Revetment Alternative Description

The Natural Revetment Alternative (Figure 2-1) includes modifying the cross-sectional geometry and meander pattern of the existing channel, stabilizing the stream banks with natural material revetments, planting dense, riparian vegetation, and establishing grade control within the channel. Bank erosion would be controlled, and riparian and fish habitat would be re-established. Natural material revetments include the use and selective placement of large diameter logs, root wads , rocks, and dense planting of riparian vegetation.

Site-specific stabilization features would be designed to function as an integral part of the river system. The features would include:

- Reconfiguration of the existing channel through excavation and backfill to create a meander pattern similar to the more natural, stable reaches of the river (see Appendix A for existing and proposed channel cross-sections). The resulting widths and depths would assist in the management of sediment transport and provide additional stability.
- Natural material revetments to provide bank protection and stabilization. The total shoreline length to be revetted is 621 feet, or about 50 percent, of the total shoreline through the project reach. A conceptual plan and profile view of a natural material revetment is shown in Figure 2-2.
- Rock weirs (Figure 2-3) to provide grade control without causing upstream lateral migration, bank erosion, and aggradation. These structures also provide the following: fish cover, deepened feeding areas in the riffle reaches, and a wider range of velocities for fish-holding water at high flow. These benefits are obtained without causing sediment deposition or significant backwater. They also maintain a low width-to-depth ratio that reduces the likelihood of bar deposition and maintains the sediment transport capacity of the stream. Large, 2- to 4-foot-diameter rocks are placed roughly as shown in Figure 2-3. The spacing between the boulders above the channel invert maintains sediment transport. Footer rocks are placed immediately downstream to prevent local bed scour.

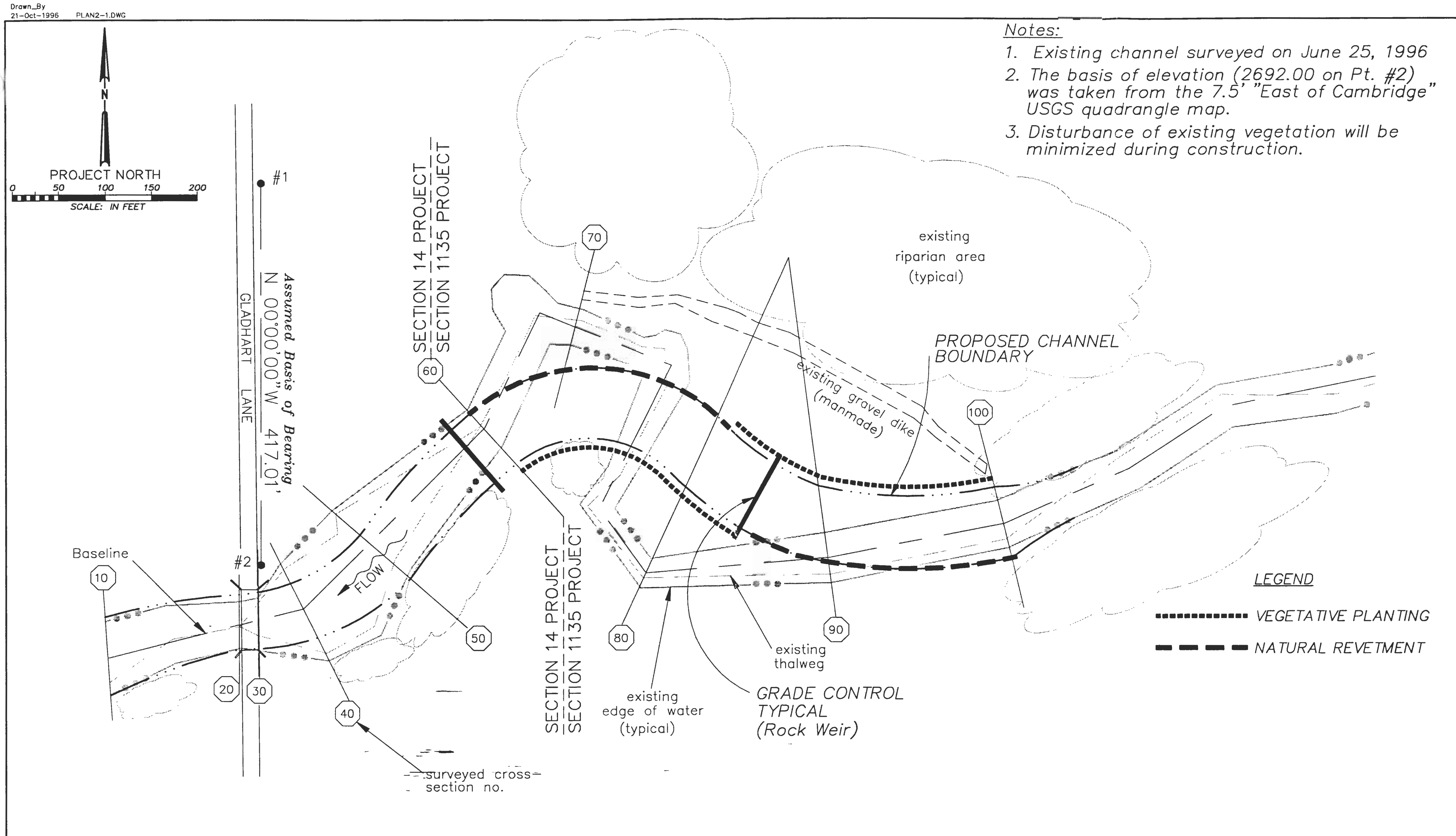
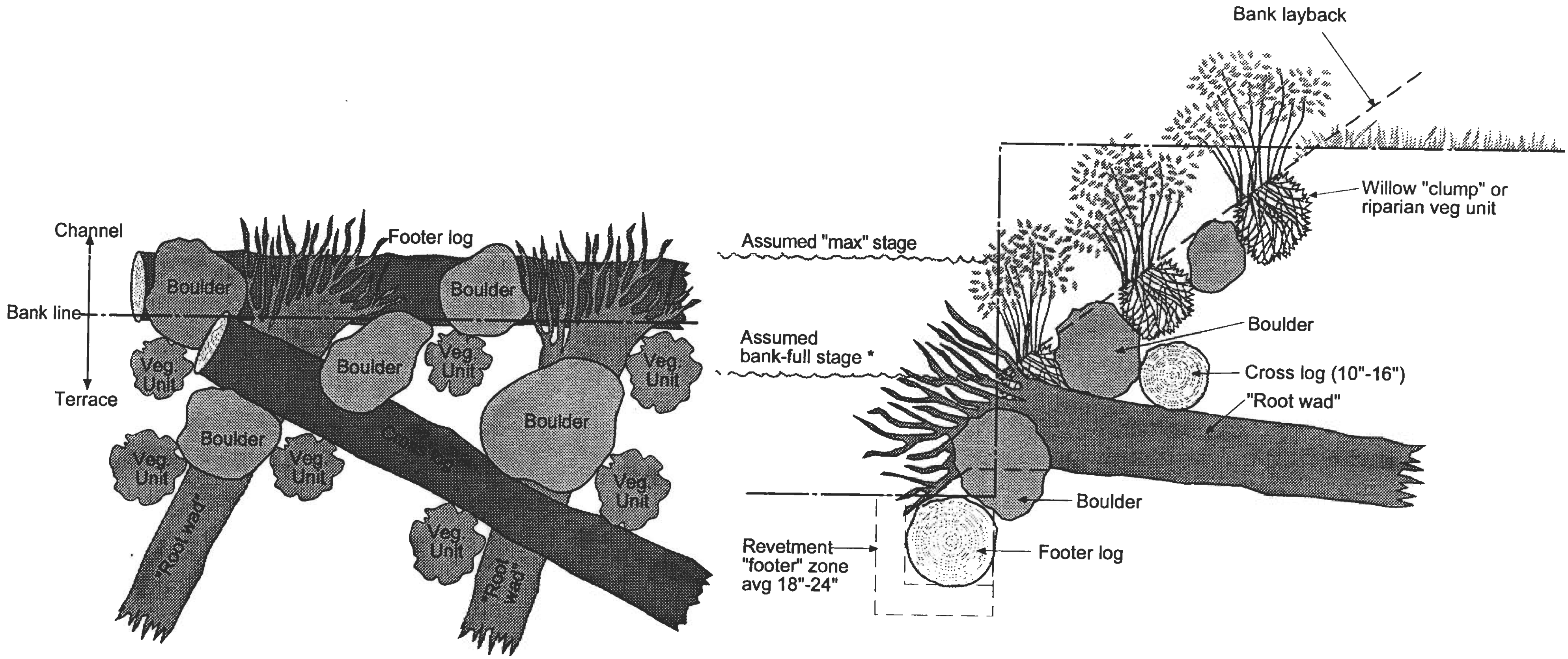


FIGURE 2-1
SITE PLAN FOR
PREFERRED ALTERNATIVE
LITTLE WEISER RIVER
SECTION 1135

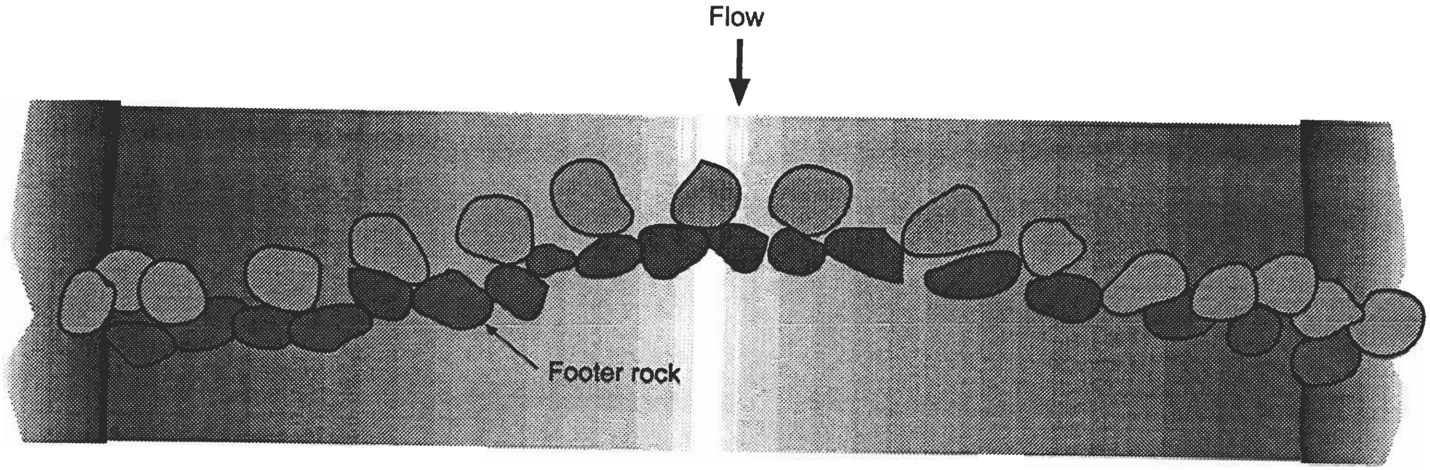


PLAN VIEW
NOT TO SCALE

CROSS SECTION VIEW
NOT TO SCALE

NOTE: * Defined in Section II.

Figure 2-2
CONCEPTUAL VIEW OF A NATURAL MATERIAL REVETMENT



PLAN
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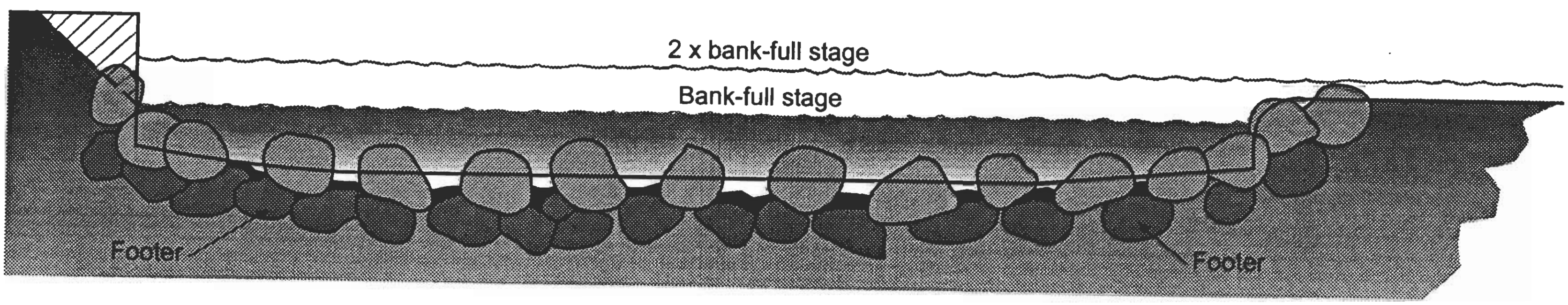

SECTION
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Figure 2-3
CONCEPTUAL VIEW OF A ROCK WEIR

- Re-establishment of riparian vegetation along the river banks to provide long-term channel stability. Plantings will be incorporated as part of the bank stabilization and are described more fully below.

As measured along the stream centerline, the existing channel reach is 954 feet long; the improved channel length would be 600 feet long. Although the improved channel reach is shorter than the existing unstable reach, it more closely replicates the meander curvature of nearby stable river reaches. The existing reach is longer only because the channel banks have extensively eroded in a lateral direction and the local sediment transport capacity of the river has diminished.

A riparian community would be reestablished along the entire length of the reconfigured channel—approximately 1,240 linear feet of stream bank. This would be split approximately evenly between two planting scenarios: 1) planting as part of the natural revetment, and 2) dense planting along the inside bends of meanders. The planting design is essentially the same for both scenarios and consists of the following:

- Equal numbers of sandbar willow (*Salix exigua*) and Pacific willow (*Salix lasiandra*) will be planted at a rate if 80 plants per 100 feet of stream bank. A single row of black cottonwoods (*Populus trichocarpa*) will be planted on 20-foot centers (average distance between plants) on the upland side of the willows. Actual distances between cottonwoods would vary from 10 to 30 feet to achieve a more irregular, natural-appearing distribution of trees. An average of two black hawthorn (*Cretaegus douglasii*) will be planted between each of the cottonwoods. The actual number would vary from one to four between each pair of cottonwoods to mimic natural conditions. Willows will be planted along the sloping bank within the revetted sections. All cottonwoods and willows will be placed within 10 lateral feet of the water's edge during normal bank-full[1] conditions. Plants that die during the first 3 years after planting will be replaced.

[1] Bank-full is defined in this report as the discharge with a 1.5-year recurrence interval; it is the dominant flow that builds and maintains river systems. The estimated bank-full discharge is approximately 850 cubic feet per second (cfs) approximately 5 miles downstream of the project at the confluence with the Weiser River and approximately 550 cfs at the gage near Indian Valley which is approximately 15 miles upstream of the project. The bank-full discharge estimates were used to determine a range of "normal" bank-full parameters including bank-full width, bank-full depth, bank-full cross-sectional area, and meander characteristics.

- Willows and cottonwoods will be placed so that the roots are immersed into fully saturated soils at the time of planting following the peak of spring runoff. All plants will be irrigated on a weekly basis for two full growing seasons (May through September). Competing weeds will be controlled around the plantings during these 2 years. Plants will be grown from local genotypes. Willows and cottonwoods may consist of cuttings or rooted stock, depending on site conditions determined during the design. Cutting size will also be determined during design, but will consist of at least 2-year-old stock.
- All plantings will be protected from beaver depredation.
- The entire length of the revetted and planted stream banks will be fenced to permanently exclude livestock. Fences will be placed 30 feet from the top of the bank of the reconfigured channel. The fenced area will be hydroseeded with a mix of local native grasses and forbs. Over time, the entire fenced area is expected to have a riparian shrub/forest canopy.

Natural Revetment Alternative Risks and Longevity

The general design concept of the natural revetment restoration method is to mimic the meander pattern and geometry of stable reaches that convey similar discharges to the restored channel. Features of the natural, stable, river form are integrated into the restoration so as to be compatible with the physical processes that allow the river to seek its own stability.

White (1973) summarized numerous researcher's descriptions of the physical nature of streams as a continually readjusting complex of interrelated variables that exist in a conservative dynamic equilibrium. He described the stream as "always changing, yet continually striving toward equalization of energy dispersal along its length. A change in one variable produces compensatory adjustment in the rest of the variables."

The variables that determine stream pattern, dimension, and profile are width, depth, slope, velocity, flow resistance, sediment size, sediment load, and stream discharge. An underlying assumption of the natural revetment restoration method is that the river reaches to be mimicked represent a stable dynamic equilibrium condition. This is evidenced by well-vegetated, stable banks, and a channel bed that is not undergoing accelerated degradation or aggradation. The restored stream uses three functioning channels: the low-flow channel, the normal high-water channel, and the established floodplain.

The risk associated with this restoration method is that it is relatively new; therefore, the design criteria do not have the benefit of long-term, historical performance data. However, Appendix B contains a partial list of restoration projects using natural materials such as root wads, willows, rock, and sod-mats. The number of years that the projects have been in place and the flows they have withstood are also included in Appendix B.

As is the case with any channel design, traditional or new, modeling will be required to establish water surface profiles at various discharges. The Natural Revetment Alternative is designed to use an active floodplain. Therefore, local land owners would have to be informed that, based on the proposed design, water would encroach into the floodplain during flood events.

The degree of revetment stability is directly related to the number of planted trees and shrubs. Logs and boulders placed within the revetment are designed to provide the structural framework while the tree and shrub roots become more established. Boulders within the revetment are intended to be permanent. The life of the logs is more difficult to determine; however, based on current research, it is likely to be at least 10 to 20 years. A recent study (Hedman, 1996) addressed the life of in-stream, large, woody debris. This particular research was based in southern Appalachia. The study found American chestnut in streams; this species disappeared from the area 60 to 80 years ago during the chestnut blight. Hemlock, a decay-resistant species, was also found in streams; this species is almost absent from the extant riparian forest and loading to the stream occurred 40 to 70 years ago. This research suggests that decay-resistant species have remained in streams up to 40 to 80 years. Based on a personal communication with one of the authors (Hedman, 1996), most of the in-stream, large, woody debris dated for their research were located within the river channel lodged between boulders, or piled-up in log jams. Only some were embedded or partially embedded into the streambanks. Because the logs used in the natural revetment will be in the streambank soil, they would likely not last quite as long as the "in-water" logs. However, minimum lifespan of 10 to 20 years is expected.

Long-term revetment stability is directly related to the number of planted trees and shrubs. The roots of dense planted willows and cottonwoods would become the primary bank stabilizing mechanism during the first 10 years following construction. Therefore, the vegetative plantings would function as the primary stabilizing mechanism before the logs would be expected to decay.

Riprap Alternative

Riprap Alternative Description

A second alternative that could be used to stabilize the channel, while providing some habitat benefits, involves the use of riprap in place of natural revetment. The channel would be reconfigured as described in the Preferred Alternative; however, riprap would be used to stabilize the riverbanks along the outside bends of the meander (Figure 2-4). In this case, the following features would be incorporated:

- The reconfigured channel would not be intended to contain the entire flow of large runoff events, and the use of an active floodplain would be necessary.
- Riprap would be placed to provide approximately 1 foot of vertical freeboard above the normal bank-full elevation.
- Because the reconfigured channel would have 3:1 (H:V) slopes both within and above the normal bank-full elevation, the distance from an adequate water supply limits planting to only two rows of willows on 10-foot centers immediately adjacent to the upper edge of the riprap (these would be the same willow species proposed for use under the Natural Revetment Alternative).
- The inside bends of the meanders would be planted with two rows of willows on 10-foot centers.
- Planting methods, temporary irrigation, fencing, grazing control, and beaver control would be the same as described for the Natural Revetment Alternative.

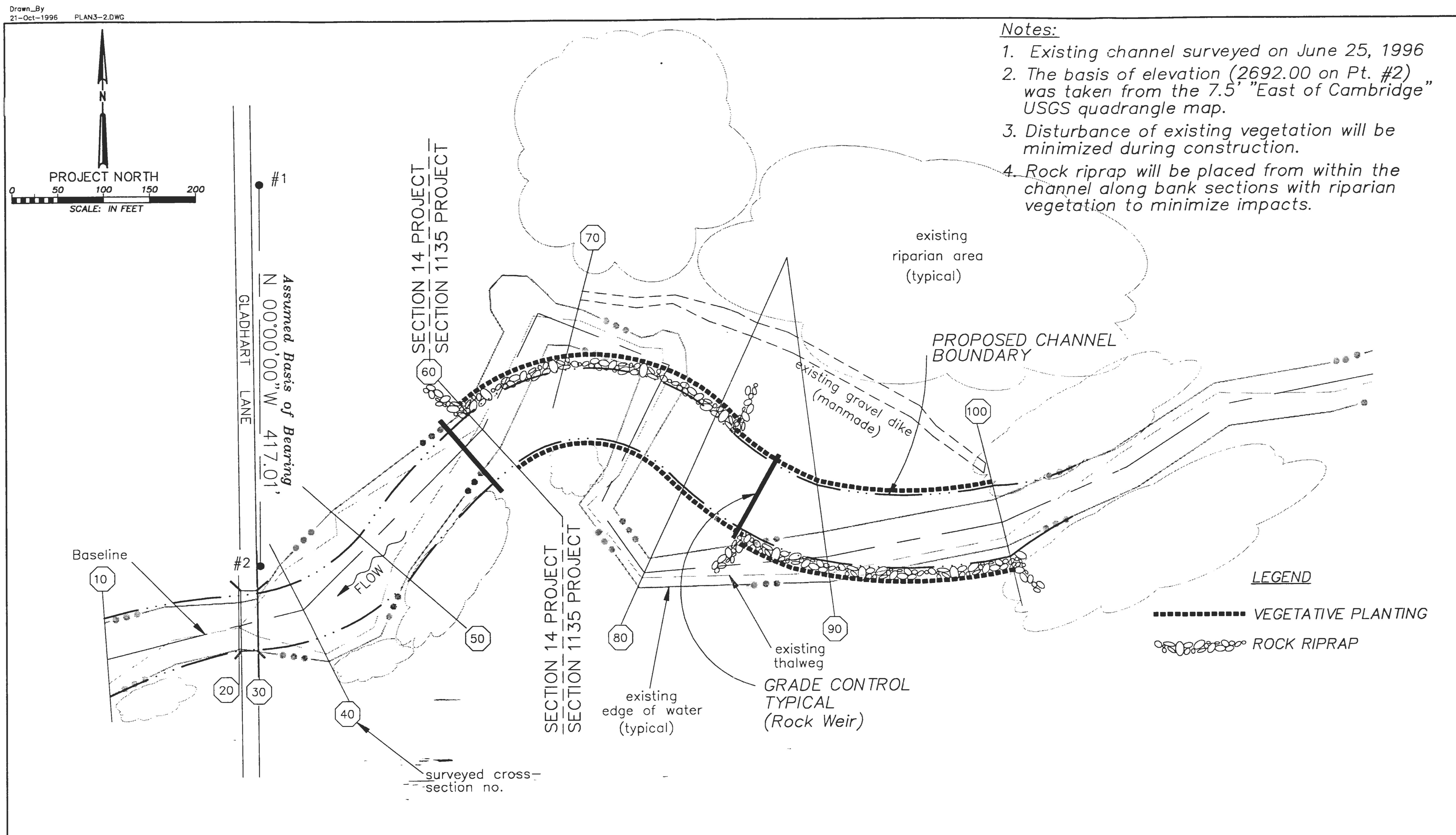

FIGURE 2-4
SITE PLAN FOR
RIPRAP ALTERNATIVE
LITTLE WEISER RIVER
SECTION 1135

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Riprap Alternative Risks and Longevity

Similar to the natural revetment restoration method, the Riprap Alternative is designed to use an active floodplain. Therefore, local land owners would have to be informed that, based on the proposed design, water would encroach into the flood-plain during flood events. Modeling would be necessary to determine the actual water surface profiles and velocities at various discharges.

During final design, the rock riprap would be sized to withstand velocities associated with the return interval of choice. Therefore, the longevity of the project would essentially be established by choosing a design return interval to size the rocks. Because the current project design is conceptual and not final, and because the necessary hydraulic modeling has not been conducted, a design return interval for sizing rock riprap has not been selected. For the purpose of determining project costs, an 18-inch median diameter rock size was chosen to design for velocities of at least 10 feet per second (FHWA, 1989).

No Action

Throughout the vicinity of project area, evidence exists of channel straightening, active bank erosion, and a decrease in riparian vegetation density and extent. As a result of these channel modifications, channel instability, and several related characteristics exist within the project reach (Figure 2-5).

Changes in dimension, pattern, and profile have caused a general lack of stability in the conveyance system of the river. Active bank erosion, point bar (inside bend) cutoffs, removal of riparian vegetation, sediment deposition, and channel pattern irregularities are present. Although these features tend to be intermixed with stable, well-vegetated reaches, the capacity of the river system to effectively transport sediment has been reduced, stream gradient has increased in straightened reaches, aquatic and riparian habitat has diminished, and the river's ability to contain and pass flood flows has been altered.

Under the No Action Alternative, these processes would likely persist or continue to magnify as changing flow regimes trigger changes in channel morphology.

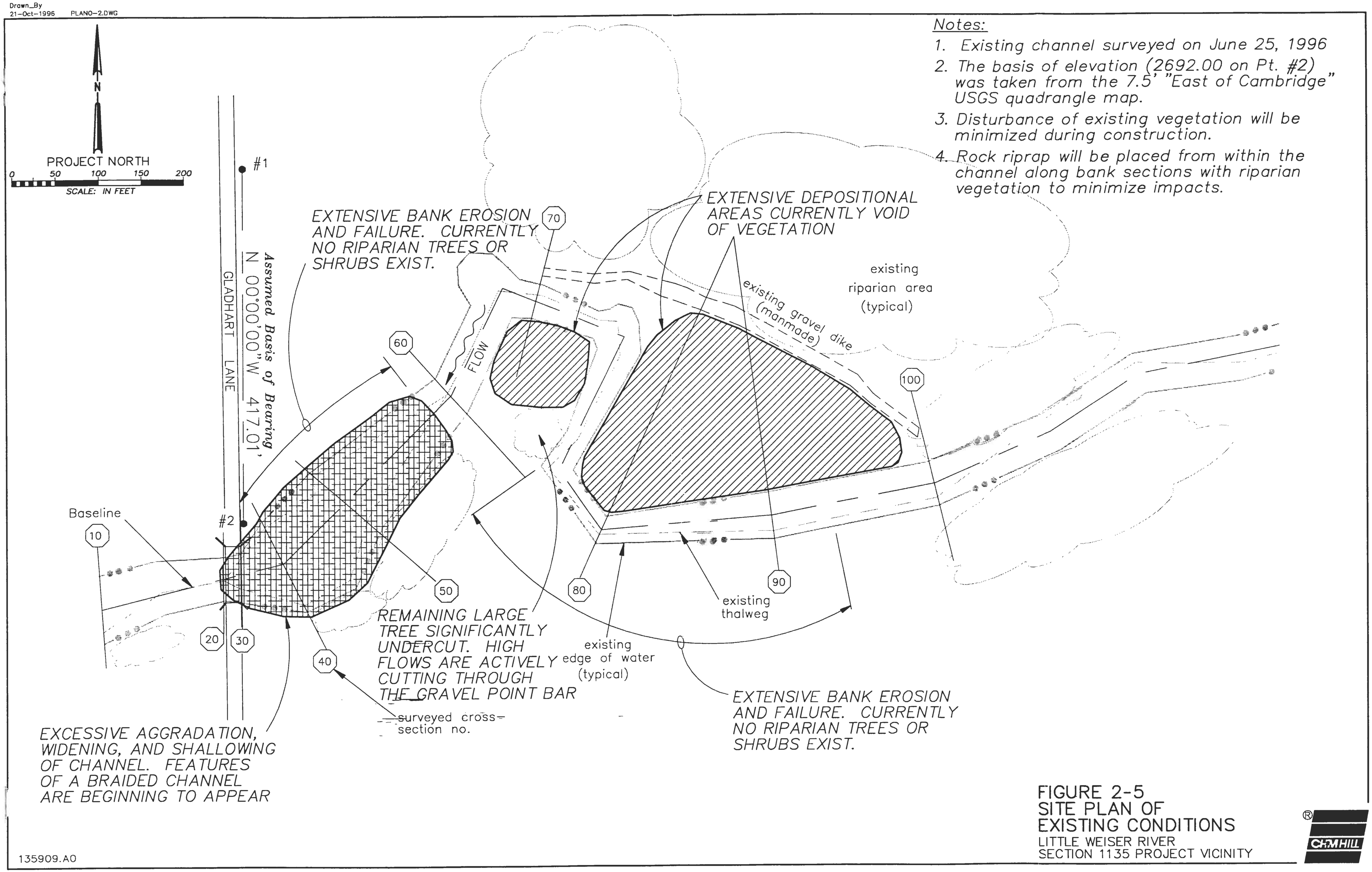

FIGURE 2-5
SITE PLAN OF EXISTING CONDITIONS
LITTLE WEISER RIVER
SECTION 1135 PROJECT VICINITY

Comparison of Alternatives

The two action alternatives and the No Action Alternative were compared based upon costs, benefits, and disadvantages or risks (Table 2-1). At the conclusion of the comparison, the Natural Revetment Alternative was selected for application upstream of the Gladhart Bridge. The Natural Revetment Alternative was selected as the Preferred Alternative for several reasons, including the following:

- Consistency with Section 1135 program objectives of environmental enhancement
- Greater fish and wildlife habitat gains
- Aesthetic benefits achieved through a more natural appearance and increased vegetation
- Lower cost
- Long-term stability (see Appendix B)

TABLE 2-1
Alternative Comparison

Item Description	Natural Revetment	Riprap	No Action
	Alternatives		
Costs			
Construction	$420,000	$455,000	0
Operation and Maintenance:			
Year 1 and 2	$5,360	$5,360	$0
Annual Maintenance	$560	$560	$0
Benefits			
Area of riparian vegetation gained	+1.2 acres	+0.3 acres	N/A
Wildlife habitat units gained	2.22	0.48	0
Fisheries habitat benefits[a]	Very good	Minimal	0
Channel stabilization	Very stable over long term	Stable over long term	Very low
Widely used technology	No	Yes	NA
Aesthetic benefits	Very good; natural appearance and greater vegetation	Poor; less natural appearance	None
Recreation benefits	Yes	Minimal	None
Disadvantages or risks			
Short-term bank stability	Stable but a very large flood event may pose problems	Very stable but a very large flood event may pose problems	None
Long-term channel stability	Very stable, at least as stable as riprap after riparian vegetation is established	Same as above	None
Consistency with Section 1135 program objectives	Very good	Moderate	N/A

NA=does not apply
[a] See Section IV for detailed list of fisheries habitat benefits. Significant benefits will be gained for aquatic habitat. However, a study was not performed to measure the Habitat Evaluation Procedure (HEP) values likely to be achieved.

III. Affected Environment

Geology and Soils

Geology

The source of the Little Weiser River is the west slope of West Mountain, situated near the Adams County/Valley County line at an elevation of about 7,500 feet. The river flows through a canyon until it reaches Indian Valley at about 3,100 feet in elevation. At that point, the Little Weiser enters a relatively flat valley that broadens to a width of several miles. The mouth of the river is at River Mile 47.6 of the Weiser River, elevation 2,600 feet.

The Little Weiser River is located in a geologic province known as the Weiser Embayment, which is the southeasternmost extension of the Columbia Plateau. The Weiser Embayment is bounded on the west by the Snake River canyon, on the north by the Seven Devils Mountains, on the east by the Salmon River Mountains, and on the south by the Snake River Plain.

The geology of the Weiser Embayment consists predominantly of thick sequences of Columbia River Basalt flows. These basalt flows overlie a remnant topography of basement rocks that are composed mainly of schists, gneisses, and granodiorites. After deposition of the basalt flows, the basement rocks and basalt flows were warped and uplifted into horsts and grabens by a series of normal faults. The Weiser River system dissects the interior of the Weiser Embayment and has eroded deep canyons in some areas, and deposited alluvial gravels, sands, and silts in valley bottoms in other areas.

In the study area, the Little Weiser River is a meandering stream that flows through a flat-bottomed valley underlain by floodplain deposits consisting of gravels, sands, and silts. The hills north and south of the Little Weiser valley are composed of Columbia River Basalt flows.

Soils

Information obtained from the U. S. Natural Resource Conservation District (NRCS) indicate that soils in the area tend to be riverwash, Shoepeg loam, or Shoepeg silty clay loam (see Appendix C). If the river is considered as the center point, those three soil types are found in a roughly concentric pattern.

Channels adjoining the Little Weiser are composed of riverwash, defined as areas of mainly sand, gravel, and cobbles that are frequently flooded, washed and reworked by stream or river waters. They support little or no vegetation.

The next soil, Shoepeg loam, is found on stream terraces at elevations of 2,200 to 3,500 feet. Somewhat poorly drained, it has moderate permeability and slow runoff. The major use of Shoepeg loam is as irrigated cropland, with wetness limiting the production of deep-rooted crops.

Shoepeg silty clay loam is also found on stream terraces, at elevations of 2,200 to 3,500 feet. It is also somewhat poorly drained, has moderate permeability, and slow runoff. This soil is used for irrigated cropland with wetness as the major management factor.

Water

Channel Morphology

The existing channel length through the project reach is 954 feet as measured along the stream centerline. As seen in Figure 2-5, a majority of the channel in the project reach lies within two prominent river bends. Along the south riverbank, where a farm field has encroached nearly to the top of the bank, approximately 400 feet of the reach is severely and actively eroding.

The majority of the north bank consists of an extensive gravel point bar—the depositional area along the inside bend of the river. At the furthest point, this depositional area extends over 250 feet from the existing vegetation along the north bank. No vegetation is present on the point bar.

Another gravel point bar exists along the south bank near cross section 70 (Figure 2-5). This gravel point bar extends approximately 100 feet from the existing vegetation. Essentially only one large tree anchors the channel material along the south side of this gravel point bar—an area where high flows are cutting directly through the gravel point bar.

The invert elevation drops 2 feet through the project reach. The channel gradient is 0.21 percent. At the time of the survey, the water surface top width and maximum depth measured at five cross sections ranged from 38 to 58 feet wide, and 0.8 to 5 feet deep, respectively.

Hydrology

The Little Weiser River at the confluence with the Weiser River has a drainage area of approximately 200 square miles with a mean annual precipitation of approximately 20 inches. Three U.S. Geological Survey (USGS) gauging stations were historically located on the Little Weiser River. A USGS gage (13261500) was located just upstream of the Gladhart bridge with a drainage area of 187 square miles and seven years of record from 1920 to 1926. Another USGS gage (13261000) was located near Indian Valley with a drainage area of 82 square miles and 41 years of record from 1920 to 1971. A USGS gage (13260500) was also located below Mill Creek, near Indian Valley, with a drainage area of 79 square miles and 2 years of record from 1981 to 1982. Appendix D contains the summarized historical record for each of these gages along with the historical record for the Weiser River near Cambridge (13258500).

Snowmelt is the primary source of stream flows, which results in high flows during the spring. It is also common to observe short duration, high flow events during the winter months when temperatures become unseasonably high from Chinook winds. Additionally, extended cold periods can cause significant ice floes that impact the channel.

Information from the Little Weiser River and Weiser River USGS data sets was used to estimate bank-full discharge. Appendix E contains daily flow duration curves and Appendix F contains annual maxima exceedence probability calculations for these data sets. Bank-full discharge was estimated as the discharge with a 1.5-year recurrence interval; it is the dominant flow that builds and maintains river systems. The estimated bank-full discharge is approximately 850 cubic feet per second (cfs) at the confluence with the Weiser

River and approximately 550 cfs at the gage near Indian Valley. The project site is located approximately 5 miles upstream of the confluence with the Weiser River, and approximately 15 miles downstream of the old USGS gage near Indian Valley.

Water Quality

The Little Weiser River in the vicinity of the project is listed by the Division of Environmental Quality (DEQ) as a 305(b) water quality-limited stream segment that requires further assessment. "Further assessment" refers to investigating the potential need for developing a total maximum daily load (TMDL) for the water body. The DEQ "priority rating" for assessing the segment is low.

The pollutants for which the Little Weiser River is listed as "impaired" are nutrients and sediment. These two constituents are directly associated with the combination of agricultural practices along diminished or non-existing riparian zones, and the active bank erosion associated with the unstable channel. Loss of riparian zone can also result in increased water temperature.

No water quality data is available for the Little Weiser River. Appendix G contains the only available water quality data for a nearby area on the Weiser River, approximately 3.8 miles upstream of the confluence with the Little Weiser River. This report, supplied by Idaho Department of Water Resources (IDWR), contains data for only three days in 1975. Only the station with latitude 44.58 and longitude 116.65 is located on the main stem of the Weiser River, approximately 2.2 miles northeast of Cambridge. Because only three grab samples are reported, no conclusions are drawn from the data. The data are included only as a reference.

Air Quality

According to the County Planner, Wayne Laird, (1996), Washington County is not designated as a non-attainment area for air quality. Air quality is impacted to a limited extent by agricultural production and road dust. Agricultural land surrounds the Gladhart Lane Bridge area, and U.S. Highway 95 (two lanes) is approximately 1 mile north of the bridge. Gladhart Lane is a paved, two-lane road.

Aquatic Environment

Fisheries

Based on a telephone conversation with Don Anderson (1996) from the McCall IDFG office, fish species that have been sampled from the Little Weiser River in the vicinity of the project include the following: redband trout, rainbow trout, mountain sucker, speckled dace, sculpin, squawfish, and shiners. There are also bull trout and brook trout in the Little Weiser River drainage; however, they may not be present in the project vicinity. No fisheries reports were available from IDFG pertaining to the Little Weiser River.

Based on a telephone conversation with Brian Horsburgh (1996) from DEQ, electroshocking is scheduled for the Little Weiser River this year; however, no fisheries data is currently available from DEQ for the Little Weiser River.

Aquatic Invertebrates

In November of 1995, DEQ sampled macroinvertebrates in the Little Weiser River as part of their Beneficial Use Reconnaissance Project that addresses water quality-limited streams (see Affected Environment, Water Quality). The sampling location is in the Payette National Forest, approximately 20 river miles upstream from the project. The results are presented in Appendix H. Although the sampling station is located at an elevation approximately 2,000 feet above the project elevation, the data at least gives an indication of the macro-invertebrate taxa present in the Little Weiser River drainage area.

The taxa collected included Diptera (flies, mosquitoes, and midges), Trichoptera (caddis flies), Plecoptera (stoneflies), Ephemeroptera (mayflies), and Coleoptera (beetles). The most abundant taxa collected were Chironomidae (midges).

Although no formal sampling was conducted at the project, a few cobble stones were investigated during a site visit to oversee the channel survey on June 25, 1996. Caddis fly larvae and stonefly nymphs were observed.

Aquatic Vegetation

Based on a telephone conversation with Bob Steed (1996), DEQ does not have any aquatic vegetation data.

During the site visit on June 25, 1996, no macrophytes or algae were observed in the project reach.

Terrestrial Environment

Vegetation

Riparian Communities. Riparian communities present along the river through the project area are much less diverse and less extensive than the riparian communities that existed before settlement and agricultural practices began. Dominant species include a few black cottonwood (*Populus trichocarpa*), Pacific willow (*Salix lasiandra*), sandbar willow (*Salix exigua*), and black hawthorn (*Cratageas douglasii*). Historically, the river supported a diverse and well-developed riparian community with associated wetland cover types. Existing riparian areas would not be affected by the project.

Wetlands. Aside from the active river channel, no jurisdictional wetlands or waters of the United States are located within the project area. National Wetland Inventory (NWI) maps include a classification of riverine/intermittent/unconsolidated bottom/mud for exposed gravel bars within the eroding channel. The existing river channel and mud/gravel bars occupy about 2.7 acres. Palustrine emergent wetland communities in the vicinity are located outside of the project area and would not be affected.

Adjacent Uplands. The upland areas adjacent to the project area have been converted into agricultural uses, dominated by alfalfa and barley cultivation. No upland communities would be affected by the project.

Wildlife

Wetland and Riparian Communities. The wildlife habitat present in the vicinity of the project area is of limited quality and extent. Typical river meanders are nearly absent, and no wetlands exist within areas that would be affected by the project. Willows comprise most of the existing riparian vegetation, but are generally limited to a few locations along the banks and do not provide large areas of cover. A few large, mature cottonwood trees grow within the riparian area. Species using riparian communities in the vicinity of the project area are limited to those that require only relatively small habitat patches such as the song sparrow or yellow warbler. Species that use mature trees, such as hawks and owls, or those that are cavity nesters, such as woodpeckers, are limited by the lack of large trees in the project reach.

Adjacent Upland Communities. The extensive agricultural areas adjacent to the project area are not expected to support a diverse wildlife population. Most of the species found are those that have adapted to disturbed conditions. Alfalfa fields may be used by deer and foraging raptors, but the prey base for raptors would be low in numbers and consist of only a few species. Ring-necked pheasants nest in alfalfa fields. Agricultural areas generally do not provide sufficient year-round cover or adequate denning or nesting habitat for most wildlife species. Agricultural lands would not be affected by the proposed project.

Gravel Bars. Gravel bars within the project area consist of approximately 20 percent gravel and 80 percent silt. Because of the large amount of fine silty sediment and the fact that they are dry for most of the year, the gravel bars are considered to be very marginal habitat for shorebirds such as killdeer or spotted sandpiper or other wildlife.

Threatened and Endangered Species.

The U.S. Fish and Wildlife Service (FWS) indicated that a few bald eagles may be present along the Little Weiser River during the winter. No other threatened or endangered species are present in the area.

Land Use

Washington County is situated on the western border of Idaho, separated from Oregon by the Snake River. The Payette National Forest encompasses portions of the northern part of the county, and several water storage reservoirs are located in the southern part of the county.

The County economy is dominated by agriculture. The proximity of the County to the Snake River makes the provision of recreational services an economic factor as well.

The town of Cambridge, which had a population of 374 in 1990, is 4.5 miles west of the proposed project site. U.S. Highway 95 crosses the County in a southwestern-northeastern direction and passes through Cambridge.

The Washington County Comprehensive Plan is in the process of being updated. The original plan was written in the late 1970s. County Planner Wayne Laird (1996) stated that the area of the proposed project areas is zoned agricultural and is not included in a future development area.

Land uses surrounding Gladhart Lane include agricultural fields, primarily alfalfa and barley production; scattered farm sites; cattle grazing; and hay storage. Access to the proposed site is from U.S. Highway 95 to Gladhart Lane, a local paved road. Gladhart Lane Bridge crosses the Little Weiser and is signed as a one-lane bridge.

Two individuals own property at the project site, and a pipe to draw irrigation water was observed on the south bank of the river immediately upstream of the bridge. Water is diverted for irrigation throughout the valley with the typical irrigation season extending from May through September, peaking in July and August. An old diversion exists downstream from the bridge, adjacent to the right bank and outside of the proposed project area. The diversion appears to have been created by use of equipment to pile channel rocks sufficient to form a low dike. No headgates were observed.

Recreation

The Little Weiser passes through agricultural and riparian areas of Washington County. Fishing may occur at various locations, subject to river access. Canoeing is feasible. No other recreational opportunities formally exist at the proposed project site or along other reaches of the river.

Aesthetics

The scenery around the Little Weiser River is generally pastoral. The river length includes stretches with well-vegetated riparian areas that are visually appealing, as well as less-vegetated areas with eroded banks and gravel bars that are less pleasing to view.

The project vicinity has areas with established brushy material and developed riparian habitat along with bare, obviously unstable banks and sand and gravel bars. The landscape above the river is dominated by agriculture.

Cultural Resources

No sites listed on the National Register are located in the vicinity of the proposed action. A cultural resource survey was conducted for the area and is included as Appendix I.

Archeological and historical site files at the Idaho State Historical Society indicate that a number of sites have been recorded within a mile of the project area. They include a historic ranch, historic roads and bridge, prehistoric campsites, lithic scatter, and an isolated artifact.

One site recorded during the cultural resource survey contained 25 to 30 secondary and tertiary flakes, a possible spokeshave, a core and several jasper nodules at a prehistoric lithic scatter. The scatter is located on a gravel bar within the meanders of the Little Weiser River at an elevation of 2,690 feet above mean sea level (amsl). This scatter is located within the project area (see Appendix I, Cultural Resources, for a location map). A manmade dike constructed of cobbles and sand scraped from the river bed borders the site on the north. Site data were recorded on an Intermountain Antiquities Computer System (IMACS) form and submitted to the State Historic Preservation Office (SHPO).

The site appears to consist of artifacts eroded from their original context at another site upstream. The artifacts were tumbled and smoothed as they washed downstream and were deposited on the gravel bar. Because they have been tumbled and smoothed, flaking and usewear patterns are difficult to determine.

The site no longer retains integrity and is unable to provide additional information important in the prehistory of the area. It has been recommended that this site be considered Not Eligible for nomination to the National Register.

IV. Environmental Consequences

Geology and Soils

Geology

No impacts on geology would occur as a result of implementation of the Preferred, Riprap, or No Action Alternative.

Soils

Preferred Alternative

Project implementation would stabilize the channel to prevent stream bank erosion, lateral scour, and channel degradation and aggradation. Stabilization would also prevent further loss of riparian habitat and soils. The active bank erosion would be stopped, and the formation of extensive depositional areas in the project reach, such as gravel bars, would be significantly reduced.

Temporary impacts would occur during construction, and cofferdams would be required for in-stream construction. The impacts, however, would only be short-term. Best Management Practices (BMPs) would be implemented during construction to minimize erosion that would increase the sediment load in the river. BMPs would include the following:

- Construction would occur during low flow periods.
- Silt fences and other erosion control structures would be used during construction to prevent erosion from cut slopes.
- Vegetative cover would be established as quickly as possible on bare soil surfaces after construction to prevent erosion. Erosion control matting would be used where necessary until the cover is established.
- All bare soil would be either vegetated with species approved in the site revegetation plan, or covered with natural materials revetment, or both.

- Topsoil excavated from the area would be stockpiled for later use in the overbank areas. Reserved soils would be stockpiled out of any sensitive areas and kept moist to protect the seed bank contained in the soils.

Riprap Alternative

The environmental consequences associated with the Riprap Alternative relating to soils would be the same as those stated above for the Preferred Alternative.

No Action Alternative

The accelerated erosion and failure of the channel banks would continue. The sediment transport of the river would be altered and downstream aggradation would result. In general, the accelerated sediment input would continue to promote the characteristics associated with a highly unstable river.

Water

Channel Morphology

Preferred Alternative

As measured along the stream centerline, the reconfigured channel would be approximately 600 feet long. Although 354 feet shorter than the existing channel, the reconfigured channel would be in a more stable meander pattern. The banks along the outside bends of the meander will be stabilized and the meander pattern will allow sediment from upstream sources to move through. Because the Little Weiser carries a high sediment load, some sediment will deposit on the inside bends of the meanders; however, it will be a dynamic situation with sediment moving in and out of the project reach. Formation of permanent, extensive, depositional areas is not expected.

The reconfigured channel invert elevation would drop 1.9 feet through the 600-foot-long reach, resulting in a slope of 0.317 percent, as compared to a slope of 0.21 percent.

Riprap Alternative

The impacts on channel morphology associated with the Riprap Alternative would be similar to those stated above for the Preferred Alternative; however, this alternative would require more gradual channel side slopes than the Preferred Alternative. These gradual side slopes would have shallower near-bank depths along the outside bends of the meanders compared to the Preferred Alternative. This equates to a much lower-quality pool habitat for fish based solely on depth.

No Action Alternative

Lateral scour, bank failure, and excessive aggradation and degradation will continue without the implementation of the project. The gravel point bar at the downstream end of the project will continue to be actively cut by high flows. The channel will remain highly unstable.

Hydrology

There would be no significant impacts on hydrology as a result of implementation of the Preferred, Riprap, or No Action Alternative.

Water Quality

Preferred Alternative

The primary water quality benefit associated with the project is decreased sediment loading to the river. The stabilized banks will provide the majority of benefits; however, the well-established riparian zone will also help reduce the potential of sediment-laden runoff entering from the nearby agricultural fields, thereby decreasing the input of nutrients adsorbed to eroded soil particles. Shading provided by the well-vegetated channel banks will promote localized cooler water temperatures during the warm season. All of these effects will improve the aquatic habitat.

A temporary increase in turbidity and suspended solids will occur during construction.

Riprap Alternative

Because the banks will be sloped back and the vegetation will not be as dense, less shading will be provided with this alternative. However, with the exception of localized cooling to the water, the same water quality benefits and temporary construction impacts associated with the Preferred Alternative will occur with this alternative.

No Action Alternative

Excessive sediment loading to the river would continue with this alternative due to bank erosion. Because the downstream gravel point bar is actively being cut by high flows, the channel will likely become braided. This would result in the channel becoming wider and shallower, exposing a greater volume of water to more intense sunlight and elevating the water temperature.

Air Quality

Preferred Alternative

No long-term air impacts would occur as a result of this action. Temporary increases in dust from hauling equipment and construction-related vehicles would take place during the building season, but they would stop once construction was completed.

Riprap Alternative

The impacts to air quality would be the same as with the Preferred Alternative.

No Action Alternative

There would be no effects on existing air quality.

Aquatic Environment

Fisheries

Preferred Alternative

The fisheries habitat through the project reach would be greatly improved. Specific fisheries habitat benefits include the following:

1. Increased water depth and greater opportunity for hiding would exist.
2. Excellent shelter, shade, and "landmark" reference points important in fish behavior (White, 1973) would be provided by the natural materials revetment.
3. Resting areas from strong currents would be provided by the boulders and logs.
4. Excellent drift-feeding opportunities would be created along the outside bends of the meanders. There, the main current is proximal to the deep-water sheltered area created by the natural materials revetment, which provides protection from predators and strong currents.
5. Overhead cover would be provided by surface turbulence near the rock weirs. This form of cover is especially important during low flows when predation from terrestrial animals is more prevalent.
6. The intragravel habitat, essential for salmonid spawning, would be improved in the project area because of increased sediment transport capacity and decreased bank erosion in the project reach.
7. Dense bank vegetation would provide a source of terrestrial food and improve the aquatic food base (see the Aquatic Invertebrates discussion in the following section).

Riprap Alternative

The bank erosion control and increased sediment transport capacity in the project reach will help improve the intragravel habitat in the project area. However, because the banks will be sloped back and no large, in-stream woody debris is associated with this alternative, the fisheries benefits such as habitat variety, overhead cover, creation of favorable resting and feeding areas, and terrestrial food inputs will not be obtained.

No Action Alternative

The fisheries habitat would continue to be degraded, primarily because of increased sediment loading, channel over-widening and shallowing, and increased water temperature.

Aquatic Invertebrates

Preferred Alternative

Decreased sedimentation and bank erosion, increased woody debris, and increased coarse particulate organic material supplied from a healthy riparian zone will all improve the aquatic invertebrate habitat. These benefits will be obtained with the Preferred Alternative.

Riprap Alternative

Decreased sedimentation and bank erosion will improve the aquatic invertebrate habitat. Because the channel banks will be sloped back from the water surface throughout the project reach, the benefit of the riparian zone as a source of coarse particulate organic matter would not be as great as with the Preferred Alternative. In addition, since this alternative does not provide in-stream large, woody debris, the macroinvertabrate habitat is limited to rock and gravel substrate. This is not as favorable as the variety of habitat substrates that would be provided by a combination of large, woody debris and gravel and rock substrate (Hedman, 1996).

No Action Alternative

Bank erosion and aggradation would continue to degrade the aquatic invertebrate habitat. Increased sedimentation can fill the interstitial substrate pores and smother benthic invertebrates. Continued removal of the riparian zone may decrease the supply of coarse particulate organic material to the macroinvertebrate grazers and shredders.

Aquatic Vegetation

There would be no impacts to aquatic vegetation as a result of implementation of the Preferred Alternative, Riprap Alternative, or the No Action Alternative.

Terrestrial Environment

Preferred Alternative

Riparian Communities. No direct impacts on riparian communities or loss of vegetation would occur. Existing riparian communities support only a limited number of wildlife species because of their small size and distinct nature. As a result, indirect impacts on wildlife as a result of disturbance during the construction phase of the restoration project are expected to be minor. These construction-related impacts would be temporary and would cease once construction is completed.

Long-term effects to the project area resulting from the restoration of the river bank include the addition of 1.2 acres of riparian vegetation. This will consist of a forested/shrub riparian community along both river banks for the entire length of the project. The increased riparian area is expected to benefit wildlife species that use riparian habitats. The expected increase in habitat value is addressed below in the Habitat Evaluation Procedure (HEP) section. Increasing the abundance, structural diversity, contiguity, and plant diversity within the riparian zone will provide greater amounts of roosting and nesting locations for birds and denning sites for mammals.

Restoration of natural river meanders may permit a very small amount of emergent wetland vegetation, primarily sedges (*Carex* spp.) and rushes (*Juncus* spp.), to become established along the relatively flat inside bends of meanders. The establishment of this vegetation will provide habitat for wetland-dependent species, including amphibians and some reptiles. This potential benefit is uncertain and would occur on a very small scale. Therefore, potential wildlife benefits are not considered in the HEP analysis.

Adjacent Uplands. The habitat value of existing agricultural fields is low. Pheasants may nest in these areas, and a few small mammals would be present. During construction, short-term temporary impacts would occur as a result of increased human activity and the noise created by machinery. These impacts would be temporary and very minor. No direct impacts on agricultural lands would occur.

Habitat Evaluation Procedure. HEP is a formalized, quantitative method of evaluating wildlife habitat quality. The measure of habitat quality is combined with the affected acreage of various cover types to determine impacts or benefits associated with water and land development projects. HEP is also used to assess future changes expected to result from implementation of mitigation measures.

HEP uses habitat suitability models to evaluate habitat quality by defining a relationship between selected, measurable habitat variables, such as canopy closure and tree height, and corresponding habitat ratings called a suitability index (SI). These relationships are based on published literature concerning the habitat requirements of the evaluation species. SIs range from 1.0 (optimum habitat value) to 0.0 (no habitat value). SIs for each individual evaluation species variable are combined in an established formula representing the relative importance of the habitat variables. The outcome of this calculation is a habitat suitability index (HSI) value specific to a particular evaluation species and cover type. As with SI values, HSI values also range from 1.0 to 0.0. HSI values (measures of habitat quality), and are multiplied by acres of available cover type (area) to determine the number of habitat units (HUs) available for each species in each cover type.

Selection of evaluation species was based on the cover types that would benefit from the proposed project. This includes forest/shrub riparian communities consisting of an over-story of cottonwoods and an understory of willows and hawthorns. The yellow warbler and the song sparrow were selected as evaluation species for the Little Weiser River project. The published models for these species indicate that the yellow warbler model may be applied in deciduous shrubland and scrub/shrub wetland (riparian) and that the song sparrow is appropriately used in deciduous shrubland and shrub-dominated wetland (riparian).

Because of the limited time and budget available for preparation of this conceptual design and Environmental Assessment, the HEP results presented below are based on a site visit, review of the evaluation species models, and an assessment of the habitat conditions expected to develop within the project area over a period of 10 to 20 years following project implementation. During that time, the willows are expected to form dense stands up to 3 meters in height for both the action alternatives. Cottonwoods are expected to grow to a height of 8 to 12 meters, and the hawthorns should attain a height of 4 meters under the natural revetment alternative. The willows and hawthorns will form dense shrub stands under the cottonwoods. The expected values of the variables and the corresponding

SI values used to derive HSI values for the song sparrow and yellow warbler are shown in Table 4-1 for the natural revetment and riprap alternatives.

TABLE 4-1

Estimated Values of Evaluation Species Variables and Corresponding Suitability Index Values

	Natural Revetment		Riprap	
Species/variable	**Variable value**	**SI**	**Variable value**	**SI**
Song sparrow				
Distance to water	2 meters	1.0	2 meters	1.0
Height of overstory shrubs	4 meters	0.9	4 meters	0.9
Shrub crown cover	75%	1.0	40%	1.0
Yellow warbler				
Shrub crown cover	75%	1.0	40%	0.5
Height of shrub canopy	4 meters	1.0	4 meters	1.0
Percent canopy cover of hydrophytic shrubs	75%	0.8	40%	0.5

The HEP values shown in Table 4-2 reflect these expected future conditions accounting for the growth of trees and shrubs.

TABLE 4-2

Projected Future HEP Values for Shrub/Forest Riparian Communities in the Little Weiser River Project Area

Alternative	Expected Acreage	Expected HSI Value		Increase in Habitat Units	
		SS	YW	SS	YW
Natural Revetment	+1.2	0.95	0.90	1.14	1.08
Riprap	+0.3	0.95	0.5	0.29	0.15
No Action	No change	0	0	0	0

SS = song sparrow, YW = yellow warbler

Habitat quality, as expressed by HSI values, for the riparian community that is expected to develop over time with the natural revetment alternative would be quite high because of the dense planting and fencing to exclude livestock. There is less opportunity for riparian habitat development under the Riprap Alternative, which is reflected by the smaller area, lower HSI values, and lower number of HUs that would develop over time (Table 4-2). The Natural Revetment and Riprap Alternatives would result in increases of 2.22 and 0.44 HUs, respectively for the two evaluation species , compared to current conditions (gravel/mud bar) and the No Action Alternative.

Threatened and Endangered Species. FWS indicated that a few bald eagles may winter along the Little Weiser River but that construction in this small area would not have any impact on this or any other threatened or endangered species. Construction would occur during the low flow period from August 15 to November 15 and would therefore not affect bald eagles. Habitat conditions for bald eagles would improve within the project area over the long term as planted cottonwood trees mature and fish habitat improves.

Riprap Alternative

Riparian Communities. It is estimated that there would be a net increase of 0.3 acres of riparian vegetation following implementation of the Riprap Alternative. Shrub height would be similar to and cover values lower than those predicted for the Preferred (Natural Revetment) Alternative. Wildlife habitat value assessed using HEP was presented in Table 4-1.

Threatened and Endangered Species. As stated above, there would be no impacts on threatened or endangered species.

No Action Alternative

None of the benefits that would occur with implementation of the Preferred Alternative would result if the No Action Alternative is implemented. No new riparian habitat would be developed so there would be no increase in habitat units (Table 4-2).

Threatened and Endangered Species. No impacts on candidate, threatened, or endangered species would occur under the No Action Alternative.

Land Use

Preferred Alternative

Land use patterns would not be impacted by implementation of the alternative. The two adjoining property owners are supportive of the project. Access and construction easements would be required along both banks of the river, between cross sections 60 and 100 (see Figure 2-1). The temporary (construction) easement areas would be approximately 200 feet wide on each side of the centerline of the new river channel. The permanent (operations and maintenance) easement includes the area within 45 feet from the top of the reconstructed bank landward on each side of the new channel.

The Little Weiser is used for field irrigation, and this use would continue. As local project sponsor, the Flood Control District No. 3 would need to obtain appropriate water rights from the IDWR for temporary irrigation of habitat improvement features.

Riprap Alternative

Existing land use patterns would not be impacted. Easements would be required for permanent and temporary use, with the temporary easement area extending approximately 200 feet from the centerline of the river channel.

Rock riprap would be used to stabilize the banks of the reconfigured channel. The rock would be purchased from a permitted, established quarry and delivered to the site. Willows would be planted along the riprap to improve wildlife habitat.

No Action Alternative

The site would remain in its current land use. The river channel would continue to degrade, and bank erosion would gradually remove more land from neighboring agricultural uses. Aquatic habitat would suffer from sediment deposits. Eventually, the integrity of the Gladhart Lane Bridge could be impacted by the channel action and nearby bank erosion, and the bridge would require stabilization.

Recreation

Preferred Alternative

The preferred action would have no impact upon recreation. Fishing within the river stretch may improve because of better habitat, although the current access to the river would not be changed.

Riprap Alternative

No recreation impact would occur.

No Action Alternative

No habitat enhancement or restoration would occur.

Aesthetics

Preferred Alternative

Channel restoration would stop the current pattern of bank undercutting through the project reach. Vegetation and revetments would replace cut, bare banks. The river channel at the project site would include rock weirs that may not be as visually pleasing to some as open waters. The overall visual aesthetics, however, would be improved by the riparian vegetation over time.

Riprap Alternative

Rock riprap would be used to line the reconfigured channel. Two rows of willow plantings are included as part of the alternative. Eroded banks would be replaced with riprap, which may be more aesthetically appealing than cut banks. Over the long term, it is unlikely that riprap would be perceived as visually appealing compared to the Preferred Alternative, since the natural revetment includes more vegetation.

No Action Alternative

The river channel would continue to degrade, with bank erosion likely escalating as the underbank becomes increasingly unstable.

Cultural Resources

Preferred Alternative

No National Register sites would be impacted by the proposed action. A cultural resource survey was conducted onsite to further investigate the project site. One prehistoric site was located that appeared to consist of artifacts eroded from their original context at another site upstream. The proposed action would redirect river flow across the site and a rock weir would be constructed across the east end of the site. Since the site has not retained its integrity, it was recommended as Not Eligible for nomination to the National Register of Historic Places. At this point, no further action is recommended at this particular location or for the remaining project area.

The construction work necessary to restore the river channel would be monitored by a qualified archaeologist. Construction workers would be cautioned about cultural resource concerns. If material is discovered, work would stop until the find is evaluated by the archaeologist. Resource protection would occur immediately in compliance with all laws and regulations regarding cultural resources.

Riprap Alternative

The results of the Cultural Resource Survey, described above and included in Appendix I, would be applicable for this alternative as well.

No Action Alternative

Cultural resources would not be impacted by the alternative.

V. Consultation and Coordination

Coordination Prior to the Environmental Assessment Process

The Corps began a preliminary examination of the Little Weiser River in the early 1990s. A meeting was held on August 30, 1993, with local landowners, IDWR, IDFG, NRCS (called the Soil Conservation Service at that point), and DEQ to discuss restoration of the 15-mile stretch of river. A field trip was conducted on September 15, 1993, with landowners and representatives from IDFG, IDWR, DEQ, and the Flood Control District.

Next, several potential alternatives were considered to address channel stability problems while providing fish and wildlife habitat benefits in compliance with the requirements of Section 1135(b). Corps personnel and CH2M HILL hydrologists conducted a helicopter flight in May 1996 to inspect the lower Little Weiser River, and problem reaches were evaluated to determine the most suitable areas for implementation of stabilization measures. It was further decided that Gladhart Lane Bridge would qualify as a Section 14 bridge protection project, and that the river upstream from the bridge was appropriate as a Section 1135 environmental enhancement project.

Coordination for the Environmental Assessment

A number of local, state, and federal agencies were contacted for input during the Environmental Assessment's scoping process for the selected local treatment in the vicinity of Gladhart Lane Bridge. See Appendix J for a copy of the letter and a list of notified agencies.

Distribution of Environmental Assessment

The same agencies that were contacted during the scoping process received copies of the Environmental Assessment for review and comment. The list included the FWS, SHPO, Washington County Planning Department, Washington County Board of Commissioners, DEQ, IDWR, IDFG, the District Regulatory Corps office, and the NRCS.

A number of local, state, and federal agencies were contacted for input during the Environmental Assessment's scoping process for the stream restoration initiative. A copy of the letter and list of notified agencies is included in Appendix J.

VI. Compliance with Environmental Protection Statutes and Regulations

All appropriate environmental protection statutes and regulations shall be complied with throughout the proposed action, including the Fish and Wildlife Coordination Act, Endangered Species Act, National Historic Preservation Act, Archaeological Resources Protection Act, and Clean Water Act. Permits and regulations that must be obtained or adhered to include the following:

- Idaho Department of Water Resources (IDWR): A Stream Alteration Permit is required for the weir and revetment treatment. It will be applied for as a joint application for permit.
- Army Corps of Engineers (Corps): Physical construction in water will require 401 and 404(b)(1) compliance. The 404(b)(1) evaluation is in Appendix K.
- Washington County and Federal Emergency Management Agency (FEMA): Floodway review and approval would be necessary prior to project construction.
- Idaho Department of Health and Welfare: A Water Quality Certification is required from the Division of Environmental Quality (DEQ). It can be obtained after the Stream Alteration Permit is processed.
- Idaho State Historic Preservation Office (SHPO): A cultural resource survey has been completed for SHPO review and agreement. It is contained in Appendix I. SHPO responded (see Appendix J) that the project can proceed with no effect on historic properties.
- U.S. Fish and Wildlife Service (FWS): The agency was contacted for input regarding threatened and endangered species in order to properly mitigate construction impacts that may occur to listed species. FWS responded that no impacts would occur as a result of the project to threatened or endangered species, besides wintering bald eagles. They noted that winter construction could disturb foraging and perching eagles, although

any birds displaced are likely to find uninhabited habitat nearby. In any event, construction is not planned during winter months (See Appendix J).

A Section 404(b)(1) evaluation is included in Appendix K. Certain activities within waters of the United States are regulated under Section 404 of the Clean Water Act. Guidelines establishing environmental criteria for the issuance of permits under Section 404 are defined in Part (b)(1) of the Act. No Section 404 permit can be issued unless the (b)(1) guidelines are satisfied. These guidelines require an evaluation of practical alternatives to any proposed fill activity, and establish a presumption of practical upland alternatives. The guidelines also provide for an assessment of discharges of fill material that will cause or contribute to significant water quality degradation.

Under the guidelines, activities must be performed to achieve minimal adverse impact, and no permits shall be issued unless measures have been taken to avoid or minimize impacts. Minimizing impacts encompasses mitigation through management and compensation. Three major aspects addressing mitigation include avoidance, minimization, and replacement/compensation.

The Little Weiser Section 1135 habitat restoration project is anticipated to have minimal impacts on waters of the U.S. No wetlands are expected to be affected by the project. Project activities include construction of log revetments and rock weirs as grade controls. Actions would be taken to minimize potential impacts to in-stream areas during placement of the logs and rocks. Project objectives are the restoration of a segment of the Little Weiser River to halt the degradation of the river channel environment caused by eroding banks, loss of riparian habitat, and gravel bar deposition. The channel would thus become part of a more stable system. The net benefits of the project will eliminate the need for compensation.

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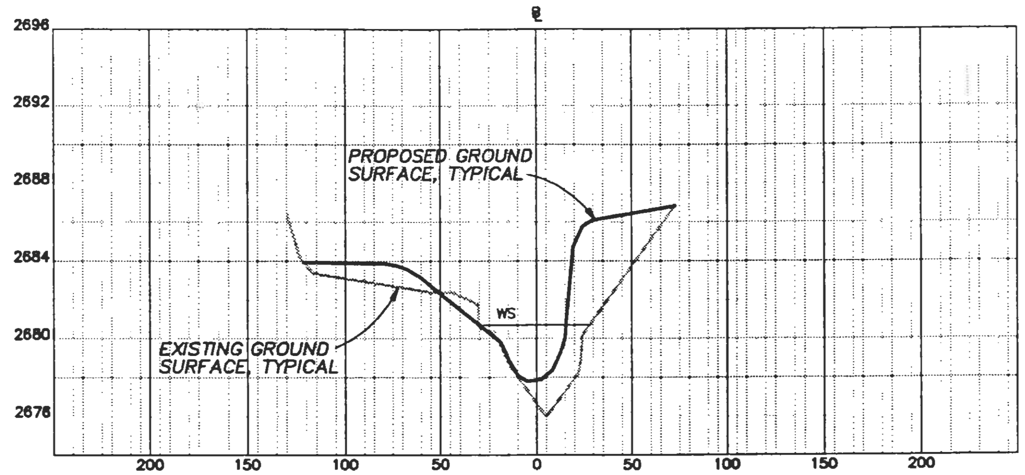
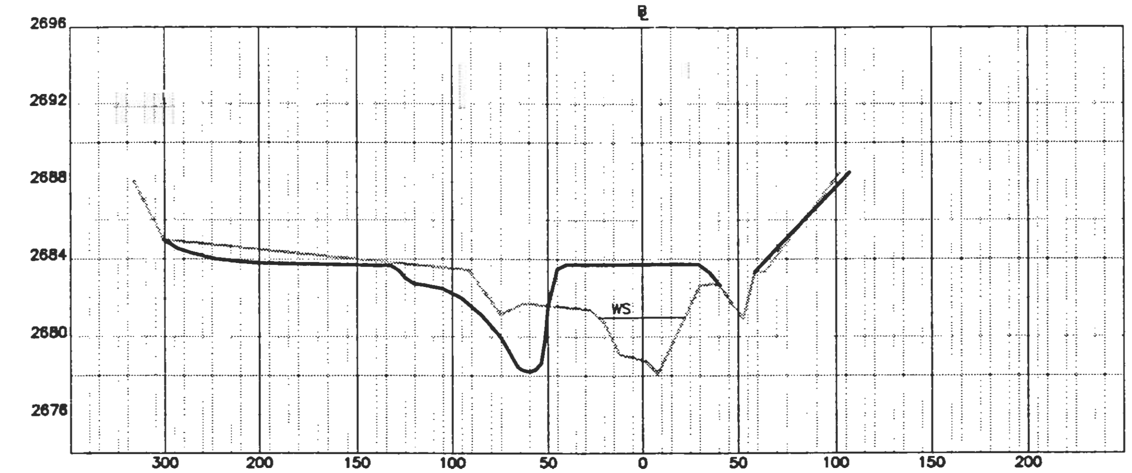
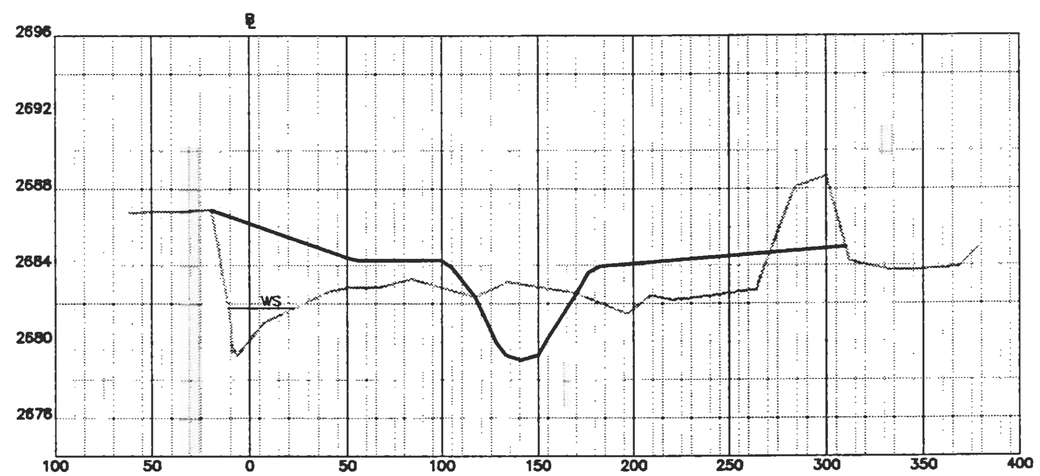
Appendix A
Channel Cross Sections



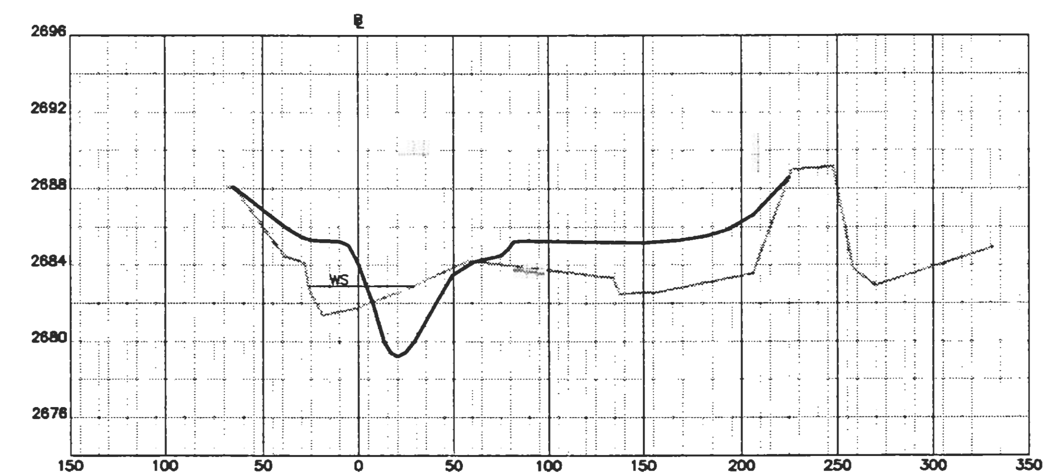
SECTION 60



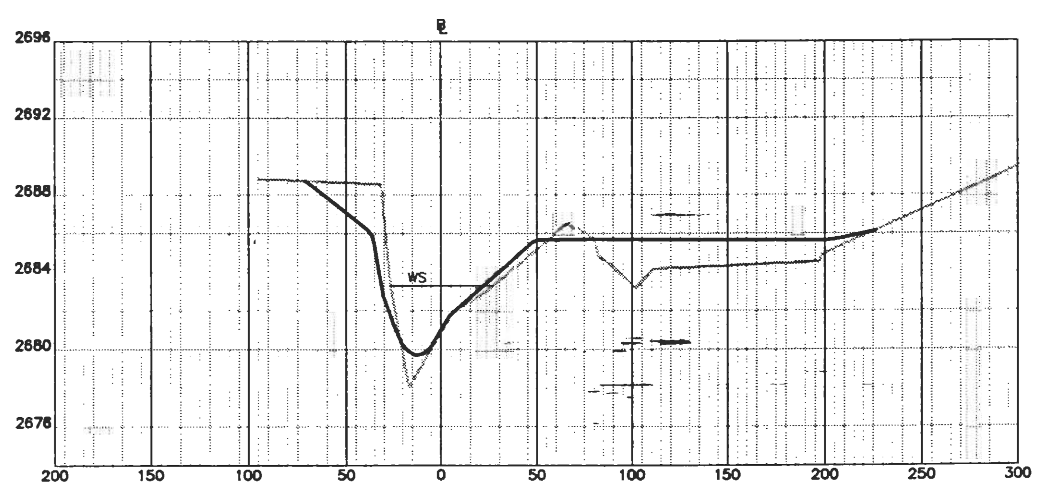
SECTION 70



SECTION 80



SECTION 90



SECTION 100

Note:

1. *WS = Water surface elevation surveyed on June 25, 1996.*

FIGURE A-1
EXISTING AND PROPOSED
CHANNEL CROSS-SECTIONS
LITTLE WEISER RIVER
SECTION 1135

CH2M HILL

Appendix B

Natural Materials Revetment Restoration Projects

Partial list of restoration projects utilizing natural materials* for stabilization—fisheries habitat enhancement
*(Root wads, rock, sod-mats, willow)

Project	Location	± Length	± Time-in-Place	Notes
Uncompahgve River	Just below Ridgeway Dam at Ridgeway, CO	1.5 miles	4 years	Mike Leak, Colorado Parks Department, Montrose, Colorado; Sherman Hebine, Colorado Division of Wildlife
Blue River	Eagle Pass Ranch 5 miles S. of Kremmling, CO	3 miles	2 years	Bank-full at ± 1,000 cfs, withstood recent flows of 4,000 and 3,600 cfs for 3 weeks
Bitteroot River	Double Fork Ranch Victor, Montana	1.5 miles	2 years	Withstood major ice-flows, January 1996
Wiminuche River	Linduer Ranch ± 20 miles NW Pagosa Springs, CO	3 miles	7 years	Bank-full at 300-350 cfs, hi-flows of 2,000 cfs
Blanco River	Linduer Ranch ± 20 miles SE Pagosa Springs, CO	2 miles	9 years	Bank-full at 650-700 cfs, hi-flows of 2,000, 3,800 cfs
East Fork San Juan River	± 15 miles NE Pagosa Springs, CO	1 mile	10 years	
Florida River	15 miles E. of Dunago, CO	1.5 miles	6 years	Flows range 5 to 1,000 cfs (below reservoir) Bank-full at 250 to 300 See: Rod Van Velson, Research Fisheries Biologist, Colorado Division of Wildlife: Fish Research Unit, Fort Collins, Colorado: Conducting studies of native materials revetments in relation to fisheries habitat enhancement.
San Juan River	at Pagosa Springs, Colorado	2 miles	2 years	Recreation—Fisheries enhancement project for town of Pagosa Springs, Colorado Division of Wildlife at Dunago, Colorado Bank-full ± 12 to 1,300 cfs, Spring 1996 hi-flows at 10,000 cfs
Wildcat River	Richmond, California	1.5 miles	4 years	East Bay Parks Recreation District
Red River	± 60 miles E-S of Grangeville, Idaho	1 mile	7 years	Nez Perce N. F. Steelhead fisheries enhancement
Eel River	near Eureka, California	1 mile	5 years	

Project	Location	± Length	± Time-in-Place	Notes
West Fork San Juan River	near Pagosa Springs, CO at Inn at the pass	1 mile	2 years	Bank-full at ± 600 cfs hi-flows at ± 2,000 cfs
East Fork San Juan River	± 15 miles NE Pagosa Springs, CO	1 mile	10 years	Bank-full at ± 600 cfs hi-flows at 2,000 cfs
Quail Creek	near Baltimore, Maryland	1.3 miles	9 years	Rocky Powell, c/o Baltimore County
NCRS	South Dakota; South Carolina			Implemented various "rootrap" projects—with success—have withstood up to 100-year storm event

Note: All of the above projects have utilized various amounts of natural materials and employed various structural facilities such as the "vortex rock weir", the "W" weir, the rock "vane", root-wads or root-fans, and utilized vegetation enhancements such as "sod-mats" and willow "clump" transplants.

The above information is per an interview with Dave Rosgan, Wildlife Hydrology Consultants, Pagosa Springs, Colorado 947/264-7100, 9/15/96

From: H.L. Silvey, Western Hydrology

Appendix C

NRCS Soil Types

RECEIVED
JUL 10 1996
CH2M HILL
BOISE

179 -- Riverwash

COMPOSITION

Riverwash - 95 percent

Contrasting inclusions - 5 percent

SETTING

Landform: channels

Elevation: 2,100 to 4,500 feet

Slope range: 0 to 3 percent

RIVERWASH

These are areas of mainly sand, gravel and cobbles which are frequently flooded, washed and reworked by stream or river waters. They support little or no vegetation.

CONTRASTING INCLUSIONS

Notus sandy loam

INTERPRETIVE GROUPS

Capability classification: VIII

189 -- Shoepeg loam, 0 to 3 percent slopes

COMPOSITION

Shoepeg soil and similar inclusions - 90 percent

Contrasting inclusions - 10 percent

SETTING

Landform: stream terraces

Elevation: 2,200 to 3,500 feet

SHOEPEG SOIL

Position on landscape: summits

Climatic data: (average annual)

*precipitation - 14 to 18 inches

*air temperature - 50 to 54 degrees F

*length of growing season - 130 to 150 days

Typical profile:

*0 to 21 inches - very dark grayish brown loam

*21 to 29 inches - dark grayish brown loam

*29 to 48 inches - dark brown silt loam

*48 to 60 inches - brown gravelly sandy loam

Depth class: very deep

Drainage class: somewhat poorly drained

Permeability: moderate

Available water capacity: high

Restriction to rooting depth: water table at 24 to 36 inches

Runoff: slow

Hazard of erosion by water: slight

High water table: April through September at 24 to 36 inches

Hazard of flooding: rare

CONTRASTING INCLUSIONS

Catherine silt loam

Dagor loam

Langrell gravelly loam

Newell clay loam

Onyx silt loam

USE AND MANAGEMENT

Major use: irrigated cropland

Major management factors: wetness

Commonly grown crops: wheat, barley, oats, grass-legume hay, pasture, sugar beets, corn and corn silage

General management consideration:

Wetness limits the production of deep-rooted crops.

INTERPRETIVE GROUPS

Capability classification: IIw, irrigated

190 -- Shoepeg silty clay loam, 0 to 3 percent slopes

COMPOSITION

Shoepeg soil and similar inclusions - 90 percent

Contrasting inclusions - 10 percent

SETTING

Landform: stream terraces

Elevation: 2,200 to 3,500 feet

SHOEPEG SOIL

Position on landscape: summits

Climatic data: (average annual)

*precipitation - 14 to 18 inches

*air temperature - 50 to 54 degrees F

*length of growing season - 130 to 150 days

Typical profile:

*0 to 26 inches - very dark gray silty clay loam

*26 to 34 inches - very dark grayish brown silt loam

*34 to 46 inches - very dark grayish brown clay loam

*46 to 60 inches - dark brown silt loam

Depth class: very deep

Drainage class: somewhat poorly drained

Permeability: moderate

Available water capacity: high

Restriction to rooting depth: water table at 24 to 36 inches

Runoff: slow

Hazard of erosion by water: slight

High water table: April through September at 24 to 36 inches

Hazard of flooding: rare

CONTRASTING INCLUSIONS

Catherine silt loam

Newell clay loam

Langrell gravelly loam

USE AND MANAGEMENT

Major use: irrigated cropland

Major management factor: wetness

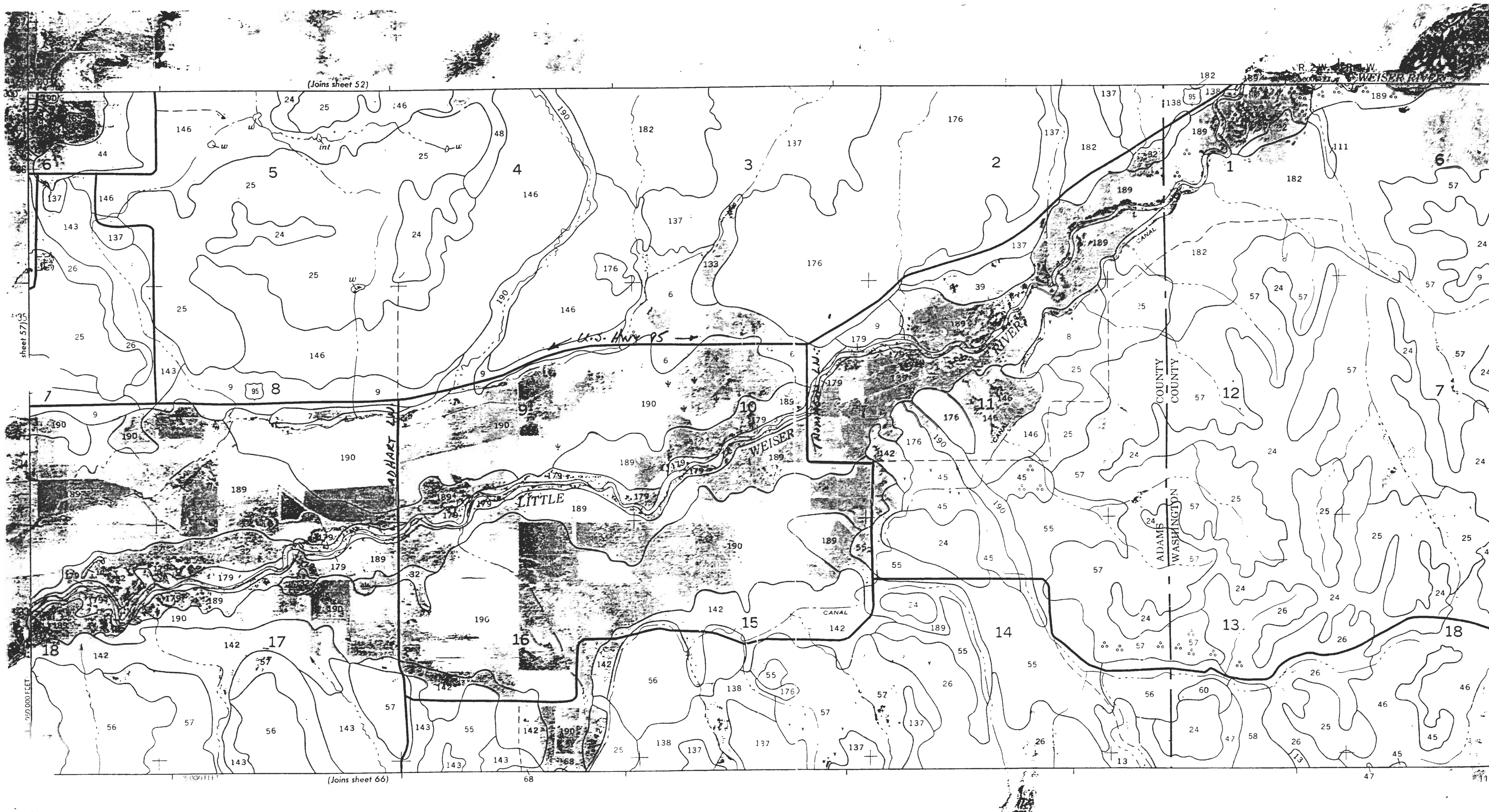
Commonly grown crops: wheat, barley, oats, grass-legume hay, pasture, sugar beets, corn and corn silage

General management consideration:

Wetness limits the production of deep-rooted crops.

INTERPRETIVE GROUPS

Capability classification: IIw, irrigated


(Joins sheet 52)
(Joins sheet 66)
sheet 57)
WEISER RIVER
LITTLE WEISER RIVER
U.S. HWY 95
CANAL
ADAMS COUNTY
WASHINGTON COUNTY
116°

Appendix D

USGS Gage Records (Summary)

Station Name	LITTLE WEISER RIVER NR CAMBRIDGE ID
Station ID	13261500
Param	Streamflow (cfs)
Statistic	Mean
State	IDAHO
County	WASHINGTON
Latitude	44:33:20
Longitude	116:35:20
Elevation	
Start Year	1920
End Year	1926
Num Years	7

	January	February	March	April	May	June	July	August	September	October	November	December	Year
1920						212.267	31.161	0.032	0.833	30.387	168.567	241.516	
1921	390.581	237.857	658.258	324.233	672.935	434.233	50.581	1.423	7.687	18.032	60.067	85.516	
1922	29.355	103.75	568.452	478.167	535.839	413.2	43.426	5.8	0.747				
1923				345.7	411.355	372.8	94.387	8.99	1.723	16.726	19.067	23.355	
1924	12	377.897	55.903	98.567	125.484	7.43	0.3						
1925	0	352	331.71	405.733	456.194	168.767	20.652						
1926			171.464	195.8	194.419	29.117	1.542						
# Days	124	104	166	180	196	210	210	136	120	93	90	93	1722
Avg Day	108	261.7	361.1	308	393.7	234	35.68	3.71	2.75	21.72	82.57	116.8	180.6
Max Day	1300	2400	1900	1320	1350	749	257	20	28	47	685	2350	2400
Min Day	0	14	35	36	31	1.5	0	0	0	2	13	12	0
# Months	4	3	4	6	6	7	6	4	4	3	3	3	2
SDev Month	188.8	137.1	269.6	139	206.8	177.7	31.97	4.1	3.32	7.54	77.25	112.4	51.86
Skew Month	1.98	0.065	-0.728	-0.524	-0.202	-0.168	0.829	0.398	1.9	1.67	1.2	1.16	
Min Month	0	103.8	55.9	98.57	125.5	7.43	0.3	0.032	0.747	16.73	19.07	23.35	195.5
Max Month	390.6	377.9	658.3	478.2	672.9	434.2	94.39	8.99	7.69	30.39	168.6	241.5	268.8
Exceedences													
1%	1290	2347	1900	930.4	1129	744.9	225.1	19.64	27.6	47	685	2350	1080
5%	556	658.4	1149	550	871	667	130	14	16	41.05	483	328	625
10%	308	514	779	512	716	550	91	11	9	40	231	187.8	493
20%	200.4	316.2	596.8	446	544	401	65	8	3	32.8	80	136	329
50%	25	194	217	307	383	212	20	2	1	20	26	61	76
80%	0	125	91.6	139	190	17	0.9	0	0.2	11	18	23.6	5.5
90%	0	90	48.2	107	134.6	9	0.2	0	0	5.5	17	21	0.7
95%	0	44	40.6	85	82.8	5.8	0	0	0	4	16	16.65	0
99%	0	44	36.32	42.6	42.76	1.78	0	0	0	3.86	13.9	13.86	0

Station Name	LITTLE WEISER RIVER NR INDIAN VALLEY ID
Station ID	13261000
Param	Streamflow (cfs)
Statistic	Max
State	IDAHO
County	ADAMS
Latitude	44:29:22
Longitude	116:23:22
Elevation	3250
Start Year	1920
End Year	1971
Num Years	41

	January	February	March	April	May	June	July	August	September	October	November	December	Year
1920							40.6	15.6	14.3	26.7	118.1	106.0	
1921	143.9	109.0											
1923				203.5	349.9								
1924			41.5	88.2	150.0	29.7	10.5	5.7	5.4	9.2	30.1	17.8	
1925	35.6	255.5	81.5	352.9	414.5	166.4	34.1	15.4	11.2	11.2	13.9	22.5	
1926	17.0	83.0	91.6	170.7	182.5	47.9	14.4	10.5	10.1	11.1	76.4	116.5	
1927	59.9	170.7	126.4	223.2	418.8	501.2	106.5	25.2	17.6				
1938					445.6	318.9	68.8	19.7	12.6	16.6	18.6	20.7	
1939	17.2	18.4	145.3	214.5	231.8	60.9	20.7	7.9	8.0	9.0	9.2	18.2	
1940	47.5	141.3	217.5	334.1	337.3	132.0	22.4	10.0	12.0	20.6	48.4	41.5	
1941	39.0	60.1	118.9	185.7	311.5	163.4	42.9	18.7	14.4	15.6	21.2	78.5	
1942	48.1	55.6	59.8	275.5	301.9	227.5	41.9	14.1	11.0	11.1	29.6	64.8	
1943	92.1	78.9	135.8	490.7	382.2	368.2	101.5	24.1	12.8	16.1	21.2	16.7	
1944	14.5	34.3	52.6	174.8	195.5	170.5	43.8	14.2	11.4	10.7	24.8	13.9	
1945	42.3	109.9	85.9	135.2	404.5	313.2	55.5	18.2	13.5	13.1	26.9	58.4	
1946	45.3	38.8	140.4	321.1	401.1	175.4	41.4	13.0	12.9	17.6	87.3	157.4	
1947	40.1	90.1	112.4	181.6	421.0	249.3	46.8	16.8	14.6	26.4	29.3	30.3	
1948	67.2	25.7	46.3	211.2	441.0	310.5	55.0	16.4	10.1	13.4	18.9	18.7	
1949	17.8	46.9	107.8	239.8	411.7	171.6	31.3	10.4	8.9	12.7	19.4	13.9	
1950	23.9	65.6	136.4	179.9	250.1	290.0	76.0	20.1	10.5	18.1	25.7	37.5	
1951	34.2	108.6	70.9	285.6	385.1	186.3	43.8	14.0	10.7	47.5	54.2	83.5	
1952	37.1	58.1	73.8	489.4	601.1	321.5	65.6	18.1	13.5	10.9	10.7	13.6	
1953	108.1	80.9	67.8	205.9	368.4	549.8	114.8	24.0	12.9	12.7	18.3	24.5	
1954	49.1	82.6	96.8	253.9	410.6	233.5	56.4	14.9	9.9	11.6	14.0	11.6	
1955	12.7	12.5	25.1	124.4	251.1	279.5	60.4	14.8	9.5	12.9	23.6	149.3	
1956	113.9	50.2	105.7	268.7	468.2	270.6	51.1	16.5	10.0	25.8	33.6	41.3	
1957	17.8	108.6	158.9	255.1	608.5	352.5	57.1	17.3	9.1	15.3	14.2	22.3	
1958	29.9	138.2	80.9	219.9	548.7	295.8	50.1	16.0	10.2	10.0	17.7	21.9	
1959	62.3	50.1	55.5	148.2	201.5	209.8	35.8	9.8	24.9	41.7	27.4	19.3	
1960	15.5	46.8	150.9	216.2	304.0	245.3	32.7	11.8	7.4	10.2	26.8	20.1	
1961	20.3	90.1	96.0	122.6	275.4	190.1	24.8	7.5	9.1	13.0	15.1	23.8	
1962	19.9	73.0	54.1	234.7	272.2	225.9	38.4	13.6	10.4	60.4	77.7	99.8	
1963	39.3	145.8	67.7	192.5	269.6	178.5	36.8	13.9	11.2	11.5	21.5	18.0	
1964	24.6	21.0	57.1	241.0	393.1	452.8	86.8	23.2	16.7	12.4	21.9	185.8	
1965	135.9	103.0	77.3	384.3	485.5	353.7	66.3	20.3	12.9	12.1	17.8	16.3	
1966	24.4	19.5	105.1	168.1	212.7	82.6	15.9	4.6	5.4	6.6	13.2	34.1	
1967	71.7	49.4	54.8	87.0	320.0	329.9	58.4	11.6	8.7	15.0	17.1	14.2	
1968	16.6	150.1	103.5	113.0	216.2	156.2	25.1	14.9	8.5	14.4	51.1	48.5	
1969	132.9	50.4	74.6	369.0	500.8	240.6	38.5	11.5	8.9	14.0	13.1	20.3	
1970	191.0	97.5	90.5	94.3	395.7	552.4	118.4	18.7	15.4	15.9	73.7	108.2	
1971	118.1	93.3	98.0	262.6	539.7	419.0	116.9	24.2	12.7				
# Days	1147	1044	1147	1140	1209	1140	1209	1209	1170	1147	1110	1147	13819
Avg Day	54.77	81.33	93.65	229.5	361	258.5	52.52	15.31	11.51	17.11	31.94	48.91	105.3
Max Day	694	950	518	961	1120	800	338	42	72	302	597	1400	1400
Min Day	6	10	10	35	54	16	6.2	3.6	3.6	4.4	5.4	4.7	3.6
# Months	37	37	37	38	39	38	39	39	39	37	37	37	36
SDev Month	44.53	49.92	39.31	97.76	116.6	127.3	28.54	5.11	3.5	11.1	24.92	46.13	29.74
Skew Month	1.41	1.28	0.895	0.962	0.208	0.519	0.966	0.048	1.42	2.6	1.91	1.54	0.169
Min Month	12.74	12.5	25.1	86.97	150	29.7	10.52	4.61	5.39	6.58	9.17	11.55	56.01
Max Month	191	255.5	217.5	490.7	608.5	552.4	118.4	25.23	24.87	60.35	118.1	185.8	157
Exceedences													
1%	404.4	480	322.6	663.4	785.6	713.6	245	37	33.3	95.12	189.1	376.6	620
5%	183.3	235.8	229	500	639.5	563	138	29	18.5	40	110.5	157.9	430
10%	121.9	163	170.3	400	575	500	98	25	16	28	56	93.3	318
20%	74	103.2	131	325	495	396	72	20	14	18	34	56	181
50%	30	56	75.5	198	343	230	40	14	11	13	20	23.5	37
80%	16	26	43	119	218	108	23	10	8.1	10	13	15	14
90%	14	18	35	94	180	70	16	7.5	7.4	9.2	11	13	11
95%	13	14	27	77	152	44	12	6	6.3	7.1	9	11	8.9
99%	10	12	16	54.4	97.18	24.4	9	4.01	4.4	6.09	7	9	6

Station Name LITTLE WEISER R BL MILL CR NR INDIAN VALLEY ID
Station ID 13260500
Param Streamflow (cfs)
Statistic Mean
State IDAHO
County ADAMS
Latitude 44:29:17
Longitude 116:22:17
Elevation
Start Year 1923
End Year 1982
Num Years 3

	January	February	March	April	May	June	July	August	September	October	November	December	Year
1923								27.55	15.4				
1981		209.3	127.8	212.5	288.4	156.5	30.42	9.08	6.86	15.35	52.5	122.8	
1982	45.42	255.9	154.9	240.4	491.7	428.2	139.9	28.19	20.8	30.39			
# Days	31	47	62	60	62	60	77	93	90	62	38	31	713
Avg Day	45.42	237	141.3	226.4	390.1	292.3	84.39	21.61	14.35	22.87	48.55	122.8	131.1
Max Day	60	753	238	414	770	577	354	43	44	90	175	587	770
Min Day	28	20	90	88	209	54	13	6.1	5.6	12	13	40	5.6
# Months	1	1	2	2	2	2	2	3	3	2	1	1	1
SDev Month			19.18	19.75	143.8	192.1	77.39	10.86	7.03	10.63			
Skew Month								-1.73	-0.655				
Min Month	45.42	255.9	127.8	212.5	288.4	156.5	30.42	9.08	6.86	15.35	52.5	122.8	165.4
Max Month	45.42	255.9	154.9	240.4	491.7	428.2	139.9	28.19	20.8	30.39	52.5	122.8	165.4
Exceedences													
1%	60	753	238	414	770	577	354	43	44	90	175	587	624.2
5%	58.35	706.8	218	407	625.3	572	292.7	40.35	23	55.8	167.8	557.3	473
10%	55	572.5	199.2	366	579.2	519	210.7	36.7	20	43.4	118.6	299.3	372.1
20%	54	421.2	185.2	345	530	451	111.4	33	18	25	73.2	149.4	237.4
50%	44	192	128	221	366	319	62	21	14	19	35	73	55
80%	40	35	103.4	110	265.4	128	27	9.54	6.4	13	16	55	18
90%	39	31.7	95.6	97	229	90	18.7	8.26	6.1	12	14.8	45.2	13
95%	38.55	27.1	91.2	95	218.1	70	15	7	5.75	12	13.9	41.1	8.13
99%	31.1	21.88	90	89.2	210.2	56.4	13	6.47	5.6	12	13	40	5.83

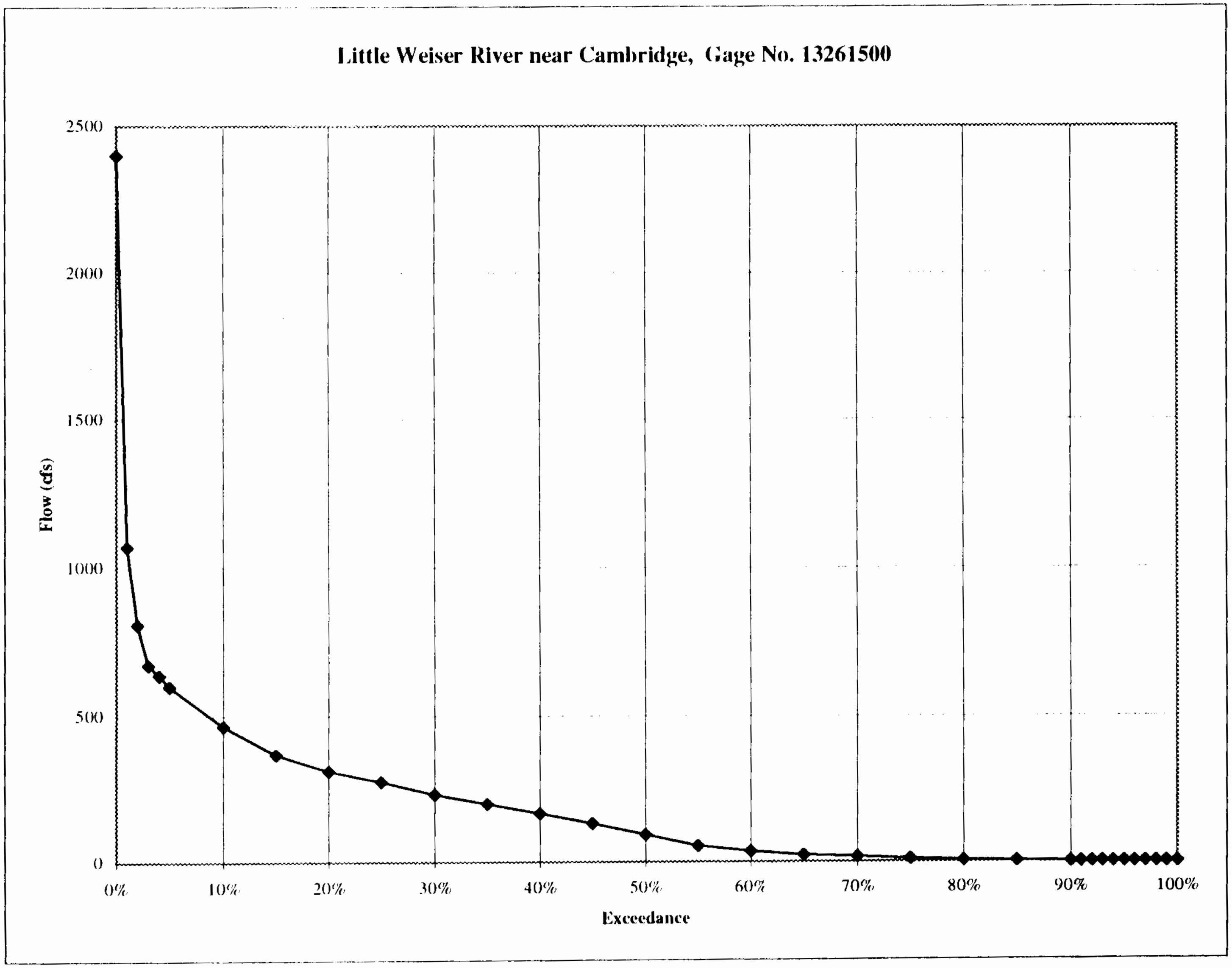
Station Name	WEISER RIVER NR CAMBRIDGE ID												
Station ID	13258500												
Param	Streamflow (cfs)												
Statistic	Mean												
State	IDAHO												
County	WASHINGTON												
Latitude	44:34:47												
Longitude	116:38:47												
Elevation	2647												
Start Year	1939												
End Year	1994												
Num Years	56												
Drain Area	605	mi^2											
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1939				1371	864	176	67	47	44	66	64	140	
1940	318	1185	2049	2342	1175	347	62	56	62	158	392	450	
1941	449	723	1237	1403	1345	830	177	97	116	134	150	854	
1942	404	545	692	2332	1549	937	151	80	73	75	228	446	
1943	738	513	1483	3556	1732	1416	349	103	69	118	183	124	
1944	104	230	473	1053	869	600	133	64	52	67	199	117	
1945	255	925	970	1118	2176	1305	186	61	81	89	256	532	
1946	420	225	1844	2476	1995	618	158	87	87	110	665	1056	
1947	237	711	994	1129	1400	659	122	69	72	153	189	182	
1948	506	469	672	2079	2821	1362	185	96	81	97	144	151	
1949	130	417	1770	1803	1841	506	74	58	88	106	127	104	
1950	173	509	1388	1895	1778	1186	262	88	67	154	175	299	
1951	245	761	861	2234	1703	605	136	69	67	253	422	926	
1952	377	479	845	4542	3429	1132	281	91	87	75	96	116	
1953	1068	717	684	1526	1761	1815	319	87	68	82	133	198	
1954	545	964	934	1854	1678	706	190	75	69	113	114	85	
1955	94	101	299	1241	1788	1033	215	79	92	100	189	1489	
1956	834	562	1180	2183	2001	858	192	82	89	203	204	272	
1957	142	737	1494	2025	2801	924	156	73	61	94	101	271	
1958	244	1501	1034	1942	2850	1172	183	92	81	84	125	142	
1959	453	574	576	1300	1230	664	137	74	144	192	132	103	
1960	98	255	1474	1654	1472	808	106	82	69	71	410	197	
1961	183	1206	1142	1207	1311	637	102	63	66	85	147	245	
1962	143	737	809	1896	1421	792	127	75	69	443	540	914	
1963	229	1089	511	1496	1421	645	132	70	86	75	206	141	
1964	173	229	526	2339	2073	1721	297	103	153	110	140	1263	
1965	786	721	835	2717	2173	1171	250	125	123	93	128	130	
1966	334	174	892	1213	883	317	103	57	45	56	140	403	
1967	717	569	841	886	2169	1411	261	91	83	142	118	123	
1968	174	1271	896	711	1079	562	111	126	85	126	249	244	
1969	777	361	976	2772	2024	778	183	88	93	117	93	186	
1970	1793	850	813	758	2295	1662	317	107	151	134	408	798	
1971	970	751	1595	2641	3115	1654	498	132	133	155	147	271	
1972	792	826	2273	1222	2146	1427	234	115	116	115	116	324	
1973	581	335	992	896	1162	441	101	74	60	76	1010	1052	
1974	1724	722	2186	2604	2352	1993	444	142	105	104	117	108	
1975	138	352	1153	1284	2605	1696	415	151	98	191	213	427	
1976	273	331	738	2267	2088	642	181	116	123	106	79	78	
1977	75	89	99	128	148	67	43	12	35	57	97	717	
1978	613	817	1373	2188	1802	976	276	77	92	70	88	86	
1979	85	363	1128	1052	1414	411	77	63	44	92	83	184	
1980	566	1079	895	1789	1685	1027	216	72	99	91	135	896	
1981	527	1156	950	1154	1061	660	131	71	69	117	427	853	
1982	345	2036	1783	2231	2756	1569	555	122	119	163	252	796	
1983	617	1332	2785	1905	2384	1499	463	164	126	111	294	456	
1984	234	392	1816	2019	2331	1827	418	118	154	175	224	208	
1985	183	181	724	1996	1098	471	85	72	163	181	221	196	
1986	205	1962	2354	1472	1297	748	157	66	123	125	141	123	
1987	117	383	1108	772	450	151	67	56	43	42	74	107	
1988	122	314	441	752	480	305	52	53	41	34	163	169	
1989	168	201	2215	1962	1282	613	88	72	87	95	104	87	
1990	144	141	898	1285	777	648	81	82	58	69	89	65	
1991	125	296	498	726	987	483	94	69	64	46	124	198	
1992	107	832	595	620	401	115	66	63	40	41	76	92	
1993	208	222	2111	2227	2293	1071	205	86	70	87	87	127	
1994	180	205	757	797	639	235	63						
# Days	1705	1554	1705	1680	1736	1680	1736	1720	1650	1705	1650	1705	20226
Avg Day	404.3	647.3	1139	1697	1676	894.3	191.6	84.46	86.06	114.9	204.1	369.4	627.1
Max Day	7480	7200	6440	6440	5070	3680	1420	427	341	2320	3160	8520	8520
Min Day	35	72	86	86	85	26	20	7.1	11	24	33	37	7.1
# Months	55	55	55	56	56	56	56	55	55	55	55	55	54
SDev Month	366.8	439.4	586.3	780.2	723.9	495.1	122.5	27.71	32.18	63.56	165.9	350.6	227.5
Skew Month	2.07	1.21	0.86	0.899	0.144	0.433	1.21	0.677	0.665	2.81	2.85	1.45	0.141
Min Month	75.06	88.79	98.77	128.3	147.5	66.57	42.52	12.35	34.67	33.71	63.53	64.52	79.8
Max Month	1793	2036	2785	4542	3429	1993	555	163.9	163.1	443.4	1010	1489	1202
Exceedences													
1%	3486	4441	4820	4980	4216	2618	870	186.6	226.5	478.4	1465	3735	3757
5%	1378	2129	2998	3620	3272	2090	574.4	145	158.5	223.5	591	1270	2397
10%	846.5	1406	2360	3010	2824	1750	410	124	139	170.5	341	784	1760
20%	459	876.2	1600	2420	2358	1420	262	106	113	140	230	425	1120
50%	210	376	879.5	1470	1540	775	130	76	76	95	130	169	213
80%	116	190	447	875	987.4	339	75	61	55	69	90	102	88
90%	93	133.4	328	692	626.6	183	61	54	44	52	78	85	68
95%	81	105	239.3	561	443.6	125	52.8	49	40	40	67.5	73	57
99%	61.1	84.54	92.1	139.6	150.8	62.4	40	11.2	21.5	28.05	53.5	52.05	39

Appendix E

Daily Flow Duration Curves

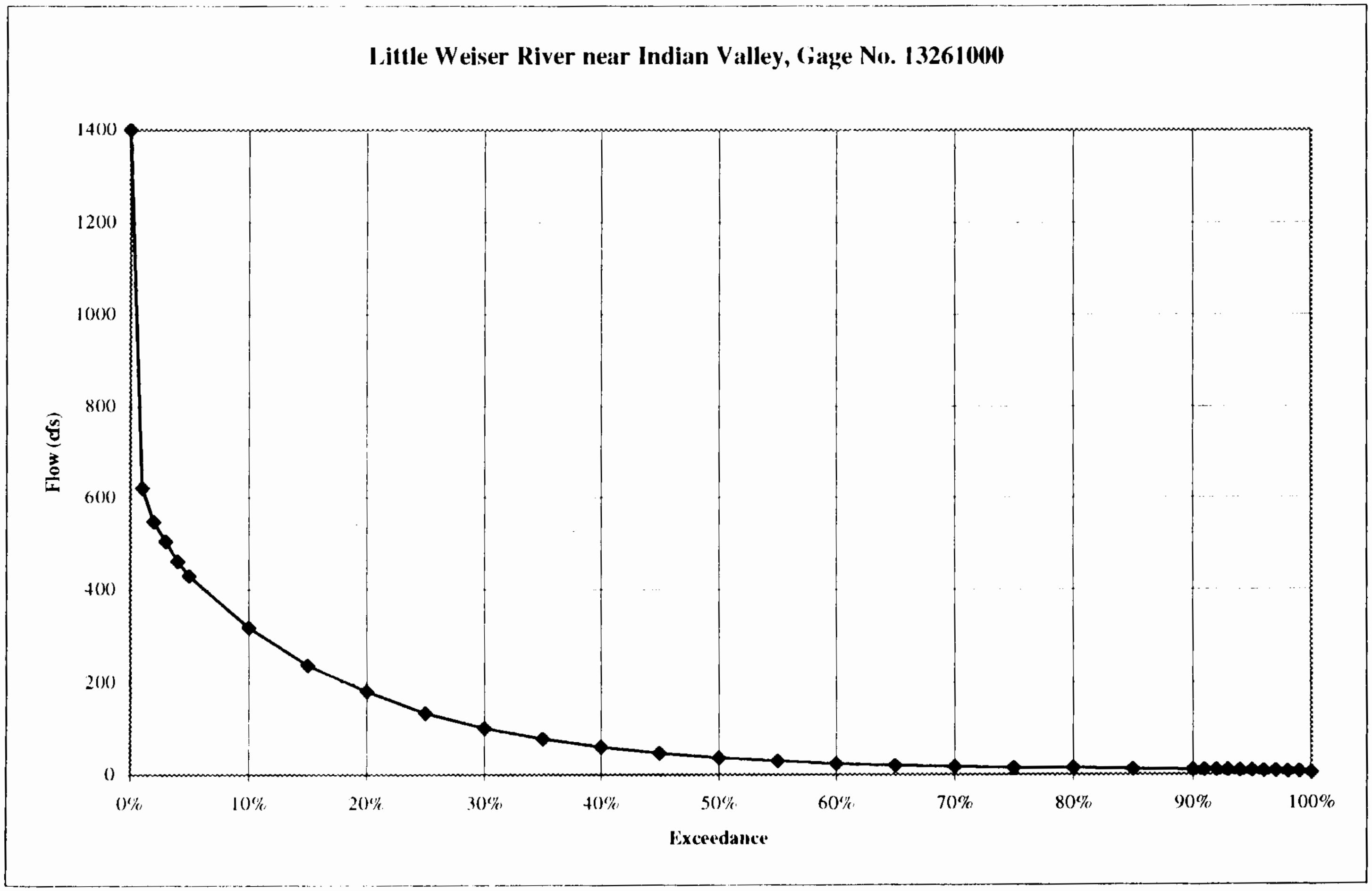
DAILY

%	Exceedance
0%	2400
1%	1070
2%	810
3%	673
4%	638
5%	599
10%	465
15%	368
20%	310
25%	274
30%	231
35%	198
40%	165
45%	129
50%	91
55%	53
60%	34
65%	22
70%	16
75%	9
80%	4
85%	2
90%	1
91%	0
92%	0
93%	0
94%	0
95%	0
96%	0
97%	0
98%	0
99%	0
100%	0



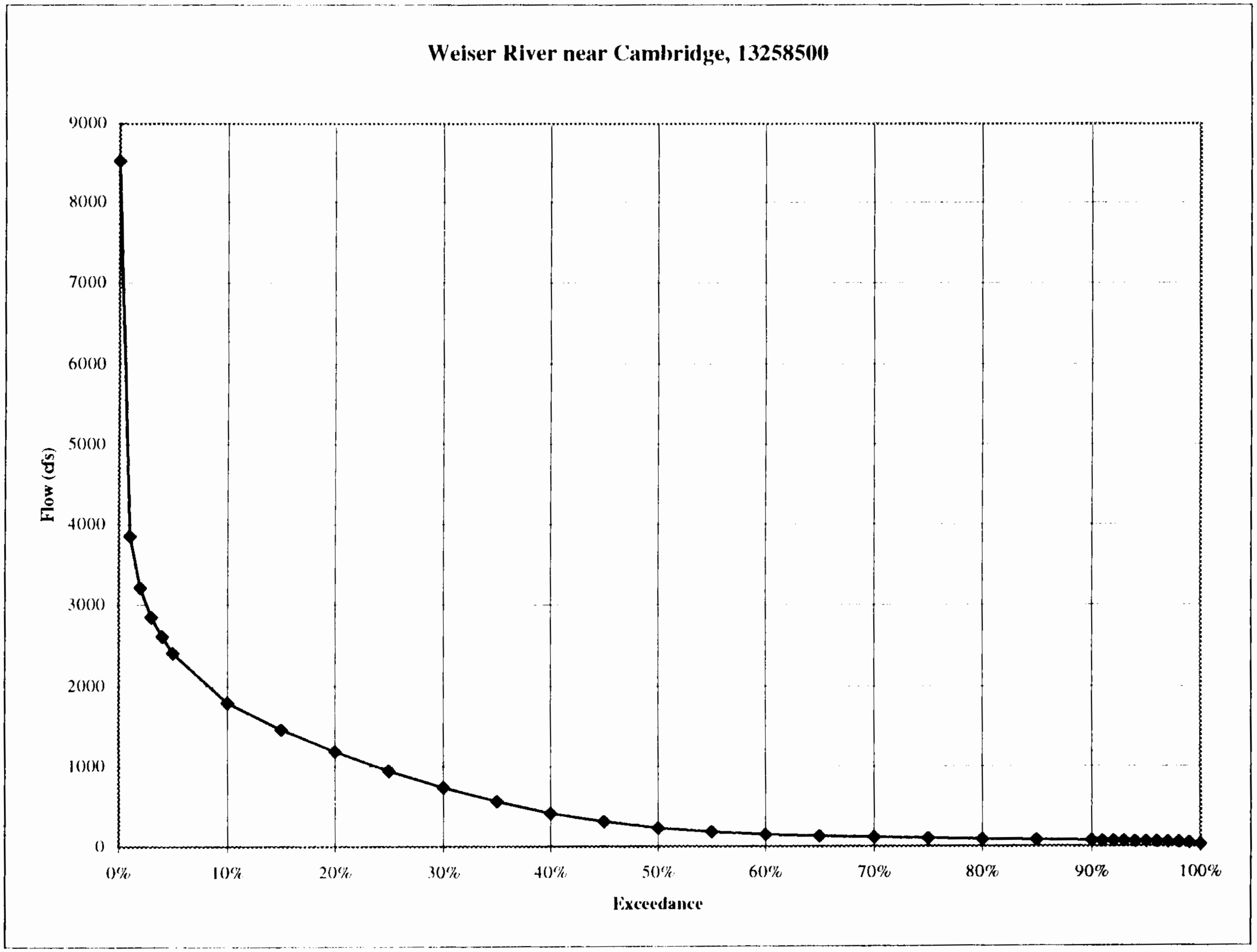
DAILY

%	Exceedance
0%	1400
1%	620
2%	548
3%	504
4%	461
5%	430
10%	318
15%	237
20%	181
25%	135
30%	102
35%	78
40%	60
45%	47
50%	37
55%	30
60%	24
65%	20
70%	17
75%	15
80%	14
85%	12
90%	11
91%	10
92%	10
93%	10
94%	9
95%	9
96%	8
97%	8
98%	7
99%	6
100%	4



DAILY

%	Exceedance
0%	8520
1%	3860
2%	3212
3%	2849
4%	2610
5%	2410
10%	1790
15%	1460
20%	1180
25%	947
30%	742
35%	566
40%	415
45%	316
50%	235
55%	183
60%	151
65%	131
70%	116
75%	103
80%	92
85%	83
90%	73
91%	71
92%	68
93%	66
94%	64
95%	62
96%	59
97%	56
98%	52
99%	47
100%	27



Appendix F

Annual Maxima Exceedance Calculations

Station Name	LITTLE WEISER RIVER NR INDIAN VALLEY ID			
Station ID	13261000			
Param	Streamflow (cfs)			
Statistic	Max	Gage Drain Area =	81.9	mi^2
State	IDAHO	Total Drain Area =	180	mi^2
County	ADAMS			
Latitude	44:29:22	Fraction=	2.2	
Longitude	116:23:22			
Elevation	3250			
Start Year	1920			
End Year	1971			
Num Years	41			

WEIBULL CALCULATION

YEAR	FLOW	RANK	PROB	RETURN	YEAR	FLOW	RANK	PROB	RETURN
1920	1400	1	0.024	41.0	1946	602	22	0.537	1.9
1957	1120	2	0.049	20.5	1968	600	23	0.561	1.8
1965	961	3	0.073	13.7	1967	594	24	0.585	1.7
1925	950	4	0.098	10.3	1954	592	25	0.610	1.6
1952	942	5	0.122	8.2	1942	570	26	0.634	1.6
1943	925	6	0.146	6.8	1923	550	27	0.659	1.5
1955	920	7	0.171	5.9	1963	550	28	0.683	1.5
1964	916	8	0.195	5.1	1960	536	29	0.707	1.4
1927	905	9	0.220	4.6	1941	482	30	0.732	1.4
1938	900	10	0.244	4.1	1961	476	31	0.756	1.3
1948	810	11	0.268	3.7	1951	474	32	0.780	1.3
1958	786	12	0.293	3.4	1944	445	33	0.805	1.2
1953	766	13	0.317	3.2	1962	430	34	0.829	1.2
1945	752	14	0.341	2.9	1926	422	35	0.854	1.2
1956	740	15	0.366	2.7	1921	418	36	0.878	1.1
1970	731	16	0.390	2.6	1939	389	37	0.902	1.1
1971	703	17	0.415	2.4	1950	372	38	0.927	1.1
1947	683	18	0.439	2.3	1959	366	39	0.951	1.1
1969	680	19	0.463	2.2	1966	317	40	0.976	1.0
1940	626	20	0.488	2.1	1924	225	41	1.000	1.0
1949	610	21	0.512	2.0					

Station Nar	WEISER RIVER NR CAMBRIDGE ID
Station ID	13258500
Param	Streamflow (cfs)
Statistic	Max
State	IDAHO
County	WASHINGTON
Latitude	44:34:47
Longitude	116:38:47
Elevation	2647
Start Year	1939
End Year	1994
Num Years	56

WEIBULL CALCULATION

YEAR	FLOW	RANK	PROB	RETURN	YEAR	FLOW	RANK	PROB	RETURN
1955	8520	1	0.018	57.0	1978	3980	29	0.509	2.0
1974	7480	2	0.035	28.5	1976	3900	30	0.526	1.9
1982	7200	3	0.053	19.0	1984	3900	31	0.544	1.8
1964	6780	4	0.070	14.3	1960	3860	32	0.561	1.8
1972	6470	5	0.088	11.4	1981	3810	33	0.579	1.7
1940	6440	6	0.105	9.5	1942	3790	34	0.596	1.7
1970	6310	7	0.123	8.1	1953	3790	35	0.614	1.6
1993	6220	8	0.140	7.1	1945	3600	36	0.632	1.6
1965	6210	9	0.158	6.3	1954	3580	37	0.649	1.5
1986	6090	10	0.175	5.7	1950	3520	38	0.667	1.5
1958	6060	11	0.193	5.2	1973	3520	39	0.684	1.5
1983	6040	12	0.211	4.8	1956	3320	40	0.702	1.4
1971	5880	13	0.228	4.4	1992	3300	41	0.719	1.4
1977	5880	14	0.246	4.1	1949	3280	42	0.737	1.4
1952	5520	15	0.263	3.8	1985	3100	43	0.754	1.3
1957	5350	16	0.281	3.6	1987	3010	44	0.772	1.3
1963	5300	17	0.298	3.4	1962	2660	45	0.789	1.3
1967	4970	18	0.316	3.2	1947	2600	46	0.807	1.2
1943	4960	19	0.333	3.0	1961	2480	47	0.825	1.2
1975	4880	20	0.351	2.9	1966	2440	48	0.842	1.2
1951	4830	21	0.368	2.7	1979	2240	49	0.860	1.2
1980	4630	22	0.386	2.6	1959	2050	50	0.877	1.1
1941	4570	23	0.404	2.5	1990	1940	51	0.895	1.1
1969	4290	24	0.421	2.4	1939	1920	52	0.912	1.1
1968	4260	25	0.439	2.3	1944	1560	53	0.930	1.1
1989	4220	26	0.456	2.2	1991	1470	54	0.947	1.1
1948	4060	27	0.474	2.1	1994	1370	55	0.965	1.0
1946	4050	28	0.491	2.0	1988	1100	56	0.982	1.0

Appendix G

Water Quality Data

State of Idaho
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, Statehouse Mail, Boise, Idaho 83720-9000
Phone: (208) 327-7900 FAX: (208) 327-7866

PHILIP E. BATT
GOVERNOR

KARL J. DREHER
DIRECTOR

TRANSMITTAL COVER SHEET

FAX NUMBER: (208) 327-7866

DATE: 7/26/96

TO: Steve Miller
CH2M Hill

FROM: Steve Aldridge
IDWR - Boise

DOCUMENT DESCRIPTION: Weiser Area Surface WQ Report

COVER SHEET + 5 **PAGES**

CONTACT: Steve 327-5453 **IF YOU DO NOT RECEIVE ALL THE PAGES**

THANK YOU!

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System

Weiser Area Surface Water
Quality Data - All in Area

LAT_DEC	LONG_DEC	Analyte	VALUE	SAMPLE DATE	PROJECT	LOCATION
44.58	116.65	CROSS-SECTION (%)	33.00	03-DEC-1975	10EPAINT	23916
		CROSS-SECTION (%)	50.00	03-DEC-1975		
		CROSS-SECTION (%)	67.00	03-DEC-1975		
		SAMPLE ACCT. NUMBE	32511.00	05-AUG-1975		
		SAMPLE ACCT. NUMBE	32520.00	06-AUG-1975		
		SAMPLE ACCT. NUMBE	32532.00	07-AUG-1975		
		SAMPLE ACCT. NUMBE	49685.00	03-DEC-1975		
		SAMPLE ACCT. NUMBE	49686.00	03-DEC-1975		
		SAMPLE ACCT. NUMBE	49687.00	03-DEC-1975		
44.59	116.60	SAMPLE ACCT. NUMBE	32799.00	05-AUG-1975		23950
44.58	116.65	WATER TEMPERATURE	0.20	03-DEC-1975		23916
		WATER TEMPERATURE	25.00	07-AUG-1975		
		WATER TEMPERATURE	26.40	06-AUG-1975		
44.59	116.60	WATER TEMPERATURE	12.22	05-AUG-1975		23950
44.58	116.65	WATER TEMP. DEG. F	32.36	03-DEC-1975		23916
		WATER TEMP. DEG. F	77.00	07-AUG-1975		
		WATER TEMP. DEG. F	79.52	06-AUG-1975		
44.59	116.60	WATER TEMP. DEG. F	54.00	05-AUG-1975		23950
44.58	116.65	DISCHARGE	96.00	07-AUG-1975		23916
		DISCHARGE	99.00	06-AUG-1975		
		DISCHARGE	104.00	05-AUG-1975		
		DISCHARGE	770.00	03-DEC-1975		
		DISCHARGE	770.00	03-DEC-1975		
		DISCHARGE	770.00	03-DEC-1975		
		DISCHARGE	770.00	03-DEC-1975		
		TURBIDITY	1.70	07-AUG-1975		
		TURBIDITY	1.80	06-AUG-1975		
		FIELD CONDUCTIVITY	105.00	03-DEC-1975		
		FIELD CONDUCTIVITY	145.00	06-AUG-1975		
		FIELD CONDUCTIVITY	150.00	07-AUG-1975		
44.59	116.60	FIELD CONDUCTIVITY	1000.00	05-AUG-1975		23950
44.58	116.65	OXYGEN DISSOLVED	9.20	06-AUG-1975		23916
		OXYGEN DISSOLVED	9.20	07-AUG-1975		
		OXYGEN DISSOLVED	12.90	03-DEC-1975		
44.59	116.60	OXYGEN DISSOLVED	1.50	05-AUG-1975		23950
44.58	116.65	OXYGEN DIS. PERCEN	109.52	07-AUG-1975		23916
		OXYGEN DIS. PERCEN	112.19	06-AUG-1975		
44.59	116.60	OXYGEN DIS. PERCEN	13.89	05-AUG-1975		23950
44.58	116.65	BOD 5-DAY AT 20 DE	1.30	03-DEC-1975		23916
		BOD, 10 DAY, 20 DE	2.10	03-DEC-1975		
		BOD, 15 DAY, 20 DE	2.50	03-DEC-1975		
		BOD 20 DAY. 20 DEG	3.10	03-DEC-1975		
		COD HIGH LEVEL MG/	11.00	03-DEC-1975		
44.59	116.60	COD HIGH LEVEL MG/	7.50	05-AUG-1975		23950
44.58	116.65	PH	7.10	03-DEC-1975		23916
		PH	7.80	07-AUG-1975		
		PH	8.10	06-AUG-1975		

LOC_DESC

LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

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LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

Environmental Data ɿagement ᴗystem

Weiser Area Surface Water
All Water Quality Data
for Area

26-JUL-1996 PAGE 3

LAT_DEC	LONG_DEC	Analyte	VALUE	SAMPLE DATE	PROJECT	LOCATION
44.59	116.60	PH	8.30	05-AUG-1975	10EPAINT	23950
		ALKALINITY,WH,FET,	40.00	05-AUG-1975		
44.58	116.65	RESIDUE SOLIDS	127.00	03-DEC-1975		23916
		RESIDUE TOTAL	25.00	03-DEC-1975		
		RESIDUE TOTAL	60.00	07-AUG-1975		
44.59	116.60	RESIDUE TOTAL	28.00	05-AUG-1975		23950
44.58	116.65	RESIDUE DISSOLVED	85.00	03-DEC-1975		23916
		RESIDUE TOTAL	42.00	03-DEC-1975		
44.59	116.60	RESIDUE TOTAL	1.00	05-AUG-1975		23950
44.58	116.65	RESIDUE VOLATILE	9.00	03-DEC-1975		23916
44.59	116.60	RESIDUE VOLATILE	1.00	05-AUG-1975		23950
44.58	116.65	NITROGEN AMMONIA T	0.01	03-DEC-1975		23916
		NITROGEN AMMONIA T	0.01	03-DEC-1975		
		NITROGEN AMMONIA T	0.01	03-DEC-1975		
44.59	116.60	NITROGEN AMMONIA T	0.09	05-AUG-1975		23950
		AMMONIA, UNIONZED	0.00	05-AUG-1975		
		NITROGEN,NITRITE T	0.00	05-AUG-1975		
		AMMONIA UNIONIZED	0.00	05-AUG-1975		
		NITROGEN NITRATE T	0.01	05-AUG-1975		
44.58	116.65	NITROGEN AMM+ORG T	0.27	03-DEC-1975		23916
		NITROGEN AMM+ORG T	0.30	03-DEC-1975		
		NITROGEN AMM+ORG T	0.32	03-DEC-1975		
		NITROGEN AMM+ORG T	0.37	03-DEC-1975		
44.59	116.60	NITROGEN AMM+ORG T	0.18	05-AUG-1975		23950
44.58	116.65	NO2 + NO3 TOTAL	0.25	03-DEC-1975		23916
		NO2 + NO3 TOTAL	0.26	03-DEC-1975		
		NO2 + NO3 TOTAL	0.26	03-DEC-1975		
		PHOSPHORUS TOTAL	0.11	03-DEC-1975		
		PHOSPHORUS TOTAL	0.11	03-DEC-1975		
		PHOSPHORUS TOTAL	0.11	03-DEC-1975		
44.59	116.60	PHOSPHORUS TOTAL	0.12	05-AUG-1975		23950
		PHOSPHORUS DISS.	0.09	05-AUG-1975		
44.58	116.65	PHOSPHORUS ORTHO D	0.02	03-DEC-1975		23916
		PHOSPHORUS ORTHO D	0.02	03-DEC-1975		
		PHOSPHORUS ORTHO D	0.02	03-DEC-1975		
44.59	116.60	PHOSPHORUS ORTHO D	0.01	05-AUG-1975		23950
		CARBON ORGANIC TOT	3.00	05-AUG-1975		
44.58	116.65	COLIFORM, TOTAL	60.00	07-AUG-1975		23916
		COLIFORM, TOTAL	80.00	06-AUG-1975		
		COLIFORM, TOTAL	270.00	03-DEC-1975		
		COLIFORM, FECAL	10.00	06-AUG-1975		
		COLIFORM, FECAL	32.00	07-AUG-1975		
		COLIFORM, FECAL	190.00	03-DEC-1975		
		FECAL STRPT MF M-E	30.00	06-AUG-1975		
		FECAL STRPT MF M-E	140.00	07-AUG-1975		
		FECAL STRPT MF M-E	230.00	03-DEC-1975		
		RATIO OF FECAL COL	0.23	07-AUG-1975		
		RATIO OF FECAL COL	0.33	06-AUG-1975		

LOC_DESC

LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM
LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

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LOCATED ON WEISER RIVER 2.3 MI. UPSTREAM

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Weiser Area Surface Water
All Water Quality Data
for Area

LAT_DEC	LONG_DEC	Analyte	VALUE	SAMPLE DATE	PROJECT	LOCATION
44.58	116.65	RATIO OF FECAL COL	0.83	03-DEC-1975	10EPAINT	23916

Appendix H

Macroinvertebrate Data

SWIRO

IDHW - Division of Environmental Quality
MACROINVERTEBRATE DATA SHEET

Field Information - Shaded areas must be completed before submittal of sample

DEQ Project Code	84-910 04 P00-BRP-5034
Name of Water Body: Little Weiser (Middle)	Site ID No. 95 SWIRO035
Location Description (Permanent Landmarks): Begins @ Mackee 206 in Payette Nat'l Forest	

Station and/or Subsample No:	County	Township	Range	Section	Quarter
T1 T2 T3	Adams	14N	1E	35	SW

Elevation (ft or m)	Collector(s) First (or initial) & Last Name(s)	Sample Method
3628 ft	B. Hoelscher, T. Eason, J. Achabal	Hess

Collection Date (YY/MM/DD)	Collection Time	Report Results to:
95-07-11	10:00	Name MICHAEL MCINTURE
Sampled Grids/Total	Habitat Sampled / Flow Conditions	Address 1445 N. ORCHARD
Sample Effort (min)	Sample Area (m²) 0.1 / Analysis Requested 100 / 300 / (500) / Complete	City BOISE ID 83706

Remarks:

Receiving Lab Information

Lab Name	Date into Lab	Sent Out	Sorted	Lab's Sample Number

Sorter(s) First (or initial) & Last name(s)	Total No. Grids	No. Grids Picked	Est. No. Macros
	30	30	

Remarks:

40995-2326 ENVTRO T106

Identifying Lab Information

IDHW Central Lab Log No.

Lab Name	Date into Lab	Date Reported
EcoAnalysts		

40995-2327 ENVTRO T107

Taxonomist (First Initial & Last Name)	Remarks:
G. Lester	

40995-2328 ENVTRO T108

Taxon	Taxon Code	Total No.	I.D. Conf	Taxon	Taxon Code	Total No.	I.D. Conf
DIPTERA				TRICHOPTERA			
Chironomidae	319	93		Hydropsyche	198	11	
Antocha	284	9		Glossosomatidae	170	4	
Hexatoma	286	1		Neophylax	225	11	
Tipulidae	282	6		Oecetis	203	1	
Atherix	311	9		Micrasema	236	2	
Simulium	303	1		Lepidostoma	237	2	

RECEIVED
JUL 16 1996
CH2M HILL
BOISE

RECEIVED
JUN 28 1996
DIV. OF ENVIRONMENTAL QUALITY
COMMUNITY PROGRAMS

IDHW
Division of Environmental Quality
MACROINVERTEBRATE DATA SHEET

Name of Water Body	Station	STORET	Replicate	Collection Date

ID Log Number

Taxon	Taxon Code	Total No.	I.D. Conf
PLECOPTERA			
Pteronarcys californica	70	5	
Pteronarcella	66	4	
Hesperoperla pacifica	113	3	
Doroneuria	110	1	
Claassenia	107	1	
Perlidae	104	1	
Sweltsa	577	29	90
Perlodidae	114	2	
EPHEMEROPTERA			
Drunella coloradensis/flavi	622	10	
Serratella tibialis	54	5	
Diphetor hageni	679	10	
Baetis tricaudatus	20	10	
Ameletus	13	1	
Cinygmula	26	3	
Rhithrogena hageni	485	1	
Epeorus longimanus	31	12	
Epeorus albertae	28	16	
COLEOPTERA			
Zaitzevia parvula	278	4	
Narpus	265	3	
Optioservus quadrimaculatus	268	57	

Taxon	Taxon Code	Total No.	I.D. Conf
HIRUDINEA			
TURBELLARIA			
GASTROPODA			
CRUSTACEA			
OTHER			
Acari	453	4	
Oligochaeta	418	11	

Appendix I

Cultural Resources

Archaeologcal Investigations:
LITTLE WEISER RIVER RESTORATION

I. INTRODUCTION

This report describes the results of an archaeological survey of a proposed stream restoration project on the Little Weiser River in Washington County, Idaho. Survey was conducted in compliance with Section 106 of the National Historic Preservation Act, for an Army Corps of Engineers Section 404 permit. The purpose of the inventory was to locate, identify and evaluate cultural resources within the area of potential effect of the project. Intensive archaeological survey was conducted by Claudia Druss and Mark Druss for CH2M Hill Company on July 13, 1996.

The project area is located on private land in T14N, R2W, Section 9, SW1/4, SW1/4; Section 16, NW1/4, NW1/4; and Section 17 NE1/4, NE1/4 at the intersection of Gladhart Road and the Little Weiser River (Figure 1). The majority of the proposed project (1000 feet) lies east of the road, with a short section (less than 200 feet) west of the road.

Project Description

CH2M Hill proposes to construct revetments made of natural materials along a portion of the Little Weiser River that has been subject to channel straightening and removal of riparian vegetation during the past 60 years. These activities have resulted in bank erosion, degraded riparian and aquatic habitats, and a generally impaired channel pattern. The improvements are expected to return part of the river system to a dynamic equilibrium and minimize channel over-widening.

The improved channel will be 1115 feet in length (Figure 1a), and will tie into an existing channel with a well-established riparian zone on the upstream end. The existing channel will be reconfigured using revetments, weirs and deflectors. Revetments, consisting of large woody materials and rocks with riparian vegetation and willow clumps, will be constructed for stabilization and redirection of the river. The total shoreline to be revetted is 970 feet; the total bank depth ranges from four to eight feet.

Four vortex rock weirs will also be constructed to create plunge pool habitat, as indicated in Figure 1. Construction of the rock weirs will require excavation to place the footer rocks below the channel invert and into the banks. Three angled deflectors (consisting of large rocks), designed to direct stream flow through the channel and prevent bank erosion, will also be embedded in the bank and bed of the river.

II. PROJECT LOCATION AND ENVIRONMENTAL SETTING

The project area is located in the Upper Weiser Drainage on the Little Weiser River, 4.5 miles east of the town of Cambridge in Washington County, Idaho (U.S.G.S. 7.5' - East of Cambridge Quad). The Little Weiser River flows westward through the agricultural

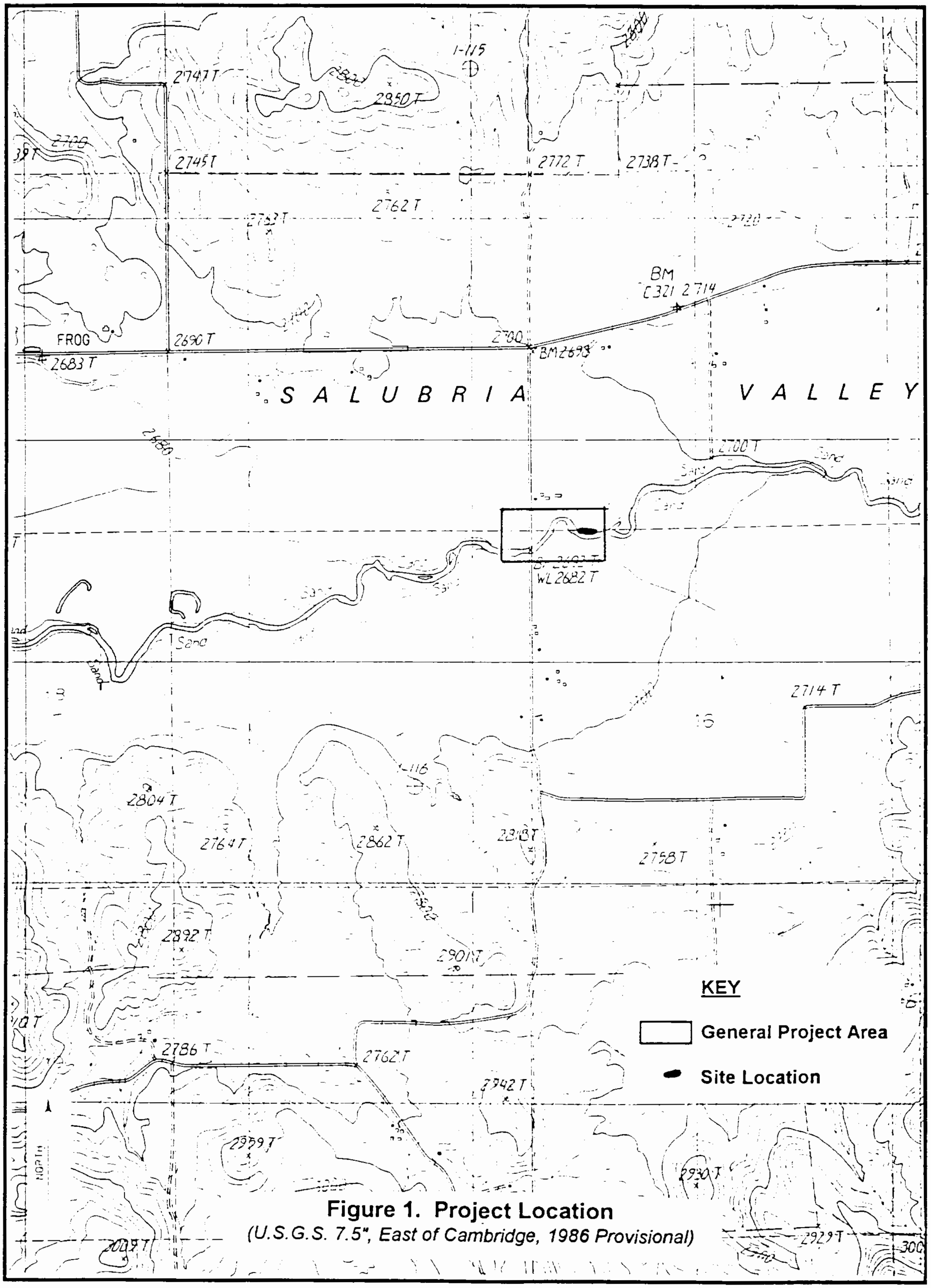


Figure 1. Project Location

(U.S.G.S. 7.5", East of Cambridge, 1986 Provisional)

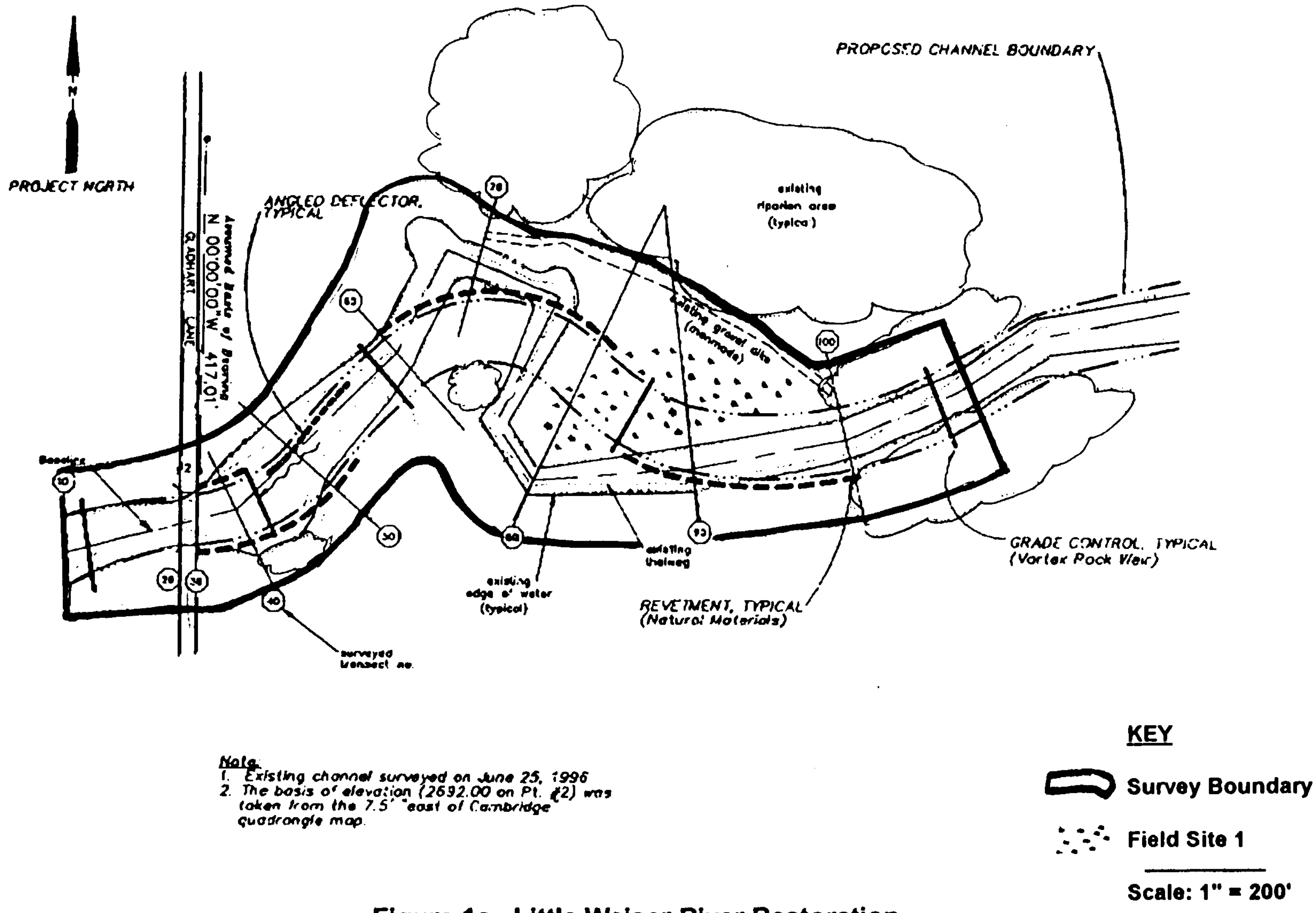


Figure 1a. Little Weiser River Restoration
(adapted from a CH2M Hill Company map)

lands of the Salubria Valley, entering the Weiser River, part of the greater watershed of the Lower Snake River, southwest of Cambridge. The valley ranges in elevation from about 2625 feet amsl. to 2783 feet amsl.

Soils along the river consist of a 3-to-5-foot layer of light brown clayey sand that overlays pea gravels. The wide meanders of the Little Weiser River wind among gravel bars consisting of river cobbles, pea gravels and sand covered by driftwood and other natural debris.

The project lies within the Intermountain Sagebrush Province (Bailey 1980), although the valley presently consists of agricultural lands. Vegetation in the immediate project area consists of aspens, riparian species such as willows and cattails, as well as high grasses and a wide variety of forbs.

III. BACKGROUND RESEARCH

A review of archaeological and historical site files at the Idaho State Historical Society in Boise indicated that a number of sites have been recorded within a mile of the project area. These are:

016921 - The Wilkerson Ranch. This site consists of the house (ca. 1926), garage (ca. 1908) and outbuildings (ca. 1908, 1920s) of the historic Wilkerson ranch located approximately 1/2 mile northwest of the project area. The Wilkerson brothers were among the first Euroamerican settlers in the Salubria Valley in the 1860s. Their descendants own much of the land in the current project area. The Wilkersons raised horses for the cavalry, and each brother homesteaded his own parcel of land. Over the years, the primary crops were hay and grain, as well as livestock. In recent years, Russell Wilkerson was cited for conservation work on the Little Weiser River including planting willows and aspens in the bends of the river to stop erosion.

87-5140 - Historic Bridge. The bridge over the Little Weiser River at Gladhart Road divides the west end of the project area. This bridge was built in 1910.

87-17208 - Historic Road. Gladhart Lane, which divides the west end of the project area, was an early homestead road.

87-17242 - Historic Schwenkfelder Road. Lies 3/4 mile south of the project area.

10WN113 - Prehistoric Campsite. 10WN113 was recorded in 1965 as part of the Smithsonian Institution River Basin Survey. It consisted of a scatter of basalt knives, scrapers and obsidian flakes on a ridge described as an alfalfa pasture, about 30 feet east of a spring, one mile southeast of the present project area. At the time of recording it was suggested that the site should be excavated. The site was on property owned by the Schwenkfelders, just east of their ranch house. The Schwenkfelders also own property in part of the current project area.

10WN114 - Prehistoric Campsite. This site was also recorded in 1965 and consisted of a scatter of basalt and obsidian lithic materials on the north bank of the Little Weiser River about a mile east/northeast (upstream) of the project area.

10WN294 - Prehistoric Workshop, Lithic Scatter. 10WN294 consisted of preforms, cores, scrapers and bifaces, primarily basalt, with some cryptocrystalline silicate, located on a knoll next to a tributary of the Little Weiser River on the south side of Highway 95 about 1/2 mile north/northwest of the project area.

10WN495 - Isolated Artifact - Utilized basalt flake found on the north side of Highway 95 about one mile northwest of the project area.

Expected Cultural Resources

Because of the intensive agricultural use of the Salubria Valley since the 1860s, it was expected that historical sites or artifacts would be found along the river, reflecting the themes of ranching and agriculture. Prehistoric sites were also expected along the river in this broad, flat valley with its riverine resources. However, it was also expected that prehistoric sites might have been impacted through the years by agricultural use of the valley.

IV. METHODS OF THE INVESTIGATION

Archaeological inventory of the project area consisted of intensive pedestrian survey of the river banks and river bed. An area 20-meters wide was walked in two 10-meter east-west transects on either side of the current and proposed channel boundaries (see Figure 1), to 20 meters beyond the last numbered stakes. The areas within the river meanders lying in the river bed were also surveyed in 10-meter east-west transects. Much of the riverbank area was densely vegetated with grasses and weeds, 4 to 5 feet high, as well as willows and other brush (Figures 2,3) resulting in zero ground visibility. Open ground was found primarily in the two-track farm roads adjacent to the river banks (visibility 50% to 75%), within the river channel along the cut banks (visibility 100%), and within the river channel on the gravel bars, manmade dikes and pads, and heavy equipment tracks (visibility 100%). These areas were closely examined for cultural material.

One site was recorded during survey. The site was mapped with pace and compass, and photographed in color. Artifacts were flagged and counted. Three lithic tools were collected from the site. The tools were described and illustrated. Since the site is on private land, the tools will be returned to the landowner after the completion of the study. Site data were recorded on an IMACS form and submitted to the SHPO.

Figure 2. Project area looking east from Gladhart Road.

Figure 3. High grasses on the south bank of the river, looking southeast

V. RESULTS OF THE INVESTIGATION

The project area is very heavily vegetated along the river. The ground surface was visible only in areas used for agricultural or stream improvement purposes. Survey was conducted on the both the east and west sides of the road.

A. West Side

Stream improvements have been conducted on the west side of Gladhart road, where a gravel dike has been constructed to channel water toward irrigation gates on the north and south banks (Figure 4). Additional scraping using heavy equipment, just beyond the irrigation take outs, has formed the beginnings of a dike on the north side (Figure 5). The exposed areas on the north bank and on the two-track road along the bank were carefully checked for cultural material. None was evident. The south bank was heavily vegetated and ground visibility was zero (Figure 6). No cultural material was noted.

B. East Side

Irrigation activity was evident on both banks of the east side near the road. High vegetation, primarily grasses with occasional willows, covered the south bank between the two-track access road and the river. A manmade gravel pad extends into the river between stakes 40 and 50 (Figure 7). Surface visibility atop the river bank was zero except near agricultural features such as the irrigation pump. All open spots were carefully checked for cultural material, including the road tracks. In the vicinity of stake 70, river meanders have left a large, barren gravel bar which was carefully checked for cultural material. None was evident. The cutbanks of the river were visible and accessible along much of the project in this area (Figures 8,9). Survey of the cutbanks indicated 3 to 5 feet of alluvium overlying river gravels. No cultural material or evidence of cultural use was found.

The north side of the river was difficult to access because of heavy brush and riparian vegetation, and required the use of a machete to pass through. Ground visibility was zero for the most part except on the barren gravel bar in the vicinity of stake 80. Cultural material was encountered on this gravel bar:

Field Site 1

Field Site 1 is a prehistoric lithic scatter of at least 25 to 30 secondary and tertiary flakes (some utilized), a possible spokeshave, a core and several chert nodules covering an area of approximately 50 meters north/south by 100 meters east/west. (Figure 10). Lithic materials consist primarily of basalt and jasper, with red and brown chert and quartzite in lesser numbers.

The scatter is located on a barren gravel bar within the meanders of the Little Weiser River (Figures 11 -13) at an elevation of 2690 feet amsl. The gravel bar is composed of rounded river cobbles, pea gravel and sand (Figure 14). A manmade dike constructed of cobbles and sand scraped from the river bed borders the site on

Figure 4. Gravel dike on the west side of project area looking east toward Gladhart Road.

Figure 5. Stream bed work on the west end of the project area, looking west.

Figure 6. South bank of the project area on the west end, looking southwest.

Figure 7. Gravel pad on the south bank of the river, looking southwest.

Figure 8. South shore of the river showing the exposed banks, looking south.

Figure 9. Exposed banks on the north side of the river, looking north.

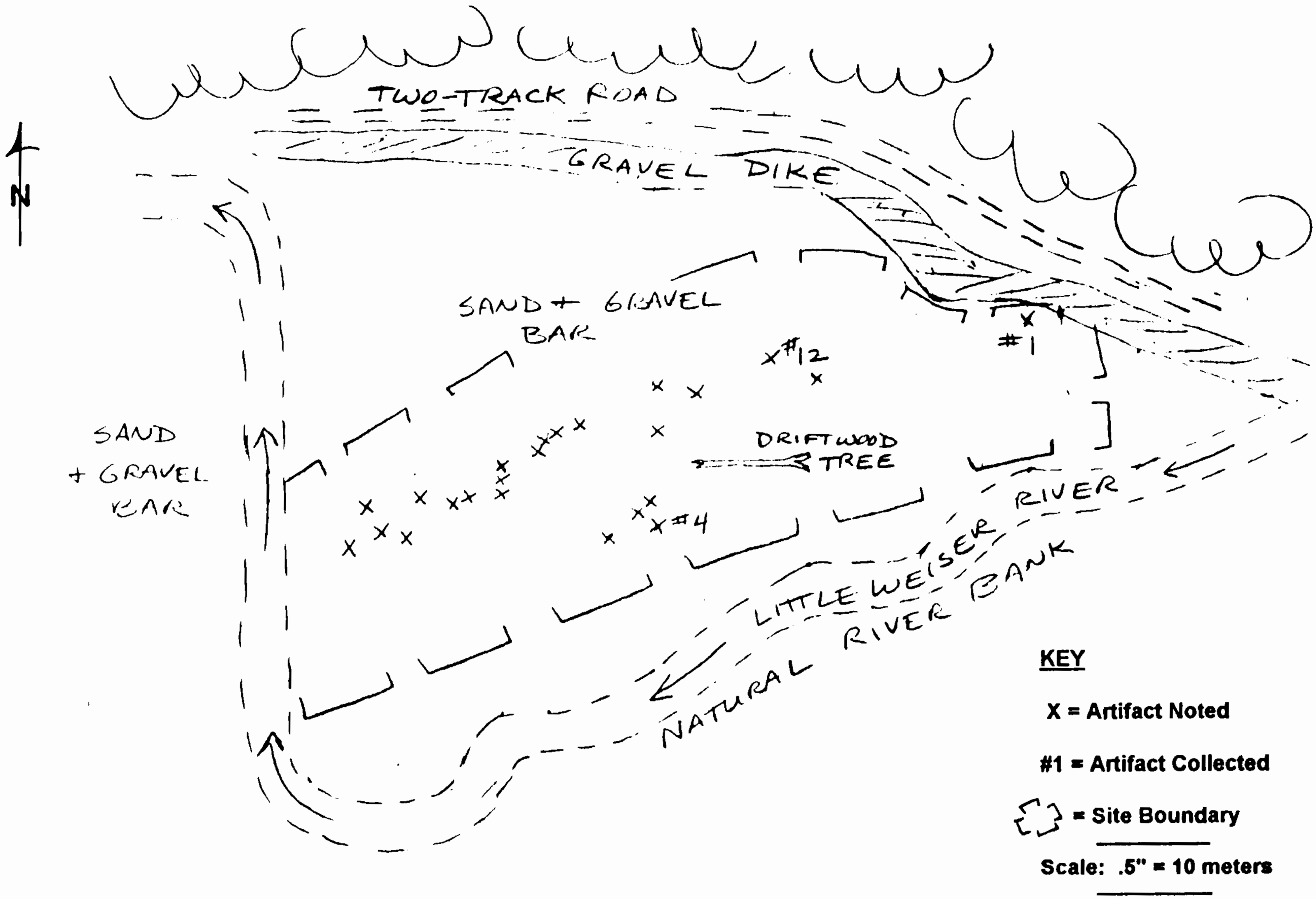


Figure 10. Field Site 1.

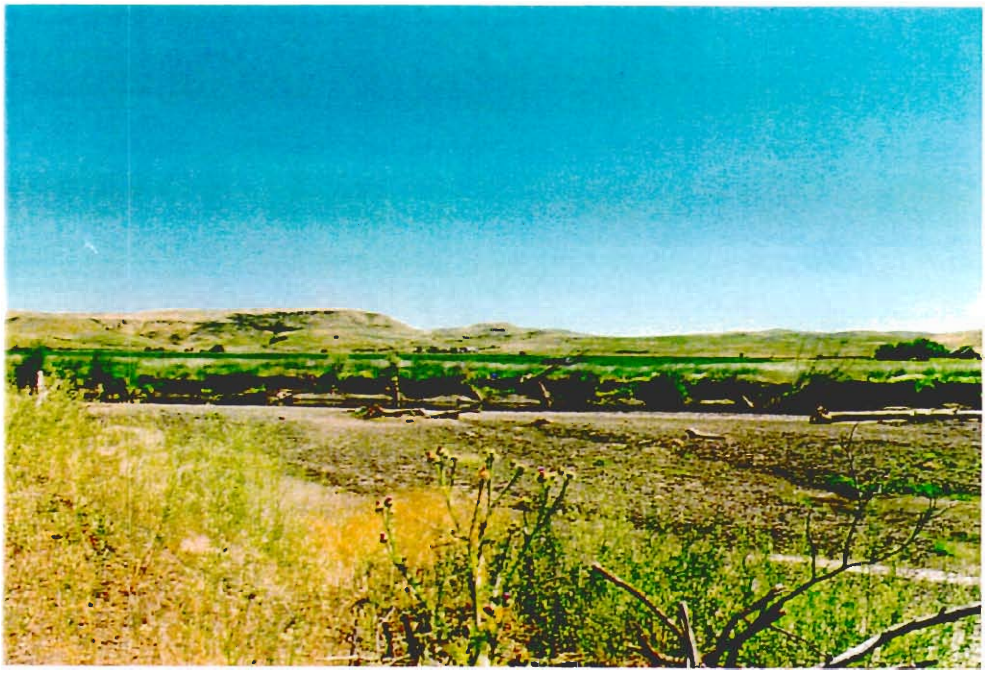


Figure 11. Field Site 1 overview, west half.
Looking southwest from the gravel dike.

Figure 12. Field site 1 overview, east half. Looking southeast.

Figure 13, View of Field Site 1 from the south bank of the river, looking northwest.

Figure 14. On-site deposition of cobbles. gravel and sand, Field Site 1.

the north. No cultural material was visible in association with the dike. Just north of the dike is an overgrown two-track road. A light scatter of modem debris, rusted metal of indeterminate age, and driftwood are also noted on the site.

The majority of the lithic flakes and tools are extremely tumbled and smoothed by stream action, making flaking and usewear patterns difficult to determine. A possible jasper spokeshave and an edge-battered heart-shaped cryptocrystalline flake are illustrated in Figure 15.

This site appears to consist of artifacts eroded from their original context at another site upstream. The artifacts were smoothed and tumbled as they washed downstream and were deposited on the gravel bar. More artifacts may lie undiscerned among the river cobbles close to the stream channel where all the rocks are covered by a light coating of mud. The artifacts are deposited in a linear fashion on the bar, generally parallel to the thalweg. They appear to have been deposited, along with the driftwood and other debris, by stream action.

National Register Recommendations

Field Site 1 appears to have been removed by flood or erosion activity from its original context in the river bank at some undetermined location upstream. It no longer retains integrity, and is therefore unable to provide additional information important in the prehistory of the area, beyond what was acquired during survey. It is therefore recommended that this site be considered Not Eligible for nomination to the National Register.

VI. CONCLUSIONS AND RECOMMENDATIONS

Although both historic and prehistoric cultural resources were expected in the area, only one prehistoric site was located during survey. As described above, Field Site 1 appears to consist of artifacts eroded from their original context at another site upstream. These include 25 to 30 secondary and tertiary flakes (some utilized), a possible spokeshave, a core and several jasper nodules. The proposed project will redirect river flow across the central portion of Field Site 1. In addition, a vortex rock weir will be constructed across the east end of the site (see Figure 1).

Recommendations

Although Field Site 1 will be impacted by project construction, it does not retain its integrity, having been redeposited from somewhere upsteam of the project area. It is recommended as Not Eligible for nomination to the National Register of Historic Places, and no further action is recommended at this site.

In much of the project area, the ground surface atop the river bank was not visible because of heavy vegetation. However, careful inspection of the many exposed cutbanks in the streambed, did not indicate cultural activity near this part of the river. Therefore no further archaeological work is recommended for the project area as it is currently planned.

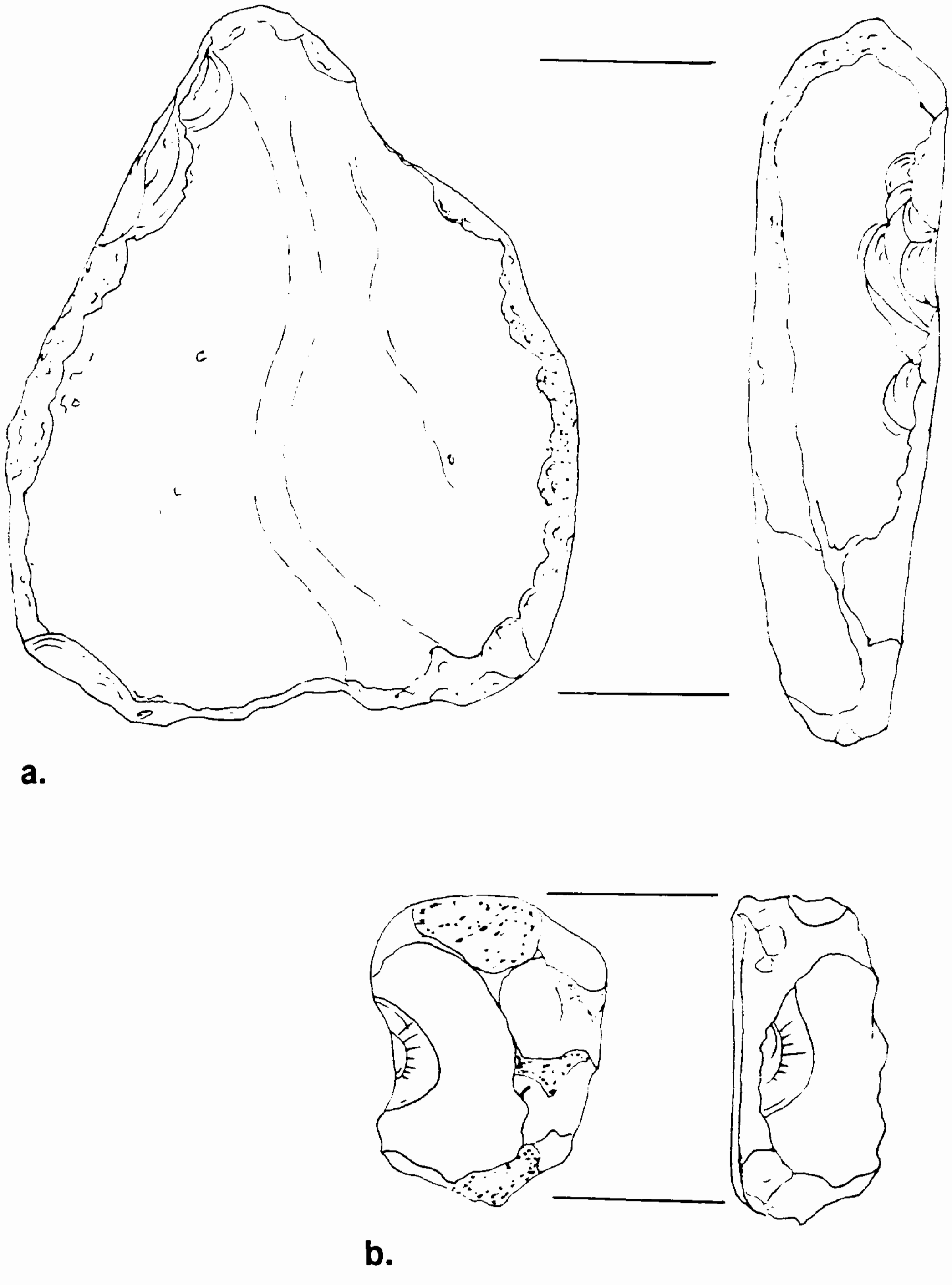


Figure 15. Lithic tools from Field Site 1
a. battered flake, cryptocrystalline;
b. possible spokeshave, jasper
Illustrated full size.

VII. CERTIFICATION

The original survey report and documentation will be maintained by the author.

I, Claudia Druss. certify that the investigation was conducted according to the Secretary of the Interior's Standards and Guidelines, and that the report is complete and accurate to the best of my knowledge.

Claudia Druss _____________________ Date 7-20-96

IMACS SITE FORM

Part A - Administrative Data

INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM
Form approved for use by
BLM - Utah, Idaho, Nevada, Wyoming
Division of State History - Utah, Wyoming
USFS - Intermountain Region
NPS - Utah, Wyoming

***1. State No.:** 10 WN
***2. Agency No.:** -
3. Temp No.: FS-1

4. State: Idaho **County:** Washington
5. Project: Little Weiser River Restoration
***6. Report No.:**
7. Site Name/Property Name:
8. Class: [X]Prehistoric [ ]Historic [ ]Paleontologic [ ]Ethnographic
9. Site Type: Flake scatter
***10. Elevation:** 2690 ft.
***11. UTM Grid:** Zone 11 532500 m E 4933590 m N
***12.** ___ of NE of NW of NW of Section 16 T. 14.0N R. 2.0W
***13. Meridian:** Boise (Idaho)
***14. Map Reference:** EastofCambridge,7.5'
15. Aerial Photo:
16. Location and Access:
Highway 95 east of Cambridge 4.5 miles to Gladhart Road. South on Gladhart Road .5 miles to bridge over the Little Weiser River. Turn east immediately past the bridge into a field and follow the track approximately .3 miles along the river. From that point, ford the river on foot to reach the sand/gravel bar.
***17. Land Owner:** Private
***18. Federal Admin. Units:**
***19. Location of Curated Materials:**
20. Site Description:
This site consists of a scatter of 25-30 lithic artifacts located on a gravel bar within the meanders of the Little Weiser River. Artifacts consist mainly of secondary flakes -- basalt, red and brown chert, and jasper. One possible spokeshave, a core, and several chert nodules were also noted. All but one of the flakes are extremely tumbled and scarred by stream action -- making flaking and usewear patterns difficult to determine. The artifacts are deposited in a linear fashion, as if by stream action. Some modern rusted metal and glass is deposited across the site.
***21. Site Condition:** Good
***22. Impact Agent(s):** (1) Erosion (2) (3)
***23. Nat. Register Status:** Non-Significant (Professional Judgement)
Justify:
The site lacks integrity. The artifacts appear to have been redeposited from a site upstream -- removed from their original context.
24. Photos: Roll 1,#8; Roll 2, #1-7.
25. Recorded by: Claudia Druss
***26. Survey Org.:** Independ. Arch. Consultan ***28. Survey Date:** 7/13/96
27. Assisting Crew Members: Mark Druss

List of Attachments:
[X] Part B [X] Topo Map [ ] Photos
[ ] Part C [X] Site Sketch [ ] Continuation
[ ] Part E [ ] Artifact/Feature Skth [ ] Other

Part A - Environmental Data

*29. **Slope=** 0 **(Degrees)** **Aspect=** 0 **(Degrees)**
*30. **Direction/Distance to Permanent Water=** 0.00 **x 100 Meters**
*Type of Water Source: Stream/river
Name of Water Source: Little Weiser River

*31. **Geographic Unit:** Upper Weiser Drainage

*32. **Topographic Location:**

PRIMARY LANDFORM	SECONDARY LANDFORM
valley	bar

Describe:
Gravel bar in a riverbed in Salubria Valley.

*33. **On-site Depositional Context**
Type: stream bed

Description of soil:
Streambed cobbles and gravels with some sand.

34. **Vegetation**
*a.Life Zone: Upper Sonoran

*b.Community: [R] **Primary OnSite** [R] **Secondary OnSite** [L] **Surrounding Site**
Riparian vegetation along the river banks with agricultural fields beyond.

*35. **Miscellaneous Text:**

36. **Comments and Continuations:**

Part B - Prehistoric Sites

Site No.: 10 WN

1. **Site Type:** Flake scatter

*2. **Culture:** **AFFILIATION** Unknown Aboriginal — **DATING** Unknown

3. **Site Dimensions:** 50 m X 100 m *Area= 3927 sq m

*4. **Surface Collection/Method:** Grab Sample
Sampling Method:
Diagnostics.

*5. **Depth of Cultural Fill:** 0-20 cm
How Estimated: Visual inspection.
(If tested, show location on site map.)

*6. **Excavation Status:** Unexcavated
Testing Method:

*7. **Summary of Artifacts and Debris:**
[X] **Lith Sctr (LS)** [ ] **Isoltd Artif.(IA)** [ ] **Burned St.(BS)** [ ] **Bone Sctr(WB)**
[ ] **Crmic Sctr(CS)** [ ] **Orgnc Remains(VR)** [ ] **Ground St.(GS)** [ ] **Chcl Sctr(CA)**
[ ] **Bskty/Txts(BT)** [X] **Shell (SL)** [ ] **Lith Source(s)**

Describe:
Artifacts and debris consist of approximately 25 large secondary and tertiary flakes scarred and rounded by stream action. Materials are basalt, jasper, and red and brown chert. Several chert nodules, one possible chert core, and one mussel shell were also noted.

*8. **Lithic Tools:**

#	TYPE	#	TYPE
1	Scraper	2	Utilized Flakes

Describe:
The scraper ("IH") listed is a possible jasper spokeshave -- other flakes may have been utilized but stream action makes it difficult to tell. One large heart-shaped jasper flake has battered edges indicating utilization and one less-battered flake is utilized.

*9. **Lithic Debitage - Estimated Total Quantity:** 25-100
Material Type: Basalt, red and brown chert, jasper.
Flaking Stages (0)Not Present 1)Rare (2)Common (3)Dominant
Decortication 1 **Secondary** 3 **Tertiary** 2 **Shatter** 0 **Core** 1

10. **Maximum Density - #/sq m (all lithics):** 0

Part B - Prehistoric Sites

Site No.: 10 WN

*11. Ceramic Artifacts:

#	TYPE	#	TYPE

Describe:

12. Maximum Density - #/sq m (ceramics): 0

*13. Non-Architectural Features (locate on site map):

[ ] Hrth/Fpt(HE) [ ] Rubble Mnd (RM) [ ] Earthen Mnd(EM) [ ] Wtr Control(WC)
[ ] Midden (MD) [ ] St. Circle (SC) [ ] Burial (BU) [ ] Petroglyph (PE)
[ ] Dpresson(DE) [ ] Rock Algnmt(RA) [ ] Talus Pit (TP) [ ] Pictograph (PI)

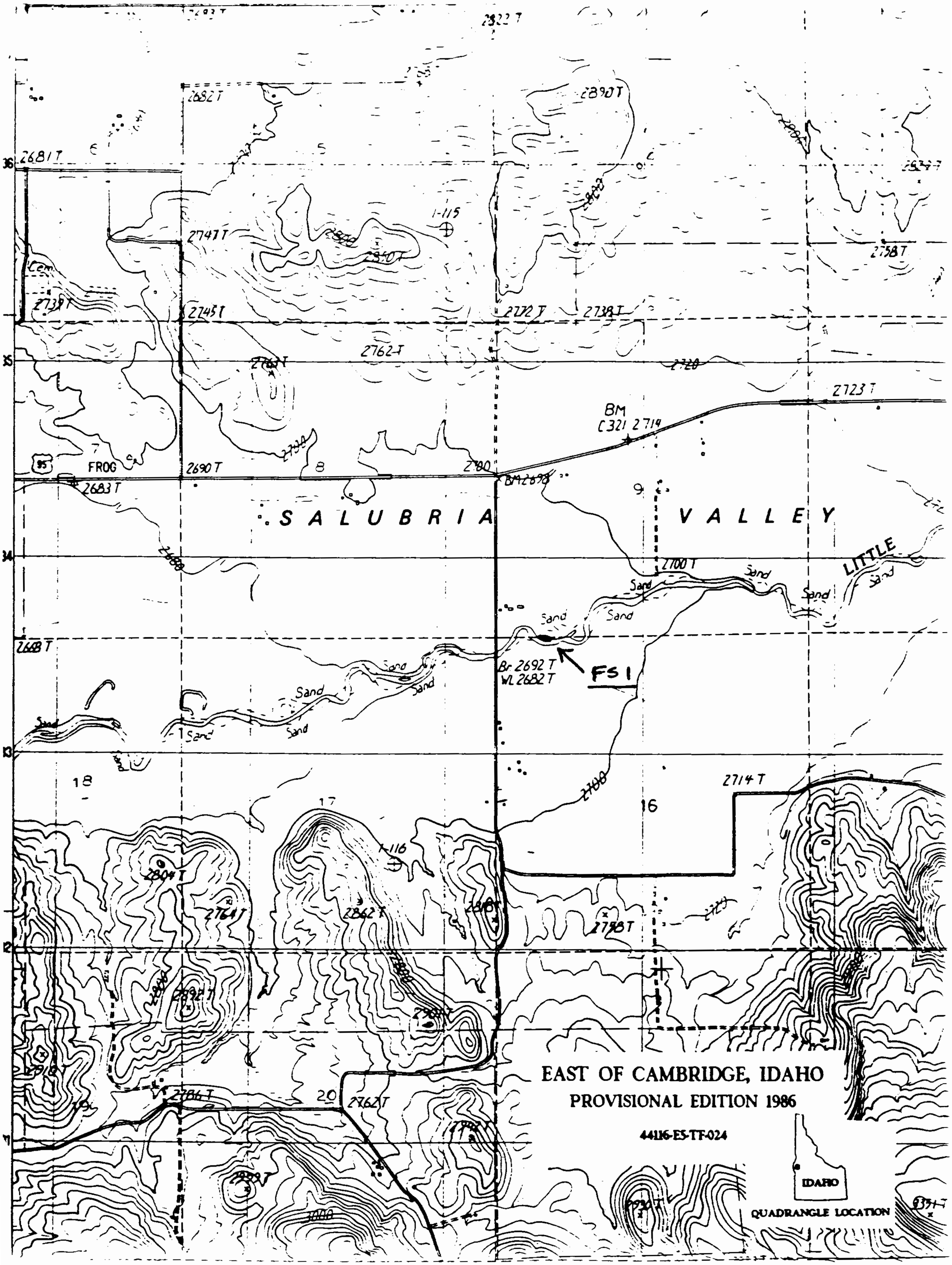
Describe:

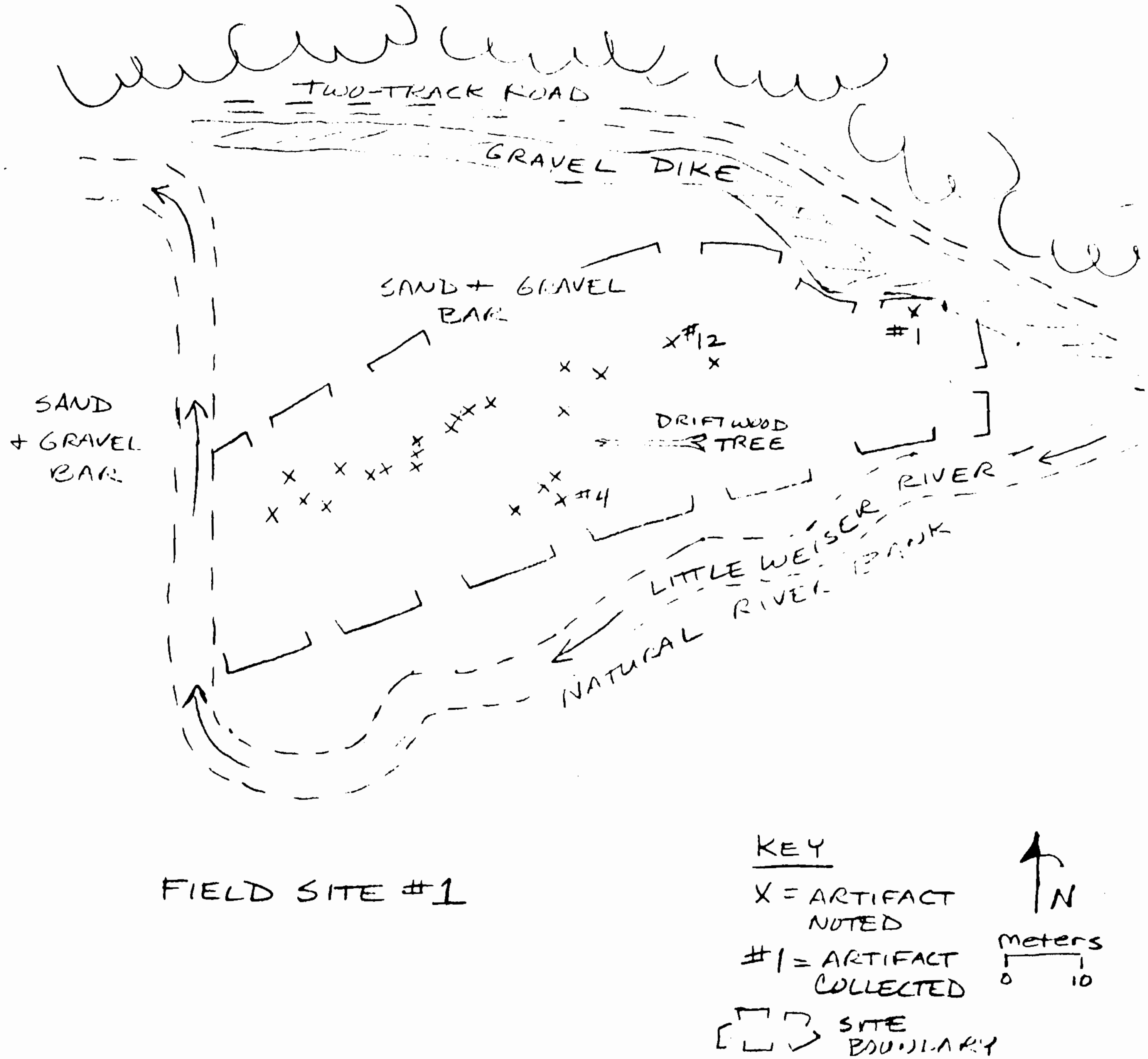
*14. Architectural Features (locate on site map):

#	MATERIAL	TYPE	#	MATERIAL	TYPE

Describe:

15. Comments/Continuations:
Lithic density is <1 /sq. meter.


EAST OF CAMBRIDGE, IDAHO
PROVISIONAL EDITION 1986
44116-E5-TF-024
IDAHO
QUADRANGLE LOCATION
SALUBRIA
VALLEY
LITTLE
FROG
95
FS 1
Br 2692 T
WL 2682 T
BM
C321 2719
BM 2698
2681 T
2682 T
2890 T
2747 T
2739 T
2745 T
2772 T
2738 T
2762 T
2758 T
2723 T
2690 T
2683 T
2700 T
2714 T
2804 T
2761 T
2862 T
2798 T
2786 T
2762 T
I-115
I-116
Cem
Sand
5
6
7
8
9
16
17
18
20


TWO-TRACK ROAD
GRAVEL DIKE
SAND + GRAVEL BAR
SAND + GRAVEL BAR
#12
#1
#4
DRIFTWOOD TREE
LITTLE WEISER RIVER
NATURAL RIVER BANK
KEY
X = ARTIFACT NOTED
#1 = ARTIFACT COLLECTED
SITE BOUNDARY
N
meters
0
10

FIELD SITE #1

Appendix J

Agency Correspondence

RECEIVED

OCT - 8 1996

CH2M HILL
BOISE

IDAHO STATE HISTORICAL SOCIETY

Preserving Idaho's Past

John R. Hill, Director

Philip E. Batt, Governor

October 2, 1996

Ms. Joanne Garnett
CH2M Hill
700 Clearwater Lane
Boise, Idaho 83712-7708

RE: Little Weiser River Section 1135 and Section 14 Stream Projects

Dear Ms. Garnett:

Thank you for sending the archaeological report on the proposed Little Weiser River Restoration project in Washington County, Idaho. The investigations were completed by Claudia Druss, Boise, Idaho.

According to the report, one archaeological site (10WN527) was identified within the project area. After reviewing the site description, we agree that site 10WN527 is not eligible for the National Register of Historic Places due to a lack of integrity. Given the location and condition of the artifacts, it appears that the cultural material had been redeposited from an upstream location. Since no other sites were identified during the inspection, we feel the project can proceed with no effect on historic properties. Our office should be notified immediately, however, if archaeological remains are discovered during project construction.

We appreciate your cooperation. If you have any questions, feel free to contact either myself or Suzi Neitzel at 208-334-3847.

Sincerely,

Robert M. Yohe II
State Archaeologist and
Deputy SHPO

RMY/spn

Administration
210 Main Street
Boise, Idaho 83702
208-334-2682

Historic Preservation
210 Main Street
Boise, Idaho 83702
208-334-3847, 3861

Historic Sites
2445 Old Penitentiary Road
Boise, Idaho 83712
208-334-2844

Historical Library and Archives
450 North Fourth Street
Boise, Idaho 83702
208-334-3356

Historical Museum
610 North Julia Davis Drive
Boise, Idaho 83702
208-334-2120

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Snake River Basin Office, Columbia River Basin Ecoregion
4696 Overland Road, Room 576
Boise, Idaho 83705

RECEIVED
SEP 23 1996

September 18, 1996

Lieutenant Colonel Donald R. Curtis
District Engineer
Walla Walla District Corps of Engineers
(Attention: Bill McDonald NPWOPRF)
201 North Third Street
Walla Walla Washington 99362-1876

Subject: Little Weiser River Section 1135 Stream Restoration Project
File #351.6000

Dear Colonel Curtis:

This letter is in response to a FAX request from Bill McDonald of your Regulatory Branch staff, concerning the Little Weiser River project proposed by the Corps of Engineers Planning Branch. The U.S. Fish and Wildlife Service has not had previous involvement with this project. We did receive a letter dated July 9, 1996 from CH2M Hill Consulting Engineers notifying us that an Environmental Assessment (EA) for the project was being prepared and would be provided to us. We have not received the EA.

While the Service does not have detailed information about the project, we understand that you propose stream restoration and bank stabilization on the Little Weiser River. The project is proposed in two components and involves just under a mile of the river. It is not clear what information Mr. McDonald needed from the Service. Given what we understand about the work, we can comment on possible presence of species listed under the Endangered Species Act.

Wintering bald eagles may occur in the project area. Construction work during the winter could disturb foraging and perching eagles. However, the density of wintering eagles there and in the surrounding area is low enough that any birds displaced because of construction work are likely to find unoccupied habitat nearby. The Service does not believe the project has potential to have an impact on any other threatened or endangered species.

If you would like any further input concerning this project, the Service will be happy to provide it. Please let us know the nature of the assistance you need and provide us with as much information about the project as possible.

Contact Alison Beck Haas of my staff if you need further assistance.

Sincerely,

Robert A. Ruesink

Supervisor, Snake River Basin Office

cc: CH2M Hill, Boise (Joann Garnett)

CH2M HILL
Engineers
Planners
Economists
Scientists

July 9, 1996

135909.AO.EA

Mr. Robert Yohe II
State Archaeologist and Deputy SHPO
Idaho State Historical Society
210 Main Street
Boise, ID 83702

Dear Mr. Yohe :

RE: Little Weiser River Section 1135 Stream Restoration Project

This letter is to inform you about a draft environmental assessment which will be forwarded to you shortly for review and comment, and to solicit your input for identifying issues or concerns that should be addressed in the assessment. The environmental assessment is being conducted by CH2M HILL on behalf of the U.S. Army Corps of Engineers for the restoration of a segment of the Little Weiser River in Washington County, Idaho. The river segment is about 4.5 miles east of Cambridge, immediately upstream from the Gladhart Lane Bridge.

Section 1135 of the Water Resources Development Act of 1986 was established to support ecosystem restoration through modification in the structures and operations of projects constructed by the Corps. In the case of the Little Weiser, Section 1135 funds have been obtained for restoration of some habitat lost due to channel erosion caused in part by channel snagging and clearing work done by the Corps in 1965 and 1978. The channel is unstable and continues to move materials from one area to another and to remove bank material and deposit it in the channel.

The proposed action is a selected local treatment that would modify the channel pattern, stabilize banks with natural material revetments, and establish grade control upstream from Gladhart Lane Bridge for up to approximately 2,000 feet. The project would provide in-channel benefits while also stabilizing a critical area around the bridge. The Weiser River Flood Control District No. 3 is the local sponsor of the project.

The Corps must work on a very fast track to complete the assessment, obtain agency comments, and proceed with the project in order to maintain project funding. A copy of the draft assessment will be sent to you before the end of July, and we will be requesting agency comments within a tight time frame. Your cooperation and prompt attention to reviewing the environmental assessment when it arrives will help assure that our area will continue to benefit from future opportunities for enhancement projects as they become available.

Thank you for your assistance with this important item. Please contact me or Steve Miller at CH2M HILL by July 19, 1996 if you have scoping input or questions about the project that you wish to have answered at this point.

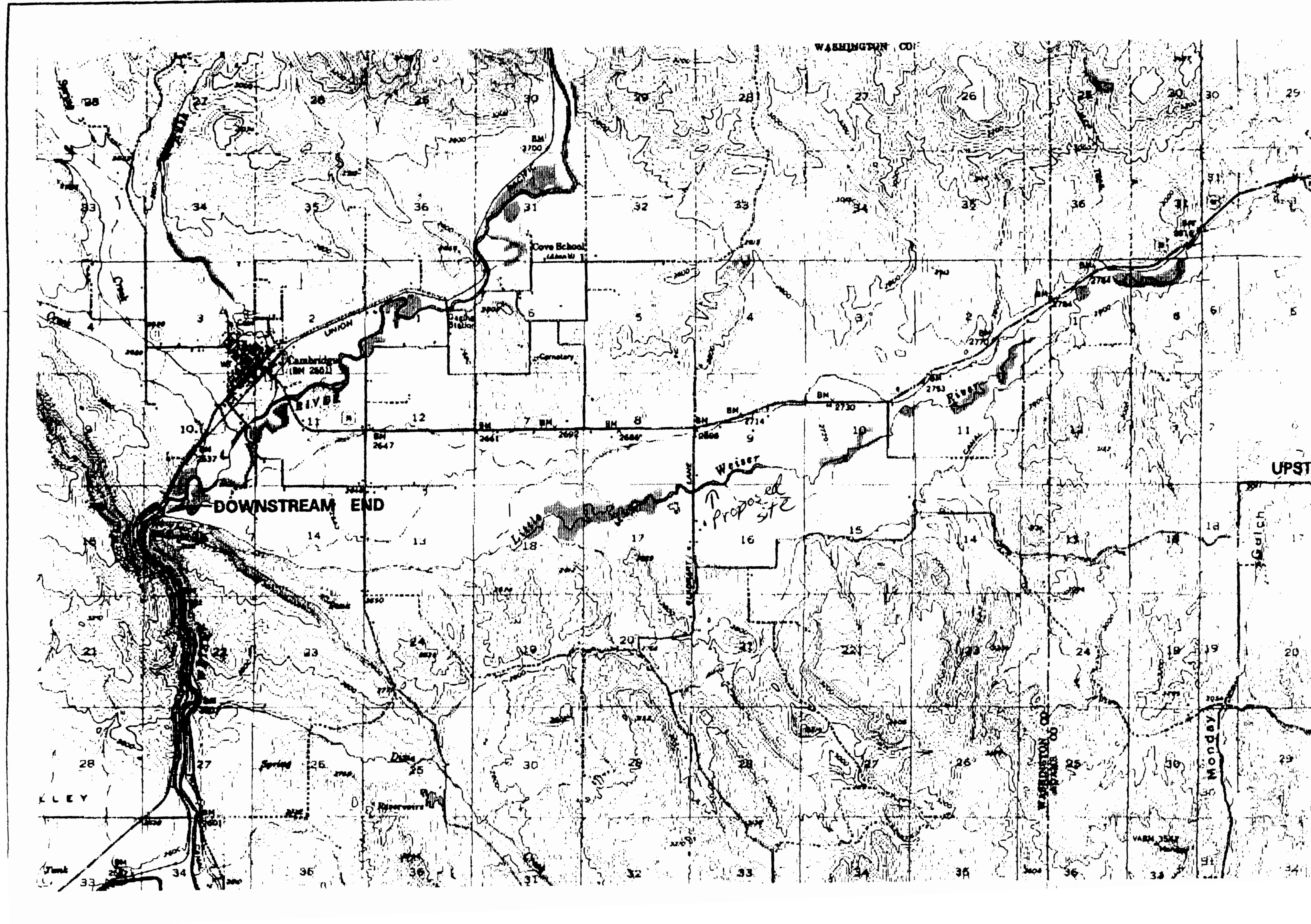
Sincerely,

CH2M HILL

Joanne Garnett

Joanne Garnett, AICP
Planner
P:\135909\scoping.doc

Enc.


WASHINGTON CO
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RIVER
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DOWNSTREAM END
UPSTR
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Weiser
Proposed site
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CANAL
Reservoirs
Monday
Gulch
WASHINGTON CO

CH2M HILL
Engineers
Planners
Economists
Scientists

July 9, 1996

135909.AO.EA

Ms. Alison Beck Haas
Ecological Services
US Fish and Wildlife Service
4696 Overland Road, Rm. 576
Boise, ID 83705

Dear Ms. Beck Haas:

RE: Little Weiser River Section 1135 Stream Restoration Project

This letter is to inform you about a draft environmental assessment which will be forwarded to you shortly for review and comment, and to solicit your input for identifying issues or concerns that should be addressed in the assessment. In accordance with the Endangered Species Act, we request that you advise us of any candidate, threatened, or endangered species in the project area. Please send us a species list at your earliest convenience.

The environmental assessment is being conducted by CH2M HILL on behalf of the U.S. Army Corps of Engineers for the restoration of a segment of the Little Weiser River in Washington County, Idaho. The river segment is about 4.5 miles east of Cambridge, immediately upstream from the Gladhart Lane Bridge.

Section 1135 of the Water Resources Development Act of 1986 was established to support ecosystem restoration through modification in the structures and operations of projects constructed by the Corps. In the case of the Little Weiser, Section 1135 funds have been obtained for restoration of some habitat lost due to channel erosion caused in part by channel snagging and clearing work done by the Corps in 1965 and 1978. The channel is unstable and continues to move materials from one area to another and to remove bank material and deposit it in the channel.

The proposed action is a selected local treatment that would modify the channel pattern, stabilize banks with natural material revetments, and establish grade control upstream from Gladhart Lane Bridge for up to approximately 2,000 feet. The project would provide in-channel benefits while also stabilizing a critical area around the bridge. The Weiser River Flood Control District No. 3 is the local sponsor of the project.

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Boise Office 700 Clearwater Lane, Boise, ID 83712-7708 208 345-5310
P.O. Box 8748, Boise, ID 83707-2748 Fax No. 208 345-5315

assessment when it arrives will help assure that our area will continue to benefit from future opportunities for enhancement projects as they become available.

Thank you for your assistance with this important item. Please contact me or Steve Miller at CH2M HILL by July 19, 1996 if you have scoping input or questions about the project that you wish to have answered at this point.

Sincerely,

CH2M HILL

Joanne Garnett

Joanne Garnett, AICP
Planner
P:\135909\scoping.doc

Enc.

Mailing List for Scoping Letter and Environmental Assessment

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Weiser, ID 83672

Idaho Fish and Game
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Nampa, ID 83686

Idaho Department of Health and Welfare
Division of Environmental Quality
1445 N. Orchard
Boise, ID 83706

Washington County Board of Commissioners
256 E. Court
Weiser, ID 83672

Idaho Department of Water Resources
2735 Airport Way
Boise, ID 83705

Greg Martinez
U.S. Army Corps of Engineers
Lucky Peak Project Office
HC 33, Box 1020
Boise, ID 83706

Appendix K

Section 404 (b)(1)

Little Weiser River Section 1135 Project: Draft Section 404 (b)(1) Evaluation

I. **Project Description**

A. **Authority and Purpose.** Under Section 1135(b), Water Resources Development Act of 1986, as amended, the Secretary (of the Army Corps) is authorized to carry out a program for the purpose of making such modifications in the structures and operations of water resources projects constructed by the Secretary which the Secretary determines 1) are feasible and consistent with the authorized project purposes, and 2) will improve the quality of the environment in the public interest. The Little Weiser River Flood Control Project has been identified as an area with strong potential for environmental improvement at a site near the Gladhart Lane bridge. This area was affected by Corps' channel clearing and snagging activities in 1965 and 1978. The purpose of this action is to restore the natural river meander pattern and re-establish and improve fish and wildlife habitat in order to replace lost riparian habitat and other environmental values associated with the Little Weiser River prior to the clearing and snagging project.

B. **Location.** The proposed project is located on a section of the Little Weiser River in Idaho. The Little Weiser is a tributary of the Weiser River, which is in turn a tributary of the Snake River. The project area is located just upstream of the Gladhart Lane Bridge.

C. **General Description.** The proposed project includes the use of natural materials and riparian vegetation plantings. It includes modifying the channel pattern, stabilizing the stream banks with natural material revetments, and establishing grade control. Bank erosion would be controlled, and riparian and fish habitat would be re-established. Natural material revetments include the use of large diameter logs and root wads, selectively placed rocks, and dense planting of riparian vegetation.

Site-specific stabilization features would be designed to function as an integral part of the river system. The features would include the following:

- Natural material revetments to provide bank protection and stabilization. The total shoreline length to be revetted is 621 feet, or 50 percent of the total shoreline through the project reach. The existing channel reach is 954 feet long; the improved channel length would be 600 feet long.
- Vortex rock weirs to provide grade control, maintain sediment transport, and enhance fisheries habitat. Large, 2- to 4-foot-diameter rocks would be used.
- Re-establishment of vegetation to provide the primary stability of the channel over the long term. Plantings incorporated as part of the bank stabilization will be protected from beaver depredation.
- Channel reconfiguration and adjustments in width and depth would occur to assist in the management of sediment transport and provide additional stability.

D. **General Description of Excavated and Fill Material.**

1. **General Characteristics of Material.** Approximately 60 percent of the cut and fill material will consist of native silty loam soil. Most of the rest of the cut and fill material will consist of native cobbles and gravels with silt removed from the river channel. Imported materials will include pit run gravel, logs, and large rock.

2. **Quantity of Material.** Nearly all of the cut and fill will be associated with construction of the reconfigured channel. The following quantities of material will be used for the natural revetment:

Feature	Quantity (Cubic Yards)
Cofferdams	1,585
Native soil and gravel (onsite cut and fill)	5,744
Pit run gravel (imported)	7,732
Logs for revetment (imported)	390
Boulders for revetment (imported)	62
Rock vortex weirs (imported)	124

3. **Source of Material.** Native rock and soil stripped from the project area will constitute about 40 percent of the material used for the project. Imported gravel and rock will be purchased from a permitted commercial gravel pit or quarry. Logs will be purchased from a permitted commercial logger.

E. **Description of the Proposed Discharge Site.**

1. **Location.** The little Weiser River channel would be reconfigured and natural revetment would be installed as shown in the Environmental Assessment.

2. **Size.** The project involves reconfiguration of 954 feet of the Little Weiser River channel. Approximately 2.7 acres of active river channel and silt/gravel bar will be disturbed during construction.

3. **Type of Site.** The fill material will be placed directly on the prepared riverbed, gravel bars, and adjacent uplands.

4. **Type of Habitat.** Throughout the project reach, the Little Weiser River consists of a shallow, wide stream meandering across a flat valley. Lands surrounding the river in the project area are agricultural.

5. **Timing and Duration of Discharge.** In-water construction will take place from July 1 to October 1.

F. **Description of Disposal Method.** All excavated and imported materials will be used to construct the reconfigured channel.

II. Factual Determinations

A. Physical Substrate Determinations.

1. **Substrate Elevation and Slope.** The riverbed through the project reach will be reconfigured so that the meander pattern and slope generally matches a more stable reach of the river in the immediate vicinity of the project area. The elevation of the upstream and downstream ends of the river beyond the project area will not be changed.

2. **Sediment Type.** Sediments are river gravels, sand, and silt.

3. **Excavated/Fill Material Movement.** Sediments that are disturbed (silt and river gravel) will quickly settle to the river bottom and be subject to the same movement as before construction. Natural revetment and riparian plantings will stabilize river banks and minimize erosion

over a short period of time. Temporary cofferdams will be removed following construction.

4. **Physical Effects on Benthos.** Organisms in the construction area will be buried. The new channel will be reconfigured into the native sands and gravels forming the river alluvium. Benthic organisms will re-establish following construction.

5. **Other Effects.** There are no other effects anticipated because of the placement of fill.

6. **Actions Taken to Minimize Impacts.** Fill material will be placed during low flow periods to minimize erosion of cofferdams.

B. **Water Circulation, Fluctuation, and Salinity Determinations.**

1. **Water.**

a) Salinity—Not applicable.

b) Water Chemistry—No change is expected.

c) Clarity—Solids suspended by the placement and removal of cofferdams will produce some turbidity in the immediate work area and for a short distance down river. Sediment input to the river from the reconfigured reach will be reduced following construction.

d) Color—No effect.

e) Odor—None anticipated.

f) Taste—No effect.

g) Dissolved Gas Levels—No effect.

h) Nutrients—No effect.

i) Eutrophication—No effect.

j) Others—No effect.

2. **Current Patterns and Circulation.**

a) Current Pattern and Flow—The reconfigured channel will be shorter than the current channel and water through the reach will be deeper on average than before the project. There will be no other effects on the current pattern and flow of the river.

b) Velocity—No effect.

c) Stratification—No effect.

d) Hydrologic Regime—No effect.

3. **Normal Water Level Fluctuations.** No effect anticipated.

4. **Salinity Gradients.** Not applicable.

5. **Actions that will be Taken to Minimize Impacts.** No actions are being taken to minimize impacts for this activity.

C. **Suspended Particulate/Turbidity Determinations.**

1. **Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Construction Site.** Placement and removal of cofferdams will cause an increase in river turbidity near the construction site. However, turbidity levels will rapidly return to background levels immediately downstream of the construction site due to dispersion of suspended material in the water column, the small amount of suspended matter expected to be generated, and the coarseness of the suspended matter. Fine sediments disturbed during construction will be suspended and moved from the project reach during the next high spring runoff event.

2. **Effects (Degree and Duration) on Chemical and Physical Properties of the Water Column.**

   a) Light Penetration—The increased turbidity expected during in-water construction may cause a short-term reduction in light penetration immediately downstream of the project. Effects on chemical and physical properties of the water column will be negligible. Light penetration will improve over the long term.

   b) Dissolved Oxygen—Cofferdam material placed in the river will not depress oxygen levels since organic content will be low.

c) Toxic Metals and Organics—No toxic metals are expected to be released based on prior and present land and water use of the construction area. Onsite materials to be moved and placed during channel configuration consist of native soil, gravel, and cobble. No indications of hazardous materials were observed in the project area during site visits. There are no known sources of chemical contaminants immediately upstream of the site. Fill material will also be free of chemical contaminants. The fill material will not result in significant water column chemical loading due to the low content of fines in the material; nutrients, pesticides, and metals are generally associated with finer-grained particles.

d) Pathogens—There are no known sources of pathogenic organisms in the area. The number of pathogens available to organisms in the water column is expect to be insignificant.

e) Aesthetics—A temporary increase in turbidity will occur during and immediately following construction. Riparian vegetation planted as part of the project will greatly improve the overall scenic value of the project reach over a period of 3 to 10 years.

3. **Effects on Biota.**

a) Primary Production, Photosynthesis—Increases in turbidity will be of limited duration and should have no effect on long-term primary production and photosynthesis.

b) Suspension/Filter Feeders—The increase in suspended particulates may interfere with feeding mechanisms of certain benthic macroinvertebrates. This impact, however, will be restricted to the immediate vicinity of the in-water work. Compared to current conditions, habitat conditions for benthos will improve in the project reach over a period of a few years.

c) Sight Feeders—Vertebrate sight feeders should be minimally affected by the turbidity and suspended solids levels expected to be generated at and immediately downstream of the construction site. Sight feeders may leave the area temporarily to avoid the short-term effects of turbidity. Turbidity generation will be of limited duration, however, and no long-term adverse effects on the aquatic ecosystem are anticipated.

4. **Actions Taken to Minimize Impacts.** The time period for in-water work was chosen to minimize turbidity problems.

D. **Contaminant Determination.** Contaminant concentration associated with the fill material is expected to be similar to that described in paragraph C(2)(c) above.

E. **Aquatic Ecosystem and Organism Determinations.**

1. **Plankton Effects.** No changes in populations are expected as a result of this work.

2. **Benthos Effects.** Benthic communities in the construction area will be buried. Suspended solids generated by the project may bury communities a short distance downstream. However, benthic communities are expected to re-establish quickly, and improved water depth during low flow periods will provide an overall net benefit for benthic communities.

3. **Nekton Effects.** Mobile organisms will move out of the immediate construction area.

4. **Aquatic Food Web Effects.** Removal of benthic communities in the project area and displacement of aquatic organisms out of the project area due to the disturbances created by the excavation and fill will cause a minimal reduction in the available food supply for the higher organisms resident in this area. The aquatic food web should be minimally affected in the short term due to the limited scope of scheduled in-water work and the rapid benthic recolonization rate expected to occur following project completion. The establishment of a healthy riparian zone along the project reach during the following 3 to 10 years will provide many benefits to aquatic organisms from macroinvertebrates to game fish.

5. **Special Aquatic Sites Effects.**

a) Sanctuaries and Refuges—Not applicable.

b) Wetlands—Not applicable.

c) Mudflats—Not applicable.

d) Vegetated Shallows—Not applicable.

e) Riffle and Pool Complexes—Increase in deep pool areas.

6. **Threatened and Endangered Species.** The U.S. Fish and Wildlife Service has been contacted regarding the presence of threatened or endangered species in the project area. No response has been received to date.

7. **Other Wildlife.** Effects on fish and other aquatic organisms are expected to be minimal and temporary. Fish will be able to easily avoid the turbid areas because the zone of turbidity will not extend far downstream.

8. **Actions Taken to Minimize Impacts.** The time period for in-water work was chosen to minimize impacts on the aquatic ecosystem.

F. **Proposed Disposal Site Determinations.**

1. **Mixing Zone Determination.**

2. **Determination of Compliance with Applicable Water Quality Standards.** Excavated material will all be used onsite for construction of the reconfigured channel.

3. **Short-Term Activity Authorization.** A Section 404 permit and an Idaho stream alteration permit will be obtained prior to construction.

4. **Potential Effects on Human Use Characteristics.**

    a) Municipal and Private Water Supply—No effect.

    b) Recreational and Commercial Fisheries—Recreational fishing will probably improve in the project reach over a period of a few years. However, the project area is surrounded by private land and is generally not open to public fishing.

    c) Water-Related Recreation—No effect.

    d) Aesthetics—No effect.

    e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves—The project is not located in any of these special areas.

    f) Actions to Minimize Impacts—None.

G. **Determination of Cumulative Effects on the Aquatic Ecosystem.** No cumulative effects are anticipated.

H. **Determinations of Secondary Effects on the Aquatic Ecosystem.** No secondary effects are anticipated.

Appendix L

Draft Finding of No Significant Impact

DRAFT
Finding of No Significant Impact for Little Weiser River Restoration (Section 1135)

Description of Proposed Action

The proposed action is to treat a portion of the Little Weiser River in Washington County, Idaho, by modifying the impaired channel pattern, providing bank stability, and establishing grade control within the channel. In the past, the river had a well-vegetated riparian zone and supported trout and salmon populations. Channel snagging and clearing work by the U.S. Army Corps of Engineers in 1965 and 1978 for flood control contributed to channel degradation. The channel is unstable, and continues to move materials from one area to another and to remove bank material and deposit it in the channel.

The existing channel reach at the stream centerline is 954 feet long; the improved channel length will be 600 feet long. Site-specific stabilization features that will be constructed include 1) natural material revetments to provide bank protection and stabilization through 621 feet, or 50 percent of the total shoreline through the project reach; 2) two vortex rock weirs using 2- to 4-foot diameter rocks; and 3) vegetation, which will incorporate plantings in the bank stabilization features. Channel dimensions will be reconfigured and adjusted in width and depth to assist in the management of sediment transport and provide additional stability.

Description of Alternatives

Alternatives were developed to return this portion of the river system to a dynamic equilibrium; minimize degradation, aggradation, channel over-widening, and sediment transport; and re-establish the riparian zone and improve aquatic habitat. The alternatives included the following:

- Preferred Alternative: Treatment using natural revetment.
- Rock Riprap Alternative: Treatment using rock riprap.
- No Action Alternative: No restoration or improvement of the existing river channel.

Summary of Environmental Impacts of the Proposed Action

The following summarizes the environmental impacts of the Preferred Alternative.

Geology and Soils. There would be no negative impact upon geology and soils because of the proposed action. Project implementation would stabilize the channel to prevent movement of bedload materials and channel erosion.

Water. Environmental consequences would be positive. The channel would be reconfigured to improve management of sediment transport and provide additional stability, which would, in turn, enhance water quality.

Air Quality. The proposed action would not impact air quality.

Aquatic Environment. The aquatic environment would be enhanced through project implementation. Revetment features would provide cover and reduce temperatures, and a pool feature would be constructed during the placement of the footer. Vortex rock weirs can create plunge pool habitat while providing grade control.

Terrestrial Environment. Significant improvements would occur to the riparian zone. Shrubs and trees would be planted as part of the restoration effort, increasing the density of the riparian vegetation. A small portion of uplands would be converted to riparian habitat. This would not create a major impact as the uplands do not support significant wildlife populations.

Wildlife. No impacts are expected to threatened or endangered species. Construction impacts would be short-term and temporary, and no winter construction would occur. After project construction, habitat quality would increase for palustrine scrub-shrub riparian areas.

Land Use. Land use patterns would not be negatively impacted by implementation of the Preferred Alternative. Banks would be stabilized, which would benefit adjoining property owners and increase the structural integrity of the Gladhart Lane Bridge, which crosses the river approximately 330 feet downstream from this reach.

Recreation. No significant impact would occur to recreation.

Aesthetics. Overall visual aesthetics would improve because of increased vegetation and treatment of the banks. Rock weirs would be placed in the river, and natural material revetments would be used for bank protection and stabilization.

Cultural Resources. No significant cultural resources would be impacted by the proposed action. One prehistoric site was located that appeared to consist of artifacts eroded from their original context at another site upstream. The site has not retained its integrity and was recommended as Not Eligible for nomination to the National Register of Historic Places. Project excavation and land-clearing activities would be monitored by a qualified archaeologist.

Conclusion

Based on the findings of this Environmental Assessment, no significant impacts are expected to occur as a result of the proposed action. Therefore, issuance of a Finding of No Significant Impact (FONSI) is warranted and an Environmental Impact Statement is not required. The Corps, in this decision, will employ all practical means to minimize adverse impacts to the local environment.

U.S. Army Crops of Engineers, Walla Walla District

Date:____________________________ By:____________________________

Appendix B

Feasibility Study

REPORT

Draft Little Weiser River Feasibility Design Study Section 14 and Section 1135

Prepared for

U.S. Army Corps of Engineers

NOVEMBER 1996

CH2M HILL

Contents

Acronyms

cfs	Cubic Feet per Second
Corps	U.S. Army Corps of Engineers
EA	Environmental Assessment
USGS	U.S. Geological Survey

Project Description

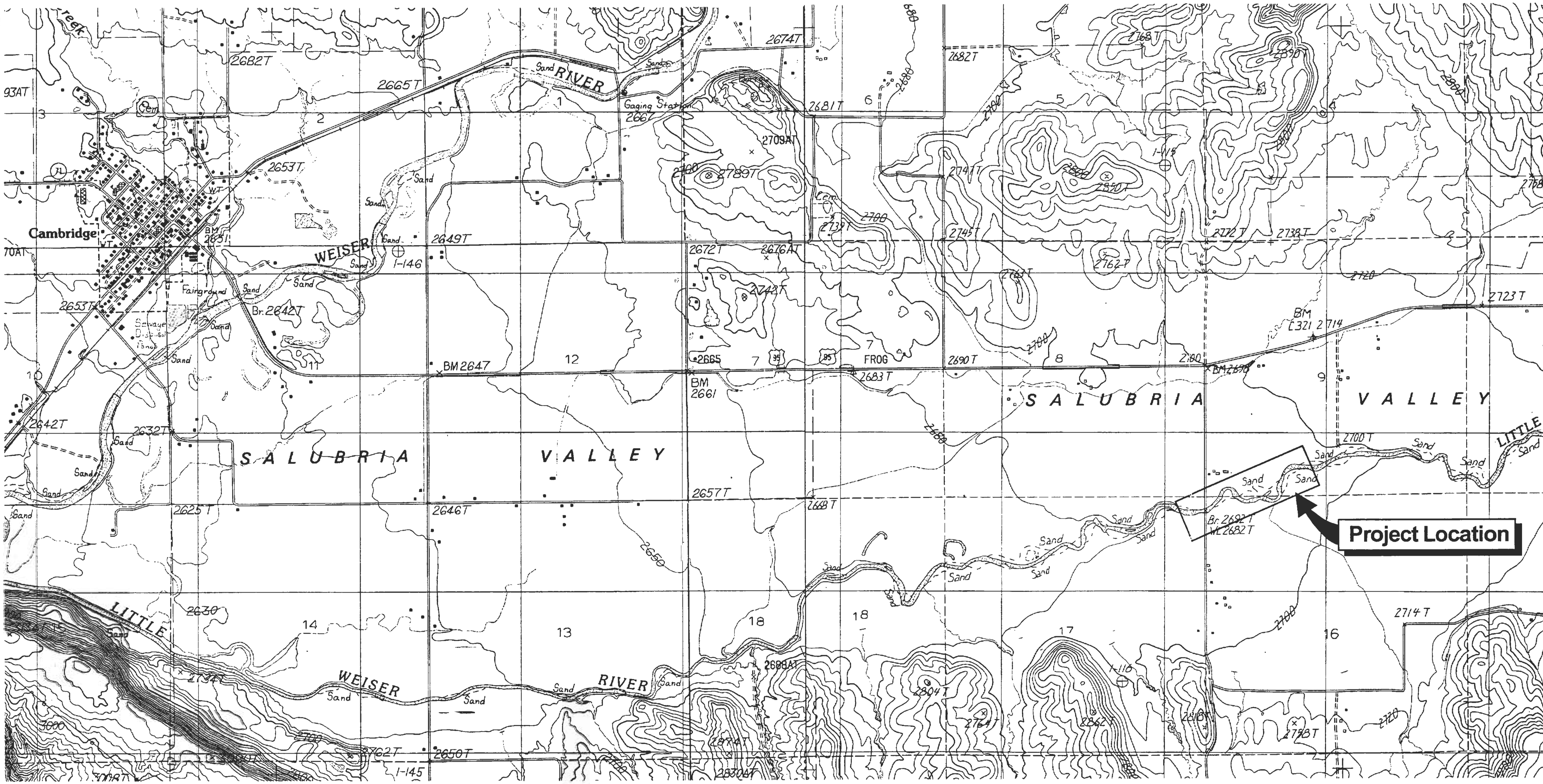
During the last 60 years, the Little Weiser River in Washington County, Idaho, has been subject to significant channel straightening and removal of riparian vegetation. These activities, combined with clearing and snagging projects, have resulted in increased stream gradients through straightened reaches, active bank erosion, channel over-widening and shallowing, decreased sediment transport capacity, and degraded riparian and aquatic habitats. The channel is unstable, and the ability of the river to contain and pass flood flows has been altered.

The goal of this project is to treat a portion of the river by modifying the impaired channel pattern, providing bank stability, and establishing grade control. The river reach selected for restoration is located approximately 4.2 miles southeast of Cambridge, Idaho (Figure 1).

The project reach encompasses a single-span bridge located on Gladhart Lane, a county road. Because of channel instability, the earthen fill behind the concrete abutment wingwall on the northern, upstream side of the bridge has begun to erode. If the process of bank erosion continues, the bridge roadway approach from the north will begin to be undermined as well. Should the bridge require replacement, costs in addition to the estimated $80,000 replacement cost of the bridge would be incurred to stabilize the streambank. By implementing the proposed project, the streambank will be stabilized and the $80,000 bridge replacement cost will be saved.

The total length of river to be included in this project is 1,452 feet. The proposed improvements will return that portion of the river to a dynamic equilibrium and minimize bank erosion, degradation, aggradation, and channel over-widening and shallowing. The project will result in significant riparian and aquatic habitat benefits, while restoring and preserving the integrity of the bridge features mentioned above.

Two different sponsors will help fund the project; therefore, the 1,452-foot project reach will be split into two adjoining projects—the Section 14 Emergency Streambank and Bridge Protection project and the Section 1135 Stream Restoration project. The Section 14 project begins 146 feet downstream of Gladhart Lane bridge and extends 330 feet upstream for a total project length of 498 feet; that portion will be sponsored by the Washington County



SOURCE: "Cambridge, Idaho" and "East of Cambridge, Idaho" USGS 7.5' Quadrangle Maps, 1986.

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Figure 1
LITTLE WEISER RIVER VICINITY MAP

Road and Bridge Department. The Section 1135 project extends upstream 954 feet from the upstream end of the Section 14 project and will be sponsored by the Weiser River Flood Control District No. 3. Throughout the remainder of this document, the two projects will be identified separately; however, the overall restoration design concepts are identical for both.

Conceptual Design

Two stream restoration alternatives are applicable to both projects. One alternative, the Natural Materials Revetment Alternative, uses logs, boulders, and dense vegetative planting to revet the streambanks; the other is the Riprap Alternative, which uses machine-placed rock riprap to stabilize the banks. The Natural Materials Revetment Alternative is the Preferred Alternative for both projects. The selection process is described in the Environmental Assessment (EA) documents. Irrespective of the revetment materials used, both alternatives involve the following:

- Reconfiguration of the existing channel geometry and meander pattern
- Establishing channel grade control
- Re-establishment of riparian vegetation

The three design features listed above are common to both alternatives and will be discussed first. The design features specific to the Natural Materials Revetment Alternative and the Riprap Alternative are discussed last. Feasibility design drawings and materials quantity and cost estimates for both projects and alternatives are contained in Appendices F, G, H, and I.

Channel Reconfiguration

Conceptual Design Approach

The highly unstable existing channel pattern and geometry is shown in Figure 2. The existing channel planimetric and profile survey data for the existing channel is included in Appendix A. The reconfigured meander pattern, labeled "Proposed Channel Boundary," is shown in Appendices F, G, H, and I. The existing and proposed channel cross sections are

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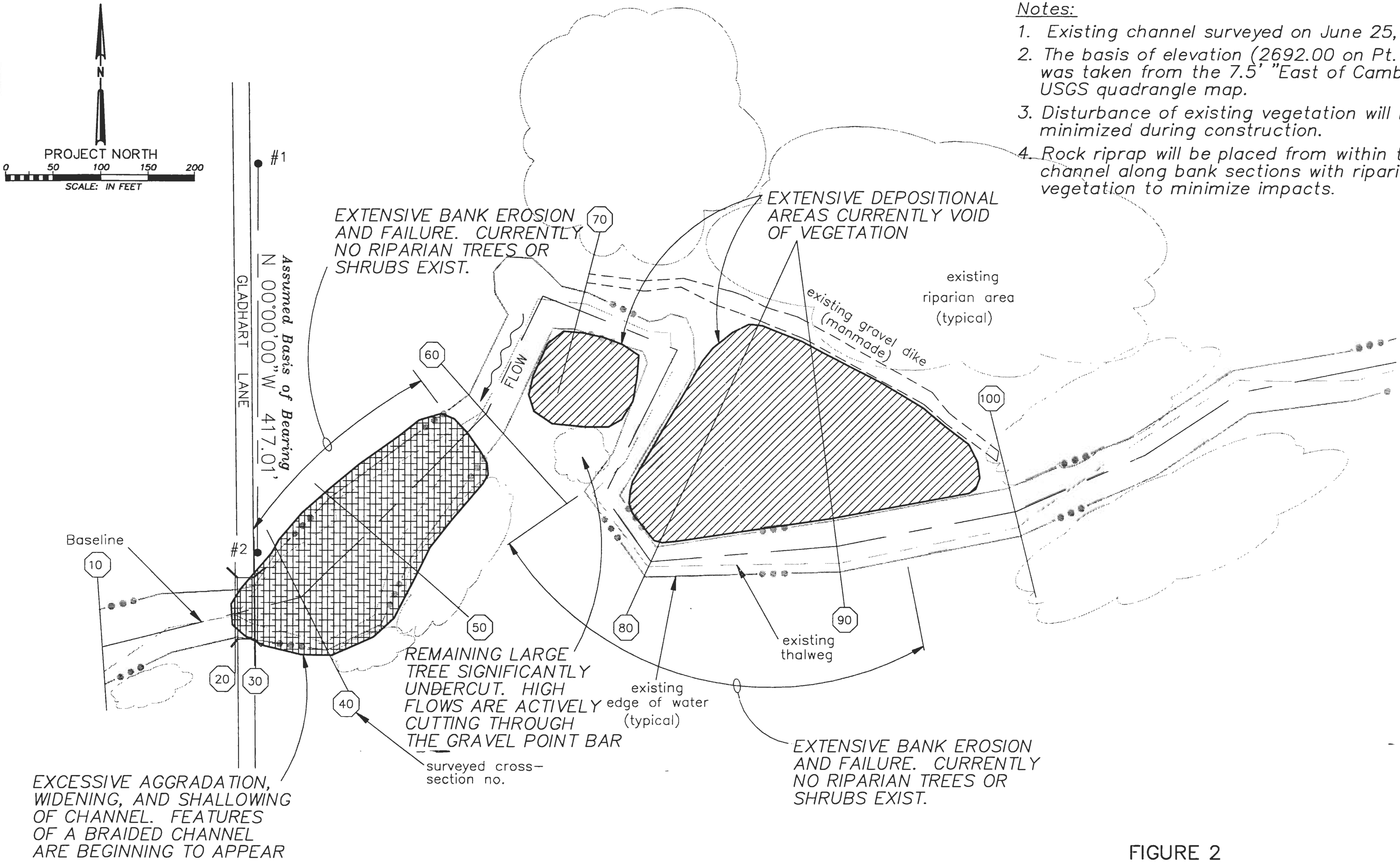

Notes:

1. *Existing channel surveyed on June 25, 1996*
2. *The basis of elevation (2692.00 on Pt. #2) was taken from the 7.5' "East of Cambridge" USGS quadrangle map.*
3. *Disturbance of existing vegetation will be minimized during construction.*
4. *Rock riprap will be placed from within the channel along bank sections with riparian vegetation to minimize impacts.*

FIGURE 2
SITE PLAN OF
EXISTING CONDITIONS
LITTLE WEISER RIVER SECTION 14 &
SECTION 1135 PROJECT VICINITY

CH2M HILL

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presented in Appendix B. Table 1 presents the estimate of cut and fill volumes required for reconfiguring the channel through both project reaches.

The general design concept of the channel reconfiguration is to mimic the meander pattern and geometry of stable river reaches that convey similar discharges to the restored channel. Features of the natural, stable, river form are integrated into the restoration to be compatible with the physical processes that allow the river to seek its own stability.

Numerous researchers have described the physical nature of streams as "a continually readjusting complex of interrelated variables that exist in a conservative dynamic equilibrium" (White, 1973). A stream is "always changing, yet continually 'striving' toward equalization of energy dispersal along its length. A change in one variable produces compensatory adjustment in the rest of the variables" (White, 1973).

The variables that determine stream pattern, dimension, and profile are width, depth, slope, velocity, flow resistance, sediment size, sediment load, and stream discharge. An underlying assumption of the proposed restoration method is that the river reaches to be mimicked represent a stable dynamic equilibrium condition. This is evidenced by well-vegetated, stable banks and a channel bed that is not undergoing accelerated degradation or aggradation. Just like a natural river, the restored stream uses three functioning channels: the low-flow channel; the normal high-water channel; and the established floodplain. Therefore, based on the reconfigured channel design, water would be expected to encroach into the floodplain during flood events (NOTE: To account for an active floodplain, a materials quantity and cost estimate for providing rock riprap protection along the bridge roadway approaches is included for both alternatives of the Section 14 project.)

Based upon the above principles, the proposed channel reconfiguration design was achieved as follows:

1. The river reach through the project area was surveyed to establish the existing channel cross sections (Appendix B) and profile in Appendix A. Cross sections 10 through 100 lie within the project reach (Figure A-1; Appendix A). Cross sections 110 through 140 represent a stable reach.

Table 1

Cut and Fill Quantity Estimate for Channel Reconfiguration
Gladhart Lane Bridge Section 14 Project and Little Weiser River Section 1135 Project

Cross Section	Cut Area (ft^2)	Fill Area (ft^2)	Average between Cross Sections Cut Area (ft^2)	Average between Cross Sections Fill Area (ft^2)	Distance between Cross Sections (ft)	Cut Volume (yd^3)	Fill Volume (yd^3)
Gladhart Lane Bridge Section 14 Project							
10	129	35					
			65	18	146	351	97
20	0	0					
			0	0	22	0	0
30	0	0					
			91	109	50	169	202
40	182	218					
			148	176	103	565	671
50	113	134					
			64	210	177	420	1,377
60	14	286					
				Gladhart Lane Bridge Section 14 Project Totals:	**498**	**1,505**	**2,347**
Little Weiser River Section 1135 Project							
60	14	286					
			103	280	183	698	1,898
70	192	274					
			212	403	375	2,944	5,597
80	231	531					
			162	487	200	1,200	3,607
90	93	443					
			94	327	196	682	2,374
100	95	210					
				Little Weiser River Section 1135 Project Totals:	**954**	**5,524**	**13,476**
				Sum of Both Project Totals:	**1,452**	**7,029**	**15,823**

2. Field inspection by hydrologists and engineers familiar with the natural revetment method, as well as traditional channel stabilization methods, determined that the section of river upstream of the project reach is relatively stable. This determination was based on the following observations: stream banks in the upstream reach are well-vegetated and, compared to the problem reach, the river channel is narrow, water depths are substantially greater, and the banks are not actively eroding. This stable section served as a model for the desired condition relative to channel configuration within the selected problem reach. It was also determined that the upstream section would provide a good tie-in location to a stable reach. This should provide protection to the project reach from the otherwise active instability prevalent throughout much of the lower Little Weiser River.

3. As described below, the new channel configuration (Appendices F, G, H, and I) was designed based on available hydrologic data for the area and features of the stable river reach.

Summary of Available Hydrologic Data

At the confluence with the Weiser River, the Little Weiser River has a drainage area of approximately 200 square miles with a mean annual precipitation of approximately 20 inches. Three U.S. Geological Survey (USGS) gauging stations were historically located on the Little Weiser River. A USGS gage (13261500) was located just upstream of the Gladhart bridge with a drainage area of 187 square miles and 7 years of record from 1920 to 1926. Another USGS gage (13261000) was located near Indian Valley with a drainage area of 82 square miles and 41 years of record from 1920 to 1971. A USGS gage (13260500) was also located below Mill Creek, near Indian Valley, with a drainage area of 79 square miles and 2 years of record from 1981 to 1982. Appendix C contains the historical record for each of these gages, along with the historical record for the Weiser River near Cambridge (13258500).

Information from the Little Weiser River and Weiser River USGS data sets was used to estimate bank-full discharge. Appendix D contains daily flow duration curves and Appendix E contains annual maxima exceedence probability calculations for these data sets. Bank-full discharge is estimated as the discharge with a 1.5-year recurrence interval; it is the dominant flow that builds and maintains river systems. The estimated bank-full discharge is approximately 850 cubic feet per second (cfs) at the confluence with the Weiser River and approximately 550 cfs at the gage near Indian Valley. To be conservative, the bank-full discharge at the project site is assumed to be 850 cfs.

Preliminary Cross Sectional Data Analyses

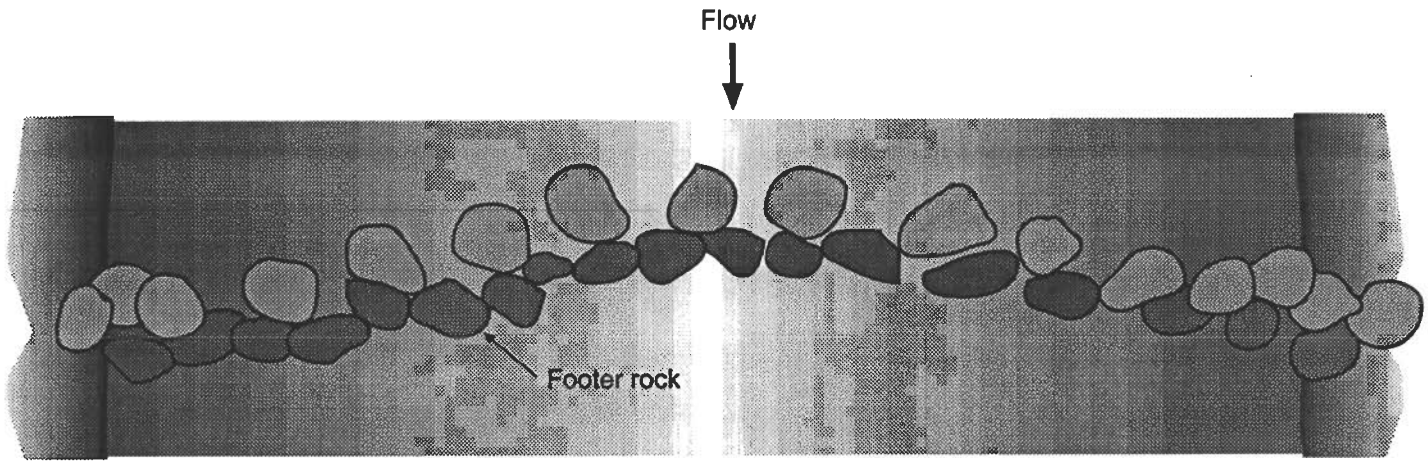
Based on the shape, configuration, and dimensions of the surveyed cross sections through the stable reach, bank-full stage is estimated to be 1.5 to 2.0 feet above the water-surface elevation surveyed on June 25, 1996. The significant cross sectional dimensions used to design the proposed channel configuration are: area, width, depth, and width-to-depth ratio.

From the preliminary analysis of the stable reach cross sections, the water-surface width at bank-full stage is estimated to be 75 to 80 feet. The estimated radius of curvature of the meander bends is 170 to 185 feet. These dimensions, in addition to those mentioned above, were used to lay out the proposed channel cross sections (Appendix B) and meanders (Appendices F, G, H, and I) for both the Section 14 and Section 1135 projects.

During final design, these preliminary dimensions would require verification. The dimensions would need to be entered into a hydraulic model, such as the U.S. Army Corps of Engineers (Corps) HEC-2 or HEC-RAS model, to determine water-surface elevations, depths, and velocities at various flow rates. The hydraulic model would also provide data needed to design contraction scour protection at the bridge.

Grade Control using Rock Weirs

Rock weirs (Figure 3) provide grade control without causing upstream lateral migration, bank erosion, and aggradation. These structures also improve fish habitat by providing cover, deepened feeding areas in riffle reaches, and a wider range of velocities for fish-holding water during high flows. These benefits are obtained without causing sediment deposition or significant backwater. These structures maintain a low width-to-depth ratio that reduces the likelihood of bar deposition and maintains the sediment transport capacity of the stream.



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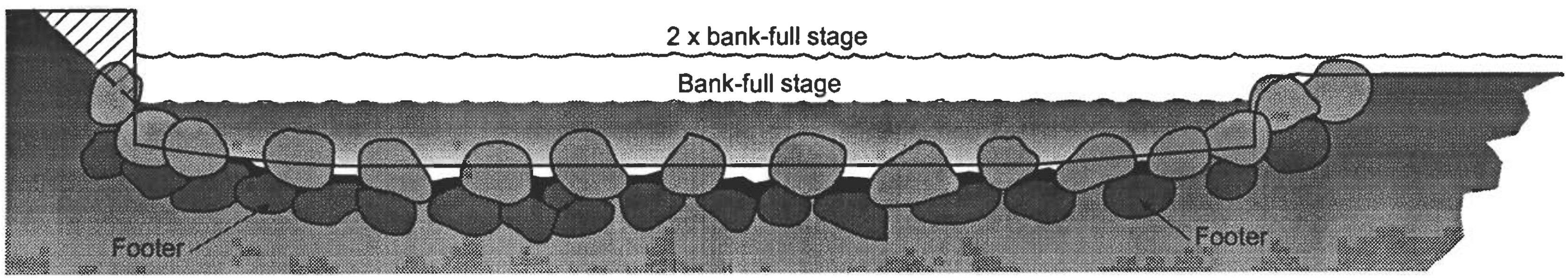

SECTION
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Figure 3
CONCEPTUAL VIEW OF A ROCK WEIR

Large, 2- to 4-foot-diameter rocks are placed as shown in Figure 3. The spacing between the boulders above the channel invert allows sediment transport to be maintained. The footer rocks below the channel invert are placed immediately downstream to prevent local bed scour.

The structures are placed to span the wetted perimeter of the channel at bank-full flow. Excavation is required to place the footer rocks below the channel invert and at least one rock diameter into the banks. Tables 2 and 3 present estimates of the quantity of rock and volume of excavation required for installing the rock weirs in the Section 14 and Section 1135 project reaches, respectively.

Three rock weirs would be required for each project; however, if both projects are installed, a total of only five would be required because the rock weir between cross sections 50 and 60 would function for both projects. (NOTE: The quantity and cost associated with the rock weir between cross sections 50 and 60 is included in the estimates for **both** projects. Eliminating the overlap would reduce the total combined project cost by approximately $7,000.)

Vegetative Planting

Re-establishing vegetation is a critical element of any channel restoration effort. Healthy, dense riparian vegetation provides the primary stability of channels over the long term. To re-establish the riparian corridor and help provide lateral control of the channel through the project reaches, the entire length of the reconfigured channel will be planted. For the natural material revetment alternative, two different planting scenarios will be used: 1) planting as part of the natural revetment, and 2) dense planting along the inside bends of meanders. The planting design is essentially the same for both scenarios and consists of the following:

- Equal numbers of sandbar willow (*Salix exigua*) and Pacific willow (*Salix lasiandra*) will be planted at a rate if 80 plants per 100 feet of stream bank. A single row of black cottonwoods (*Populustrichocarpa*) will be planted on 20-foot centers (average distance between plants) on the upland side of the willows. Actual distances between cottonwoods would vary from 10 to 30 feet to achieve a more irregular, natural-appearing distribution of trees. An average of two black hawthorn (*Cretaegus douglasii*) will be planted between each of the cottonwoods. The actual number would vary from one to

Table 2

Rock Weirs Quantity Estimate

Gladhart Lane Bridge Section 14 Project

Location	Number of Structures	Bank-full Wetted Perimeter (ft)	Additional Length for Curvature (ft)	Total Length (ft)	Width (ft)	Depth (ft)	Volume (yd^3)
Quantity of Rock:							
Between Cross Sections 10 and 20	1	96	10	106	3	6	71
Between Cross Sections 40 and 50	1	94	10	104	3	6	69
Between Cross Sections 50 and 60	1	84	10	94	3	6	63
Total	**3**						**203**
Excavation:							
Between Cross Sections 10 and 20	1	96	10	106	8	4	126
Between Cross Sections 40 and 50	1	94	10	104	8	4	123
Between Cross Sections 50 and 60	1	84	10	94	8	4	111
Total	**3**						**360**

Width and depth for determining quantity of rock is based on an average rock diameter of 3 feet.
Width and depth for determining excavation volume is based on a maximum rock diameter of 4 feet.

Table 3

Rock Weirs Quantity Estimate

Little Weiser River Section 1135 Project

Location	Number of Structures	Bank-full Wetted Perimeter (ft)	Additional Length for Curvature (ft)	Total Length (ft)	Width (ft)	Depth (ft)	Volume (yd^3)
Quantity of Rock:							
Between Cross Sections 50 and 60	1	84	10	94	3	6	63
Between Cross Sections 80 and 90	1	82	10	92	3	6	61
Total	**2**						**124**
Excavation:							
Between Cross Sections 50 and 60	1	84	10	94	8	4	111
Between Cross Sections 80 and 90	1	82	10	92	8	4	109
Total	**2**						**220**

Width and depth for determining quantity of rock is based on an average rock diameter of 3 feet.
Width and depth for determining excavation volume is based on a maximum rock diameter of 4 feet.

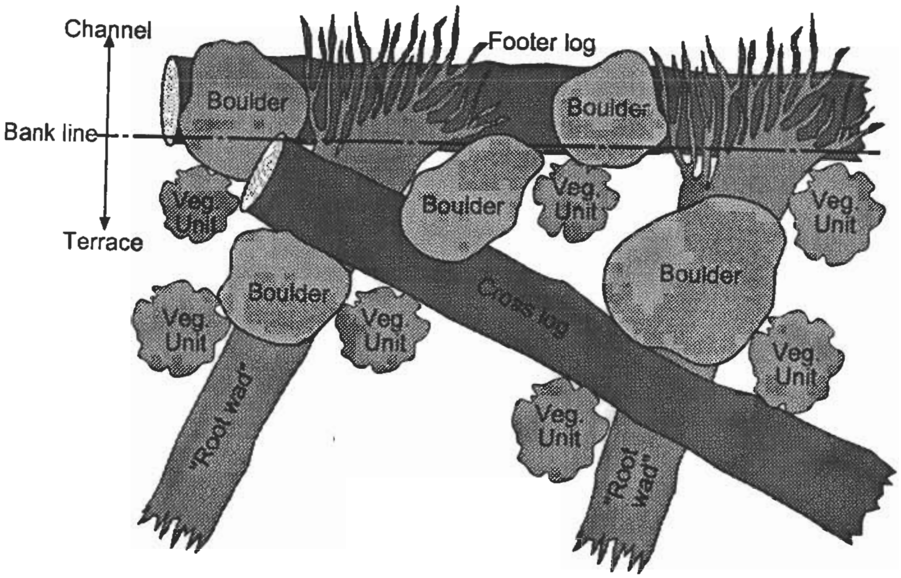
four between each pair of cottonwoods to mimic natural conditions. Willows will be planted along the sloping bank within the revetted sections. All cottonwoods and willows will be placed within 10 lateral feet of the water's edge during normal bank-full conditions. Plants that die during the first 3 years after planting will be replaced.

- Willows and cottonwoods will be placed so that the roots are immersed into fully saturated soils at the time of planting following the peak of spring runoff. All plants will be irrigated on a weekly basis for two full growing seasons (May through September). Competing weeds will be controlled around the plantings during these 2 years. Plants will be grown from local genotypes. Willows and cottonwoods may consist of cuttings or rooted stock, depending on site conditions determined during the design. Cutting size will also be determined during design, but will consist of at least 2-year-old stock.
- All plantings will be protected from beaver depredation.
- The entire length of the revetted and planted stream banks will be fenced to permanently exclude livestock. Fences will be placed 30 feet from the top of the bank of the reconfigured channel. The fenced area will be hydroseeded with a mix of local native grasses and forbs. Over time, the entire fenced area is expected to have a riparian shrub/forest canopy.

Because the reconfigured channel with the Rock Riprap Alternative would have 3:1 (H:V) side slopes both within and above the normal bank-full elevation, the distance from an adequate water supply limits planting to only two rows of willows on 10-foot centers immediately adjacent to the upper edge of the riprap (these would be the same willow species proposed for use under the Natural Material Revetment Alternative). The inside bends of the meanders would also be planted with two rows of willows on 10-foot centers. Planting methods, temporary irrigation, fencing, grazing control, and beaver control would be the same as described above for the natural material revetment alternative.

Natural Material Revetment

Natural material revetment can be used to provide bank protection and stabilization. Figure 4 is a conceptual view of a natural material revetment. When used in conjunction with the reconfigured channel, features of the natural, stable, river form are integrated into



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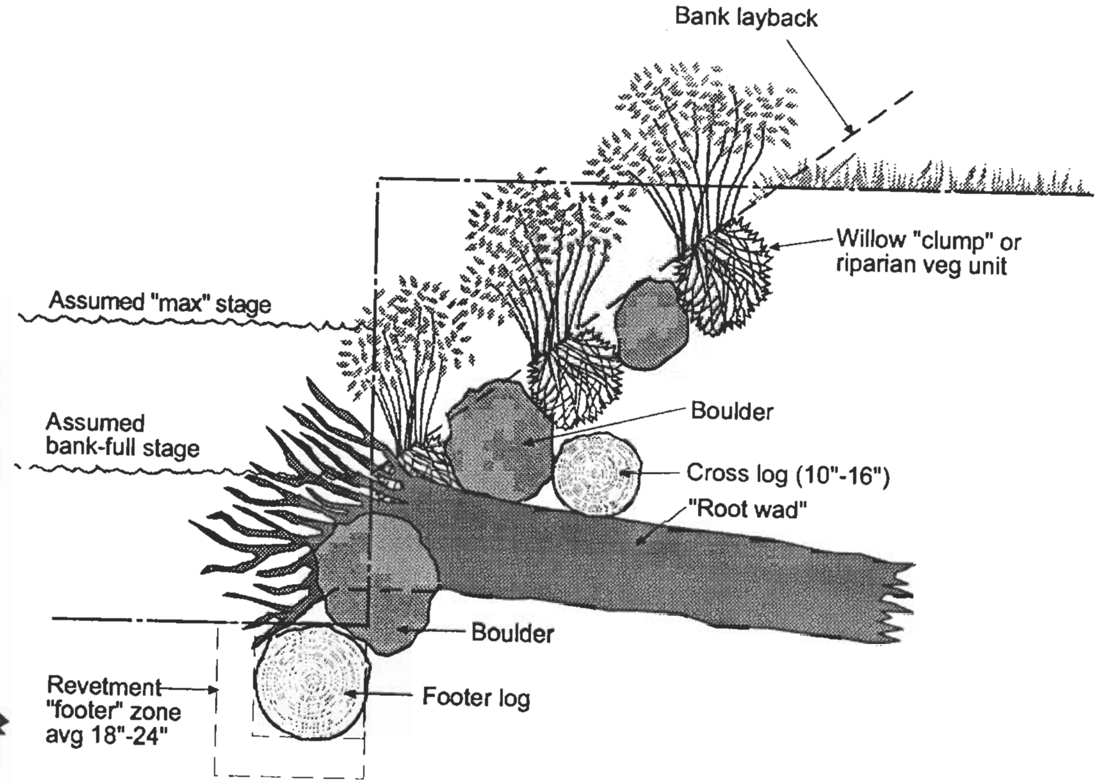

CROSS SECTION VIEW
NOT TO SCALE

Figure 4
CONCEPTUAL VIEW OF A NATURAL MATERIAL REVETMENT

the restoration to be compatible with the physical processes that allow the river to seek its own stability.

The aquatic and riparian habitat benefits and the aesthetic benefits associated with natural material revetments are extensive. These benefits are documented in the EA reports for the Section 14 and Section 1135 projects.

As shown in Appendices F and H, the natural materials revetment is used to stabilize the outside bends of the reconfigured channel. The total revetment length for the Section 14 project is 608 feet, or 60 percent of the project's reconfigured channel bank length. The total revetment length for the Section 1135 project is 621 feet, or 50 percent of the project's reconfigured channel bank length .

Rock Riprap Revetment

Because this feasibility design is a conceptual design level of effort, engineering judgment was used to generate the design features of the rock riprap alternative so that quantity and cost estimates could be made. During final design, velocities and depths would be calculated for a selected flood return interval to appropriately size the rock diameter.

The conceptual design features used to generate the rock riprap materials and cost estimates are as follows:

- 3:1 (H:V) channel side slopes
- 1.5-foot median diameter rock size
- 3-foot riprap layer thickness
- The channel slope above normal bank-full stage would be riprapped to provide 1 foot of vertical freeboard
- Toe scour protection, upstream and downstream flanks, geotextile fabric, and a gravel filter layer would be required—see Appendix J for details

As shown in Appendices G and I, the rock riprap revetment is used to stabilize the outside bends of the reconfigured channel. The total revetment length for the Section 14 project is 608 feet, or 60 percent of the project's reconfigured channel bank length. The total revetment length for the Section 1135 project is 621 feet, or 50 percent of the project's reconfigured streambank length. Approximately 2,000 cubic yards of rock riprap is required for each project.

As mentioned above, the reconfigured channel would not be intended to contain the entire flow of large runoff events, and the use of an active floodplain would be necessary (see Channel Reconfiguration). The rock riprap would be machine-placed and standard design specifications would have to be met. The source of all rock, for both projects and alternatives, would be an existing offsite quarry.

Preliminary Cost Estimates Preparation

The project cost estimates listed in Table 4 were prepared by performing quantity takeoffs from the various preliminary plans and details included in this report. Quantities were defined as carefully as can be expected at the level of conceptual design. These quantities were priced using engineering judgment and project experience from similar projects as well as direct contact with materials and equipment suppliers. A summary to the significant unit prices are listed in Table 5.

Operations and maintenance costs are expected to be $5,360 for the first 2 years per project. Annual maintenance costs are estimated to be $560 per project. These costs represent estimates for removing snags, irrigating the vegetation during the first 2 years, and maintaining the fence.

TABLE 4
Summary of Facilities Cost Estimates for each project

	Alternatives	
Project	Natural Materials Revetment	Rock Riprap Revetment
Section 14	287,000	339,000
Section 1135	420,000	455,000

TABLE 5
Summary of Materials Unit Costs Estimates[a]

Excavation and backfill (onsite materials)	\$10 per yd^3
Backfill (pit-run gravel) hauled-in from offsite:	\$15 per yd^3
Rock riprap (D_{50}=1.5 feet), purchased, hauled, and machine-placed	\$100 per yd^3
Geotextile fabric	\$1.50 per yd^2
Boulders (2 feet to 4 feet diameter), purchased, hauled, and placed	\$120 per yd^3
Logs (avg. 1.5 feet x 12 feet), purchased, hauled, and placed	\$330 per log
Vegetative plantings for natural revetment and riparian zone	\$40 to 50 per unit
Barbed wire fence	\$6,000 per mile
Site preparation and seeding of grass and forbs	\$350 per acre

[a]All cost estimates based on similar projects and engineering judgment.

The opinions of costs shown have been prepared to define the relative cost of the projects from the information available at the time the opinions were prepared. The costs are considered as budget-level estimates. According to the American Association of Cost Engineers, this level of estimate is normally expected to be accurate to within +30 percent to -15 percent. These opinions of cost have been prepared using August 1996 dollar values. The final cost of the projects will depend on the total actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors as they occur. To help ensure proper project evaluation and adequate funding, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions.

Works Cited

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CH2M HILL. Draft Little Weiser River Restoration Environmental Assessment. August 1996.

Federal Highway Administration. *Design of Riprap Revetment (HEC-11)*. U.S. Department of Commerce. March 1989.

White, Ray J. "Stream Channel Suitability for Coldwater Fish." *Wildlife and Water Management: Striking a Balance*. Soil Conservation Society of America: Ankeny, Iowa. 1973.

Appendix A
Planimetric and Profile Survey Data

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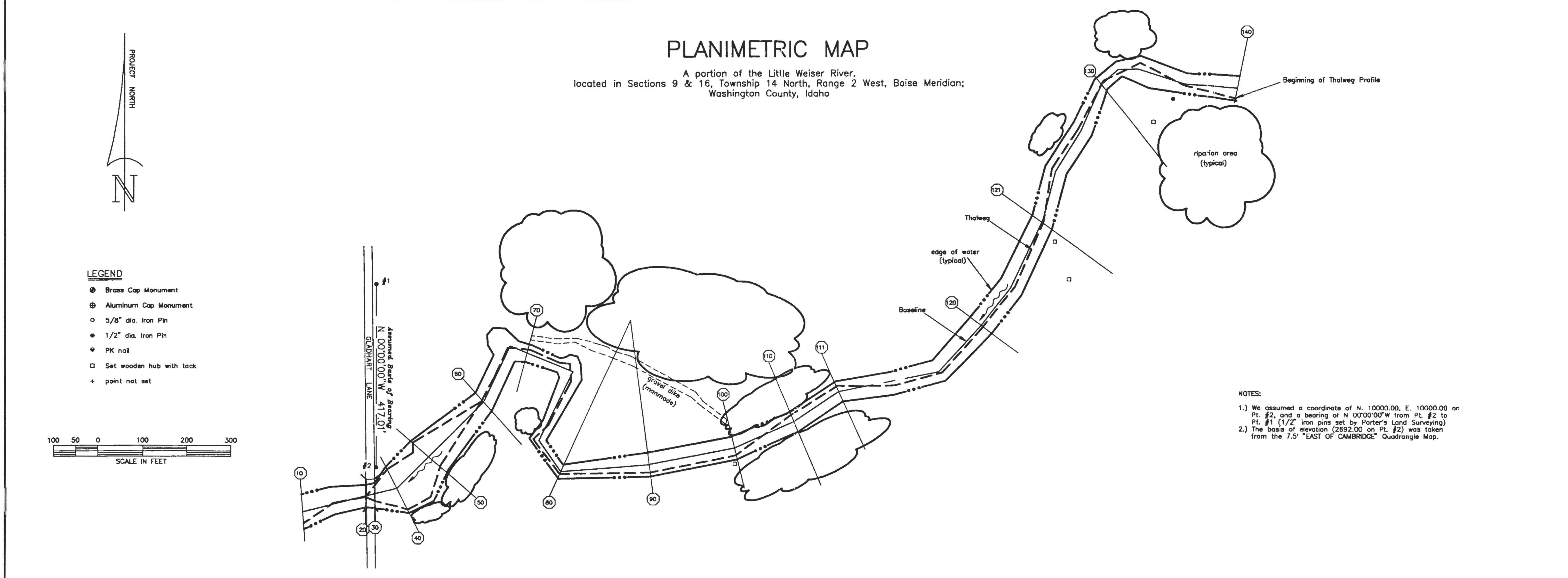
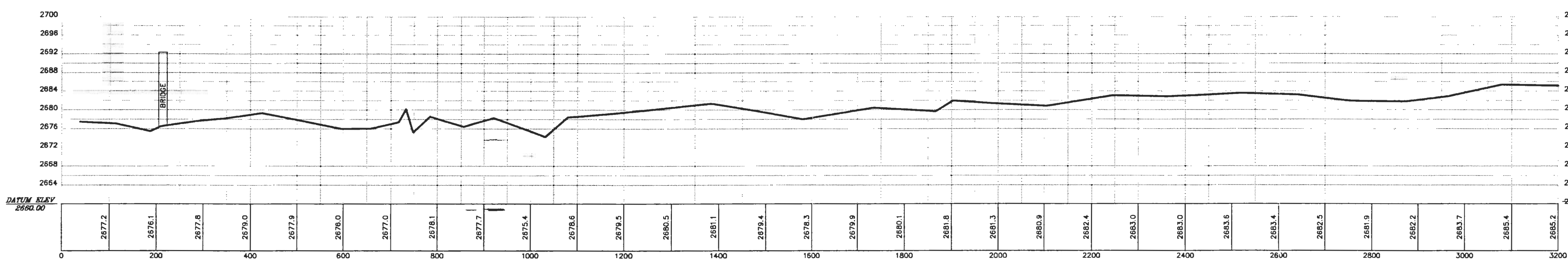
27-Sep-1995 PLAN6.DWG





THALWEG PROFILE

Prepared by:
PORTER'S LAND SURVEYING, INC.
Planning Surveying
Boise, Idaho
Job No. 9654

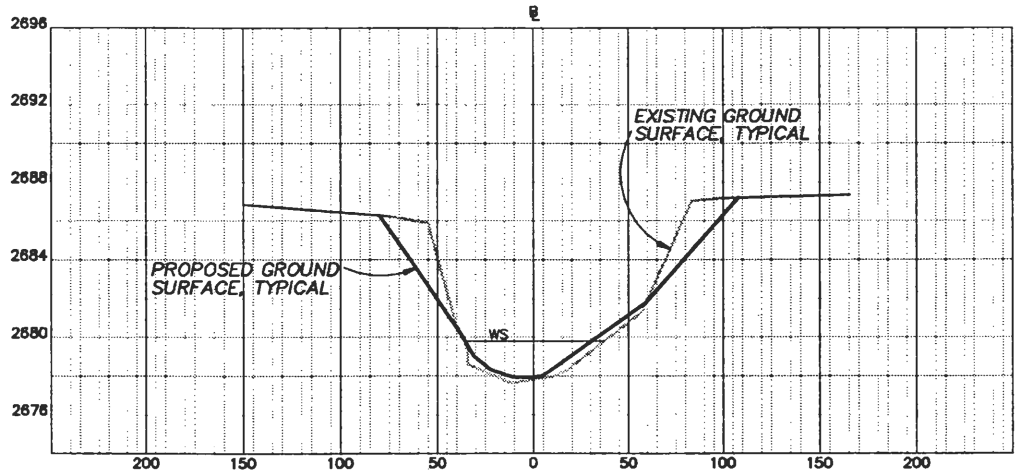
135909.A0

FIGURE A-1
PLANIMETRIC AND PROFILE SURVEY DATA
LITTLE WEISER RIVER

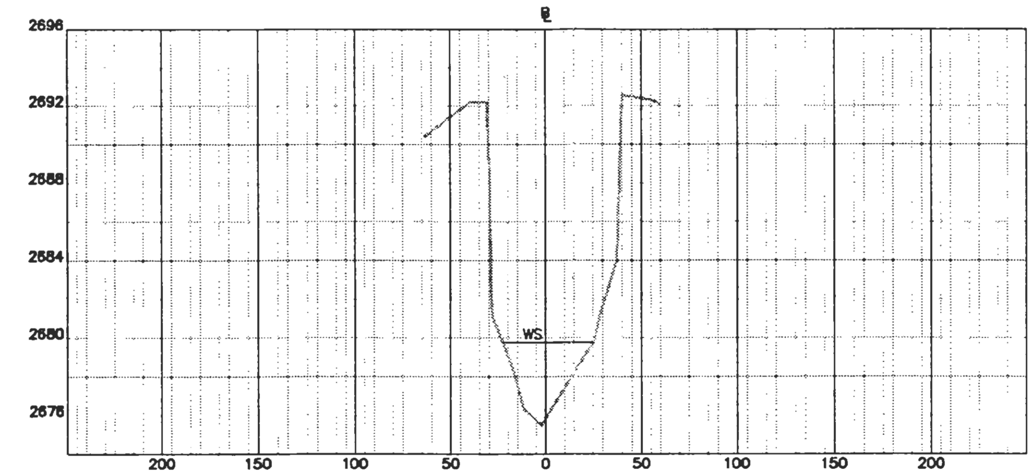
CH2M HILL

Appendix B

Channel Cross Sections



SECTION 10



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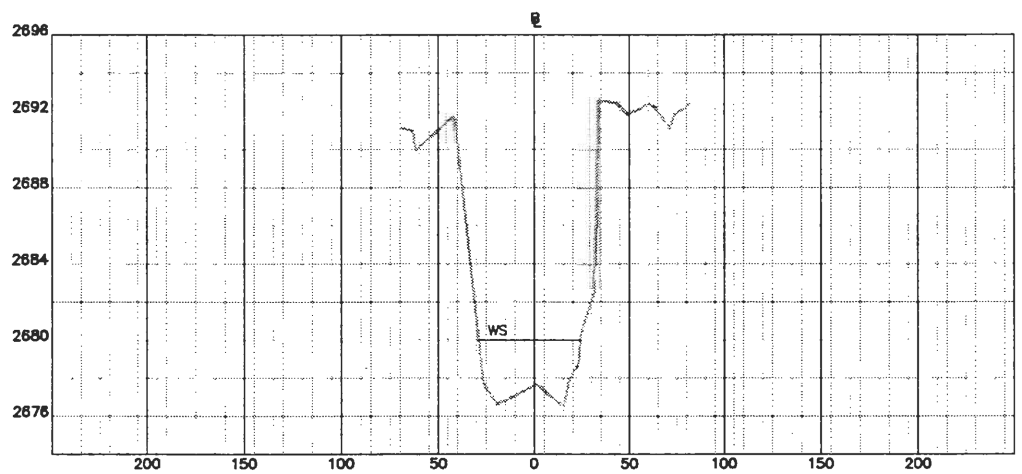

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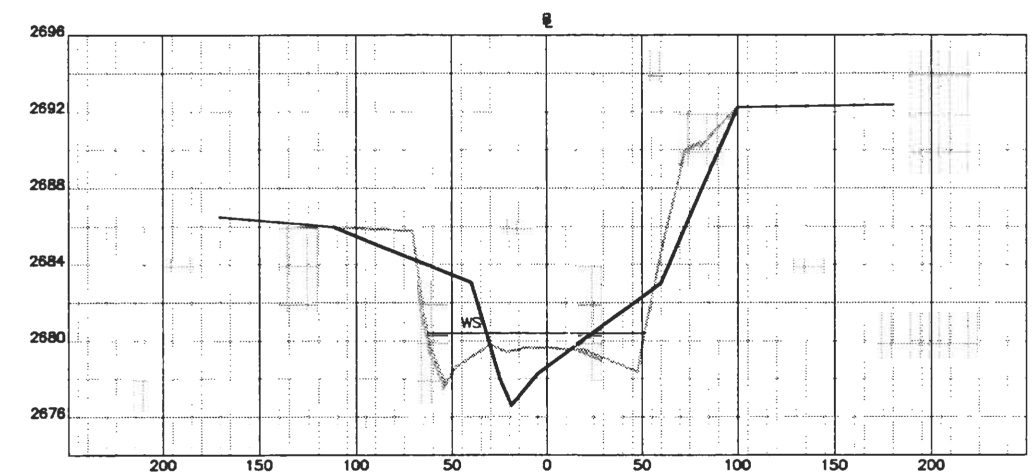

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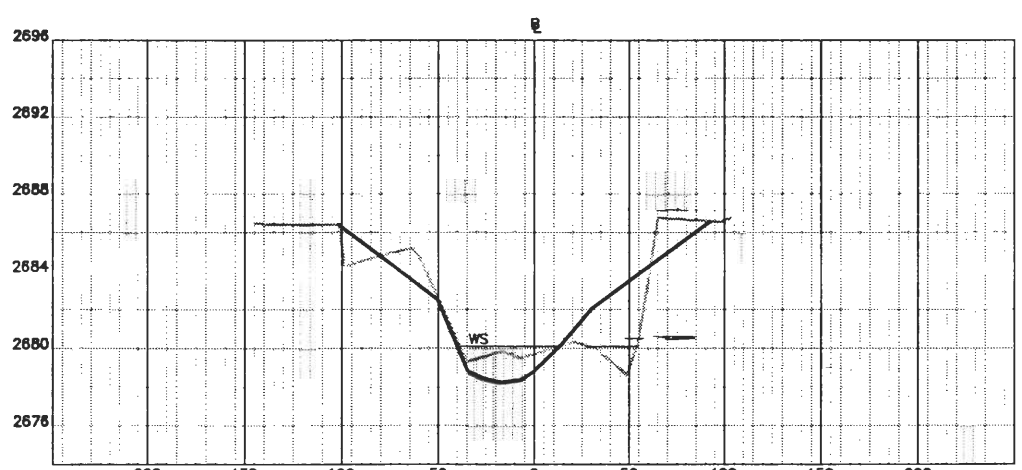

SECTION 50

Note:

WS = Water surface elevation surveyed on June 25, 1996.

FIGURE B-1
EXISTING AND PROPOSED
CHANNEL CROSS-SECTIONS
LITTLE WEISER RIVER SECTION 1135 &
GLADHART LANE BRIDGE SECTION 14

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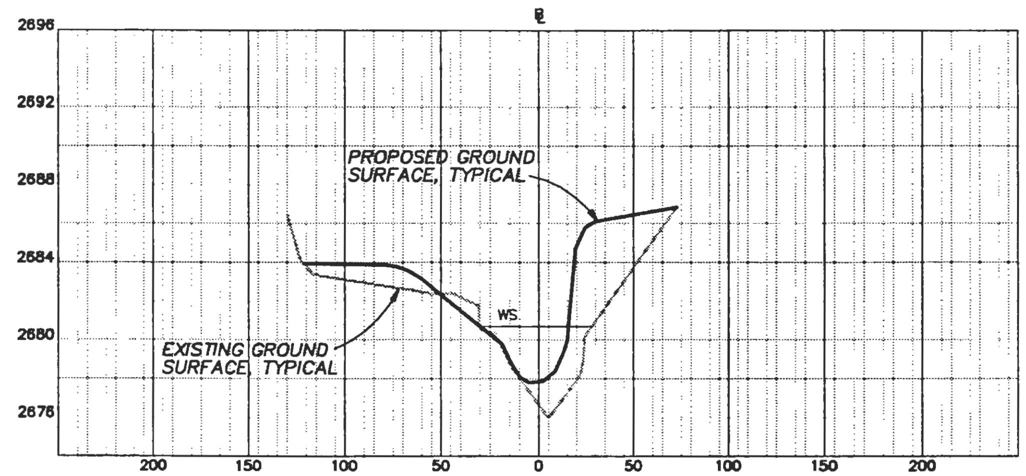

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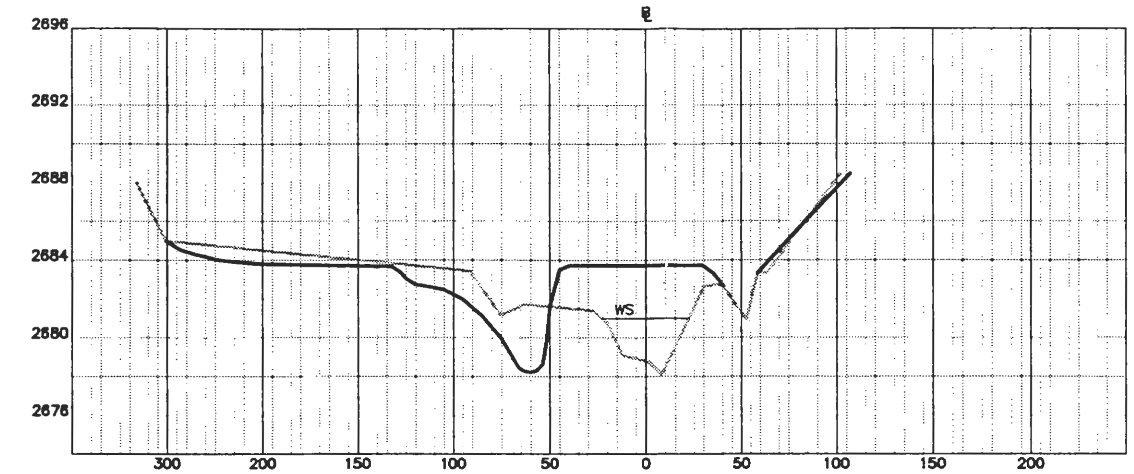

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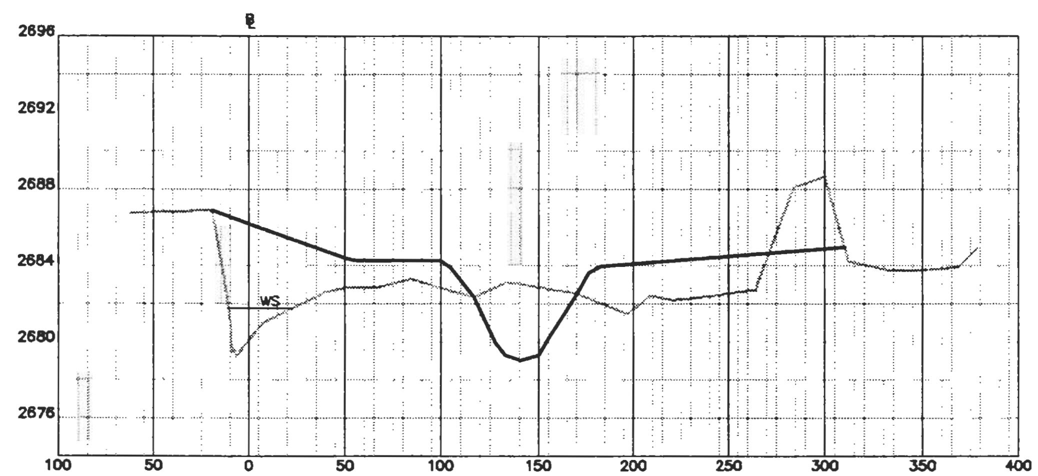
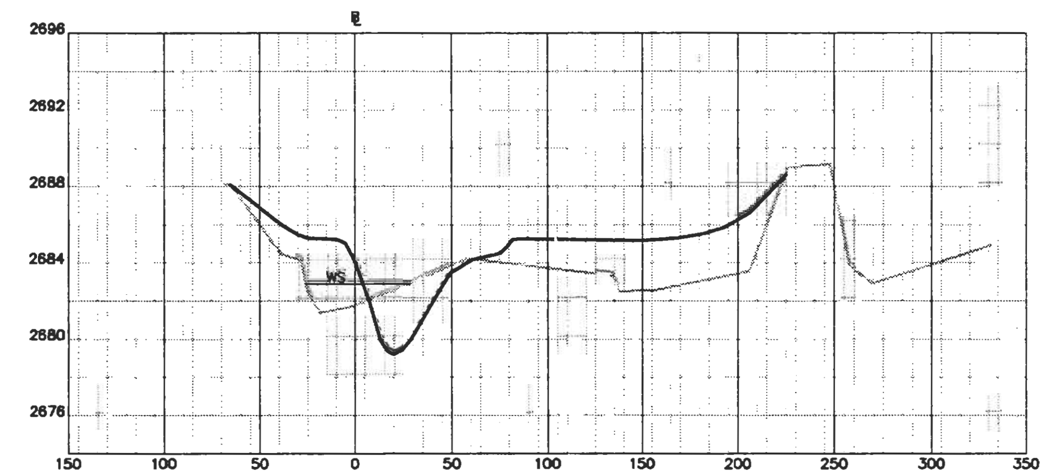


SECTION 80



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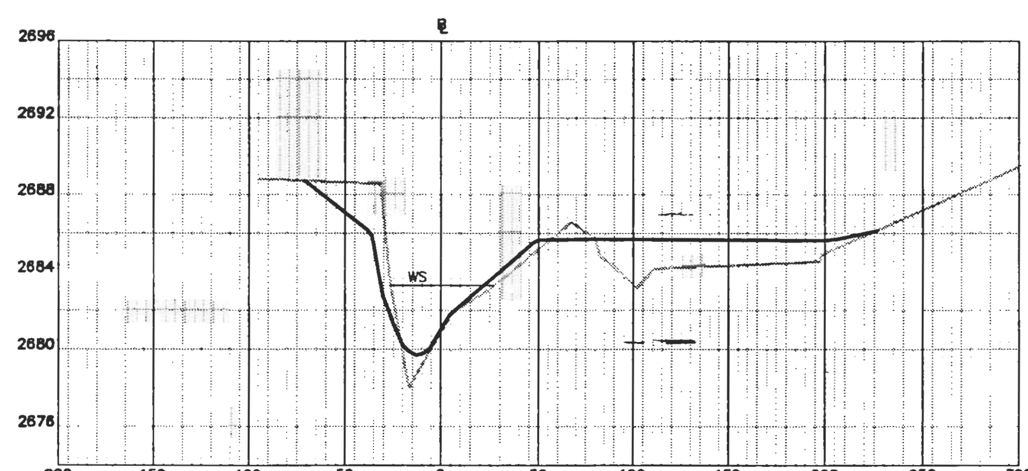

SECTION 100

Note:

1. *WS = Water surface elevation surveyed on June 25, 1996.*

FIGURE B-2
EXISTING AND PROPOSED CHANNEL CROSS-SECTIONS
LITTLE WEISER RIVER SECTION 1135 &
GLADHART LANE BRIDGE SECTION 14

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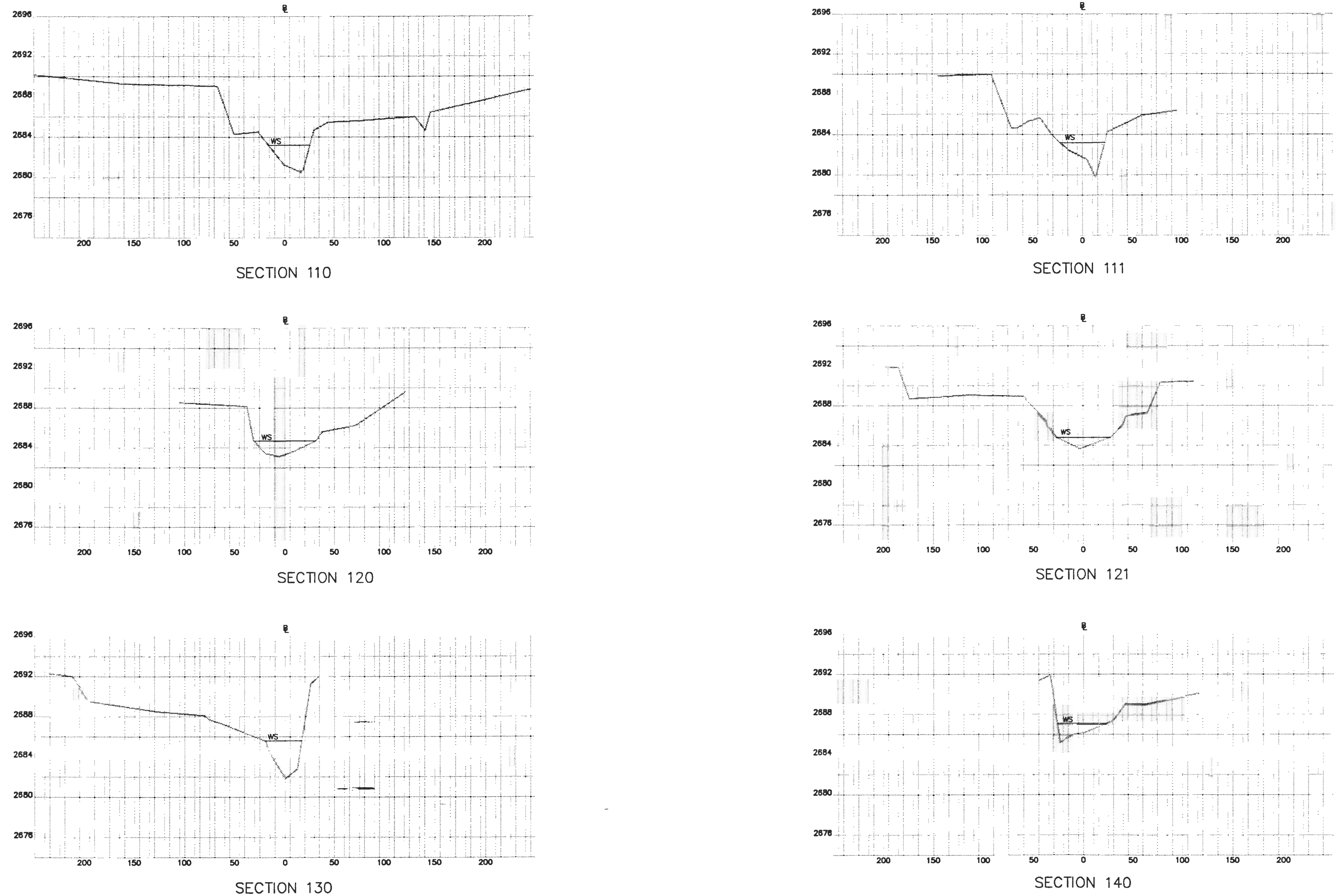


Note:

1. *WS = Water surface elevation surveyed on June 25, 1996.*

FIGURE B-3
EXISTING CHANNEL CROSS-SECTIONS
LITTLE WEISER RIVER SECTION 1135 &
GLADHART LANE BRIDGE SECTION 14

Appendix C
USGS Gage Records (Summary)

Station Name	LITTLE WEISER RIVER NR CAMBRIDGE ID
Station ID	13261500
Param	Streamflow (cfs)
Statistic	Mean
State	IDAHO
County	WASHINGTON
Latitude	44:33:20
Longitude	116:35:20
Elevation	
Start Year	1920
End Year	1926
Num Years	7

	January	February	March	April	May	June	July	August	September	October	November	December	Year
1920						212.267	31.161	0.032	0.833	30.387	168.567	241.516	
1921	390.581	237.857	658.258	324.233	672.935	434.233	50.581	1.423	7.687	18.032	60.067	85.516	
1922	29.355	103.75	568.452	478.167	535.839	413.2	43.426	5.8	0.747				
1923				345.7	411.355	372.8	94.387	8.99	1.723	16.726	19.067	23.355	
1924	12	377.897	55.903	98.567	125.484	7.43	0.3						
1925	0	352	331.71	405.733	456.194	168.767	20.652						
1926			171.464	195.8	194.419	29.117	1.542						
# Days	124	104	166	180	196	210	210	136	120	93	90	93	1722
Avg Day	108	261.7	361.1	308	393.7	234	35.68	3.71	2.75	21.72	82.57	116.8	180.6
Max Day	1300	2400	1900	1320	1350	749	257	20	28	47	685	2350	2400
Min Day	0	14	35	36	31	1.5	0	0	0	2	13	12	0
# Months	4	3	4	6	6	7	6	4	4	3	3	3	2
SDev Month	188.8	137.1	269.6	139	206.8	177.7	31.97	4.1	3.32	7.54	77.25	112.4	51.86
Skew Month	1.98	0.065	-0.728	-0.524	-0.202	-0.168	0.829	0.398	1.9	1.67	1.2	1.16	
Min Month	0	103.8	55.9	98.57	125.5	7.43	0.3	0.032	0.747	16.73	19.07	23.35	195.5
Max Month	390.6	377.9	658.3	478.2	672.9	434.2	94.39	8.99	7.69	30.39	168.6	241.5	268.8
Exceedences													
1%	1290	2347	1900	930.4	1129	744.9	225.1	19.64	27.6	47	685	2350	1080
5%	556	658.4	1149	550	871	667	130	14	16	41.05	483	328	625
10%	308	514	779	512	716	550	91	11	9	40	231	187.8	493
20%	200.4	316.2	596.8	446	544	401	65	8	3	32.8	80	136	329
50%	25	194	217	307	383	212	20	2	1	20	26	61	76
80%	0	125	91.6	139	190	17	0.9	0	0.2	11	18	23.6	5.5
90%	0	90	48.2	107	134.6	9	0.2	0	0	5.5	17	21	0.7
95%	0	44	40.6	85	82.8	5.8	0	0	0	4	16	16.65	0
99%	0	44	36.32	42.6	42.76	1.78	0	0	0	3.86	13.9	13.86	0

Station Name	LITTLE WEISER RIVER NR INDIAN VALLEY ID
Station ID	13261000
Param	Streamflow (cfs)
Statistic	Max
State	IDAHO
County	ADAMS
Latitude	44:29:22
Longitude	116:23:22
Elevation	3250
Start Year	1920
End Year	1971
Num Years	41

	January	February	March	April	May	June	July	August	September	October	November	December	Year
1920							40.6	15.6	14.3	26.7	118.1	106.0	
1921	143.9	109.0											
1923				203.5	349.9								
1924			41.5	88.2	150.0	29.7	10.5	5.7	5.4	9.2	30.1	17.8	
1925	35.6	255.5	81.5	352.9	414.5	166.4	34.1	15.4	11.2	11.2	13.9	22.5	
1926	17.0	83.0	91.6	170.7	182.5	47.9	14.4	10.5	10.1	11.1	76.4	116.5	
1927	59.9	170.7	126.4	223.2	418.8	501.2	106.5	25.2	17.6				
1938					445.6	318.9	68.8	19.7	12.6	16.6	18.6	20.7	
1939	17.2	18.4	145.3	214.5	231.8	60.9	20.7	7.9	8.0	9.0	9.2	18.2	
1940	47.5	141.3	217.5	334.1	337.3	132.0	22.4	10.0	12.0	20.6	48.4	41.5	
1941	39.0	60.1	118.9	185.7	311.5	163.4	42.9	18.7	14.4	15.6	21.2	78.5	
1942	48.1	55.6	59.8	275.5	301.9	227.5	41.9	14.1	11.0	11.1	29.6	64.8	
1943	92.1	78.9	135.8	490.7	382.2	368.2	101.5	24.1	12.8	16.1	21.2	16.7	
1944	14.5	34.3	52.6	174.8	195.5	170.5	43.8	14.2	11.4	10.7	24.8	13.9	
1945	42.3	109.9	85.9	135.2	404.5	313.2	55.5	18.2	13.5	13.1	26.9	58.4	
1946	45.3	38.8	140.4	321.1	401.1	175.4	41.4	13.0	12.9	17.6	87.3	157.4	
1947	40.1	90.1	112.4	181.6	421.0	249.3	46.8	16.8	14.6	26.4	29.3	30.3	
1948	67.2	25.7	46.3	211.2	441.0	310.5	55.0	16.4	10.1	13.4	18.9	18.7	
1949	17.8	46.9	107.8	239.8	411.7	171.6	31.3	10.4	8.9	12.7	19.4	13.9	
1950	23.9	65.6	136.4	179.9	250.1	290.0	76.0	20.1	10.5	18.1	25.7	37.5	
1951	34.2	108.6	70.9	285.6	385.1	186.3	43.8	14.0	10.7	47.5	54.2	83.5	
1952	37.1	58.1	73.8	489.4	601.1	321.5	65.6	18.1	13.5	10.9	10.7	13.6	
1953	108.1	80.9	67.8	205.9	368.4	549.8	114.8	24.0	12.9	12.7	18.3	24.5	
1954	49.1	82.6	96.8	253.9	410.6	233.5	56.4	14.9	9.9	11.6	14.0	11.6	
1955	12.7	12.5	25.1	124.4	251.1	279.5	60.4	14.8	9.5	12.9	23.6	149.3	
1956	113.9	50.2	105.7	268.7	468.2	270.6	51.1	16.5	10.0	25.8	33.6	41.3	
1957	17.8	108.6	158.9	255.1	608.5	352.5	57.1	17.3	9.1	15.3	14.2	22.3	
1958	29.9	138.2	80.9	219.9	548.7	295.8	50.1	16.0	10.2	10.0	17.7	21.9	
1959	62.3	50.1	55.5	148.2	201.5	209.8	35.8	9.8	24.9	41.7	27.4	19.3	
1960	15.5	46.8	150.9	216.2	304.0	245.3	32.7	11.8	7.4	10.2	26.8	20.1	
1961	20.3	90.1	96.0	122.6	275.4	190.1	24.8	7.5	9.1	13.0	15.1	23.8	
1962	19.9	73.0	54.1	234.7	272.2	225.9	38.4	13.6	10.4	60.4	77.7	99.8	
1963	39.3	145.8	67.7	192.5	269.6	178.5	36.8	13.9	11.2	11.5	21.5	18.0	
1964	24.6	21.0	57.1	241.0	393.1	452.8	86.8	23.2	16.7	12.4	21.9	185.8	
1965	135.9	103.0	77.3	384.3	485.5	353.7	66.3	20.3	12.9	12.1	17.8	16.3	
1966	24.4	19.5	105.1	168.1	212.7	82.6	15.9	4.6	5.4	6.6	13.2	34.1	
1967	71.7	49.4	54.8	87.0	320.0	329.9	58.4	11.6	8.7	15.0	17.1	14.2	
1968	16.6	150.1	103.5	113.0	216.2	156.2	25.1	14.9	8.5	14.4	51.1	48.5	
1969	132.9	50.4	74.6	369.0	500.8	240.6	38.5	11.5	8.9	14.0	13.1	20.3	
1970	191.0	97.5	90.5	94.3	395.7	552.4	118.4	18.7	15.4	15.9	73.7	108.2	
1971	118.1	93.3	98.0	262.6	539.7	419.0	116.9	24.2	12.7				
# Days	1147	1044	1147	1140	1209	1140	1209	1209	1170	1147	1110	1147	13819
Avg Day	54.77	81.33	93.65	229.5	361	258.5	52.52	15.31	11.51	17.11	31.94	48.91	105.3
Max Day	694	950	518	961	1120	800	338	42	72	302	597	1400	1400
Min Day	6	10	10	35	54	16	6.2	3.6	3.6	4.4	5.4	4.7	3.6
# Months	37	37	37	38	39	38	39	39	39	37	37	37	36
SDev Month	44.53	49.92	39.31	97.76	116.6	127.3	28.54	5.11	3.5	11.1	24.92	46.13	29.74
Skew Month	1.41	1.28	0.895	0.962	0.208	0.519	0.966	0.048	1.42	2.6	1.91	1.54	— 0.169
Min Month	12.74	12.5	25.1	86.97	150	29.7	10.52	4.61	5.39	6.58	9.17	11.55	56.01
Max Month	191	255.5	217.5	490.7	608.5	552.4	118.4	25.23	24.87	60.35	118.1	185.8	157
Exceedences													
1%	404.4	480	322.6	663.4	785.6	713.6	245	37	33.3	95.12	189.1	376.6	620
5%	183.3	235.8	229	500	639.5	563	138	29	18.5	40	110.5	157.9	430
10%	121.9	163	170.3	400	575	500	98	25	16	28	56	93.3	318
20%	74	103.2	131	325	495	396	72	20	14	18	34	56	181
50%	30	56	75.5	198	343	230	40	14	11	13	20	23.5	37
80%	16	26	43	119	218	108	23	10	8.1	10	13	15	14
90%	14	18	35	94	180	70	16	7.5	7.4	9.2	11	13	11
95%	13	14	27	77	152	44	12	6	6.3	7.1	9	11	8.9
99%	10	12	16	54.4	97.18	24.4	9	4.01	4.4	6.09	7	9	6

Station Name	LITTLE WEISER R BL MILL CR NR INDIAN VALLEY ID
Station ID	13260500
Param	Streamflow (cfs)
Statistic	Mean
State	IDAHO
County	ADAMS
Latitude	44:29:17
Longitude	116:22:17
Elevation	
Start Year	1923
End Year	1982
Num Years	3

	January	February	March	April	May	June	July	August	September	October	November	December	Year
1923								27.55	15.4				
1981		209.3	127.8	212.5	288.4	156.5	30.42	9.08	6.86	15.35	52.5	122.8	
1982	45.42	255.9	154.9	240.4	491.7	428.2	139.9	28.19	20.8	30.39			
# Days	31	47	62	60	62	60	77	93	90	62	38	31	713
Avg Day	45.42	237	141.3	226.4	390.1	292.3	84.39	21.61	14.35	22.87	48.55	122.8	131.1
Max Day	60	753	238	414	770	577	354	43	44	90	175	587	770
Min Day	28	20	90	88	209	54	13	6.1	5.6	12	13	40	5.6
# Months	1	1	2	2	2	2	2	3	3	2	1	1	1
SDev Month			19.18	19.75	143.8	192.1	77.39	10.86	7.03	10.63			
Skew Month								-1.73	-0.655				
Min Month	45.42	255.9	127.8	212.5	288.4	156.5	30.42	9.08	6.86	15.35	52.5	122.8	165.4
Max Month	45.42	255.9	154.9	240.4	491.7	428.2	139.9	28.19	20.8	30.39	52.5	122.8	165.4
Exceedences													
1%	60	753	238	414	770	577	354	43	44	90	175	587	624.2
5%	58.35	706.8	218	407	625.3	572	292.7	40.35	23	55.8	167.8	557.3	473
10%	55	572.5	199.2	366	579.2	519	210.7	36.7	20	43.4	118.6	299.3	372.1
20%	54	421.2	185.2	345	530	451	111.4	33	18	25	73.2	149.4	237.4
50%	44	192	128	221	366	319	62	21	14	19	35	73	55
80%	40	35	103.4	110	265.4	128	27	9.54	6.4	13	16	55	18
90%	39	31.7	95.6	97	229	90	18.7	8.26	6.1	12	14.8	45.2	13
95%	38.55	27.1	91.2	95	218.1	70	15	7	5.75	12	13.9	41.1	8.13
99%	31.1	21.88	90	89.2	210.2	56.4	13	6.47	5.6	12	13	40	5.83

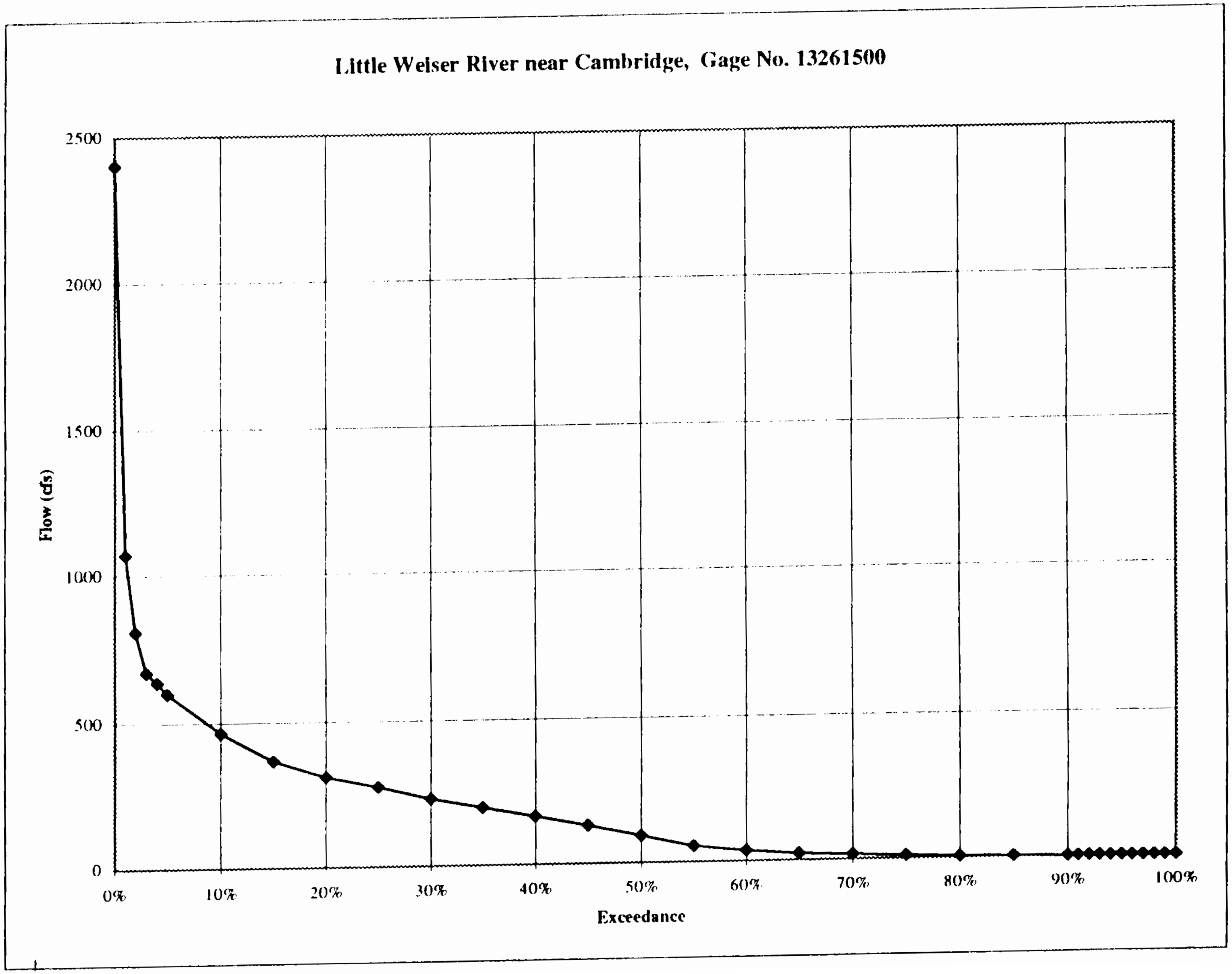
Station Name	WEISER RIVER NR CAMBRIDGE ID												
Station ID	13258500												
Param	Streamflow (cfs)												
Statistic	Mean												
State	IDAHO												
County	WASHINGTON												
Latitude	44:34:47												
Longitude	116:38:47												
Elevation	2647												
Start Year	1939												
End Year	1994												
Num Years	56												
Drain Area	605	mi^2											
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1939				1371	864	176	67	47	44	66	64	140	
1940	318	1185	2049	2342	1175	347	62	56	62	158	392	450	
1941	449	723	1237	1403	1345	830	177	97	116	134	150	854	
1942	404	545	692	2332	1549	937	151	80	73	75	228	446	
1943	738	513	1483	3556	1732	1416	349	103	69	118	183	124	
1944	104	230	473	1053	869	600	133	64	52	67	199	117	
1945	255	925	970	1118	2176	1305	186	61	81	89	256	532	
1946	420	225	1844	2476	1995	618	158	87	87	110	665	1056	
1947	237	711	994	1129	1400	659	122	69	72	153	189	182	
1948	506	469	672	2079	2821	1362	185	96	81	97	144	151	
1949	130	417	1770	1803	1841	506	74	58	88	106	127	104	
1950	173	509	1388	1895	1778	1186	262	88	67	154	175	299	
1951	245	761	861	2234	1703	605	136	69	67	253	422	926	
1952	377	479	845	4542	3429	1132	281	91	87	75	96	116	
1953	1068	717	684	1526	1761	1815	319	87	68	82	133	198	
1954	545	964	934	1854	1678	706	190	75	69	113	114	85	
1955	94	101	299	1241	1788	1033	215	79	92	100	189	1489	
1956	834	562	1180	2183	2001	858	192	82	89	203	204	272	
1957	142	737	1494	2025	2801	924	156	73	61	94	101	271	
1958	244	1501	1034	1942	2850	1172	183	92	81	84	125	142	
1959	453	574	576	1300	1230	664	137	74	144	192	132	103	
1960	98	255	1474	1654	1472	808	106	82	69	71	410	197	
1961	183	1206	1142	1207	1311	637	102	63	66	85	147	245	
1962	143	737	809	1896	1421	792	127	75	69	443	540	914	
1963	229	1089	511	1496	1421	645	132	70	86	75	206	141	
1964	173	229	526	2339	2073	1721	297	103	153	110	140	1263	
1965	786	721	835	2717	2173	1171	250	125	123	93	128	130	
1966	334	174	892	1213	883	317	103	57	45	56	140	403	
1967	717	569	841	886	2169	1411	261	91	83	142	118	123	
1968	174	1271	896	711	1079	562	111	126	85	126	249	244	
1969	777	361	976	2772	2024	778	183	88	93	117	93	186	
1970	1793	850	813	758	2295	1662	317	107	151	134	408	798	
1971	970	751	1595	2641	3115	1654	498	132	133	155	147	271	
1972	792	826	2273	1222	2146	1427	234	115	116	115	116	324	
1973	581	335	992	896	1162	441	101	74	60	76	1010	1052	
1974	1724	722	2186	2604	2352	1993	444	142	105	104	117	108	
1975	138	352	1153	1284	2605	1696	415	151	98	191	213	427	
1976	273	331	738	2267	2088	642	181	116	123	106	79	78	
1977	75	89	99	128	148	67	43	12	35	57	97	717	
1978	613	817	1373	2188	1802	976	276	77	92	70	88	86	
1979	85	363	1128	1052	1414	411	77	63	44	92	83	184	
1980	566	1079	895	1789	1685	1027	216	72	99	91	135	896	
1981	527	1156	950	1154	1061	660	131	71	69	117	427	853	
1982	345	2036	1783	2231	2756	1569	555	122	119	163	252	796	
1983	617	1332	2785	1905	2384	1499	463	164	126	111	294	456	
1984	234	392	1816	2019	2331	1827	418	118	154	175	224	208	
1985	183	181	724	1996	1098	471	85	72	163	181	221	196	
1986	205	1962	2354	1472	1297	748	157	66	123	125	141	123	
1987	117	383	1108	772	450	151	67	56	43	42	74	107	
1988	122	314	441	752	480	305	52	53	41	34	163	169	
1989	168	201	2215	1962	1282	613	88	72	87	95	104	87	
1990	144	141	898	1285	777	648	81	82	58	69	89	65	
1991	125	296	498	726	987	483	94	69	64	46	124	198	
1992	107	832	595	620	401	115	66	63	40	41	76	92	
1993	208	222	2111	2227	2293	1071	205	86	70	87	87	127	
1994	180	205	757	797	639	235	63						
# Days	1705	1554	1705	1680	1736	1680	1736	1720	1650	1705	1650	1705	20226
Avg Day	404.3	647.3	1139	1697	1676	894.3	191.6	84.46	86.06	114.9	204.1	369.4	627.1
Max Day	7480	7200	6440	6440	5070	3680	1420	427	341	2320	3160	8520	8520
Min Day	35	72	86	86	85	26	20	7.1	11	24	33	37	7.1
# Months	55	55	55	56	56	56	56	55	55	55	55	55	54
SDev Month	366.8	439.4	586.3	780.2	723.9	495.1	122.5	27.71	32.18	63.56	165.9	350.6	227.5
Skew Month	2.07	1.21	0.86	0.899	0.144	0.433	1.21	0.677	0.665	2.81	2.85	1.45	0.141
Min Month	75.06	88.79	98.77	128.3	147.5	66.57	42.52	12.35	34.67	33.71	63.53	64.52	79.8
Max Month	1793	2036	2785	4542	3429	1993	555	163.9	163.1	443.4	1010	1489	1202
Exceedences													
1%	3486	4441	4820	4980	4216	2618	870	186.6	226.5	478.4	1465	3735	3757
5%	1378	2129	2998	3620	3272	2090	574.4	145	158.5	223.5	591	1270	2397
10%	846.5	1406	2360	3010	2824	1750	410	124	139	170.5	341	784	1760
20%	459	876.2	1600	2420	2358	1420	262	106	113	140	230	425	1120
50%	210	376	879.5	1470	1540	775	130	76	76	95	130	169	213
80%	116	190	447	875	987.4	339	75	61	55	69	90	102	88
90%	93	133.4	328	692	626.6	183	61	54	44	52	78	85	68
95%	81	105	239.3	561	443.6	125	52.8	49	40	40	67.5	73	57
99%	61.1	84.54	92.1	139.6	150.8	62.4	40	11.2	21.5	28.05	53.5	52.05	39

Appendix D

Daily Flow Duration Curves

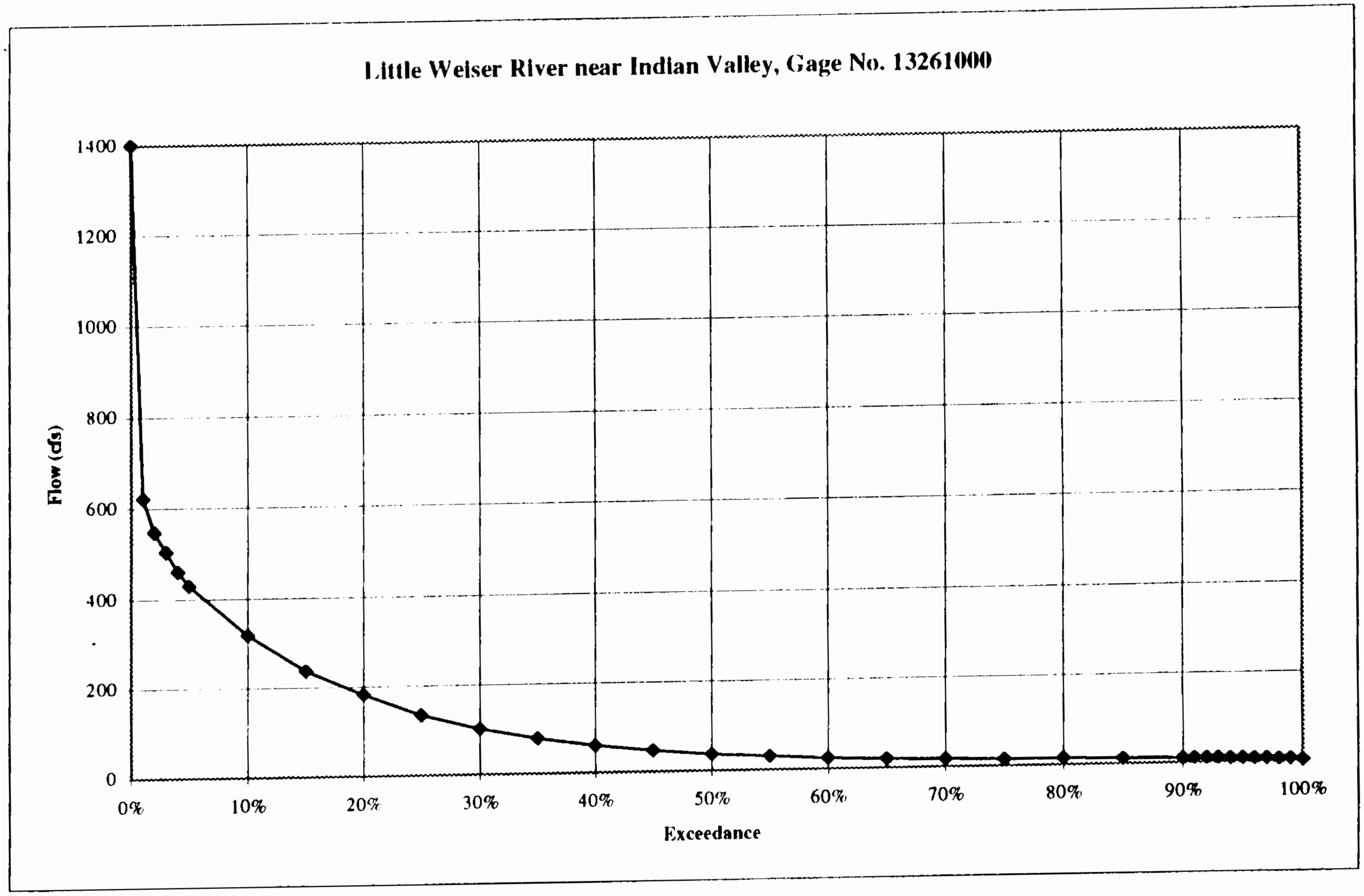
DAILY

%	Exceedance
0%	2400
1%	1070
2%	810
3%	673
4%	638
5%	599
10%	465
15%	368
20%	310
25%	274
30%	231
35%	198
40%	165
45%	129
50%	91
55%	53
60%	34
65%	22
70%	16
75%	9
80%	4
85%	2
90%	1
91%	0
92%	0
93%	0
94%	0
95%	0
96%	0
97%	0
98%	0
99%	0
100%	0



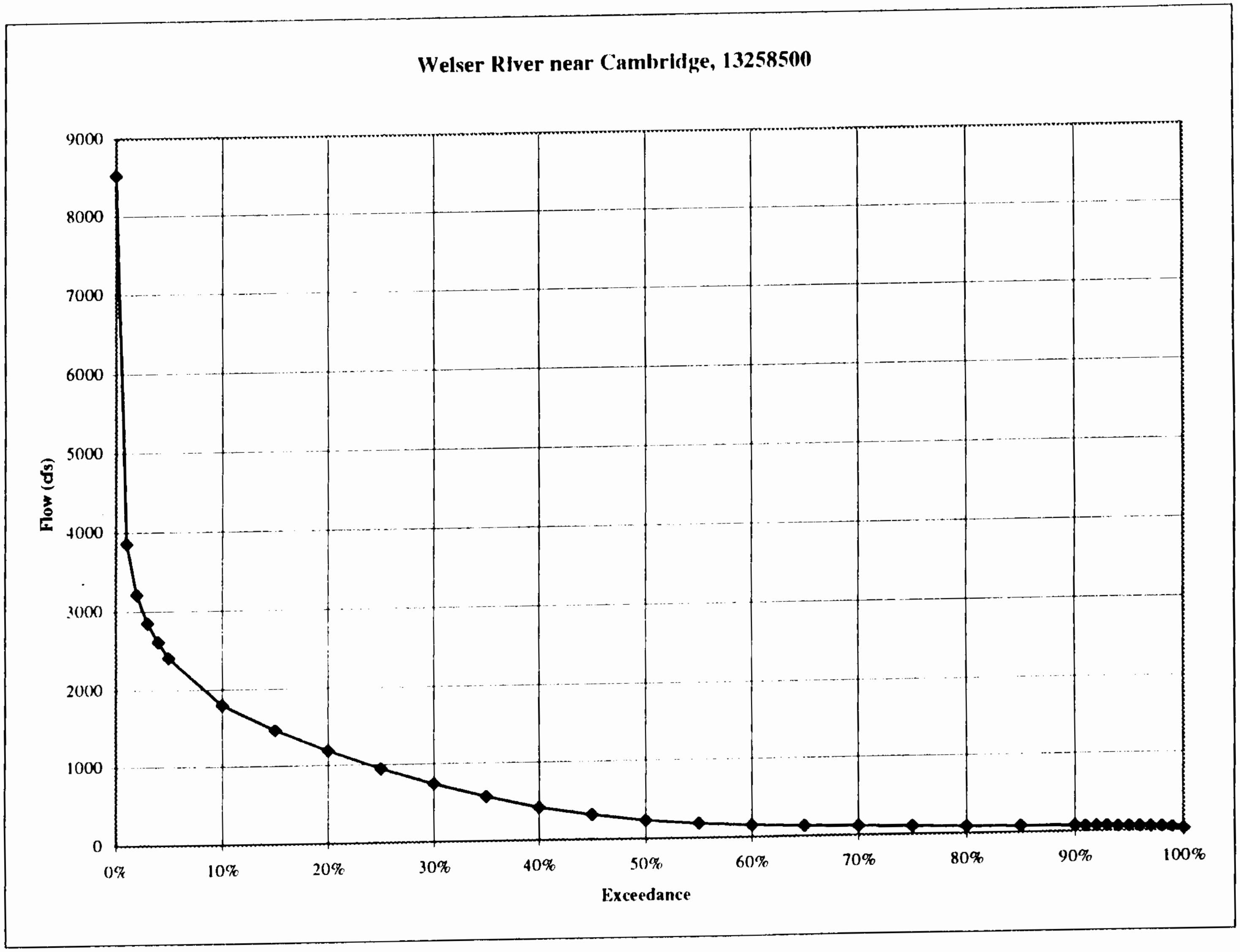
DAILY

%	Exceedance
0%	1400
1%	620
2%	548
3%	504
4%	461
5%	430
10%	318
15%	237
20%	181
25%	135
30%	102
35%	78
40%	60
45%	47
50%	37
55%	30
60%	24
65%	20
70%	17
75%	15
80%	14
85%	12
90%	11
91%	10
92%	10
93%	10
94%	9
95%	9
96%	8
97%	8
98%	7
99%	6
100%	4



DAILY

%	Exceedance
0%	8520
1%	3860
2%	3212
3%	2849
4%	2610
5%	2410
10%	1790
15%	1460
20%	1180
25%	947
30%	742
35%	566
40%	415
45%	316
50%	235
55%	183
60%	151
65%	131
70%	116
75%	103
80%	92
85%	83
90%	73
91%	71
92%	68
93%	66
94%	64
95%	62
96%	59
97%	56
98%	52
99%	47
100%	27



Appendix E

Annual Maxima Exceedance Probability Calculations

Station Name	LITTLE WEISER RIVER NR INDIAN VALLEY ID					
Station ID	13261000					
Param	Streamflow (cfs)					
Statistic	Max		Gage Drain Area =		81.9	mi^2
State	IDAHO		Total Drain Area =		180	mi^2
County	ADAMS					
Latitude	44:29:22			Fraction=	2.2	
Longitude	116:23:22					
Elevation	3250					
Start Year	1920					
End Year	1971					
Num Years	41					

WEIBULL CALCULATION

YEAR	FLOW	RANK	PROB	RETURN		YEAR	FLOW	RANK	PROB	RETURN
1920	1400	1	0.024	42.0		1946	602	22	0.524	1.9
1957	1120	2	0.048	21.0		1968	600	23	0.548	1.8
1965	961	3	0.071	14.0		1967	594	24	0.571	1.8
1925	950	4	0.095	10.5		1954	592	25	0.595	1.7
1952	942	5	0.119	8.4		1942	570	26	0.619	1.6
1943	925	6	0.143	7.0		1923	550	27	0.643	1.6
1955	920	7	0.167	6.0		1963	550	28	0.667	1.5
1964	916	8	0.190	5.3		1960	536	29	0.690	1.4
1927	905	9	0.214	4.7		1941	482	30	0.714	1.4
1938	900	10	0.238	4.2		1961	476	31	0.738	1.4
1948	810	11	0.262	3.8		1951	474	32	0.762	1.3
1958	786	12	0.286	3.5		1944	445	33	0.786	1.3
1953	766	13	0.310	3.2		1962	430	34	0.810	1.2
1945	752	14	0.333	3.0		1926	422	35	0.833	1.2
1956	740	15	0.357	2.8		1921	418	36	0.857	1.2
1970	731	16	0.381	2.6		1939	389	37	0.881	1.1
1971	703	17	0.405	2.5		1950	372	38	0.905	1.1
1947	683	18	0.429	2.3		1959	366	39	0.929	1.1
1969	680	19	0.452	2.2		1966	317	40	0.952	1.1
1940	626	20	0.476	2.1		1924	225	41	0.976	1.0
1949	610	21	0.500	2.0						

Station Nai	WEISER RIVER NR CAMBRIDGE ID									
Station ID	13258500									
Param	Streamflow (cfs)									
Statistic	Max									
State	IDAHO									
County	WASHINGTON									
Latitude	44:34:47									
Longitude	116:38:47									
Elevation	2647									
Start Year	1939									
End Year	1994									
Num Years	56									
	WEIBULL CALCULATION									
YEAR	FLOW	RANK	PROB	RETURN		YEAR	FLOW	RANK	PROB	RETURN
1955	8520	1	0.018	57.0		1978	3980	29	0.509	2.0
1974	7480	2	0.035	28.5		1976	3900	30	0.526	1.9
1982	7200	3	0.053	19.0		1984	3900	31	0.544	1.8
1964	6780	4	0.070	14.3		1960	3860	32	0.561	1.8
1972	6470	5	0.088	11.4		1981	3810	33	0.579	1.7
1940	6440	6	0.105	9.5		1942	3790	34	0.596	1.7
1970	6310	7	0.123	8.1		1953	3790	35	0.614	1.6
1993	6220	8	0.140	7.1		1945	3600	36	0.632	1.6
1965	6210	9	0.158	6.3		1954	3580	37	0.649	1.5
1986	6090	10	0.175	5.7		1950	3520	38	0.667	1.5
1958	6060	11	0.193	5.2		1973	3520	39	0.684	1.5
1983	6040	12	0.211	4.8		1956	3320	40	0.702	1.4
1971	5880	13	0.228	4.4		1992	3300	41	0.719	1.4
1977	5880	14	0.246	4.1		1949	3280	42	0.737	1.4
1952	5520	15	0.263	3.8		1985	3100	43	0.754	1.3
1957	5350	16	0.281	3.6		1987	3010	44	0.772	1.3
1963	5300	17	0.298	3.4		1962	2660	45	0.789	1.3
1967	4970	18	0.316	3.2		1947	2600	46	0.807	1.2
1943	4960	19	0.333	3.0		1961	2480	47	0.825	1.2
1975	4880	20	0.351	2.9		1966	2440	48	0.842	1.2
1951	4830	21	0.368	2.7		1979	2240	49	0.860	1.2
1980	4630	22	0.386	2.6		1959	2050	50	0.877	1.1
1941	4570	23	0.404	2.5		1990	1940	51	0.895	1.1
1969	4290	24	0.421	2.4		1939	1920	52	0.912	1.1
1968	4260	25	0.439	2.3		1944	1560	53	0.930	1.1
1989	4220	26	0.456	2.2		1991	1470	54	0.947	1.1
1948	4060	27	0.474	2.1		1994	1370	55	0.965	1.0
1946	4050	28	0.491	2.0		1988	1100	56	0.982	1.0

Appendix F

Section 14—Natural Materials Revetment

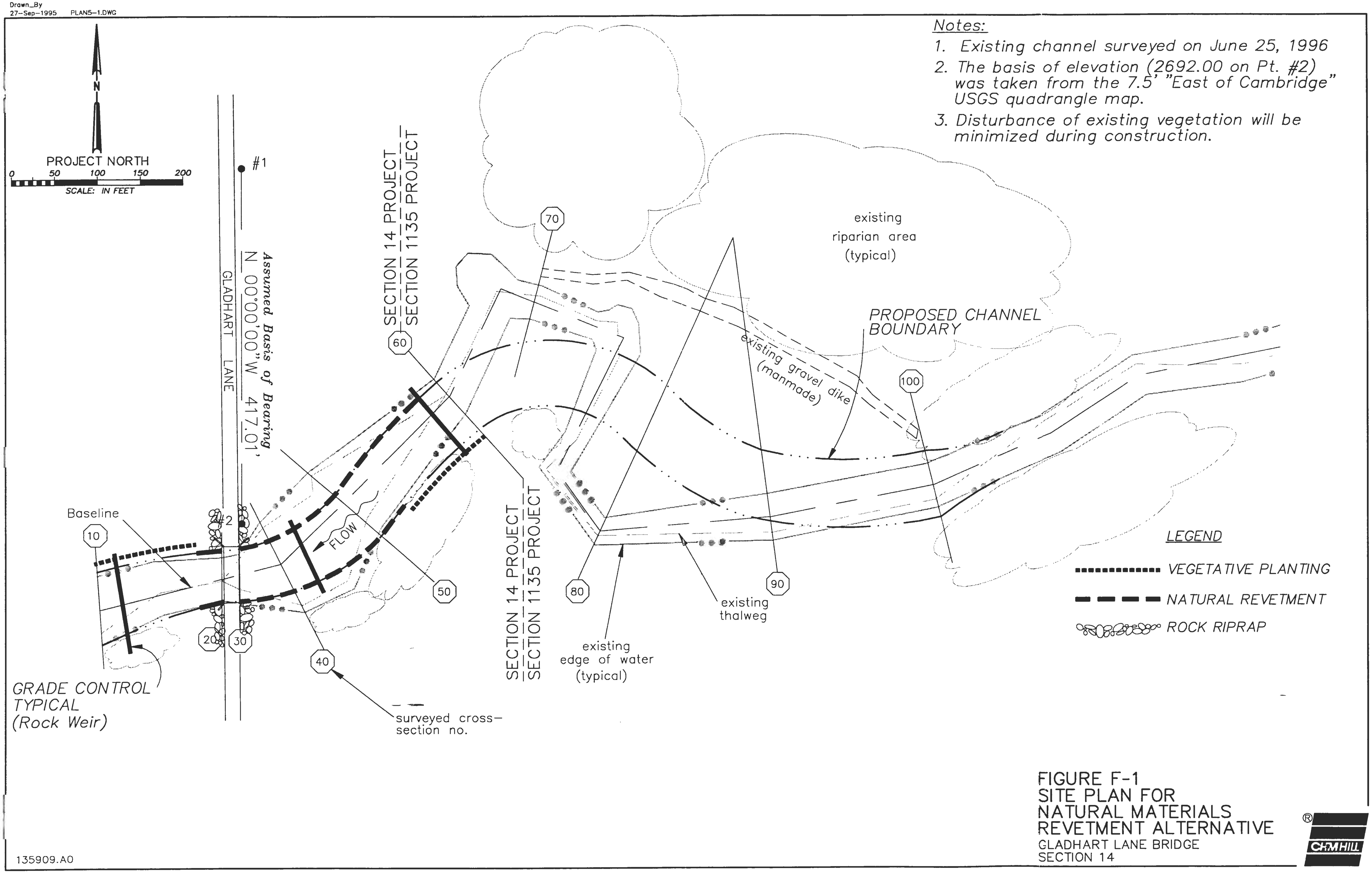


FIGURE F-1
SITE PLAN FOR
NATURAL MATERIALS
REVETMENT ALTERNATIVE
GLADHART LANE BRIDGE
SECTION 14

GLADHART LANE BRIDGE SECTION 14 PROJECT - FEASIBILITY DESIGN

NATURAL REVETMENT ALTERNATIVE - QUANTITIES AND COSTS

Natural Revetment:

Channel Bank	Revetment Length (ft)	Number of Units[a] per 100 linear feet			Total Number of Units		
		Boulders	Logs	Veg. units	Boulders	Logs	Veg. units
North	342	80	80	95	274	274	325
South	266	80	80	95	213	213	253
Total	608				487	487	578

[a] Unit Descriptions

Boulders (1' to 2' dia avg 1.5' dia.)

Logs (1' to 2' dia. x 8' to 16' long, avg 1.5' x 12')

Veg. (1'x1' to 2'x2'+ rootball w/ 4' to 6' stem/crown height)

	Unit	No. of Units	($/Unit)		($)
	Boulders	487	15	$	7,305
	Logs	487	330	$	160,710
	Veg. Units	578	50	$	28,900
Subtotal =				**$**	**196,915**

Rock Riprap:

(see Appendix J for quantity details)

	(yd^3)	($/$yd^3$)		($)
Bridge roadway approaches =	149	100	$	14,900
"Keys" betw. bridge abutments and natural revetments =	110	100	$	11,000
Subtotal =			**$**	**25,900**

Gravel Filter:

(see Appendix J for quantity details)

	(yd^3)	($/$yd^3$)		($)
Subtotal =	50	15	**$**	**750**

Geotextile fabric:

(see Appendix J for quantity details)

	(yd^2)	($/$yd^2$)		($)
Subtotal =	179	1.50	**$**	**269**

Grade Control - Vortex Rock Weirs:

(see Appendix J for quantity details)

	(yd^3)	($/$yd^3$)		($)
Subtotal =	203	120	**$**	**24,360**

Cut and Fill:

(see Appendix J for quantity details)

	(yd^3)	($/$yd^3$)		($)
Cut for channel reconfiguration =	1505	10	$	15,050
Cut for vortex rock weir placement =	360	10	$	3,600
Cut for riprap "keys" placement =	110	10	$	1,100
	1,975			
Fill required for channel reconfiguration =	2,347			
Available backfill from onsite cut =	- 1,975			
Fill to be hauled-in from offsite =	372	15	$	5,580
Subtotal =			**$**	**25,330**

Vegetation:

	Linear ft to be Planted	No. of Plants per 100 ln. ft.	No. of Plant	($/plant)		($)
Subtotal =	242	95	230	50	**$**	**11,500**

Barbed Wire Fence:

(see Appendix J for quantity details)

	(linear feet)	(mile)	($/mile)		($)
Subtotal =	1,210	0.23	6,000	**$**	**1,380**

Seeding:

	Linear ft to be Seeded	Width of coverag (ft)	Area (acres)	($/acre)		($)
Subtotal =	242	20	0.11	350	**$**	**39**

TOTAL COST (excluding O&M Costs) = $ 286,443

Appendix G

Section 14—Riprap Revetment

Drawn_By
27-Sep-1995 PLAN4-1.DWG

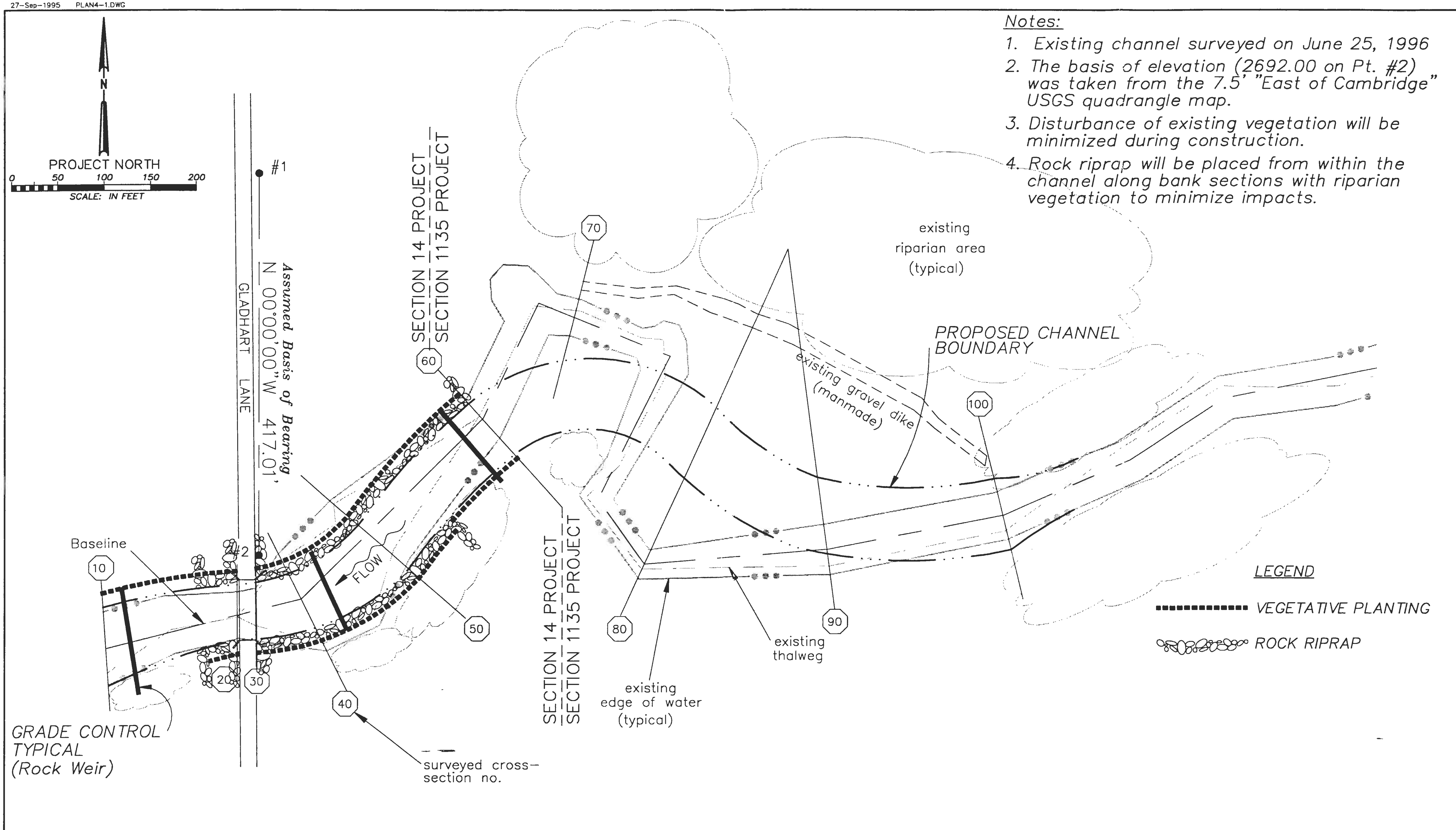


FIGURE G-1
SITE PLAN FOR
RIPRAP ALTERNATIVE
GLADHART LANE BRIDGE
SECTION 14

135909.A0

CH2M HILL

GLADHART LANE BRIDGE SECTION 14 PROJECT - FEASIBILITY DESIGN
RIPRAP ALTERNATIVE - QUANTITIES AND COSTS

Rock Riprap Channel-Bank Slope Protection:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
				(B+C+D)		$((E*F)^2+E^2)^{1/2}$						(K*H)	(L*H)		(M*O/27)	(N*O/27)		(P*R)	(Q*R)		
TR No.[a]	Vertical Channel Depth[b] (ft)	Vertical Toe Depth (ft)	Vertical Freeboard (ft)	Total Vertical Depth (ft)	Channel Side-Slope (H:V)	Riprap Bank Height at each Transect (ft)	Riprap Bank Height avg. betw. Transects (ft)	Proposed Channel Dist. betw. Transects North Bank (ft)	Proposed Channel Dist. betw. Transects South Bank (ft)	Riprapped Length North Bank (ft)	Riprapped Length South Bank (ft)	Riprapped Area[c] North Bank (ft^2)	Riprapped Area[c] South Bank (ft^2)	Riprap Layer Thickness (ft)	Riprap Volume North Bank (yd^3)	Riprap Volume South Bank (yd^3)	Riprap Unit Cost[d] ($\$/yd^3$)	Cost North Bank ($)	Cost South Bank ($)	Cumulative Costs by Transect North Bank ($)	Cumulative Costs by Transect South Bank ($)
10	3.3	3	1	7.3	3	23															
							29	147	150	30	30	1020	1020	3	113	113	100	$ 11.300	$ 11.300	$ 11,300	$ 11.300
20	6.6	3	1	10.6	3	34															
							33	22	22	0	0	0	0	3	0	0	100	$ -	$ -	$ 11,300	$ 11,300
30	5.9	3	1	9.9	3	31															
							31	32	64	32	64	992	1984	3	110	220	100	$ 11,000	$ 22,000	$ 22,300	$ 33,300
40	5.6	3	1	9.6	3	30															
							28	96	122	96	122	2688	3416	3	299	380	100	$ 29,900	$ 38,000	$ 52,200	$ 71,300
50	3.8	3	1	7.8	3	25															
							28	184	175	184	50	5152	1400	3	572	156	100	$ 57,200	$ 15,600	$ 109,400	$ 86,900
60	5.5	3	1	9.5	3	30															
Subtotal:										342	266	9,852	7,820		1,094	869		**$ 109,400**	**$ 86,900**		

[a] Surveyed transect number - refer to Figure G-1.
[b] Distance from proposed channel invert to bank-full stage (as defined in text).
[c] Riprapped area between TR 10 and TR 20 is calculated by multiplying the riprapped length by the total bank height at TR 20 since the riprap will be placed adjacent to the bridge.
[d] Costs include material transport and placement and miscellaneous related items.

Additional Rock Riprap Quantities and Costs:
(see Appendix J for quantity details)

	(yd^3)	($\$/yd^3$)		($)
Additional rock riprap for toe scour protection =	321	100	$	32,100
Upstream and downstream flanks =	220	100	$	22,000
Bridge roadway approaches =	149	100	$	14,900
Subtotal =	690	100	**$**	**69,000**

Gravel Filter:
(see Appendix J for quantity details)

	(yd^3)	($\$/yd^3$)		($)
Bridge roadway approaches =	50	15	$	750
Channel-bank slope protection =	655	15	$	9,825
Subtotal =			**$**	**10,575**

Geotextile fabric:
(see Appendix J for quantity details)

	(yd^2)	($\$/yd^2$)		($)
Subtotal =	3,508	1.50	**$**	**5,262**

Grade Control - Vortex Rock Weirs:
(see Appendix J for quantity details)

	(yd^3)	($\$/yd^3$)		($)
Subtotal =	203	120	**$**	**24,360**

Cut and Fill:
(see Appendix J for quantity details)

	(yd^3)	($\$/yd^3$)		($)
Cut for channel reconfiguration =	1505	10	$	15,050
Cut for vortex rock weir placement =	360	10	$	3,600
Cut for riprap flank placement =	220	10	$	2,200
	2,085			
Fill required for channel reconfiguration =	2,347			
Available backfill from onsite cut =	- 2,085			
Fill to be hauled-in from offsite =	262	15	$	3,930
Subtotal =			**$**	**24,780**

Vegetation:

	Linear ft. to be Planted	No. of Plants per 10 ln. ft.	No. of Plants	($/plant)		($)
Subtotal =	850	2	170	40	**$**	**6,800**

Barbed Wire Fence:
(see Appendix J for quantity details)

	(linear feet)	(mile)	($/mile)		($)
Subtotal =	1,210	0.23	6,000	**$**	**1,380**

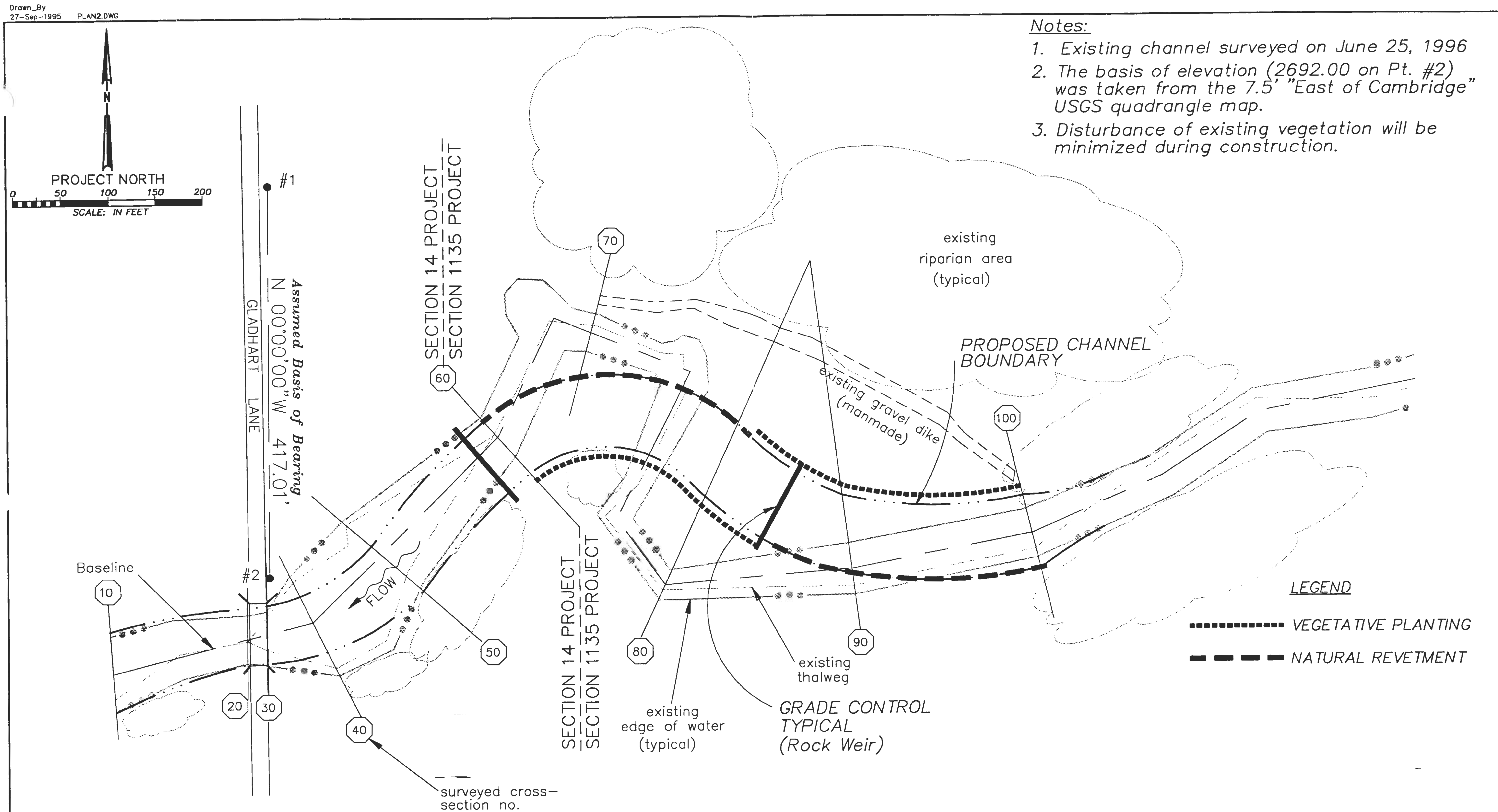
Seeding:

	Linear ft. to be Seeded	Width of coverage (ft)	Area (acres)	($/acre)		($)
Subtotal =	850	20	0.39	350	**$**	137

TOTAL COST (excluding O&M Costs) = $ 338,594

Appendix H

Section 1135—Natural Materials Revetment



Notes:

1. Existing channel surveyed on June 25, 1996
2. The basis of elevation (2692.00 on Pt. #2) was taken from the 7.5' "East of Cambridge" USGS quadrangle map.
3. Disturbance of existing vegetation will be minimized during construction.

FIGURE H-1
SITE PLAN FOR
NATURAL MATERIALS
REVETMENT ALTERNATIVE
LITTLE WEISER RIVER
SECTION 1135

CH2M HILL

135909.A0

Appendix I

Section 1135—Riprap Revetment

LITTLE WEISER RIVER SECTION 1135 PROJECT - FEASIBILITY DESIGN
NATURAL MATERIALS REVETMENT ALTERNATIVE - QUANTITIES AND COSTS

Natural Revetment:

Channel Bank	Revetment Length (ft)	Number of Units[a] per 100 linear feet			Total Number of Units		
		Boulders	Logs	Veg. units	Boulders	Logs	Veg. units
North	333	80	80	95	266	266	316
South	288	80	80	95	230	230	274
Total	621				496	496	590

[a] Unit Descriptions:
Boulders (1' to 2' dia.; avg. 1.5' dia.)
Logs (1' to 2' dia. x 8' to 16' long; avg. 1.5' x 12')
Veg. (1'x1' to 2'x2'+ rootball w/ 4' to 6' stem/crown height)

	Unit	No. of Units	($/Unit)	($)
	Boulders	496	15	$ 7,440
	Logs	496	330	$ 163,680
	Veg. Units	590	50	$ 29,500
Subtotal =				**$ 200,620**

Grade Control - Vortex Rock Weirs:

(see Appendix J for quantity details)

	(yd^3)	($\$/yd^3$)	($)
Subtotal =	124	120	**$ 14,880**

Cut and Fill:

(see Appendix J for quantity details)

	(yd^3)	($\$/yd^3$)	($)
Cut for channel reconfiguration =	5524	10	$ 55,240
Cut for vortex rock weir placement =	220	10	$ 2,200
	5,744		
Fill required for channel reconfiguration =	13,476		
Available backfill from onsite cut =	- 5,744		
Fill to be hauled-in from offsite =	7,732	15	$ 115,980
Subtotal =			**$ 173,420**

Vegetation:

	Linear ft. to be Planted	No. of Plants per 100 ln. ft.	No. of Plants	($/plant)	($)
Subtotal =	617	95	586	50	**$ 29,300**

Barbed Wire Fence:

(see Appendix J for quantity details)

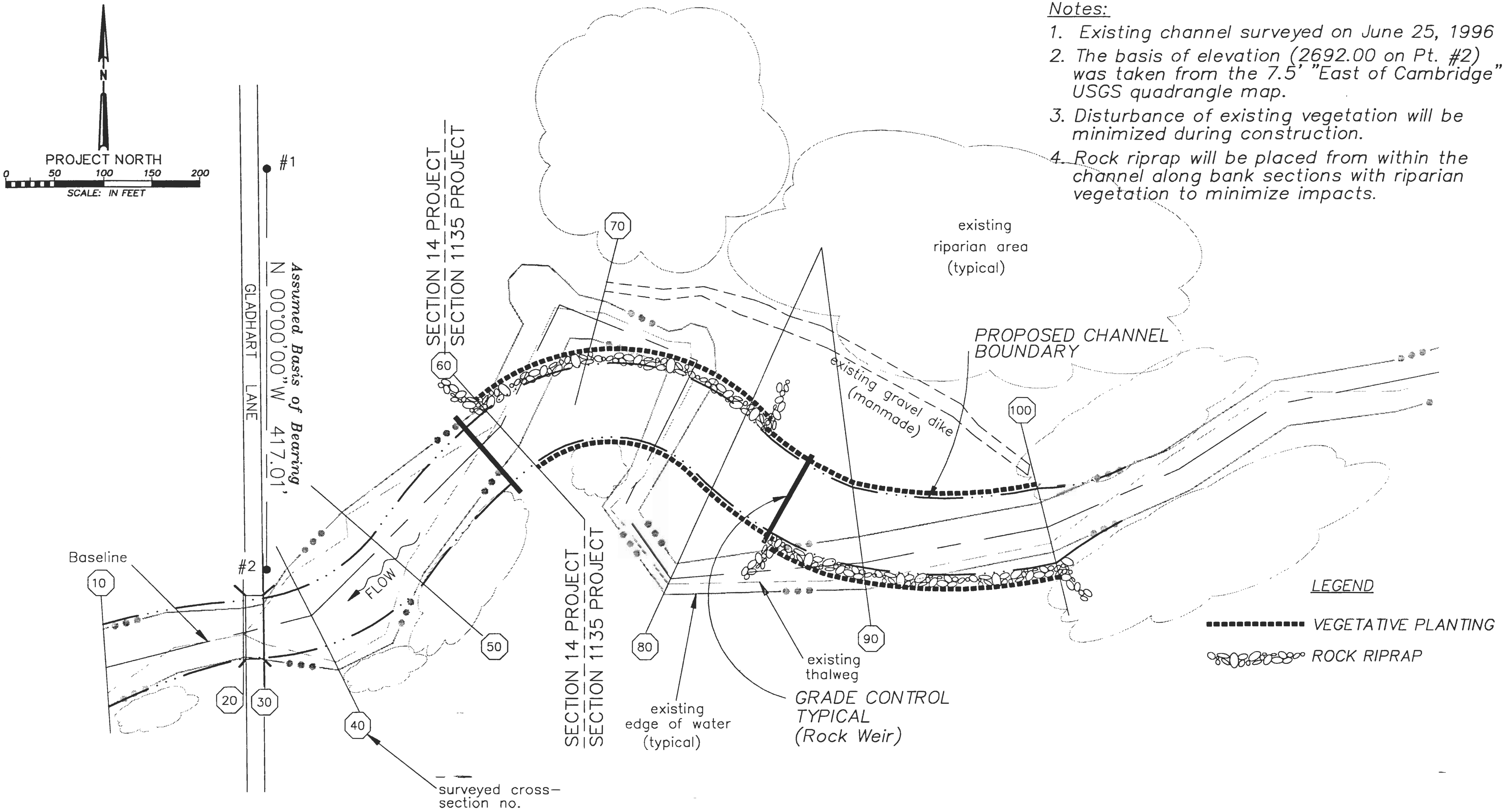
	(linear feet)	(mile)	($/mile)	($)
Subtotal =	1,318	0.25	6,000	**$ 1,500**

Seeding:

	Linear ft. to be Seeded	Width of coverage (ft)	Area (acres)	($/acre)	($)
Subtotal =	1,238	20	0.57	350	**$ 200**

TOTAL COST (excluding O&M Costs) = $ 419,920

Drawn_By
27-Sep-1995 PLAN3.DWG



Notes:

1. Existing channel surveyed on June 25, 1996
2. The basis of elevation (2692.00 on Pt. #2) was taken from the 7.5' "East of Cambridge" USGS quadrangle map.
3. Disturbance of existing vegetation will be minimized during construction.
4. Rock riprap will be placed from within the channel along bank sections with riparian vegetation to minimize impacts.

LEGEND

VEGETATIVE PLANTING

ROCK RIPRAP

FIGURE I-1
SITE PLAN FOR
RIPRAP ALTERNATIVE
LITTLE WEISER RIVER
SECTION 1135

CH2M HILL

135909.A0

LITTLE WEISER RIVER SECTION 1135 PROJECT - FEASIBILITY DESIGN
RIPRAP ALTERNATIVE - QUANTITIES AND COSTS

Rock Riprap Channel-Bank Slope Protection:

A	B	C	D	E (B+C+D)	F	G ((E*F)^2+E^2)$^{1/2}$	H	I	J	K	L	M (K*H)	N (L*H)	O	P (M*O/27)	Q (N*O/27)	R	S (P*R)	T (Q*R)	U	V
	Vertical Channel Depth[b]	Vertical Toe Depth	Vertical Freeboard	Total Vertical Depth	Channel Side-Slope	Riprap Bank Height at each Transect	Riprap Bank Height avg. betw. Transects	Proposed Channel Dist. betw. Transects		Riprapped Length		Riprapped Area		Riprap Layer Thickness	Riprap Volume		Riprap Unit Cost[c]	Cost		Cumulative Costs by Transect	
TR No.[a]	(ft)	(ft)	(ft)	(ft)	(H:V)	(ft)	(ft)	North Bank (ft)	South Bank (ft)	North Bank (ft)	South Bank (ft)	North Bank (ft^2)	South Bank (ft^2)	(ft)	North Bank (yd^3)	South Bank (yd^3)	($/yd^3)	North Bank ($)	South Bank ($)	North Bank ($)	South Bank ($)
60	5.5	3	1	9.5	3	30															
							29	123	43	123	0	3567	0	3	396	0	100	$ 39,600	$ -	$ 39,600	$ -
70	5.0	3	1	9	3	28															
							27	190	183	190	0	5130	0	3	570	0	100	$ 57,000	$ -	$ 96,600	$ -
80	4.2	3	1	8.2	3	26															
							28	130	174	20	88	560	2464	3	62	274	100	$ 6,200	$ 27,400	$ 102,800	$ 27,400
90	5.4	3	1	9.4	3	30															
							30	195	200	0	200	0	6000	3	0	667	100	$ -	$ 66,700	$ 102,800	$ 94,100
100	5.5	3	1	9.5	3	30															
Subtotal:										333	288	9,257	8,464		1,028	941		$ 102,800	$ 94,100		

[a] Surveyed transect number - refer to Figure I-1.
[b] Distance from proposed channel invert to bank-full stage (as defined in text).
[c] Costs include material transport and placement and miscellaneous related items.

Additional Rock Riprap Quantities and Costs:
(see Appendix J for quantity details)

	(yd^3)	($/yd^3)	($)
Additional rock riprap for toe scour protection =	328	100	$ 32,800
Upstream and downstream flanks =	110	100	$ 11,000
Subtotal =	438	100	$ 43,800

Gravel Filter:
(see Appendix J for quantity details)

	(yd^3)	($/yd^3)	($)
Subtotal =	656	15	$ 9,840

Geotextile fabric:
(see Appendix J for quantity details)

	(yd^2)	($/yd^2)	($)
Subtotal =	3,356	1.50	$ 5,034

Grade Control - Vortex Rock Weirs:
(see Appendix J for quantity details)

	(yd^3)	($/yd^3)	($)
Subtotal =	124	120	$ 14,880

Cut and Fill:
(see Appendix J for quantity details)

	(yd^3)	($/yd^3)	($)
Cut for channel reconfiguration =	5524	10	$ 55,240
Cut for vortex rock weir placement =	220	10	$ 2,200
Cut for riprap flank placement =	110	10	$ 1,100
	5,854		
Fill required for channel reconfiguration =	13,476		
Available backfill from onsite cut =	- 5,854		
Fill to be hauled-in from offsite =	7,622	15	$ 114,330
Subtotal =			$ 172,870

Vegetation:

	Linear ft. to be Planted	No. of Plants per 10 ln. ft.	No. of Plants	($/plant)	($)
Subtotal =	1,238	2	248	40	$ 9,920

Barbed Wire Fence:
(see Appendix J for quantity details)

	(linear feet)	(mile)	($/mile)	($)
Subtotal =	1,318	0.25	6,000	$ 1,500

Seeding:

	Linear ft. to be Seeded	Width of coverage (ft)	Area (acres)	($/acre)	($)
Subtotal =	1,238	20	0.57	350	$ 200

TOTAL COST (excluding O&M Costs) = **$ 454,944**

Appendix J

Background Information for Materials Quantity Estimates

Appendix J
Quantity Descriptions

Additional Rock Riprap for Toe Scour Protection:

Based on guidance from the FHWA (1989) document *Design of Riprap Revetment (HEC-11)*,
an additional rock volume equal to 50% of the toe volume is included for scour protection along the riprapped channel length as shown below:

0.50x(9.5 ftx 3 ft x linear feet of riprapped bank)/27

where: 9.5 ft = toe slope length (3:1 [H:V] slope, 3 ft. vertical toe depth)
3 ft = riprap layer thickness
Linear feet of riprapped bank as listed in columns K and L of the riprap quantity spreadsheets (Appendices G and I)

Upstream and Downstream Flanks:

Based on guidance from the FHWA (1989) document *Design of Riprap Revetment (HEC-11)*,
quantities for the upstream and downstream riprap flanks are based on Figure J-1, where T = 3 feet.

Quantity estimates for riprap "keys" between bridge abutments and natural revetments are also based on Figure J-1, where T = 3 feet. These provide for a riprapped section between the bridge abutments and the natural revetments.

Bridge Roadway Approaches:

Quantities of riprap along each of the bridge roadway approach slopes are based on the following dimensions:

- Areas to be riprapped are triangular shaped
- Bank slopes are 2:1
- Vertical height at the abutments is 6 feet, tapering to a height of 0 feet, along a distance of 50 linear feet

Gravel Filter:

One foot layer of gravel (3- to 6-inch dia.) placed over the geotextile fabric.

Geotextile Fabric:

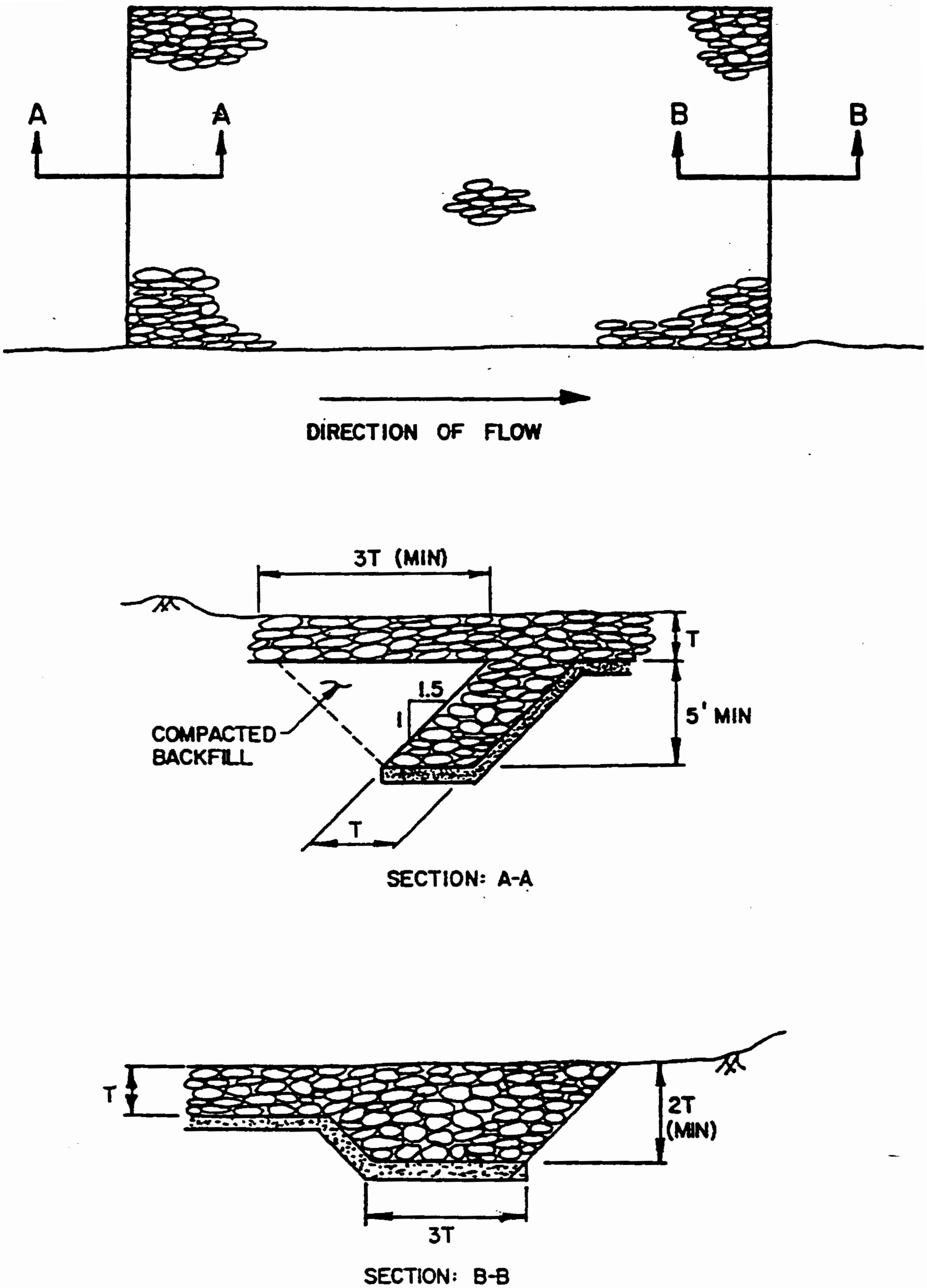
The total area of geotextile fabric needed is computed as follows:

Sum items (1), (2), and (3), then multiply by 1.2 to provide additional material for end- and top-folds and stretching:

(1) "Riprapped Area" associated with the channel-bank slope protection
(columns M and N from the riprap quantity spreadsheets [Appendices G and I])
(2) Total bridge roadway approach area (described above)
(3) Multiply: (12 feet)x(linear feet of riprapped bank) to provide placement along the toe as shown in Figure J-2 (linear feet of riprapped bank is shown in columns K and L of the riprap quantity spreadsheets [Appendices G and I])

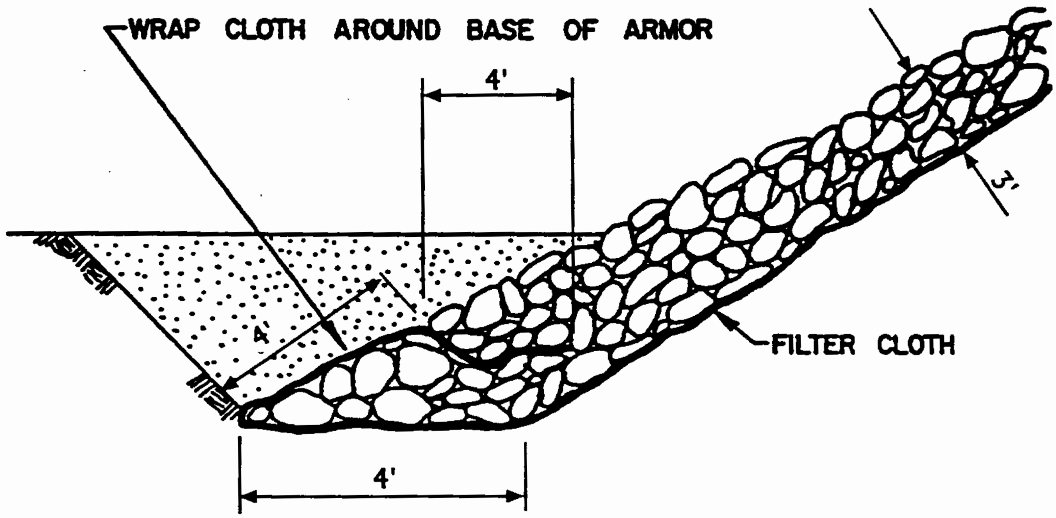
Barbed Wire Fence:

The total linear feet of barbed wire fence is the sum of the linear distances along each bank plus the sum of the 30 foot lengths required to "close" the fence around the project to each stream bank. The Section 14 Project requires eight 30 foot lengths to provide closure both upstream and downstream of Gladhart Lane Bridge; and, the Section 1135 Project requires four 30 foot lengths.



SOURCE: FHWA (1989) Design of Riprap Revetment (HEC-11).

Figure J-1
TYPICAL RIPRAP INSTALLATION: PLAN AND FLANK DETAILS



SOURCE: FHWA (1989) Design of Riprap Revetment (HEC-11).

Figure J-2
FILTER FABRIC PLACEMENT

Appendix C
Real Estate Report

Real Estate Report

Little Weiser River Section 1135 Project Near Cambridge, Idaho

1. General

This report provides a real estate perspective on the project modification initiative proposed within this study. A location has been selected where environmental restoration efforts are proposed to help stabilize features of the Little Weiser River to obtain a more natural dynamic equilibrium.. At this location, channel and streambank stabilization features will be introduced to assist in replacing lost fisheries, wildlife, and other environmental values associated with the river prior to activities of snagging and clearing, channelization, and removal of riparian vegetation throughout a significant portion of at least 15 miles of the lower portion of the river . The sponsor (the Weiser River Flood Control District No. 3) supports channel stabilization through environmental restoration and enhancement along the Little Weiser River. Figures that show the project area and alternatives are attached at the end of this report.

A second, separate project is being proposed under the authorization of Section 14 of the Flood Control Act, as amended, immediately adjoining this project on the west.

2. Area, City, and Neighborhood

The project area lies within the Weiser River Valley, which is located in west-central Idaho, near the Idaho-Oregon border. The proposed project is located approximately 4-1/2 miles southeast of the town of Cambridge, Idaho (1990 population 374). Cambridge is an agricultural community and a take-off point for recreational activities in Hell's Canyon on the Snake River, lying several miles to the west.

The immediate project area is located on the Little Weiser River, a tributary to the Weiser River. The area is agricultural and has scattered farms. Agricultural cropland lies near, but not adjacent to, the project area. Crops in these fields include wheat, corn, alfalfa, and grass hay. Access to the proposed project site is from U.S. Highway 95, about a half mile north of the project area, to Gladhart Lane, a local paved road. Gladhart Lane Bridge crosses the Little Weiser River.

3. Property/Project Data

Two ownerships are involved in this project, both of which are used as operating farms. Both owners live in or near the area of these parcels. Crops grown include wheat, corn, alfalfa and grass hay. All parcels in this appraisal are small portions of larger ownerships, and none of the impacted property appears to be used as cropland. These parcels are located 4-1/2 miles southeast of Cambridge, Idaho, in Sections 9 and 16, Township 14 North, Range 2 West, Boise Meridian, in Washington County, Idaho. All of the property within this project is within the Little Weiser River floodplain, and the proposed standard channel improvement easement areas are all within the existing riverbed.

within this project is within the Little Weiser River floodplain, and the proposed permanent easement areas are all within the existing riverbed.

Soils in the area are generally riverwash in old channel areas adjoining the river, and Shoepeg loam and Shoepeg silty clay loam on terraces adjoining the channel area. While riverwash soils support no vegetation, the loam and silty clay loam soils are used for irrigated cropland, although wetness is a major constraint. Little vegetation exists in the immediate project area because of the presence of riverwash soils. Beyond the project area vegetation is generally agricultural crops. Zoning in the area is Agriculture.

The proposed project would realign the Little Weiser River channel within the existing riverbed, planting trees and shrubs to stabilize the river channel in the new location. Such plantings would be developed over approximately 621 feet of shoreline within the total 954-foot-long project reach. The new alignment would be configured to establish channel grade control, re-establish riparian vegetation, and reconfigure the existing channel geometry and meander pattern. The resulting widths and depths of the channel would assist in the management of sediment transport and provide additional stability to the channel. An alternative to the natural plantings being considered to stabilize the channel is the use of riprap.

4. Real Estate Requirements

The estate to be appraised for this project is a temporary easement for construction purposes, estimated to have a maximum duration of three months. In addition, a permanent easement for access and maintenance purposes will be required. The permanent easement is the area 45 feet landward from the top of the reconstructed bank. The temporary easement extends 200 feet from centerline of the new channel. No property will need to be purchased for this project.

5. Real Estate Costs

The value of irrigated cropland in the particular area where the subject parcels are located is estimated to be $1,000 per acre. This conclusion was reached after researching sales activity for similar properties in the neighborhood, talking with the subject property owners, local real estate agents, and other appraisers in the area. Generally sales of irrigated land were found to range from about $1,000 per acre to $1,800 per acre depending on size, soils, water and location. For non-irrigated farmland or good grazing land, the values found were considerably less, in the range of $250 to $600 per acre. Since none of the land appraised is used as cropland, but adjoins irrigated cropland and/or pasture and in a limited way is used in conjunction with the cropland, a value of $500 per acre was concluded. It is common practice to exclude so-called "waste" land from consideration when buying or selling farmland, focusing only on the usable portions. The land where easements are to be acquired might be considered as waste, since it is mostly un-tillable, being in the riverbed. However, portions could be used seasonally for storing hay, parking equipment, and/or accessing the river for irrigation or grazing livestock. For this reason, the subject land has not been considered as "waste", but as non-irrigatable land.

Based on a value of $500 per acre, the rental value for land within the temporary easement area has been estimated based on a return of 10 percent annually. This is a common return demanded (and received) for non-agricultural land as a fair return on investment.

Agricultural land is leased on a per acre basis (Animal Unit Month for grazing land), or on a sharecropping basis where the landowner receives a share of the harvested crop. Since this is not crop producing land, and it cannot be imagined that it would be leased separately for any purpose, a fair investment return on the fee value has been used as a basis of value for the temporary easements, anticipating a construction period of three months.

The easement value estimated for land to be encumbered by a permanent easement is 50 percent of the unencumbered value. This recognizes the owner's continued right to use the encumbered area for access or other purposes, as long as access is kept open to maintain the river channel.

Given the foregoing information provided in this Real Estate Report, the following is an estimated breakdown of project real estate costs:

TABLE 1
Lands and Damages

Item	Quantity	Unit	Project Cost
Land			
Easement: Permanent and Construction	5.53 acres	Lump Sum	$1,000[a]
		Contingency (20%)[b]	200
			$1,200
Administration—Sponsor			
Includes mapping/survey, title evidence, appraisal, negotiation and closing, miscellaneous coordination			$4500
		Contingency (20%)[b]	900
			$5,400
Administration—Government			
Federal review and assistance			$1,500
		Contingency (20%)[b]	300
			$1,800
Total Project Real Estate Costs[c]			**$8,400**

[a]NOTE: This amount is half the project cost for land for both this project a proposed Section 1135-funded project that adjoins this project upstream.. As such, it is less than if each project were purchased separately.

[b]NOTE: A 20 percent contingency has been added to each category comprising this total. This allows for negotiation latitude and the passage of time between this report and actual real estate acquisition.

[c]NOTE: Since two separate projects are proposed in an area adjoining each other, if both receive approval it is expected that the estimated administrative costs can be reduced through coordination of these efforts for the two projects.

Real Estate Milestones After Feasibility

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Execution of PCA		4/30/97 (forecast)		4/30/97 (forecast)
Formal transmittal of final ROW drawings to LS and instruction to acquire LERRD		PCA+5 days		
Prepare mapping and legal descriptions			PCA+10 days	PCA+2 months
Obtain title evidence			PCA+10 days	PCA+2 months
Obtain tract appraisals			PCA+2 months	PCA+3 months
Review tract appraisals	PCA+3 months	PCA+3-1/2 months		
Conduct negotiations			PCA+3 1/2 months	PCA+4 months
Obtain possession				PCA+4 months

OWNERSHIP SUMMARY

	PROJECT Section 14 Size (acres)	PROJECT Section 1135 Size (acres)	Total Size (acres)
PARCEL 1			
WX Ranch			
Permanent Easement	0.61	0.00	0.61
Temporary Easement	0.79	0.00	0.79
	1.40	0.00	1.40
PARCEL 2			
Schwenkfelder			
Permanent Easement	1.26	2.11	3.37
Temporary Easement	1.69	2.32	4.01
	2.95	4.43	7.38
PARCEL 3			
Wilkerson			
Permanent Easement	0.00	0.06	0.06
Temporary Easement	0.14	1.04	1.18
	0.14	1.10	1.24

VALUATION SUMMARY

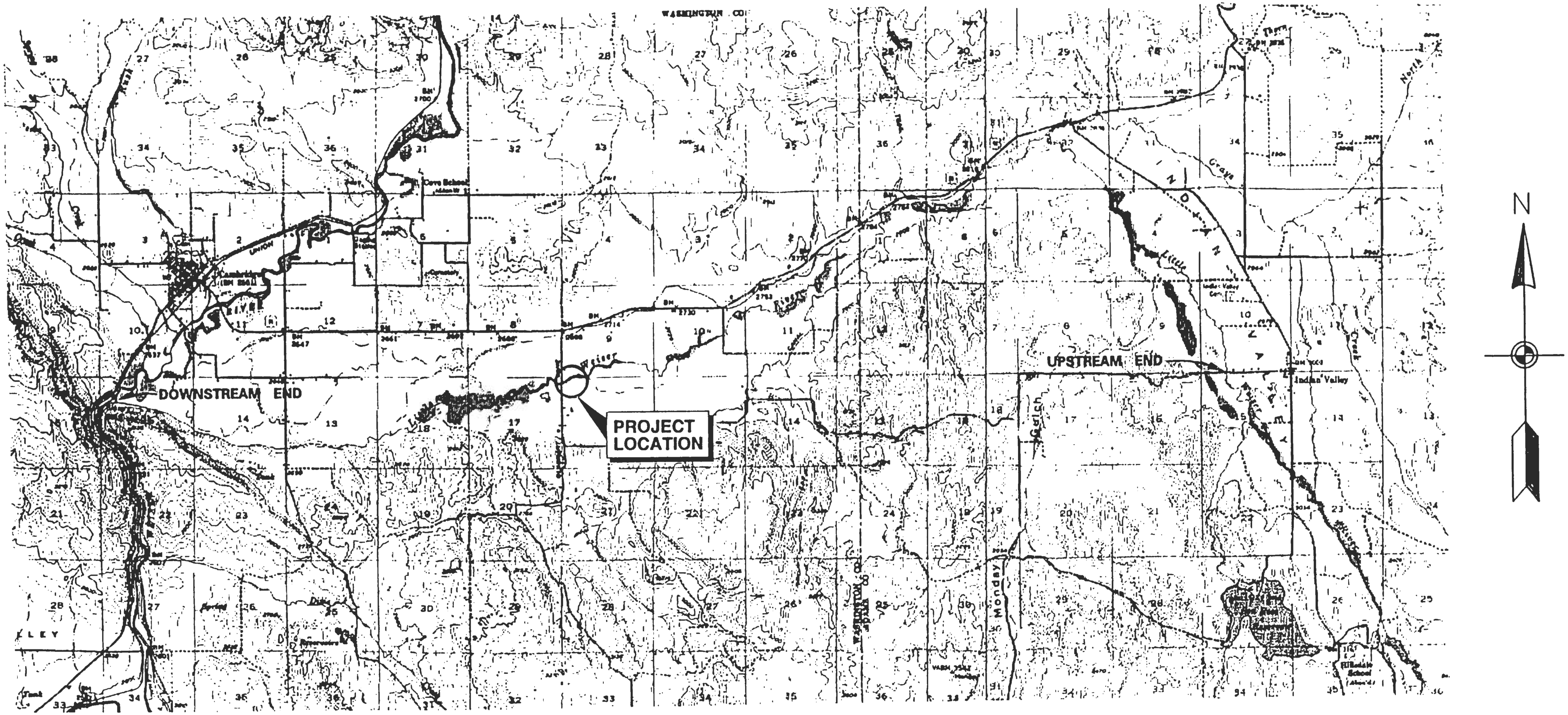
ASSUMPTIONS:

Land Value:	Irrigated Cropland:	$1,000	/acre
	Non- Cropland:	$500	/acre
Construction Period:	3 months		
Annual Lease Rate:	10%	of value	
Permanent Easement:	50%	of unencumbered value	
Minimum Compensation:	$500.00	(used by State of Idaho, Dept. of Transportation)	

	PROJECT Section 14 Size (acres)	PROJECT Section 1135 Size (acres)	Total Size (acres)
PARCEL 1			
WX Ranch			
Permanent Easement	$152.50	$0.00	$152.50
Temporary Easement	9.88	0.00	9.88
	$162.38	$0.00	$162.38
Suggested Compensation:			**$500.00**
PARCEL 2			
Schwenkfelder			
Permanent Easement	$315.00	$527.50	$842.50
Temporary Easement	21.13	29.00	50.13
	$336.13	$556.50	$892.63
Suggested Compensation:			**$1,000.00**
PARCEL 3			
Wilkerson			
Permanent Easement	$0.00	$15.00	$15.00
Temporary Easement	1.75	13.00	14.75
	$1.75	$28.00	$29.75
Suggested Compensation:			**$500.00**

Columbia Valuation Group, Inc.

CORPS OF ENGINEERS SAFETY PAYS U. S. ARMY



SCALE: 1"=6000'

6000' 0 6000'

U. S. ARMY ENGINEER DISTRICT
WALLA WALLA, WASHINGTON

MacDONALD DESIGNED BY	Figure 2
GUILLE DESIGNED BY	LITTLE WEISER RIVER
CHECKED BY	VICINITY MAP
SUBMITTED	APPROVED / DATE
	SCALE AS SHOWN / INV. NO.

VALUE ENGINEERING PAYS

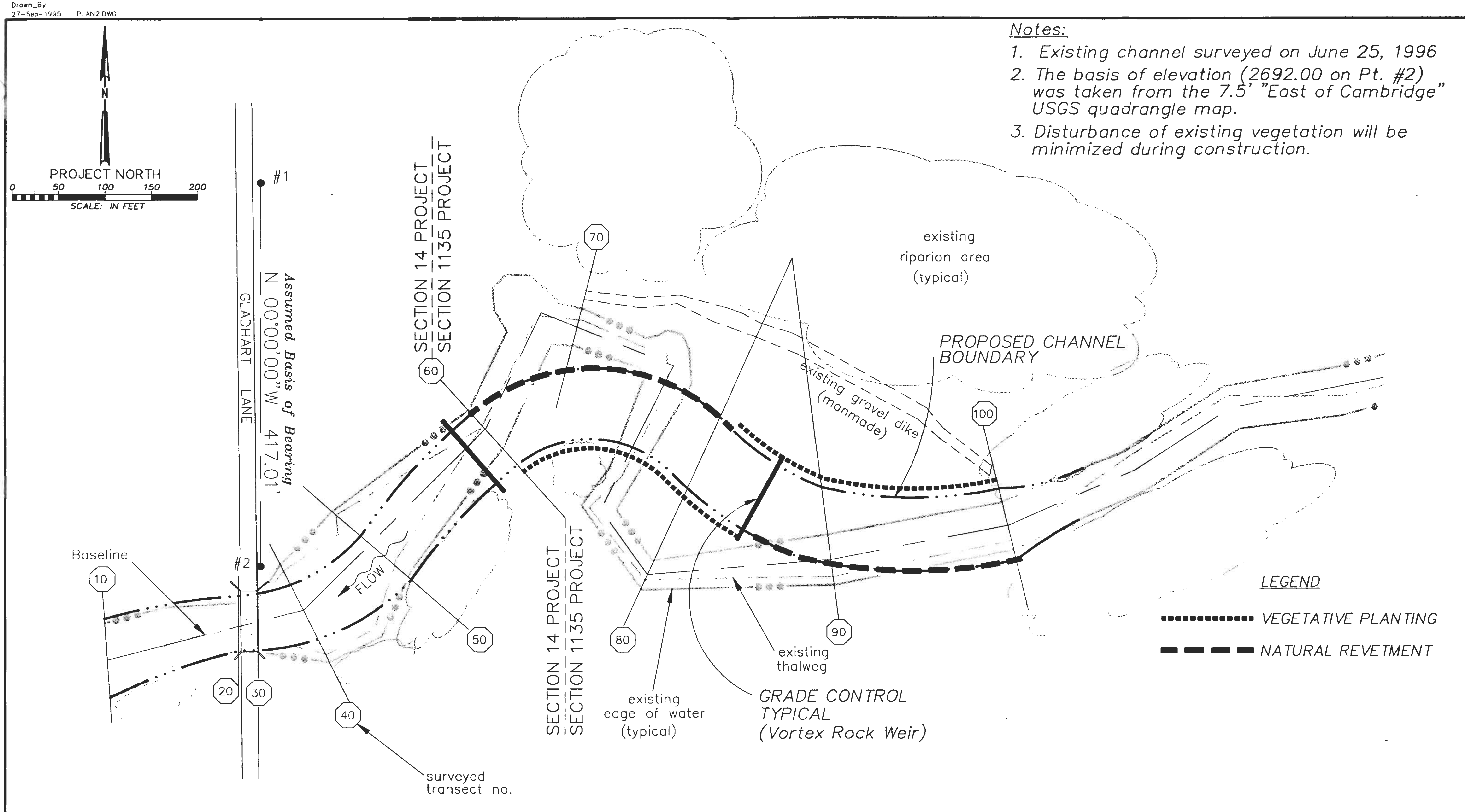


Figure 3

SITE PLAN FOR
PREFERRED ALTERNATIVE
LITTLE WEISER RIVER
SECTION 1135
FEASIBILITY DESIGN

135909.A0

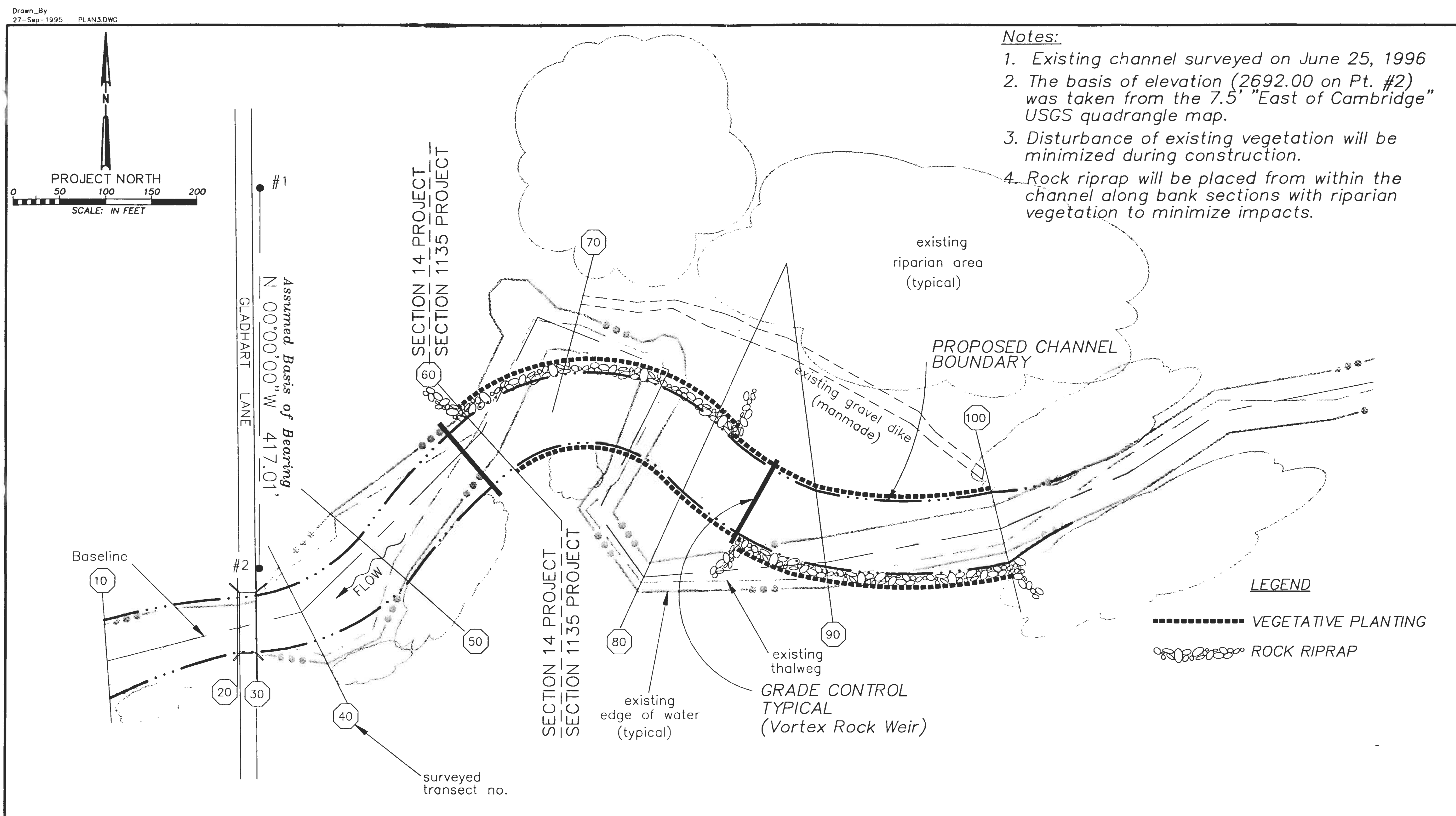


Figure 4

SITE PLAN FOR
RIPRAP ALTERNATIVE
LITTLE WEISER RIVER
SECTION 1135
FEASIBILITY DESIGN

CH2M HILL

Appendix D

Local Sponsor Correspondence

LTC Curtis, District Engineer.
Dept of the Army
Walla Walla District
201 North 3rd
Walla Walla, WA 99362-1876

Dear LTC Curtis

The Weiser Flood Control District is appreciative of your effort to assist local property owners with the proposed Section 1135 Little Weiser stream restoration project. We have requested, and were granted, time to evaluate our ability to cost share and provide inkind services. Unfortunately we are not able to provide the required 25% of the estimated $ 504,000 construction cost.

Cambridge and it's rural agricultural community along the Weiser and Little Weiser River consists of small farms with very limited economic base. As you are aware, most of the people on the Little Weiser River are dependent on cattle for their major income, and everybody knows the shape the cattle industry is in now. We desire Corps assistance but are unable to pay such costly solution as proposed in the existing study prepared by CH2MHILL. At this point, we have no choice but to request that you terminate the Little Weiser Section 1135 study.

In the future a local highway improvement project may provide for an inexpensive source of rock which could be used for stream restoration. At that time we would hope that you could initiate a restoration study that would use a more inexpensive approach. Local property owners are interested in cost sharing less expensive approaches even if they have a higher risk of failure and require greater maintenance.

Sincerely

Jim Bumgarner
Flood Control District #3

CF Bill MacDonald

sm