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# Bodie Hills RV Park

Revised Specific Plan &  
Final Environmental Impact Report

Technical Appendices

## Volume II

January 2000

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# Bodie Hills RV Park

Revised Specific Plan &  
Final Environmental Impact Report  
Technical Appendices

## Volume II

January 2000



**Bodie Hills RV Park  
Revised Specific Plan &  
Final Environmental Impact Report (FEIR)**

**Volume II:  
Technical Appendices**

**January 2000**

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**Bodie Hills RV Park  
Revised Specific Plan and Final EIR**

**SCH# 97012031**

**January 2000**

**PREPARED BY:**

**Mono County Community Development Department  
P.O. Box 347  
Mammoth Lakes, CA 93546**



## NOTE

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The Bodie Hills RV Park Revised Specific Plan and Final Environmental Impact Report (FEIR) is in three volumes:

Volume I	Revised Specific Plan & Final Environmental Impact Report (FEIR)
Volume II	Technical Appendices
Volume III	Comments & Responses, Revised Specific Plan/EIR



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**Appendix A  
and  
Appendix B**

**BODIE HILLS RV PARK**



## **APPENDIX A**

**1. Notice of Preparation**

**2. Comment Letters to  
Notice of Preparation**





# Notice of Preparation

To: \_\_\_\_\_  
(Agency)  
\_\_\_\_\_  
\_\_\_\_\_

SUBJECT: Notice of Preparation for a Draft Environmental Impact Report

Lead Agency: Mono County Planning Department

Consulting Firm:

Agency Name Planning Department

Firm Name None

Street Address P.O. Box 347

Street Address \_\_\_\_\_

City/State/Zip Mammoth Lakes, CA 93546

City/State/Zip \_\_\_\_\_

Contact Stephen Higa

The Mono County Planning Department will be the Lead Agency and will prepare a combined Specific Plan and Focused Environmental Impact Report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice.

Please send your response to Stephen Higa, Senior Planner at the address shown above. We will need the name for a contact person in your agency.

Project Title: Bodie Hills Specific Plan

Project Location: Bridgeport (5 miles south of the Bridgeport Townsite) Mono  
City (nearest) County

Project Description: (brief)

The Bodie Hills Specific Plan Project calls for the construction of a RV Park, Motel and Campground located on a portion of a 155 acre parcel at the southeast intersection of U.S. 395 and S.R. 270. With the exceptions of a leach field area and utility lines, project development will occur on the flat areas bordering S.R. 270 and Clearwater Creek. Development is proposed on 13 acres of the 155 acre lot.

Date 1/2/97

Signature   
Title Stephen Higa  
Senior Planner

Telephone (619) 924-5450

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## **PROJECT IMPACTS**

The potential project impacts would include:

- 1) Adverse impacts on plant and wildlife species by converting existing wildlife habitat and by introducing additional human presence into the area.
- 2) Disturbance of cultural resource sites.
- 3) Additional erosion and sedimentation into Clearwater Creek.
- 4) Visual impacts created by new development.
- 5) An increase in vehicular traffic and the level of human activity in the area which will cause a corresponding increase in the ambient noise level.

Four technical studies, including a Wildlife Survey, Vegetation Survey, an Archaeological Survey and Band-Thigh Beetle Survey, have been completed to date. The information and mitigation measures contained in the technical studies will be incorporated into the Draft Environmental Impact Report. The studies have not identified any significant impacts that can not be mitigated by changes in project design or through the adoption of mitigation measures. Copies are available for review from the Mono County Planning Department in Mammoth Lakes.



BODIE HILLS RV PARK,  
MOTEL & CAMPGROUND

SPECIFIC PLAN  
PROJECT DESCRIPTION

DECEMBER 11, 1996

**BACKGROUND:**

The property is currently owned by Mrs. Barbara Lembas, Edward Babcock and Willis H. Lapham, who are brothers and sister. This property has been in the same family ownership since it was purchased in the late 1800's by Bertrand Sallis.

The prominent topography of the property is mountainous with steep rocky slopes and ravines. Clearwater Creek Canyon enters the property near its southeasterly corner and traverses westerly, exiting at the intersection of U.S. Highway 395 and S.R. 270 (the Bodie Road). Clearwater Creek meanders within a fourteen (14) foot deep channel of varying width within Clearwater Creek Canyon. Sagebrush, rabbit brush, squaw tea and various grasses are in evidence throughout the property. Pinon pine and juniper trees dot the steeper slopes which emanate out from the ravines and Clearwater Canyon. Numerous groups of willows grow along Clearwater Creek.

The property is currently undeveloped.

**PROPOSED PROJECT:**

Project Description:

The applicant proposes to construct a recreational vehicle park and support facilities on a portion of Assessor's Parcel No. 11-070-04 in Section 26, T4N, R25E, MDB&M. The proposed Bodie Hills RV Park, Motel & Campground (BRVP) will be located on a thirteen (13) acre portion of the 155 acre parcel, said location being in Clearwater Creek Canyon along SR 270 (the Bodie Road) and Clearwater Creek.

The proposed development will consist of the following facilities:

1. General Store/Motel Building:
  - General Store area: 1,600 sq.ft.
  - Office area: 300 sq.ft.
  - Restroom area: 300 sq.ft.
  - Ten (10) unit motel area: 2,600 sq.ft.
  
2. Old West Museum:
  - Building area: 600 sq.ft.



3. Recreational Vehicle Park Spaces:
  - 20'X40' Back-in access  
with utility hookups on 6'X8' concrete pads: 28 spaces
  - 20'X60' Pull-through access  
with utility hookups on 6'X8' concrete pads: 12 spaces
4. Recreation Vehicle Park Restroom, Shower and Laundry Building:
  - Building area: 800 sq.ft.
5. Eight (8) Camping Cabins (no utility services):
  - Cabin area: 300 sq.ft.per cabin
6. Camping Cabin Restroom, Shower and Laundry Building:
  - Building area: 800 sq.ft.
7. Tent Camping Area Restroom Building  
(to serve fourteen (14) tent camping spaces):
  - Building area: 300 sq.ft.
8. Facility Maintenance/Storage Building:
  - Building area: 800 sq.ft.

Access:

**Highway Access:** Access to the project site is via California State Highway 270 (the Bodie Road). The Bodie Road is a twenty two (22) foot wide paved State Highway which traverses Clearwater Canyon through the entirety of the project. The State of California currently claims ownership of the road by prescription. The applicant proposes to offer a forty (40) foot wide right of way to the State in accordance with future agreement with the State.

**Recreational Vehicle Space Access:** Access to the recreational vehicle park spaces adjacent to the proposed State highway right of way shall be from a sixteen foot (16), one-way gravel roadway constructed parallel with the proposed State highway right of way.

Access to the recreational vehicle spaces on the southerly side of Clearwater Creek shall be via a sixteen (16) foot wide, one-way gravel road. Two (2) bridges shall be constructed across Clearwater Creek one (1) at the entrance to and one (1) at the exit from the southerly spaces. Bridge construction shall include concrete abutments that will be constructed outside of the Clearwater Creek channel. Bridges shall be constructed of steel or wood and shall be finished in a manner that is unobtrusive and is complementary to the surrounding area.

**Recreational Vehicle Pedestrian Access to General Store:** Access shall be provided by a footbridge as indicated on the Specific Plan. This footbridge is intended to direct pedestrian traffic to reduce riparian area disturbance and stream bank erosion.

**Camping Cabin Access:** Access to the camping cabin area shall be via a twenty (20) foot wide two (2) way gravel access road.

**Tent Camping Access:** Access to the tent camping area shall be via a twenty (20) foot wide gravel road. One (1) bridge shall be constructed across Clearwater Creek in accordance with the same standards as previously described for the recreational vehicle space area.

**Parking:** Parking spaces shall be 10'X20'. Handicap parking spaces shall be 14'X20'. All regular parking spaces shall be gravel surfaced. Handicap spaces shall be surfaced with concrete.

**Parking Space Summary:**

1. General Store/Motel Area:
  - 10'x20' parking spaces: 30 spaces
  - 14'x20' handicap spaces: 3 spaces
2. Camping Cabin Area:
  - 10'x20' parking spaces: 14 spaces
  - 14'x20' handicap space: 1 spaces
3. Tent Camping Area:
  - 10'x20' parking spaces: 18 spaces
  - 14'x20' handicap space: 1 spaces
4. Recreational Vehicle Restroom/Laundry Area:
  - 10'x20' parking spaces: 5 spaces
  - 14'x20' handicap space: 1 spaces

Utility Services:

**Water:** Water shall be supplied from underground well. A water distribution system shall be constructed which includes the well, a 20,000 +/- gallon storage tank and a distribution system. The distribution system shall be constructed to serve the general store and motel complex; the recreational vehicle spaces; the recreational vehicle area restroom, laundromat and shower building; the camping cabin restroom, laundromat and shower building; and the tent camping area restroom building. Earth disturbances shall be kept to a minimum. Neither the roadwork nor the R/V sites will require significant cuts or fills. Disturbed areas shall be revegetated with native vegetation where possible.

**Sewer:** Sewage disposal systems shall include a collection system, a septic tank and leach field system.

**General Store/Motel Complex:** Sewage from the general store/motel complex shall flow directly to a 3,000 gallon septic tank and leach field disposal system which is located southerly from the complex.

**Recreational Vehicle Spaces:** All recreational vehicle spaces shall be provided with a sewer service connection. Sewage from each space shall be transported through the sewer collection system to a 5,000 gallon septic tank. Effluent from the septic tank shall flow to a sewer lift station. Effluent from the lift station shall be pumped to a leach field disposal system which is located southerly from the recreational vehicle spaces.

**Camping Cabin Restroom, Laundry, Shower Building:** Sewage from this building shall flow to a nearby 3,000 gallon septic tank and leach field disposal system located southerly from the building.

**Tent Camping Restroom:** Sewage from this building shall flow to a nearby 1,000 gallon septic tank and leach field disposal system located westerly from the building.

**Power:** Overhead: Electrical service shall be supplied from an existing Southern California Edison (SCE) overhead power line located on a ridge westerly from U.S. Highway 395. An 800 foot overhead electrical service line is proposed to be constructed from the existing SCE overhead line northeasterly to the ridge on which the recreational vehicle leach field sewage disposal system is located.

**Underground:** Underground service is proposed from the sewage disposal system ridge to and throughout the project. Underground electrical service shall serve the general store/motel complex; all recreational vehicle spaces; the maintenance building; and the restroom laundry and shower buildings in the recreational vehicle space area and in the camping cabin area.

**Telephone:** Telephone service to the project shall be provided overhead and underground in the same manner as outlined under power service. Telephone service shall be provided to the general store/motel complex and to the restroom, laundry and shower buildings.

**Gas:** Propane gas service shall be provided for the general store/motel complex and to the restroom, laundry and shower buildings. A 500 gallon propane storage tank shall be placed near to and southeasterly from the building. Two hundred (200) gallon propane tanks shall be placed near the restroom, laundry and shower buildings. Tanks shall be screened from the highway and parking areas by construction of wood, rustic looking fencing.

**Solid Waste:** A screened dumpster area shall be provided near the General Store, and fourteen (14) garbage cans with lids shall be placed at various places in the RV and camping areas.

#### Landscaping:

In addition to the fencing, screening and protection of the natural vegetation as otherwise described in this submittal, the applicant proposes to landscape two (2) areas as shown on the Plot Plan:

1. **Camping Cabin/Proposed Picnic and Recreation Area:** It is proposed to landscape this area with lawn. Picnic tables, playground equipment and a fire pit are also proposed for this area.
2. **General Store/Motel Area:** Lawn is proposed for the triangular area in front of the motel units.

**ENVIRONMENTAL:****Visual/Aesthetics:**

The project is located on the Bodie Road near its intersection with U.S. Highway 395. The Bodie Road is the primary access to the "Ghost Town" of Bodie. It is the desire of the owners to develop this project in a manner that is aesthetically compatible with the historic character of the old Town of Bodie.

**Buildings:** Buildings shall be constructed such that they present a rustic, nineteenth century appearance. Buildings shall be constructed primarily of wood and of other materials that are compatible with the character of Bodie. Wood shall be stained, painted or otherwise treated to present a weathered aged appearance. Roofing shall be fire treated wood shingles, fiberglass shingles or metal roofing. Roofing colors shall be sage, rust or similar colors which emulate Bodie building construction and are compatible with the surrounding area. No bright colors or reflective materials shall be used.

**Fencing:** Fencing shall be used sparingly. Fencing shall be used to screen certain improvements (i.e. propane gas tank) and to direct patrons away from environmentally sensitive areas. Fencing shall be constructed of wood. Wood shall be stained, painted or otherwise treated to present a weathered aged appearance.

**Vegetation:** The entire project has been designed to maintain and protect the existing vegetation. Trees and willow groups have been avoided in design except that a portion of one willow group will need to be removed to allow construction of the restroom, laundromat and shower building in the recreational vehicle space area. Recreational vehicle spaces have been sited to obtain maximum screening advantage of the existing vegetation. Sage brush and other vegetation shall be maintained to the maximum extent practicable outside of roadway and building areas. Canyon slopes shall remain undisturbed except for the temporary disturbance necessary to construct and maintain the sewer force main and underground power line.

**Lighting:** The outdoor lighting shall be 1890's replica lampposts. Nineteen (19) lampposts shall be installed within the project as shown on the Plot Plan. Lighting shall be installed on the exterior of the proposed buildings as necessary for the respective purposes of each building. Exterior building lighting shall be indirect and non-intrusive. Spot lights or other types of bright lighting shall not be used.



**Vegetation:**

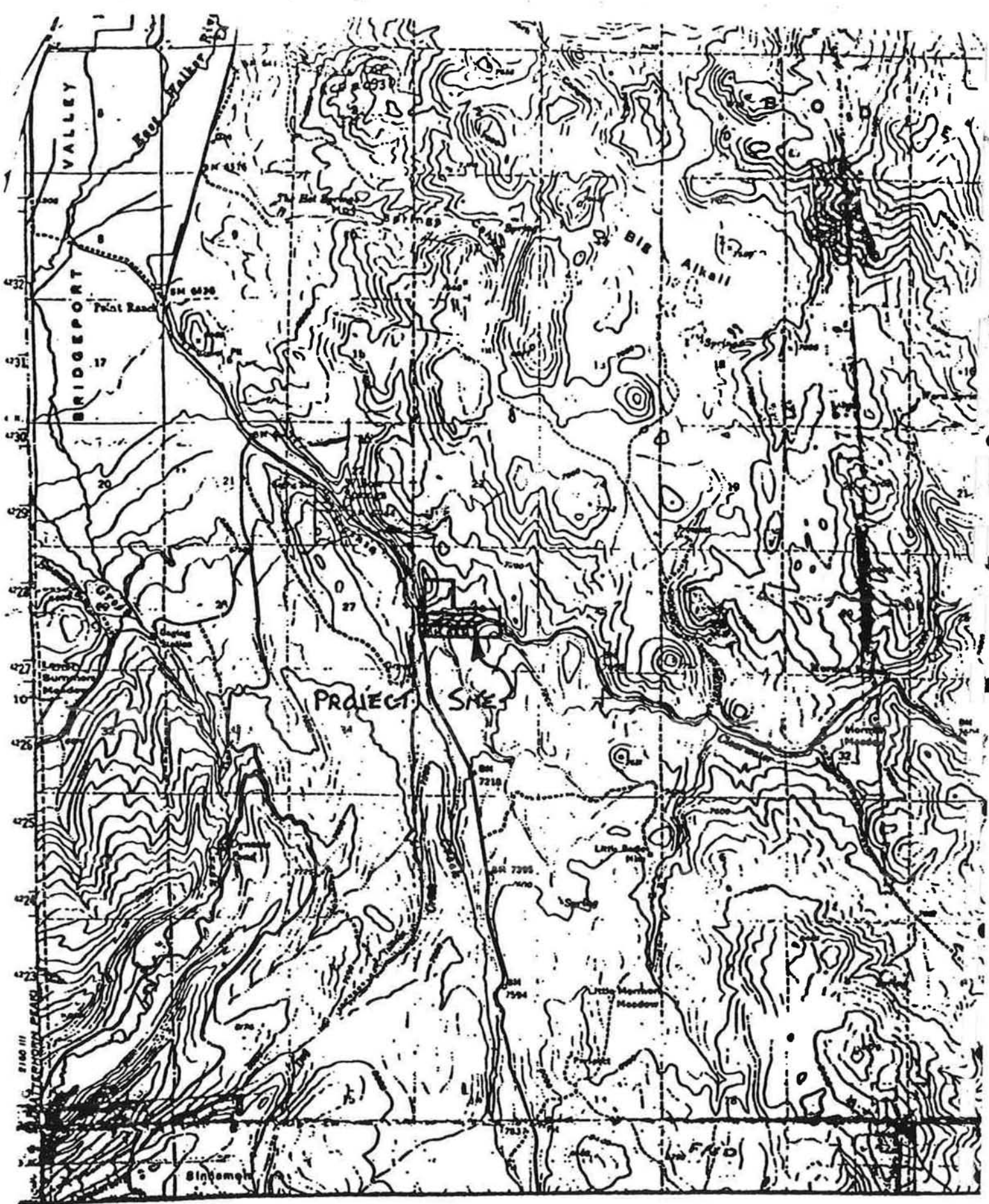
An endangered plant study was performed as recommended by the Mono County Planning Department subsequent to the preapplication meeting. Two (2) areas were identified in the study as possible habitat for an endangered plant. The study recommended avoidance of these areas. The project has been designed to avoid these areas.

**Wildlife:**

During the preapplication meeting for this project, the Mono County Planning Department recommended that a wildlife assessment be completed prior to submittal of the project application. The applicant contracted with the Planning Department to complete the assessment. Mitigation measures as recommended by the completed wildlife assessment have been incorporated into the design of this project.

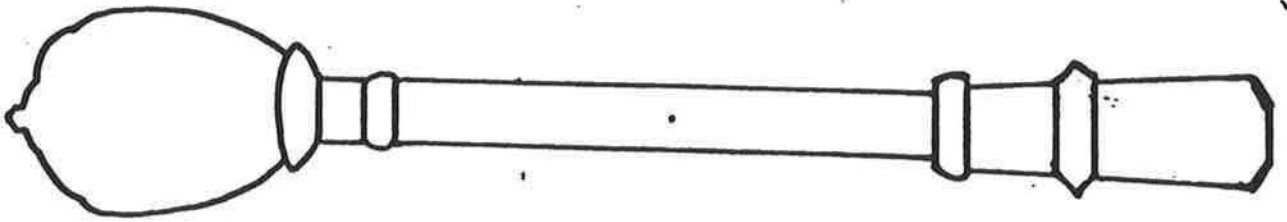
**Cultural Resources:**

During the preapplication meeting for this project, the Mono County Planning Department recommended that an archaeological assessment be completed prior to submittal of the project application. The applicant contracted with the Planning Department to complete the assessment. No significant archaeological sites were identified within the report which required additional analysis except for the area in which the Camping Cabins are located. The report recommends that additional archaeological field work and report be completed prior to construction in this area.

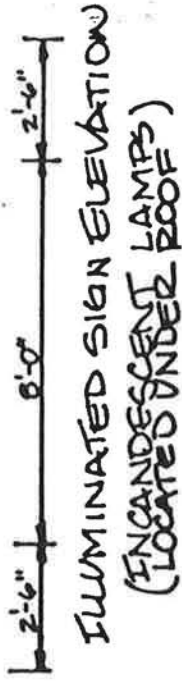
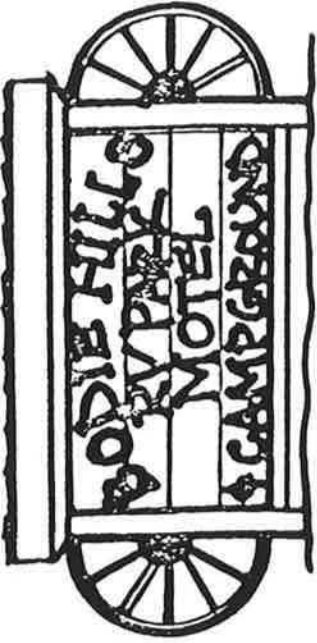
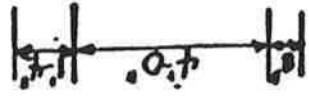


VICINITY MAP  
NO SCALE

BODIE HILLS RV PARK, MOTEL & CAMPGROUND SIGN & LIGHTING PLAN

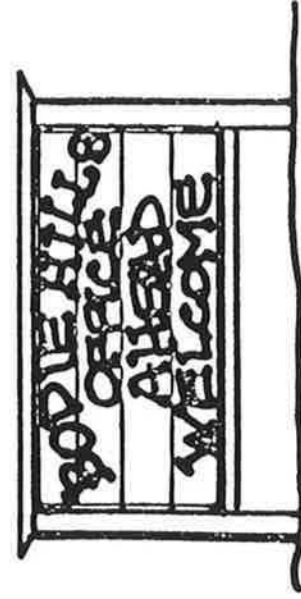
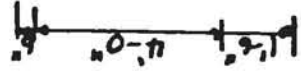


BERUCA 1890's LAMPPOST ELEVATION



ILLUMINATED SIGN ELEVATION  
(INCANDESCENT LAMPS  
LOCATED UNDER ROOF)

COLOR & MATERIALS: BUSTIC COLORS  
PAINTED ON BUSTIC WOOD FACES  
MOUNTED ON A WOOD FRAME.



NON-ILLUMINATED SIGN ELEVATION





# United States Department of the Interior

BUREAU OF LAND MANAGEMENT  
Bishop Resource Area  
785 [redacted] North Main Street, Suite [redacted] E  
Bishop, California 93514-2495

IN REPLY REFER TO

RECEIVED  
FEB 10 1997  
MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

Stephen Higa, Senior Planner  
Mono County Planning Department  
P.O. Box 347  
Mammoth Lakes, CA 93546

Dear Mr. Higa:

Thank you for the opportunity to respond to the Notice of Preparation for the Bodie Hills Specific Plan and Environmental Impact Report.

The 155 acre parcel in question is surrounded on all sides by land administered by the Bureau of Land Management (BLM), Bishop Resource Area (hereafter referenced as public lands). BLM personnel participated in developing, together with Mono County, the draft Bodie Cooperative Management Plan (CMP) which supports recreational development consistent with public safety and other goals (Page III-6) and proposes Rural Resort designation for this parcel (Figure 6). While BLM supports enhancing recreation opportunities in the area, we do have concerns regarding the possible effects of this project as currently proposed.

The following are issues that we request be addressed in detail in the Specific Plan/EIR:

### **Public safety**

Although these public safety issues do not affect public land, we request that they receive close consideration in the EIR due to the prioritizing of public safety in the draft Bodie CMP and potential effects on public land users.

**Traffic and access** - Vehicle ingress and egress at each of the four developed areas, and pedestrian traffic from one area to another (e.g. from RV park to store), have the potential to create safety hazards along this narrow, winding, and heavily used stretch of road. We ask that the EIR incorporate the standards proposed by CalTrans in writing and at the meeting of February 6, and address whether they are sufficient to mitigate these hazards.

**Flooding and erosion** - The portion of Clearwater Creek passing through the parcel carries a large proportion of drainage from the Bodie Hills, is deeply gullied, and appears to be unstable and highly erodible. We ask that the EIR address the potential dangers to users. The RV park plans, in particular, show heavy development and use along a portion of the gully embankment that appears to be subject to collapsing.



## **Water quality**

**Erosion and sedimentation** - As noted above, the stream channel within this parcel is highly susceptible to erosion. Development and increased use may accelerate erosion, increasing sedimentation downstream and erosion upstream on public lands. The EIR needs to specify in detail where and how much earth moving and filling would occur; how stream bank erosion would be avoided during construction; what stream bank erosion may occur as a result of increased use; and what measures may be taken to stabilize the stream banks. The EIR also needs to address the adequacy of pipelines and culverts planned to accommodate inflow from the four side drainages leading into the stream through the project area.

**Waste pollution** - BLM is concerned about the proximity of proposed leach fields to Clearwater Creek in the tent, cabin, and motel areas. These may have the potential to pollute waters downstream on public lands. We request that the EIR incorporate the standards set by Lahontan Regional Water Quality Control Board (RWQCB).

**Other** - We urge that the EIR address other possible impacts described in comments you have received from Lahontan RWQCB, which may affect public lands downstream. These include compliance with water quality control standards for the Lahontan Basin Plan, water quality monitoring, well test water disposal, risk of spills, and cumulative impacts.

## **Wildlife**

**Fish** - Fish in Clearwater Creek (brown trout and Lahontan sucker) are at risk of direct impacts due to sedimentation, erosion and pollution as discussed above. The effects of the project on fish habitat should be thoroughly addressed in the EIR. Again, note that in addition to impacts downstream on public lands, fish habitat may be impacted on public lands upstream if actions in the project area contribute to accelerating erosion upstream.

**Deer** - The EIR must thoroughly address possible impacts on the mule deer migration corridor\_ which is shown on project maps as passing through the proposed RV park.

**Off-site impacts** - Wildlife habitat on public land in the vicinity of the development may be impacted by increased visitor use. This should be addressed in the EIR, along with possible off-site impacts of increased noise and artificial light in the developed areas.

**Trash containers** - The EIR should address the need to make trash containers secure against wildlife such as skunks, raccoons, rodents and bears. Having trash available as a food source could change wildlife populations and habits, ultimately affecting public land users.

## **Vegetation**

**Non-native plants** - BLM requests that the EIR discuss the use of native plants in landscaping. Non-native plants present the possibility of spreading to surrounding public lands and decreasing habitat value for native plants and wildlife.

**Noxious weeds** - Weeds which tend to become established in disturbed soil may spread aggressively and have particularly deleterious effects on native habitat. The EIR should address minimizing large areas of disturbed soil.

## **Recreation spillover impacts**

**Wilderness values** - The north side of the private land parcel adjoins WSA CA-010-099 (Bodie Mountains). There may be some potential for spillover impacts onto public lands which may affect wilderness values. These impacts may be related to equestrian and OHV use, etc. if these recreationist types use the proposed facilities. BLM is required to protect wilderness values in their present state and any impacts occurring in the WSA would require mitigation. It appears that the landscape topography at this site and the natural buffer between the edge of the developments on the north side (cabin camping, motel, general store, museum) and the WSA would by its self-protective nature avert potential impacts. We ask that the EIR include, as mitigation, maintaining this natural buffer and managing it as such.

**Impacts along south edge** - The southern edge of the proposed project area lies along what appears to be softer, gentler terrain that is less likely to deter recreation spillover impacts on adjoining public lands. Again, impacts from activities such as OHV use, equestrian use, etc. which spill over onto public lands could result in surface impacts (trail or route development, etc.) that would necessitate mitigation by the BLM. However, the space between the developments on the south side (tent camping, RV camping, proposed powerline and any associated roads) and the public lands may serve as a buffer and avert potential impacts. Again, we ask the developer to maintain this natural buffer in its present state and manage it to avoid such impacts.

**Virginia Creek dispersed camping** - Presently, dispersed camping and recreational gold panning occur on nearby BLM land along Virginia Creek (a Wild and Scenic Study River) and the Dogtown historic site. The nature of the proposed facility's attraction or full use of the proposed facility may result in overflow use occurring on Virginia Creek. This may result in increased use and additional physical impacts. The BLM plans to continue its present level of dispersed site management on Virginia Creek. We would, however, need to implement measures to protect the site's physical integrity including riparian values, cultural values, etc. depending on the degree and magnitude of new impacts to the site. We ask that the EIR address these impacts.

Also, the non-commercial nature of dispersed camping at the creek site may deter some potential clients from camping at the proposed facility. Presently, there are no plans to charge fees for use of public lands at the site.

**Cultural sites** - In addition to measures to protect cultural sites in the project area, the EIR must address indirect impacts to sites on nearby public lands. These impacts would be expected to take the form of increased visitation and casual collecting. Dogtown already receives a notable volume of visitation and impacts associated with recreational gold prospecting. Prehistoric sites in the vicinity, including one overlapping the private property boundary, would also be subject to increased visitation.

## **Utility line construction**

It appears that a short segment of a utility line is proposed for construction on public land from the existing powerline to the private land site. Construction on public land would require a

right-of-way and subsequently a visual contrast analysis, cultural clearances, etc. to ensure it conforms with BLM regulations and policies. A simpler alternative may be to consider tying in the new line into the main powerline where it crosses the proponents' private land. Consequently utility line construction would occur entirely on private land, bypassing public lands and BLM requirements.

### **Visual impacts**

We note and applaud the intent to keep signing and buildings unobtrusive and in keeping with the historical appearance of Bodie, as per goals and objectives of the draft CMP.

### **Public involvement**

We encourage you to fully notify and involve the public in all future stages of the CEQA process for this project, including press releases to the local newspapers and radio stations.

Again, we appreciate the opportunity to comment on this project. Please continue to keep us informed. You may contact environmental coordinator Joy Fatooh at 872-4881 if you have any questions.

Sincerely,



Genivieve D. Rasmussen  
Area Manager



**DEPARTMENT OF FISH AND GAME**

Environmental Services Division  
407 West Line Street  
Bishop, California 93514  
(619) 872-1171



January 31, 1997

**RECEIVED****FEB 10 1997****MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY**

Mr. Stephen Higa, Senior Planner  
Mono County Planning Department  
P.O. 347  
Mammoth Lakes, CA 93546

Dear Mr. Higa:

**Notice of Preparation of Draft Environmental Impact Report  
for the Bodie Hills Specific Plan**

Thank you for providing the Department of Fish and Game (Department) with the opportunity to comment on the Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the Bodie Hills Specific Plan; which includes the construction of an RV Park, Motel and Campground located on a portion of a 155 acre parcel at the southeast intersection of U.S. 395 and S.R. 270. Development is proposed on 13 acres of the 155 acre lot.

Potential environmental impacts from the proposed project include, but are not necessarily limited to, adverse impacts on plant and wildlife species by converting existing wildlife habitat and by introducing additional human presence into the area and additional erosion and sedimentation into Clearwater Creek. The Department is also concerned of the potential direct loss of wildlife habitat, at minimum, for both mule deer and sage grouse; the potential disruption of seasonal use areas for the endangered bald eagle, the northern harrier, American peregrine falcon, willow flycatcher, and Canada Geese.

The Department would greatly appreciate being provided copies of the Wildlife Survey, Vegetation Survey and Band-Thigh Beetle Survey which have been completed to date. Please forward copies of these documents at your earliest convenience to the attention of Bruce Kinney, California Department of Fish and Game, Environmental Services, 407 West Line Street, Bishop, California 93514.

The Department agrees with the finding an Environmental Impact Report should be prepared for the proposed project. In order for the Department to adequately review and provide comments on the project's potential impacts to fish and wildlife resources of the area, the DEIR should contain the following information:

1. A complete assessment of flora and fauna within and adjacent to the project area, with particular emphasis upon identifying endangered, threatened, rare, California "species of special concern" and locally unique species and sensitive habitat.

a) Rare and endangered species to be addressed should include all those species which meet the California Environmental Quality Act (CEQA) definition of rare and endangered. Species of special concern and/or unique local sensitive species, which could become candidate species as well, should be treated the same as listed species. [CEQA Section 15380]

b) A thorough assessment of rare plants and rare natural communities, following the Department's guidelines for Assessing Impacts to Rare Plants and Rare Natural Communities, should be completed. The Department recommends focused plant surveys be conducted as necessary concerning endangered, threatened, and rare species which may be present in the area of the proposed project; such as the Long Valley milk vetch (*Astragalus johannis-howellii*), and Mono milk vetch (*Astragalus monoensis*), both State listed rare plant species.

c) The Department's California Natural Diversity Data Base should be contacted at (916) 327-5960 to obtain information on any previously reported sensitive species and/or habitats, including Significant Natural Areas identified under chapter 12 of the Fish and Game Code. California Natural Diversity Data Base information may be used to identify target species for the surveys, but are not to be used in place of site-specific surveys. Focused site-specific surveys are required for adequate evaluation of project impacts.

d) Biological surveys of the project site should be conducted during the appropriate seasons of the year to detect presence of species which occupy the site both year-round and seasonally. This should include surveys for mammals, amphibians, reptiles, resident and migratory raptors, waterfowl and songbirds which may utilize the area. Focused species-specific surveys, conducted at the appropriate time of year and time of day when sensitive species are active or otherwise identifiable is also required. A complete assessment of sensitive wildlife species winter, spring and summer use should be addressed. Species-specific survey procedures should be developed in consultation with the Department and U.S. Fish and Wildlife Service. The Department recommends detailed focused surveys be conducted as necessary concerning the following species which either are known or are likely to be present within the project area or its immediate vicinity, either year-round or seasonally, and may be impacted by the proposed project:

(A). mule deer (*Odocoileus hemionus*); (B). mountain lion (*Felis concolor*); (C). the American badger (*Taxidea taxus*), western white-tailed hare (*Lepus townsendii*) and pygmy rabbit (*Brachylagus idahoensis*), all state species of special concern; (D). Bald eagle (*Haliaeetus leucocephalus*) and American peregrine falcon (*Falco peregrinus*), both State and Federal listed Endangered species; (E). Willow flycatcher (*Empidonax traillii*), a State Endangered species; (F). Sage grouse (*Centrocercus urophasianus*), prairie falcon (*Falco mexicanus*), northern harrier (*Circus cyaneus*), and yellow warbler (*Dendroica petechia*), all state species of special concern; (G). Red-tailed hawk (*Buteo jamaicensis*), and migrant waterfowl species such as Canada Geese. The DEIR should address potential impacts to these species and their associated habitat. Measures should be identified to provide protection of existing habitat, or mitigation proposed for project impacts to these species and their associated habitat areas.

e) The proposed project has the potential to have a negative impact on the local and migratory mule deer herd. The DEIR should discuss the project's conformance with the Deer Herd Management Plans which have been prepared by the Department. The DEIR should thoroughly discuss the potential disturbance to the deer herd resulting from increased noise, lights, vehicle traffic, and any other impacts associated with the project. This should further include an analysis of the potential for the project to force deer away from the area during migration periods and any resultant increase in deer highway fatalities. The DEIR should offer proven and effective measures for reducing or eliminating impacts to the deer herd. The DEIR should also discuss alternatives to the project that would not result in detrimental effects to the deer herd or other biological resources found in the project vicinity. This same analysis should be applied to those additional species previously listed in section 1. d) above.

2. A thorough discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts.

a) CEQA Section 15125(a) directs that knowledge of the regional setting is critical to an assessment of environmental impacts and special emphasis should be placed on resources that are rare or unique to the region. In addition to the biological resources mentioned above, the Department believes the impacts to Clearwater Creek and its adjacent wetlands may be significant and should be fully evaluated in the DEIR.

b) Project impacts should be analyzed relative to their effect on off-site habitats. Specifically, this should include nearby public lands, natural habitats, riparian



ecosystems and open space lands. Impacts to and maintenance of movement areas for wildlife, including access to undisturbed habitat in adjacent areas should be fully evaluated and provided. Further, a thorough assessment of the potential the proposed project may have to impact the quality of experience for sport fishing anglers who utilize Virginia Creek and other closely associated areas within view of the project should be included in the DEIR. This assessment should also include potential impacts to sport hunting in these same areas. These creeks, waters, and areas represent a sport fishery and historical sport hunting area for which the Department has Commission Policy and general management objectives. The DEIR should provide an analysis, including angler and hunter surveys, of the potential detrimental effect of the proposed project to the quality of experience for anglers, hunters and possibly other outdoor recreationists utilizing these areas.

c) A cumulative effects analysis should be developed under the provisions of CEQA Section 15130. General and specific plans, as well as past, present and anticipated future projects, including those projects outside the control of the agency, should be analyzed relative to their impacts on similar plant communities and wildlife habitats. Growth inducing impacts from the proposed project should also be analyzed. The Department believes the DEIR should include an analysis of water supply availability not only for the proposed project, but also in relation to the growth inducing impacts which may follow, and any resultant impacts to adjacent surface and spring flows of influence within this watershed. Pursuant to 15130 (b) (1) (A), the DEIR should provide a detailed analysis of the cumulative impacts of known future projects and examine options for mitigating or avoiding any significant cumulative effects of the proposed project.

3. A range of alternatives should be analyzed to ensure alternatives to the proposed project are fully considered and evaluated pursuant to CEQA Section 15126(d). A range of alternatives which avoid or otherwise minimize impacts to biological resources should be included. Specific alternative locations should be evaluated in areas with lower biological value, where appropriate. If alternatives with reduced environmental impacts are dismissed, off-site compensation for unavoidable impacts through acquisition and protection of high quality habitat should be addressed in the DEIR for the proposed project. Mitigation measures should then be incorporated into the proposed project and/or preferred alternative and required to reduce any identified impacts to a level of insignificance. The Department would further request analysis within the DEIR to clearly identify the projected and reasonable need for the proposed project, including the need at this time.

a) Mitigation measures for project impacts to plants, animals and their habitats should emphasize evaluation and selection of alternatives which avoid or minimize project impacts.

b) In identifying project alternatives, the DEIR should list both the preferred and environmentally superior alternative. The analysis of the alternatives, including the No-Project alternative, should identify environmental impacts of those alternatives and focus on the avoidance or reduction of impacts as compared to the proposed project. In dismissing listed alternatives or deciding not to include a specific alternative in the DEIR, the agency should provide its rationale for selecting or defining alternatives in order to disclose the analytic route from evidence to action showing how it arrived at its conclusions.

4. If the project has the potential to adversely affect species of plants or animals listed under the California Endangered Species Act, either during construction or over the life of the project, a permit must be obtained under Section 2081 of the Fish and Game Code. Such permits are issued to conserve, protect, enhance and restore state-listed threatened or endangered species and their habitats. Early consultation is encouraged, as significant modifications to a project and mitigation measures may be required in order to obtain a 2081 permit.

5. The Department opposes the elimination of water courses and/or their conversion to subsurface drains and channelization. All wetlands and watercourses, whether intermittent or perennial, must be retained and provided with substantial setbacks which preserve the riparian and aquatic habitat values and maintain their value to on-site and off-site wildlife populations.

a) A discussion of potential adverse impacts from any increased runoff, sedimentation, soil erosion, and/or urban pollutants on streams and watercourses on or near the project site, with mitigation measures proposed to alleviate such impacts must be included.

Once again, the Department respectfully requests copies of any and all biological surveys completed and/or utilized in preparing the DEIR, including specials status species and wetlands surveys, the survey biologist, methods used and actual field data be provided directly to the Department's Bishop Field Office, Attention Mr. Bruce Kinney, 407 W. Line Street, Bishop, California 93514.

Mr. Stephen Higa  
January 31, 1997  
Page Six

Thank you for the opportunity to provide comment on the Notice of Preparation of a Draft Environmental Impact Report for the Bodie Hills Specific Plan. If you have any questions or concerns regarding this letter, please contact me direct at (619) 872-1129, or by message at (619) 872-1171.

Sincerely,

A handwritten signature in cursive script, appearing to read "Bruce Kinney". The signature is written in dark ink and is positioned above the typed name.

Bruce Kinney  
Environmental Specialist  
Region 5

DEPARTMENT OF FORESTRY AND FIRE PROTECTION  
385 NORTH ARROWHEAD AVENUE, THIRD FLOOR  
SAN BERNARDINO, CALIFORNIA 92415-0186  
(909) 387-4213



January 29, 1997

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MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

Stephen Higa, Senior Planner  
MONO COUNTY  
Planning Department  
Post Office Box 347  
Mammoth Lakes, CA 93546

RE: Bodie Hills Specific Plan/Notice of Preparation

Dear Mr. Higa:

We are in receipt of your Notice of Preparation of the Bodie Hills Specific Plan dated January 2, 1997. Regarding the fire protection issue for the Bodie Hills RV Park, motel and campground, please be advised that, at a minimum, the project will be required to comply with the following:

1. Public Resources Code Section 4290 standards, or its equivalent; and
2. All buildings must be constructed of Class A roofing materials.

Should you have any questions, or need additional information, please feel free to contact this office.

Sincerely,

PAUL L. BENSON  
Unit Chief

A handwritten signature in black ink that reads "Steve Faris".

STEVE FARIS,  
Captain, Fire Protection Planning

SF:bas

c: Paul Miller, CDF-San Bernardino  
Carl Stadick, CDF-Owens Valley  
File





## DEPARTMENT OF PARKS AND RECREATION

P.O. BOX 942896

SACRAMENTO 94296-0001

(916) 653-6725



January 29, 1997

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FEB - 3 1997

MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

Mr. Stephen Higa, Senior Planner  
Mono County Planning Department  
Post Office Box 347  
Mammoth Lakes, California 93546

Dear Mr. Higa:

The California Department of Parks and Recreation has received and reviewed the Notice of Preparation for a combined Specific Plan and Focused Environmental Impact Report (DEIR) for the construction of an RV park, motel and campground located on a 13 acre portion of a 155 acre parcel at the southeast intersection of U.S. 395 and State Route 270 in Mono County.

This Department is a Trustee Agency for Bodie State Historic Park (SHP) and as such has a strong interest in the preparation and review of the environmental document for this project. In particular, we draw your attention to the General Development and Resource Management Plan (Plan) prepared for Bodie SHP which emphasizes that the natural environment along the park's access routes is a critical part of the ghost town experience. The primitive natural condition and isolation that were a basic part of the history of Bodie, and that contributed to its transformation into a ghost town, are valuable scenic resources. The Plan states that the area along the access road "shall be maintained in its natural state, so visitors can understand the conditions Bodie townspeople had to endure and feel the ghost town experience on the way into the unit." Therefore, we request that the DEIR identify and evaluate the following impacts of the project.

Runoff, Erosion Control, Stream Modification: State Route 270 is the entrance to Bodie SHP over which the majority of the approximately 200,000 visitors yearly travel to reach the park. Bridging of Clearwater Creek Canyon, changes in and concentration of runoff, or channel modification can result in erosion of the roadway and hamper access, not only for the public but for park personnel responsible for protection of the SHP's resources. These potential impacts from project development should be addressed and alternative designs proposed if necessary.

Cultural Resources: Effects on any archaeological or historical resources should be described. Mitigation measures for any effects on archaeological resources should be coordinated with the State Historic Preservation Office and affected tribal groups and individuals. Effects on any such resources should be mitigated and the mitigation described.

**Environmentally Sensitive Areas:** Habitat maps of the project site and adjacent areas affected by the project should be prepared. The effects of the project on these habitats, particularly streams or areas falling within the U.S. Army Corps of Engineers jurisdiction or on public lands, should be identified. Impacts of the project, including noise, traffic, increased public use, etc., on wildlife either on-site or on adjacent habitats, should be estimated. In particular, effects of use of subsurface water withdrawal on springs or other water sources used by wildlife should be considered and evaluated. Potential for sedimentation or pollution of the stream with resultant effects to the fishery and water quality by runoff or the introduction of petroleum based products or septic leachates should be determined and mitigation measures proposed. Not only should areas with sensitive vegetation be avoided in the project development stage, but provisions for their continued protection should be described. We strongly urge that habitat and sensitive vegetation mitigation measures be closely coordinated with the Department of Fish and Game.

**Visual Impacts:** The project site is the visual gateway to Bodie. Here visitors leave a high speed section of U.S. 395, and begin to slow as they enter the winding stretch of Clearwater Canyon before starting the series of grades to the ghost town. The site is important as the visitor begins to slow down and step into the past and prepares to discover the park. Unless very sensitively designed and located, the subject project may be a jarring reminder of the current time period. As a consequence, appropriate design, siting and landscaping must be utilized. The existing visual setting of the project site and adjacent lands, and the effects of the project on this setting should be described (including any highway signing along U.S. 395) Photographic perspectives of the project site, signing, and any overhead utilities as seen from public viewing areas should be provided, using methods such as computer modeling to simulate the project at completion. Effects of lighting and other project operation should be described and evaluated. Mitigation measures, such as alternative siting, site design and full undergrounding of utilities, and landscaping activities employing native vegetation should be proposed for all project elements.

**Plan Conformance:** In preparing this focused environmental document and specific plan, analysis should be provided for project conformance with all relevant portions of Mono County's General Plan. Particular attention should be paid to the Open Space, Cultural, Biological, and Visual Resource Policies of the Conservation/Open Space Element. Due to the fact that the "specific plan" and "area plan" called for by the Mono County General Plan for the Bodie area have not been completed or even commenced, the proposed project may be premature until those implementation and standard setting mechanisms are in place to provide a framework against which this project can be measured.

The proximity of the project site to the Bureau of Land Management's Bodie Bowl Area of Critical Environmental Concern and the Bodie Hills Management Area,

Mr. Stephen Higa  
January 29, 1997  
Page Three

and its adjacency to the Bodie Mountain Wilderness Study area, should be described. Due to the project site's sensitivity at the entranceway to Bodie, consideration should be made of the guidance provided by the "Bishop Resource Management Plan - Record of Decision" (1993) and "The Bodie Bowl Area of Critical Environmental Concern Management Plan" (1995), and conformance to their guidance sought.

Growth Inducing Impact: The California Department of Parks and Recreation is concerned about the growth-inducing effect of this project in the Bodie Hills Area. The ten motel units, 40 RV spaces, and 22 tent or tent cabin sites seem a relatively small total to be a successful economic unit. Is this intended to be the first phase of a multi-phased project? If so, the DEIR should provide a complete environmental analysis of all anticipated future development associated with the proposed project.

Alternative Siting: Alternative layouts of the project on the project site, and alternative project sites, should be identified and evaluated. The DEIR should assess the effects of the alternative configurations, as well as the alternative sites, in order to determine the most feasible, least environmentally damaging alternative.

Please do not hesitate to contact us if we can be of assistance or can answer any questions you may have concerning this response. Please direct your inquiry to Noah Tilghman, Resource Management Division, at (916) 653-3460; or Robert Macomber, Sierra District Superintendent, at (916) 525-9523.

— Thank you for consulting with us.

Sincerely,



Richard G. Rayburn, Chief  
Resource Management Division





GTE Telephone  
Operations

350 Lagoon Street  
Bishop CA 93514  
1 800 827 2112

Mono County  
Planning Department  
Stephen Higa  
P.O.Box 347  
Mammoth Lakes, CA 93546

Date: January 24, 1997  
Subject: Bodie Hills R.V. Park  
Motel and Campground

Dear Mr. Higa:

GTE intends to provide telephone service to this project based on current tariffs and regulations that are to be met by the property owners.

Upon receipt of Line Extension or Speculative Development payments, construction of telephone lines to the development will commence.

During the construction phase to place cable on the existing SCE pole line, it may be necessary to traverse lands to access each pole. Existing roads will be used as appropriate, however, it must be noted that some excursions into the brush may be required.

In the package that was referred to me on January 24, 1997 there was no indication as to the tentative development date. The proposed development time frame is necessary to our Planning Department to provide studies and funding for this work. The planning and engineering process could take several months prior to construction of telephone lines. Timely notification by the developer is essential.

Sincerely,

*S. J. Fletcher*  
S.J.Fletcher  
Engineer  
(619)872-0855





**Cal/EPA**

**Lahontan  
Regional Water  
Quality Control  
Board**

**South Lake Tahoe  
Office**

2501 Lake Tahoe Blvd.  
South Lake Tahoe, CA  
96150  
(916) 542-5400  
FAX (916) 544-2271

January 30, 1997

Stephen Higa, Senior Planner  
Mono County Planning Department  
P.O. Box 347  
Mammoth Lakes, CA 93546

Dear Mr. Higa:

**RESPONSE TO NOTICE OF PREPARATION OF AN ENVIRONMENTAL  
IMPACT REPORT FOR THE BODIE HILLS SPECIFIC PLAN, SCH #  
97012031, MONO COUNTY**

Thank you for the opportunity to provide comments on the Notice of Preparation (NOP) for the above-referenced project. Based on the information contained in the NOP, we understand that the proposed project includes construction of a recreational vehicle park, motel and campground located on a portion of 155 acre parcel at the southeast intersection of U.S. 395 and State Route 270.

The Lahontan Regional Board will be a responsible agency under the California Environmental Quality Act (CEQA) for the Project and will need an adequate CEQA document as the basis for Clean Water Act Section 401 Water Quality Certification (if wetlands or stream crossings are involved) and issuing or waiving waste discharge requirements. Also, the project proponent must apply for coverage under the National Pollutant Discharge Elimination System (NPDES) General or Individual Permit for Storm Water Discharges Associated With Construction Activity for this project if it will result in more than 5 acres of soil disturbance. Our comments on the scope and content of the EIR are as follows:

1. Compliance with the Water Quality Control Plan (for the Lahontan Region Basin Plan) - The EIR should address impacts of the proposed project in relation to compliance with all applicable California water quality standards and water quality control measures. The standards are currently contained in the Basin Plan. These control measures and standards include discharge prohibitions, and numerical and narrative water quality objectives to protect designated beneficial uses. The beneficial uses of Clearwater Creek in the East Walker Tributaries Hydrologic Area are:
  - a. municipal and domestic supply
  - b. agricultural supply
  - c. groundwater replenishment
  - d. commercial and sport fishing
  - e. water-contact recreation
  - f. non-water-contact recreation

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MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY



Pete Wilson  
Governor



- g. cold freshwater habitat
- h. wildlife habitat

2. Wetland Impacts - Based on the project location, there may be adverse impacts to wetlands. Construction in wetlands should be prevented, if at all possible. If construction in wetlands is unavoidable, full justification and mitigation must be provided and discussed in the EIR. It must be demonstrated that construction in wetlands has been avoided to every extent, and that measures will be taken to mitigate the impact of construction to the maximum extent practical. We recommend that all wetland areas be identified in the area by persons with experience in delineating wetlands (using the Corps of Engineers Wetlands Delineation Manual). The Regional Board will require mitigation of any wetland areas disturbed. Mitigation will consist of restoring or constructing wetlands of equivalent function and value.

The U.S. Army Corps of Engineers should be contacted for information on obtaining Federal permits for projects in floodplain and wetland areas. If Federal permits are necessary for work in floodplains and wetlands, you will need to apply to the Lahontan Regional Board for Clean Water Act Section 401 Water Quality Certification.

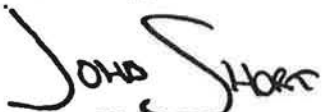
3. Storm Water Pollution Prevention - The EIR should address the impacts on storm water runoff that may result from the large amount of soil disturbance proposed. Mitigation measures including temporary erosion controls, and revegetation should be described. The EIR should also discuss compliance with requirements of the NPDES General Permit for Storm Water Discharges Associated With Construction Activity (if applicable). Please also discuss how waste earthen materials will be disposed of without impacting water quality.
4. Cumulative Impacts - CEQA requires that all cumulative impacts be discussed in conjunction with existing and proposed development in the area.
5. Water Quality Monitoring - CEQA requires monitoring of all mitigation efforts as conditions of project approval. Please include a monitoring program in the EIR.



6. Well Test Water Disposal - The Basin Plan prohibits the discharge of wastes to surface water in the Lahontan Region. Wastes include the spoils from well drilling activities, and development and test waters from newly drilled wells. Please include in the environmental document the disposal location and methods of disposal for the wastes generated by well drilling activities.
  
7. Risk of Spills - The EIR should assess the potential of spills, leaks, and accidental discharges of materials during construction and operation of the new facility. Impacts from such discharges should be discussed with appropriate cleanup responses.

We look forward to receiving a copy of the final environmental document. Please contact Chris Adair at (916) 542-5433, or me at (916) 542-5434, if you have any questions regarding these comments.

Sincerely,



John Short, P.E.

Senior Water Resource Control Engineer

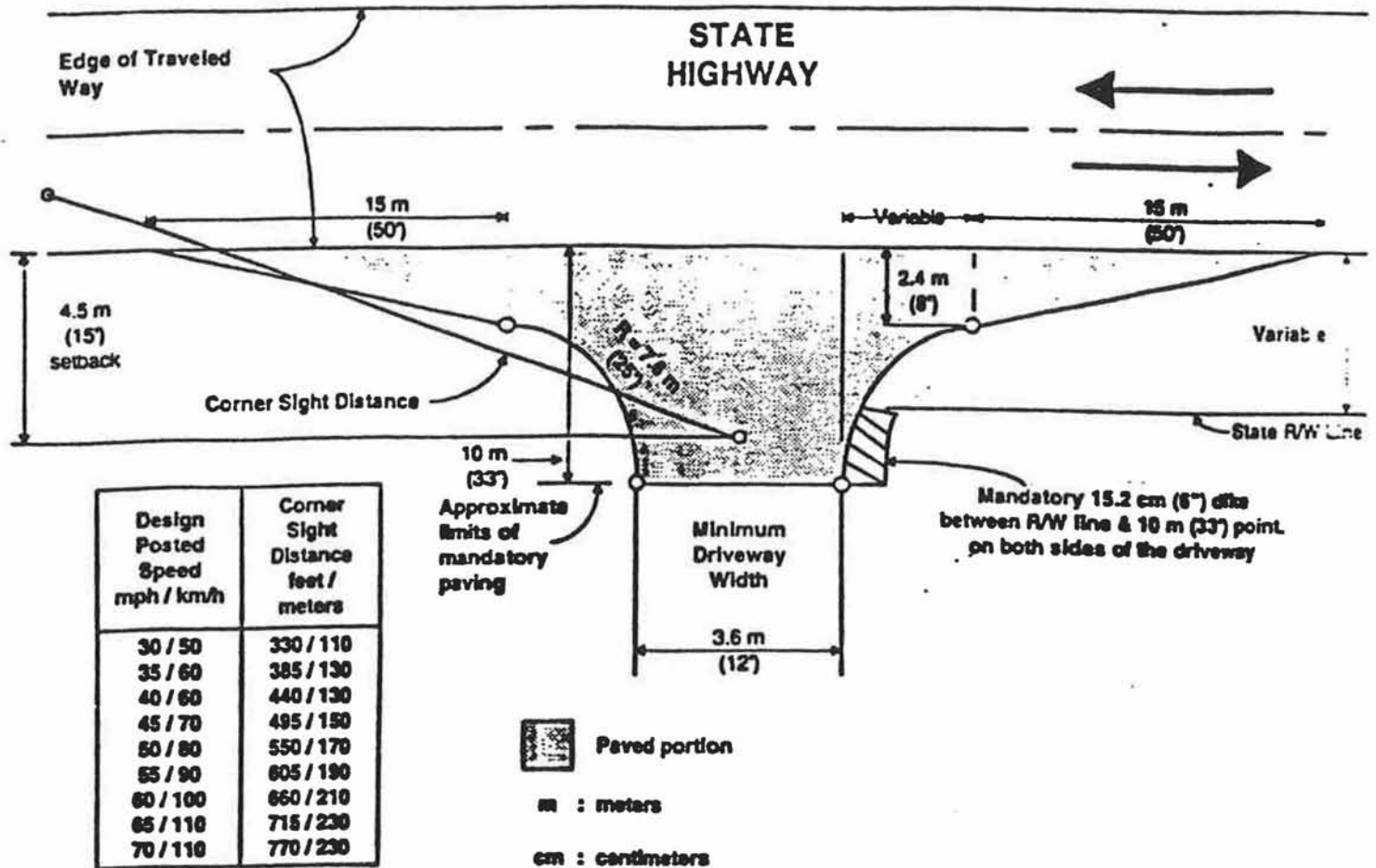
CWA/shT:BoDie.cop

[26/New/BoDie Hills RV Park, Motel & Campground]



**STANDARD PRIVATE & COMMERCIAL DRIVEWAY APPROACH  
IN RURAL AREAS WITH UNIMPROVED FRONTAGE  
ON CONVENTIONAL STATE HIGHWAY    REV. 1/95**

(not to scale)



- Driveway approach within 6 m (20') of the traveled way shall have a grade not greater than 5% except that on superelevated curves, the pavement slope shall be continued to the edge of the shoulder.
- Culvert pipe under the driveway approach might be required to carry the State Highway gutter flow.
- Paved portion of driveway shall be surfaced not less than :
  - Private : 7.6 cm A.C. over 15.2 cm aggregate base (3" A.C./6" A.B.)
  - Commercial : 10.2 cm A.C. over 15.2 cm aggregate base (4" A.C./6" A.B.)



## DEPARTMENT OF TRANSPORTATION

DISTRICT 9  
500 S. Main, BISHOP CA 93514  
TDD (619) 872-0691  
FAX (619) 872-0755



June 14, 1995

File: R/W  
9-Mno-270-0.0/0.8

Triad/Holmes Associates  
P.O. Box 1570  
Mammoth Lakes, California 93546

Attention: Gary Posekian

Mr. Dave Lavery of your firm recently approached this office regarding a dedication of right of way along State Highway 270 in conjunction with the Bodie Hills R.V. Park project. This would be beneficial to both the State and the grantor. The State would gain a record right of way where there is now only a prescriptive claim. Since the State would basically only want to acquire to the prescriptive limits, the grantor would not be giving up much over and above what the State would claim anyway. But the grantor would know where the right of way lines are. This should make the planning/engineering for said project easier.

The State will have to invest a considerable amount of time in field surveying and right of way engineering to pursue said dedication to completion. This office would thus like written assurance that the grantor will indeed make the dedication. Listed below are the points that should be covered in the letter:

1. The dedication will cover a right of way on both sides of State Highway 270 through all of Assessor's Parcel 11-070-04.
2. Through the area of the proposed development the right of way widths will be kept as narrow as possible so as not to acquire any more of the relatively small amount of flat (developable) land than necessary while still providing the State the necessary room to maintain the existing highway facility.
3. From the east boundary of the proposed development to the east boundary of said Assessor's Parcel there are some fairly substantial highway cuts and fills. In this area the acquisition lines will be 15' +/- outside the tops of cuts and toes of fills.
4. This dedication will be made even if the proposed r.v. park project is not carried through to completion.
5. The most current vesting document (distribution under will, O.R. 548/201) indicates there are three owners of the subject property. All three owners

This office will not start working on this project until we receive said written assurance. If you would like to discuss this further, before the letter of assurance is prepared, please call me at (619) 872-0643.

Sincerely,

**CHUCK ANDRUS**  
District Right of  
Way Engineer

CA:ccg  
cc: Mike Lahodny

DEPARTMENT OF TRANSPORTATION  
500 SOUTH MAIN STREET  
BISHOP, CA 93514



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MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

(619) 872-0658

January 30, 1997

File - Mono - 270 - 0.1  
SCH 97012031

Mr. Stephan Higa  
Mono County Planning Department  
P.O. Box 347  
Mammoth Lakes, California 93546

NOTICE OF PREPARATION OF ENVIRONMENTAL IMPACT REPORT AND  
SPECIFIC PLAN

Thank you for the opportunity to review and comment on the proposed Bodie Hills Recreational Vehicle Park, Motel and Campground on SR270. We have the following comments:

The existing 40-foot prescriptive right-of-way width may not be adequate for the standard 2-lane highway. In an earlier conversation, a representative of the property owner expressed a willingness to dedicate right-of-way in conjunction with this project (see attached). We need to fully discuss the additional, as well as the dedication of, right-of-way, therefore we will try to have a representative at the scoping meeting with the Lead Agency and the owner scheduled for February 6, 1997.

Improvements should be designed to avoid an increase in the flood plain, e.g., bridges and drainage structures should be designed for adequate conveyance to prevent backwater flooding of the highway. We request the opportunity to review grading/drainage plans in order to evaluate potential impacts to the State right-of-way. We would also like to obtain copies of the following technical studies: Wildlife Survey, Vegetation Survey, Archaeology Survey, and Band-Thigh Beetle Survey.

Mr. Stephan Higa  
January 31, 1997  
Page two

Encroachment permits are required for all work performed inside State right-of-way, and all driveways accessing State facilities must conform to Caltrans Standards. The Standard Design for private driveways is enclosed. It should be noted that SR 270 is not maintained in the winter months.

Please call me at (619) 872-0658 if you have any questions about our comments.

Sincerely,

  
for DENNIS MANNING  
Chief, Branch of IGR/CEQA Reviews

Attachments  
cc: SCH - Angel Howell



January 27, 1997

Mono County Planning Department  
POB 347  
Mammoth Lakes, CA 93546  
Attn. Stephen Higa

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JAN 30 1997

MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

Dear Mono County Planning Department,

Thank you for the opportunity to provide comments during the scoping phase of the proposed Bodie Hills Specific Plan, henceforth referred to as the Bodie Hills R.V. Park. I appreciate receiving the packet of materials.

I am a former Mono County resident, and currently spend most of my vacation time in the County. In addition, I am a wildlife biologist and environmental planner.

I am very disappointed that the Mono County Planning Dept. did not submit any public notice on this project. A project of this size, in a location as sensitive as the Gateway to Bodie, is extremely significant and warrants full public input. I subscribe to a local paper (Mammoth Times) primarily to keep posted on such matters, but never saw any announcement.

Below I have outlined some concerns:

**(1) flood potential**

The site seems inappropriate for development, particularly in light of the fact that other, similarly situated developments washed away just a few weeks ago in Mono County. What is the 100-year flood data for Clearwater Creek? The Bodie Hills are also susceptible to summer flash flooding, as well as large pulses of runoff during early spring.

**(2) impacts to Section 404 lands**

Even though the Specific Plan Project Description states that there will only be impacts to a single clump of willows, it is obvious from the enclosed map, as well as personal knowledge of the site, that most of the impacts fall in lands jurisdictional to the Army Corps of Engineers (seasonally wet meadows). This project will need a wetland delineation, and appropriate nationwide permits from the Army Corps of Engineers.

**(3) sprawl**

This project is incompatible with the surrounding undeveloped lands. Highly impactful projects such as this one should be clumped in other already-developed areas. "Sprawl" developments such as this will eventually make Mono County less desirable as a tourist attraction, and greatly escalate impacts to wildlife, wetlands, cultural resources, etc.

**(4) wildlife impacts**

The draft EIR must discuss full impacts to deer migration, threatened, endangered, and sensitive wildlife and plant species, include a rare plant survey by a qualified botanist, acknowledge increased impacts to wildlife from additional presence of humans and their pets, and recognize impacts to local bird populations when residents use seed bird feeders (which encourage brown-headed cowbird populations, which in turn parasitize other bird's nests). Riparian corridors, especially those in the Great Basin, are critical to wildlife. As stated above, this is an inappropriate site for a major development. Deer migration data may be available from studies conducted over the years by Caltrans. Full impacts to sage grouse, mountain quail, and pronghorn must be acknowledged. The Bodie Hills have significant populations of both of these animals.

The project description indicates that rare plants have been identified, but that direct impacts to these populations will be avoided. However, many times rare plant populations are destroyed by indirect impacts such as changes in runoff patterns from poorly planned development, trampling by humans, etc.

#### **(5) watershed management plan**

As you know, fishing is an important part of the eastern Sierra economy. I have frequently observed people fishing in Virginia Creek. Destruction or reduction of the Virginia Creek fishery would impact existing development at several motels located between the Bodie Road and Bridgeport.

Incorporated in the EIR, or as a stand-alone document, should be a watershed management plan, which would include basic background data such as current turbidity loads both in Clearwater Creek and Virginia Creek, current fish populations and associated invertebrates, expected impacts of the proposed development on fish populations, and expected impact of sewage leachate from the proposed project on fish populations. How much groundwater would be extracted at the proposed well? How much water would be lost to instream use from evapotranspiration from landscaping, and evaporation from the leach field?

#### **(6) public safety**

Upstream of the proposed project are several old sites, including Little Bodie Mine, and a prospect in Cinnabar Canyon. Appropriate water quality studies must be conducted to determine if there is mercury or any other mining by-product in Clearwater Creek that would make the water unsafe for public use.

The project description does not mention if any seismic studies have been conducted. Also, there is no mention of soil studies. Both items are important to determine if the site would withstand floods, earthquakes, etc.

What designs will the project incorporate to ensure the safety of pedestrians crossing over to fish at Virginia Creek?

(7) aesthetic

I have probably visited Bodie at least 50 times from approximately age seven onwards. One of my family's most cherished memories is a set of photographs my parents took at Bodie before it was designated as a State Park. Currently, the "gateway" to Bodie (junction of Bodie Road/ Highway 395) and the Bodie Road itself is extremely wild and scenic. It provides a critical setting in which to visit the Park: that you are approaching an extremely wild, remote place. Because it is a narrow, two-lane road that has a relatively low traffic volume. This atmosphere allows the harried east-side visitor (one day to visit Yosemite, three hours to visit Mono Lake, etc.) a chance to relax and unwind. The proposed R.V. Park will irreparably impact the "gate", and destroy the isolated spirit which brings visitors back year after year to Bodie.

(8) cultural resources

Full archeological studies must be conducted. Several years ago I collected some Mormon tea at this junction and found a large (5" long) obsidian bifaced blank. Needless to say, I left this treasure (although I shifted its location slightly so that it would be less visible to the next Mormon tea harvester). I would be happy to provide the exact location to a qualified archeologist. More recent human history must also be analyzed.

As mentioned in materials provided by the Mono County Planning Dept., increased human presence will greatly reduce lithic scatter.

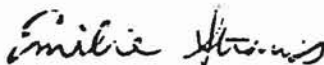
(9) miscellaneous

Will the rest of the 155 acre parcel be designated as permanent open space?

Will a bond be posted by the proponents to ensure full restoration of the site should the project be terminated mid-construction?

I would very much like to receive a copy of the combined Specific Plan and Focused Environmental Impact Report. I would like to receive copies of any technical reports currently available to the public.

Sincerely,



Emilie Strauss  
1606 Hearst Ave.  
Berkeley, CA 94703

cc: Ron Thomas, Terry Russi/Joy Fatooh



501 Woodmont Ave.  
Berkeley, Ca. 94708  
February 2, 1997

RECEIVED

FEB 10 1997

MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

Mono County Planning Department  
P.O. Box 247  
Mammoth Lakes, Ca. 93546

Gentlemen:

I have received some material describing plans for a railroad from the Mono Basin to Bodie plus an RV park at the edge of Clearwater Creek. We visit this area once or twice a year from the Bay Area to visit old friends who have lived on the shore of Mono Lake for 25 years or so. We have driven all of the roads in the area including both roads in to Bodie and the 167/359 road to Hawthorne. Yesterday I spent a day attending a lecture on the native plants in the Bodie Hills.

I don't know what the total economic benefit might be to the good folk living in Mono County of this RV park plan. From the standpoint of the tourist coming from outside the county this sounds like bad news. Part of the thrill of coming to the Mono Basin is the solitude and the openness of the country. Any more development in this area would be unwelcome. Not long ago the Mono Lake Committee won its long battle with Los Angeles water interests to restore Mono Lake to something closer to its original level. As you probably know thousands of letters poured in from all over the state to support this cause. I cite this as evidence that there is an enormous affection for Mono Lake and for keeping the wilderness aspects of the surrounding area.

As to the railroad maybe there is some merit. The ride would be picturesque. Driving in from the Mono Lake side by car is a dusty affair. Given the extremely low budgets of the Calif. State Parks I wonder if they could handle carloads of tourists descending upon them. Bodie is fragile and could suffer from the impact of too many people plus more crime and vandalism.

I love your county. Take care of the Bodies, the Mono Lakes, the Bridgeports and the June Lake loops. Mammoth Lakes is too touristy thanks to your friends from L.A. but let this be the last place this happens. What will bring visitors like me back to Mono County time and again is the unspoiled natural landscape and not the tourist amenities.

If you put me on your mailing list for any written material concerning this plan I wouldn't mind. Thank you.

Sincerely yours,

*Paul J. J. J.*



ELIZABETH DAVIDSON  
1419 Summit Road  
Berkeley, California 94708

Feb. 7, 1997

Mono County Planning Dept.

POB 347

Mammoth Lakes

CA 93546

RECEIVED

FEB 11 1997

MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

To whom it may concern;

Clearwater Creek is rare and should not be disturbed. A restoration of the sections to Bodie railroad would be desirable if done with careful planning.

An "amusement park" anywhere in this location is out of place and a poor way to present the historical past to Americans and visitors from abroad.

Development is not progress unless it is done intelligently.

Sincerely,

Elizabeth Davidson

Member, California Native  
Plant Society and enthusiastic  
visitor to Bodie @ it.





2/12/96

Dear Sir:

These comments are in regard to the Bodie Hills RV Park Specific Plan and EIR.

I am a member of the Bodie ACEC Advisory Committee, and I have a great concern and love for Bodie. While this development was considered in our discussions of the future of the Bodie area, I still have some concerns that I would like to see addressed in the DEIR.

One of these concerns is for the wetlands and the creek. There is a lot of erosion along the creek banks, and part of the mitigation should address this. Stream banks should be stabilized by plantings, and cattle grazing along the stream should be eliminated.

Another concern is the visual impact of this development. Please consider a condition that would require that the architecture of this development would be consistent with Bodie, ie, that building exteriors be wood, and the size and scale of the buildings would be consistent with those in Bodie. A ghost town theme for the development, such as at Knott's Berry Farm or Calico (which is also mostly not original) would be commercially valuable and consistent with the Bodie experience.

Finally, please consider requiring a conservation easement for the balance of this property, to restrict further, possibly incompatible development in the area.

Please send me the DEIS for this project when available.

Sincerely,

*Stan Haye*  
Stan Haye  
P. O. Drawer W  
Independence, CA 93526

RECEIVED

FEB 14 1997

MONO COUNTY PLANNING DEPT.



## **APPENDIX B**

- 1. Archeological Study**
- 2. Botanical Study**
- 3. Wildlife Study**
- 4. Traffic Study**
- 5. Hydrology and Stream  
Bank Studies**



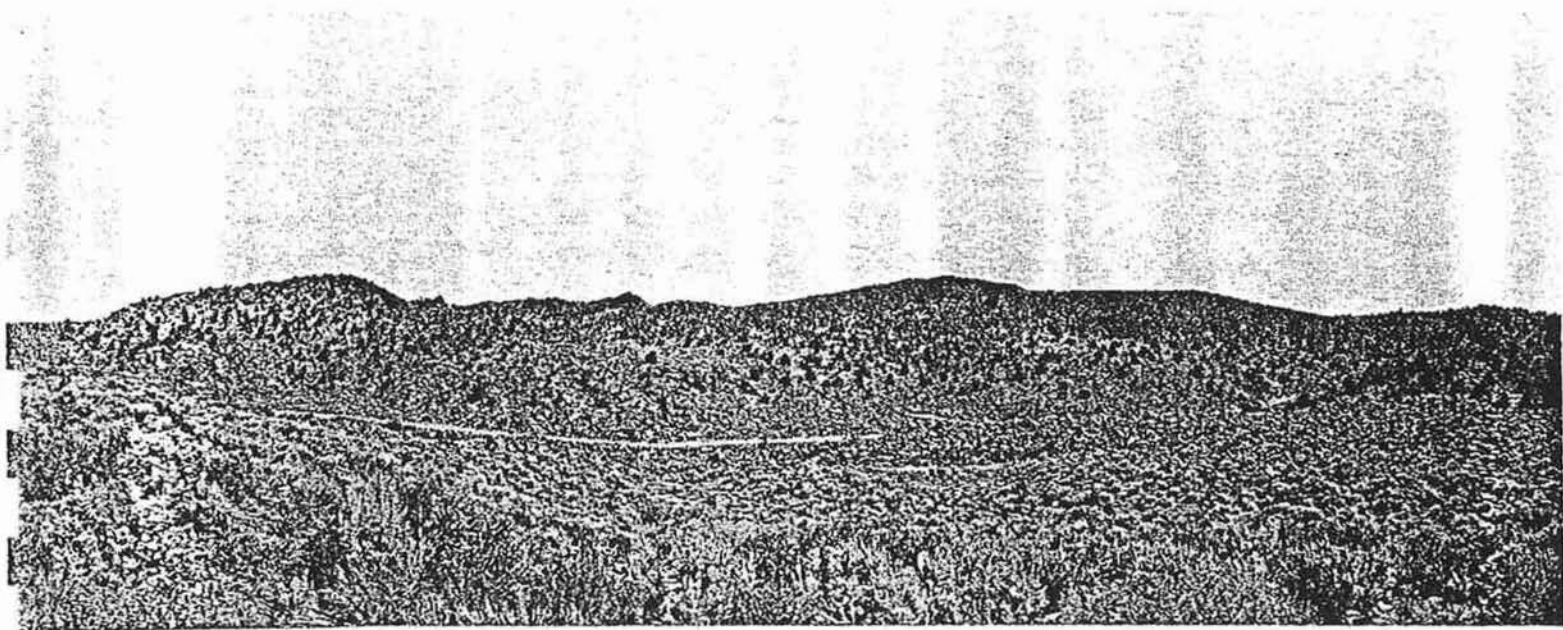
## 1. Archeological Study

THE UNIVERSITY OF CHICAGO LIBRARY



AN ARCHAEOLOGICAL SURVEY OF THE  
PROPOSED BODIE HILLS R.V. PARK  
MONO COUNTY, CALIFORNIA

Mary M. Farrell  
and  
Jeffery F. Burton



Trans-Sierran Archaeological Research  
Contributions to Trans-sierran Archaeology No. 41  
November 1996



AN ARCHAEOLOGICAL SURVEY OF THE  
PROPOSED BODIE HILLS R.V. PARK  
MONO COUNTY, CALIFORNIA

Prepared by:

Mary M. Farrell  
and  
Jeffery F. Burton

Trans-Sierran Archaeological Research  
332 East Mabel Street  
Tucson, Arizona 85705

Prepared for:

Mono County Planning Department  
P.O. Box 8  
Bridgeport, California 93517

TSAR Project No. 51  
Contributions to Trans-sierran Archaeology No. 41  
November 1996



## Management Summary

Trans-Sierran Archaeological Research has conducted an archaeological survey of the proposed Bodie Hills R.V. Park, within Mono County, California, as part of environmental studies for the Mono County Planning Department. Most of the development would be located along Clearwater Creek, but caretaker cabins or residences may be built on benches to the north. However, most of the 155-acre private parcel was surveyed, to facilitate future planning and to allow project modifications without initiating additional survey work. During the course of the survey 17 archaeological sites and 43 isolates were located and recorded. In addition, site record updates were completed for four sites previously recorded within the parcel; a fifth previously recorded site is well away from proposed developments. Together the sites suggest use of the property from A.D. 600 or earlier, up through the historical period.

Both direct (e.g., land disturbance from facility construction) and indirect impacts (e.g., degradation of archaeological resources from increased population) are considered, to comply with the *California Environmental Quality Act* (CEQA). The first stage of the project as proposed has the potential to directly impact two of the sites, and indirectly impact one other site. One of these, BHRV #2, is a scatter of historic to modern trash along State Highway 270. The site does not appear to meet CEQA criteria, nor to warrant additional work. The second site that would be directly impacted, Site BHRV #4, is a sparse lithic scatter located north of the road. Artifacts in disturbed areas suggest there may be intact subsurface deposits elsewhere within the site; it should be tested to determine its significance.

A third site would be subject to indirect impacts from the increased number of people in the area resulting from the R.V. park use. This site, CA-MNO-264, is a small rockshelter with associated artifact scatter, located within 75 meters of a proposed store and museum and less than 15 meters from an old road alignment that would be reopened to access the caretakers' cabins. Limited testing and surface collection is recommended to determine this site's significance.

Other work is recommended if the residences on the bluff are constructed. Limited subsurface testing would be needed at sites BHRV #8 and #10, and possibly BHRV #9 to determine their significance and if additional mitigation measures are needed.

Table 1. Site Summary.

Site No.	Site Type	Size	Features and Artifacts	Max. Density <sup>1</sup>	Impacts <sup>2</sup>	Significant <sup>3</sup>	Recommendations <sup>4</sup>
CA-MNO-264	Occupation	12 m x 15 m	rockshelter, 30 flakes, charcoal, abrader, historical trash	4	I	P	T
CA-MNO-265	Lithic scatter	40 m x 30 m	60 flakes, RSCN point, 4 biface fragments	6	N	P	
CA-MNO-266	Occupation?	45 m x 80 m	rockshelter, 1000± flakes, biface fragment, core, metate, possible hammerstone	50	N	P	
CA-MNO-2237-H	Dogtown	250 m x 850 m	numerous historical features and artifacts	-	N	Y	
CA-MNO-2761-H	Road	n/a	road alignment	-	N	Y	
BHRV # 1	Rockshelter	4 m x 3 m	recent and historical trash	-	N	N	
BHRV # 2	Trash scatter	250 m x 10 m	historical trash	-	Y	N	
BHRV # 3	Rockshelter	3 m x 4 m	rock wall, lumber, wire nail	-	N	N	
BHRV # 4	Lithic scatter	50 m x 150 m	50± flakes	4	Y	P	T
BHRV # 5	Lithic scatter	45 m x 15 m	100± flakes, 2 biface fragments	15	N	P	
BHRV # 6	Lithic scatter	370 m x 150 m	1000+ flakes	30	N	P	
BHRV # 7	Lithic scatter	10 m x 10 m	10 flakes	3	N	N	
BHRV # 8	Lithic scatter	60 m x 30 m	50± flakes, possible ground stone fragment	4	I	P	T*
BHRV # 9	Lithic scatter	20 m x 20 m	50± flakes	6	I	P	T*
BHRV # 10	Occupation	100 m x 200 m	house pit, milling slick, 2 possible mortars, historical trash, glass bead, 100s flakes, 2 points, 3 bifaces, metate fragment	6	I	P	T*
BHRV # 11	Occupation?	170 m x 110 m	possible rock ring, 1000s flakes, point fragment, 5 biface fragments, metate fragment, core	15	N	P	
BHRV # 12	Lithic scatter	45 m x 20 m	100s flakes, point fragment	75	N	P	

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Site No.	Site Type	Size	Features and Artifacts	Max. Density <sup>1</sup>	Impacts <sup>2</sup>	Significant <sup>3</sup>	Recommendations <sup>4</sup>
BHRV # 13	Lithic scatter	50 m x 40 m	50± flakes, Humboldt biface, 2 biface fragments	5	N	P	
BHRV # 14	Mining claim	25 m x 15 m	6 rock cairns, historic trash	-	N	N	
BHRV # 15	Lithic scatter	45 m x 30 m	30± flakes	3	N	P	
BHRV # 16	Lithic scatter	30 m x 50 m	40± flakes	8	N	P	
BHRV # 17	Artifact scatter	60 m x 30 m	possible rock alignment, 100s flakes, mano fragment, metate fragment, core, bone, pumice smoother, can	20	N	P	

1. flakes per square meter.

2. N = none, Y = direct, I = indirect.

3. N = no, P = potentially significant, Y = likely significant (not evaluated as part of this project).

4. T = testing is recommended to determine significance, T\* = testing may be needed before construction of caretaker cabins, depending on final alignment of access road.

## Acknowledgments

Funding for this work was provided by Mono County as part of a series of environmental studies conducted for the proposed Bodie Hills R.V. Park. I thank Mono County planner Stephen Higa for his support and interest. Field work was conducted by Geri Antone, Ron Beckwith, Betty Abril Burton, and Jim Burton. The hard work and professionalism of all the archaeologists on this project is much appreciated.

## Introduction

Under contract with Mono County, Trans-Sierran Archaeological Research (TSAR) conducted an archaeological survey of the proposed Bodie Hills R.V. Park, approximately 8 miles south of Bridgeport, California, and about 10 miles north of Mono Lake. The R.V. park would be developed on private land located along State Highway 270, just east of that road's intersection with U.S. Highway 395.

As stated in the description provided by the project proponents, the proposed R.V. park is located in Section 26, T4N, R25E, MDB&M, on approximately 13 acres of a 154.77-acre parcel in Clearwater Creek Canyon (Figure 1). The project area extends from the intersection of State Highway 270 with U.S. Highway 395 easterly up the canyon for approximately 3/4 mile. The R.V. park project has been proposed by Barbara Lembas, Edward Babcock, and Willis H. Lapham, owners of the property.

The proposed project includes the construction of a general store with restroom facilities; restaurant and office; a recreational vehicle park with 45 hook-up spaces and a restroom facility; a tent camping area with 8 camping cabins and a restroom facility; 10 housekeeping units; an old-west museum; a maintenance building; an owner's residence and two caretakers' residences; a 16-foot-wide gravel access road; two bridges over Clearwater Creek; underground water and power lines; and septic/leach field systems (Figure 2).

The survey was designed to identify archaeological resources within the project area as a first step in fulfilling *California Environmental Quality Act* (CEQA) requirements for mitigating the effects of the project. Most of the development would be located along Clearwater Creek, but at some point caretaker cabins or residences may be built on benches to the north. Although only about 13 acres have been proposed for development at this time, most of the 154-acre private parcel was surveyed, to facilitate future planning and to allow project modifications without initiating additional survey work. The larger survey area was also necessary to gauge potential indirect impacts; development and even slight increases in population have the potential to increase visitation and vandalism of nearby sites. In this report "survey area" refers to this larger area actually surveyed; "project area" refers to areas currently proposed for development; and "private parcel" refers to the entire 154.77 acres owned by the project proponents.

This report discusses the background, methods, and results of the survey, followed by an evaluation of the significance of the sites and recommendations for their treatment.

## Environmental Background

The survey area is located in the East Walker River watershed, near where Clearwater Creek joins Virginia Creek, which flows northward to Bridgeport Valley. The steep escarpment of the Sierra Nevada dominates the skyline to the south and west; within the survey area and to the northeast are the gently rolling Bodie Hills. The Bodie Hills are dominated by Tertiary and Quaternary volcanic rocks of rhyolitic through basaltic composition (Dohrenwend 1982). In the parcel, rhyolitic outcrops and boulders are most evident north of Clearwater Creek, and in bluffs to the south. South of these are Pleistocene outwash-gravel deposits (Dohrenwend 1982), which in the survey area appear as poorly sorted rounded cobbles, gravels, and sands, derived from the rocks of the Sierra Nevada.

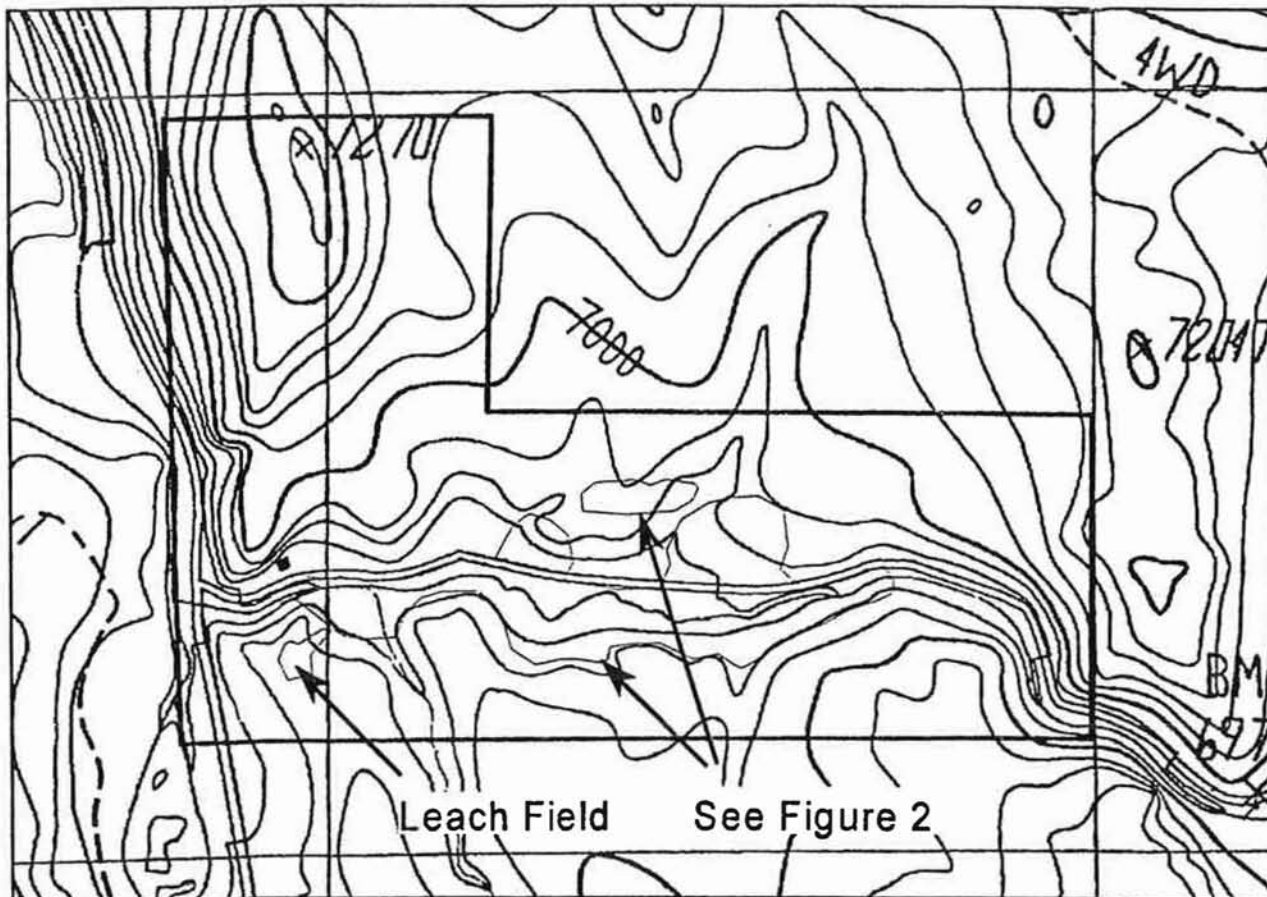


Figure 1. Proposed development areas, Bodie Hills R.V. Park (1 cm = 100 m; adapted from USGS 7.5' map Big Alkali, California, provisional edition 1989).

Elevation ranges from 6840 to 7270 feet. Clearwater Creek, where most of the developments are proposed, has a gently sloping canyon bottom 100 to 400 feet wide. Above the canyon bottom are broken and bouldery slopes, some over 100 feet high. On the north side of the creek some of these slopes continue steeply to the ridge tops in the northwest and northeast portion of the survey area, but much of the land both north and south of the canyon includes gently sloping benches.

The climate is semi-arid, with mild summers, cold winters, and approximately 10 to 15 inches of precipitation annually, mostly in the form of snow. The survey area straddles an ecotone of the sagebrush scrub and pinyon pine plant communities. Clearwater Creek supports a riparian community of dense willow and grasses, although parts of the stream terrace are eroded, and rabbitbrush is invasive.

Overstory vegetation is predominately pinyon (*Pinus monophylla*), with lesser amounts of juniper (*Juniperus occidentalis*). Understory vegetation consists of shrubs such as basin sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), rabbitbrush (*Chrysothamnus nauseosus*), and Mormon tea (*Ephedra viridis*). Grasses include Great Basin wild rye (*Elymus cinereus*), Indian ricegrass (*Oryzopsis* sp.), bluegrass (*Poa* sp.), blue wildrye (*Elymus glaucus*), and squirreltail (*Sitanion hystrix*).

Fauna present in the vicinity today include: mule deer (*Odocoileus hemionus*), jackrabbits (*Lepus townsendii*,

*L. californicus*), cottontail (*Sylvilagus nuttallii*), ground squirrels and mice (e.g., *Peromyscus*), black bear (*Ursus americanus*), mountain lion (*Felis concolor*), and coyote (*Canis latrans*). Beaver (*Castor canadensis*) live along nearby stretches of Clearwater and Virginia Creeks, and grizzly bear (*U. horribilis*), antelope (*Antilocapra americana*), and possibly bighorn sheep (*Ovis canadensis*) may have visited the area in the past.

Paleoclimatic data for the region have been compiled and summarized by Curry (1969), Mehringer (1986), and Bettinger (1982a). Between 12,000 and 10,000 years ago, the Great Basin underwent rapid climatic changes: as alpine glaciers retreated, lakes shrank, and plants and animals moved to higher elevations (Mehringer 1986). From 10,000 to 8,000 years ago, there was a warming trend in the Basin; Mehringer postulates that this warming trend continued, reducing the effective moisture through 5000 B.P. Various researchers have found evidence that the hot and dry conditions of the "Altithermal" may have prevailed up until 3,000 or 4,000 years ago, after which cooler temperatures and variable moisture were dominant until the late 19th century (Busby et al. 1979:36). Curry cites evidence for neoglacial periods between 2700 B.P. and 2000 B.P., a relatively dry period between A. D. 800 and 1300 (except for moist maxima between A. D. 900 and 1100), and glacial advances between A. D. 850-1050, A. D. 1550-1700, and 1750-1895.

## Cultural Background

In order to provide a contextual framework for this project, the cultural and theoretical background are briefly discussed below. Previous archaeological work in the region is summarized, the prehistory and history of the area is reviewed, and an overview of the ethnography of the region is provided.

### Previous Archaeological Research

Archaeological work in the region has been summarized by Busby et al. (1979), in an overview prepared for the Bureau of Land Management. In 1953, C. Meighan and graduate students of the University of California at Los Angeles conducted sample survey in parts of the East Walker River drainage, where they recorded over 100 sites, most marked by an abundance of obsidian (Meighan 1955:10). The three prehistoric sites previously recorded in the project area were found as part of this survey. Singer and Ericson (1977) sampled the Bodie Hills obsidian quarry, and determined that the main products manufactured were bifaces and blades, with the peak production between about 2200 and 300 B.C.

In a random sample survey conducted for the Bodie Hills Geothermal Area, Hall (1980) recorded over 400 archaeological sites, including temporary camps, hunting blinds, rock ring pinyon caches, and quarry/camps. He suggested that there were three main Native American uses of the area: fall pinyon pine nut harvesting, summer-to-fall deer and mountain sheep hunting, and obsidian quarrying. Historic sites included structural remains and trash scatters, which Hall inferred to be likely related to shepherding, cattle ranching, and mining.

Ann Peak (1975) surveyed the Bodie Road prior to the paving of State Highway 270. The then-dirt road and a buffer 30 feet wide on each side were surveyed; no sites were encountered in the current project parcel. David White (1986) conducted a survey for a transmission line located just west of the current project area; as part of this survey "Dogtown" and the 1892 Dynamo Pond to Bodie powerline were partially recorded, as well as other historic and prehistoric sites.



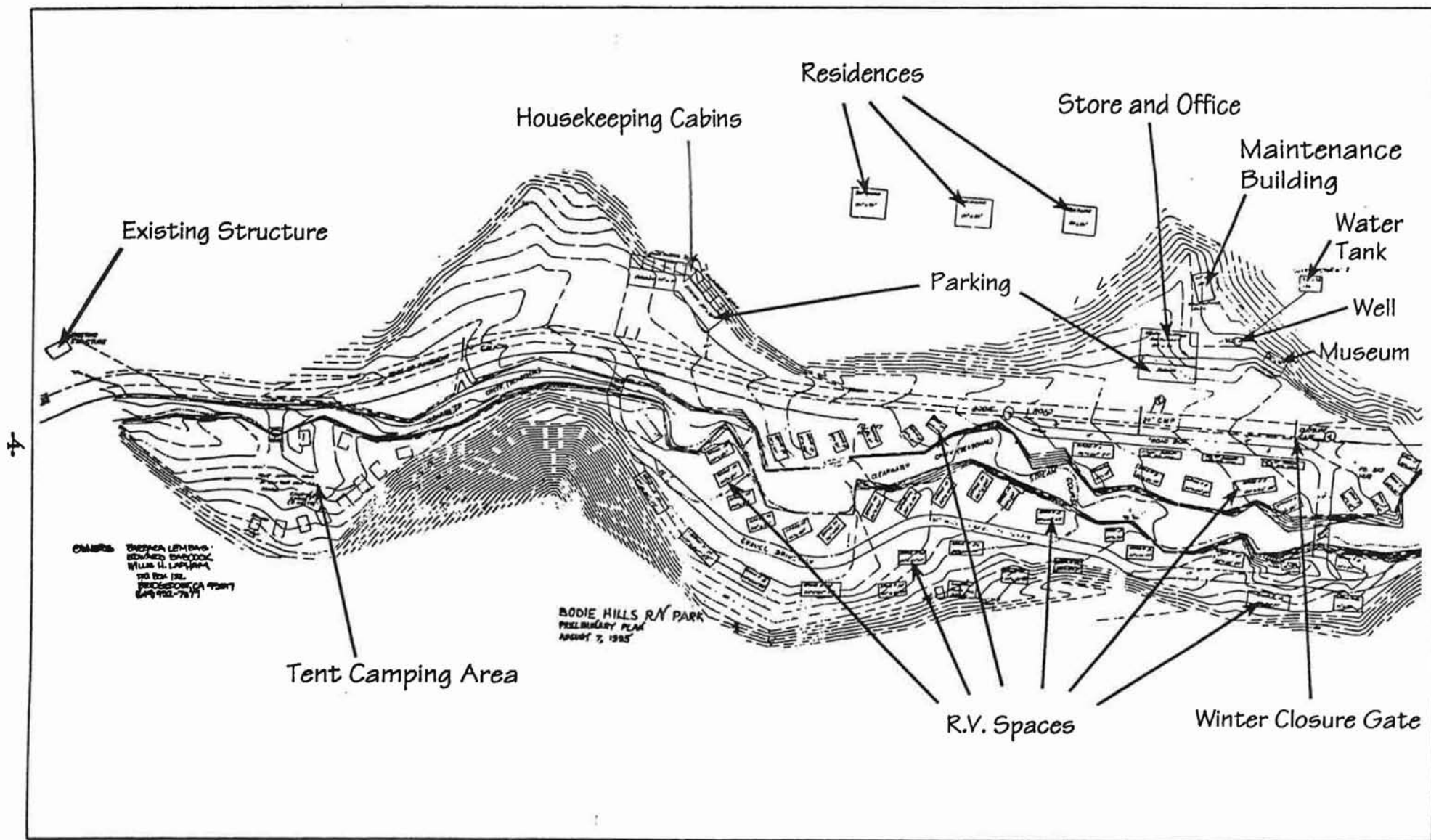


Figure 2. Project area, adapted from preliminary plan.

Archival research conducted at the Eastern Information Center of the California Historical Resources Inventory System (CHRIS), located at the University of California, Riverside, provided site records for the previously recorded sites in and within one mile of the survey area, and in addition pointed out that State Highway 270 itself within the project area was part of CA-MNO-2761-H, the "Old Country Road" from Bridgeport to Casa Diablo Hot Springs.

### Prehistory

Busby et al. (1979:208-213) compiled various archaeological accounts in their overview of the area to suggest an occupational history of the region. They posit an initial occupation possibly as early as 10,000-9000 B.C. From ca. 9000-6000 B.C. the "Western Pluvial Lakes Tradition" included a generalized subsistence pattern, emphasizing lacustrine and megafaunal food resources. Between 6000 B.C. and 4000 B.C. the warming, drying trend of the Altithermal fostered more use of higher elevations, and partial abandonment of some lower elevation ecological zones. The hunting-gathering patterns characteristic of ethnographic groups were established by 4000 B.C. Manos, metates, Humboldt, Pinto, Silver Lake, Lake Mohave, Elko and Gypsum projectile points are characteristic of this Great Basin Archaic period. Around A.D. 500 the introduction of the bow and arrow is marked by smaller Rose Spring and Eastgate points. Cottonwood and Desert Side-notched points appear ca. A.D. 1000 and, along with pottery in some areas, mark the Late Prehistoric Phase.

A slightly different chronology, based on time-sensitive projectile points, has been proposed by Bettinger (1982a:89-92) for the Inyo-Mono region: Pre-Medithermal Mohave complex (pre-3500 B.C.)—indicated by Mohave, Silver Lake, and Great Basin Transverse projectile point assemblages; Medithermal Little Lake Period (3500 to 1200 B.C.)—indicated by Little Lake and Pinto series projectile points and Humboldt Concave-base bifaces; Newberry Period (1200 B.C. to A.D. 600)—indicated by Elko series projectile points; Haiwee Period (A.D. 600 to 1300)—indicated by Eastgate and Rose Spring series ("Rosegate") projectile points and Humboldt Basal-notched bifaces; Marana Period (A.D. 1300 to historic)—indicated by Cottonwood and Desert Side-notched projectile points and Owens Valley Brown Ware ceramics.

### Ethnography

The boundaries of ethnographic groups in the Bridgeport Valley - Mono Lake vicinity were fluid (Busby et al. 1979; Davis 1965; Stewart 1938; Stewart 1939, 1941). The area is considered within the territory of the northern Paiute; the *Kuzedika* Paiute (Davis 1965) were centered in the Mono Basin area to the south; Steward (1933:Map 1) depicts a separate group, the *Paxai-dika* Paiute, in Bridgeport Valley. Although Steward provides no further details on this group, in 1934 and 1938 Merriam conducted linguistic studies listing the food plants and animals used by the Bridgeport Paiute (Heizer 1978:176-178), and Cain (1961) provides anecdotes about the late 19th and early 20th Century history of Paiute living in the Bridgeport and Coleville vicinities. The Sierra Miwok lived to the west and the Monache and Owens Valley Paiute to the south. The Paiute and Monache are Numic speakers, of the Uto-Aztecan language family, while the Miwok are a branch of the Utian language family. Price (1962, cited in Busby et al. 1979:109-114) includes the East Walker River watershed within the peripheral territory of the Washo, of the Hokan language family.

The social structure Davis (1965) documented for the Mono Lake Paiute probably applied to the Bridgeport Paiute as well. The *Kuzedika* were organized around the nuclear family, with perhaps one or two additional relatives completing the household. Most subsistence activities were performed by these independent small groups; families would come together in the winter, but composition of these larger aggregations was fluid, varying from year to year depending on resources. While an individual might be designated a group leader for individual events, leadership was ascribed, based upon talent, and temporary.

Due to friendly relations with the Paiute, small groups of Monache or Miwok from the west slope of the Sierra Nevada might spend extended visits on the east side (Gifford 1932; Cain 1961:94), and inter-group marriage did occur. The Monache and the Southern Sierra Miwok groups were probably similar in their social organization to the Owens Valley Paiute, with at least some hereditary rulers and semi-permanent villages (Levy 1978; Spier 1978; Theodoratus Cultural Research 1984:32-39).

Busby et al. (1979:143) list ethnographic references for the Washo, and summarize data on subsistence. The Washo traveled to make use of seasonally-available resources, focusing on riparian, lacustrine, desert scrub, and mountain zones. Shelters included brush windbreaks, semi-permanent winter houses of poles, and both round and gabled houses.

Bridgeport Valley offered a variety of food resources during snow-free months (cf. Davis 1964, 1965). In the spring, Tui chub, specked dace, and native trout may have been fished from creeks, while roots and greens along creeks and meadows might have replenished dwindling winter stores. Small game, deer, and antelope could have been hunted nearby. In the summer, grass seeds may have been collected from meadows and drier upland areas. Much of the trade and travel likely occurred during the summer months, when the high Sierran passes were free of deep snow. Fall subsistence activities would have revolved around the collection of pinyon pine nuts.

### History

There is some speculation that mountain man Jedediah S. Smith followed the east fork of the Walker River into the present Bridgeport vicinity during his Sierra Nevada crossing in 1827. Joseph R. Walker may have crossed Bridgeport Valley, a few miles north of the project area, during his 1833-1834 trip, as may have John C. Fremont in 1843-44. U.S. Army Lieutenant Tredwell Moore entered the Mono Basin on a punitive expedition against fleeing Yosemite Miwok in 1852, and reports of gold found by members of his expedition inspired Leroy Vining to begin prospecting in the Mono Basin that same year. A.W. Von Schmidt completed township plats of the Bridgeport Valley (filed in 1857) which plotted "Indian Trails;" one trail was located just south of the survey area (McCarthy and Young 1978).

It was the search for minerals that precipitated the first Euroamerican settlement in the region. The Dogtown placers, located just west of the survey area along Virginia Creek, were discovered in 1857 by Mormon prospectors. Up to 100 people mined the area between 1857 and 1859 (Fletcher 1987:30). White and Weisbrod (1985, citing Wedertz 1978) report that a few dozen people, mostly Chinese, continued to live and work in the area after the majority of the population left for new strikes elsewhere. Renewed interest in the Dogtown placers in 1878 led to several new claims and water developments;



dredging operations were undertaken in the early 1900s. The portion of the site recorded by White and Weisbrod contains the remains of rock cabin foundations, excavations and gravel mounds from the placer operations, and a small cemetery. Other gold strikes fostered short-term developments at Monoville or Mono Diggings in 1859, and at Aurora in 1860. Bodie, where gold placers had been discovered in 1859, boomed in the 1870s and 1880s with lode mining (Fletcher 1987). The 1892 powerline from Dynamo Pond on Green Creek to Bodie, the first electrification attempt in the Mono Lake - Bridgeport Valley area, passes less than a mile south of the survey area (White and Weisbrod 1985).

Mining precipitated road building, with a toll road over Sonora pass completed in 1868. The economy of Bridgeport Valley was stimulated by the mining towns of Aurora, Masonic, and later Bodie. The Big Meadows (Bridgeport) - Bodie Toll Road was completed in 1880 (Maule 1938:17 and maps). This road, which follows the alignment of Highway 270 in the project area, was formalized as a county road from 1901 until 1936, when it was superceded by Highway 395 (Costello and Marvin 1993). The 58-mile-long "Old County Road" (recorded as site CA-MNO-2761-H) connected Bridgeport and Casa Diablo Hot Springs, near Mammoth Lakes. The Highway 270 section was apparently unpaved until ca. 1975 (Peak 1975).

In the 1920s, with the closing of the mills at Bodie, cattle grazing, recreation, and tourism became the dominant industries of the region.

### Research Topics

As a result of previous work in the Inyo-Mono region, many research questions have been identified. For ease of reference, these can be divided into the eight thematic categories below. Not all sites in the region will have information on all, or even most, categories. But by estimating the quantity and quality of data categories present at a particular site, its potential for addressing research questions (and therefore significance) may be addressed (see Moratto 1981).

#### *Subsistence, Production, and Exchange*

Subsistence change: Bettinger (1975, 1976, 1977b, 1982a) has interpreted archaeological evidence in Owens Valley, to the south of the survey area, as indicating changes in subsistence through time. Bettinger and Baumhoff (1982) relate some of these changes to the Numic invasion/incursion, and postulate that a different Numic subsistence strategy supplanted the pre-Numic strategy. Other researchers (Hall 1981; Munday and Lincoln 1979; Bouscaren et al. 1982; cf. Bettinger 1979, 1981) have questioned whether there is sufficient evidence to support these inferences. Some researchers have postulated subsistence intensification through time (Basgall and McGuire 1988). Are these changes evident in the survey area? If so, do they reflect more labor-intensive strategies, or involve more marginal resource areas? Data on subsistence are found in evidence of food procurement and diet (e.g., floral and faunal remains, fire-cracked rock) and tools related to subsistence (e.g., projectile points, milling equipment, hearths).

Obsidian production: In a study of a Bodie Hills obsidian quarry site, Singer and Ericson (1977) postulate that obsidian production peaked from 2200 B.C. to 300 B.C.; is variability within that time

period evident within the archaeological record? Did the technology of obsidian reduction change through time? Did climatic or catastrophic events (Hall 1983, 1984) disrupt production? Are there differences in production for exchange of luxury or utilitarian items (Moratto 1972)? Data on obsidian production can be derived from sites containing evidence of local manufacture of trade items such as obsidian bifaces (preforms) or cores and from the analysis of lithic debris.

Regional and inter-regional (trans-sierran) exchange systems: What was the direction and intensity of exchange? Who were the producers, and who were the consumers? Was obsidian obtained directly by visiting groups or through exchange with the local inhabitants or middlemen? What is the antiquity of formalized exchange systems; estimates vary from as early as 3500 B.P. (cf. Bettinger 1982a; Hughes and Bettinger 1984), to as recent as the late prehistoric (Basgall 1983, Bouey and Basgall 1984). In Owens Valley, shell and stone beads have been equated with a local money economy in late prehistoric times, based on extensive intra-valley trade (Bettinger 1982b; Bettinger et al. 1984); is this money economy reflected in the archaeological record north of the Owens Valley? How would it have affected local subsistence and trade? Exchange system data can be found in artifacts that reflect trade (e.g., non-local material or manufacture).

Technology, tool use, and curation: Can the timing, causes, and consequences of technological innovations, such as the introduction of the bow and arrow or ceramics, be defined and clarified? Bettinger et al. (1984) have postulated that differences in pre-Numic and Numic subsistence strategies would result in differences in tool use and curation. For example, the "traveller" strategy of the pre-Numic would result in longer curation and more caching of artifacts than the Numic "processor" strategy.

#### *Demography and Settlement Patterns*

Demography: Although issues such as regional population estimates usually require more extensive data and more temporal control than are usually available for prehistoric times, some demographic information may be extracted through skeletal studies. Age structure, nutritional stress, and diseases are sometimes discernible, if human remains are available for study (Hassan 1978).

Settlement patterns: Often intimately tied with subsistence, the questions listed under Subsistence, Production, and Exchange also will pertain here. However, settlement pattern studies also may include specifics of site location. For example, are sites more likely on ridgetops or along drainages? Were certain soil types, or vegetation covers, more likely chosen for habitation or campsites? Did the types of locations occupied change through time? Does intra-site or regional patterning reflect social organization?

Cultural succession: Investigate the hypothesis concerning the Numic invasion/migration as forwarded by Lamb (1958) and elaborated upon by others (Ambler and Sutton 1989; Bettinger and Baumhoff 1982; Sutton 1986). Relevant data can be found in rock art sites, changes in artifact styles, and settlement types.

#### *Art, Ritual, and Cultural Identity*

Art and ritual: Can the analysis of artifact designs, style, or function provide any ritual or symbolic

content? Can any ritual artifacts or features be identified?

Rock art: Analysis of designs, style, environmental context, and associations may provide information on ritual communities (Whitley 1987), social function, style, and cultural identities. For example, Bettinger and Baumhoff (1982) use rock art data as one line of evidence in their argument concerning Numic replacement of pre-Numic populations.

Cultural affiliation: Can culture affiliation be discerned through culturally diagnostic artifacts, features, technology, or ethnically-controlled raw material?

Ethnography: Test the fit between the ethnographic and archaeological records (Thomas 1973).

Acculturation: Examine the effects of the Euroamerican incursion on local native groups, through their material correlates.

#### *Social Organization and Territoriality*

Social organization: The documented presence of craft specialization and hereditary headmen in the Owens Valley argues for established sociopolitical complexity in the protohistoric-historic period (see Bettinger and King 1971). Evidence of craft specialization in the Bodie Hills area may provide data on the geographic extent of this complexity.

Territoriality: Territoriality is manifested in the degree of resource protection or restriction. Bettinger (1982b) has postulated that Owens Valley groups were territorial, based on the distribution of artifacts made of Fish Springs obsidian. Although ethnographic evidence indicates the Mono Lake - Bridgeport Paiute were not territorial, is there archaeological evidence of earlier territoriality?

#### *Regional Chronology*

Chronology: Researchers have provided and refined a basic chronology useful for the Western Great Basin (Bettinger and Taylor 1974; Heizer and Hester 1976; Thomas 1981). However, refinement of this chronology is desirable because of the morphological and temporal overlap of projectile point types in the Inyo-Mono region (Jackson and Bettinger 1985:49-50; Flenniken 1985; Flenniken and Raymond 1986). Further, some types, such as Great Basin stemmed series projectile points, are less well defined. Other temporally diagnostic artifacts, such as shell beads, have been dated primarily in contexts outside east-central California, often using highly variable radiocarbon associations. Chronometric data can be derived from sites that permit temporal control (e.g., time sensitive artifacts, organic materials suitable for radiocarbon dating, or obsidian for hydration dating).

Paleoindian and early man sites: What is the antiquity of human occupation in the Great Basin? Despite a tremendous amount of research, there is no conclusive evidence of paleoindian occupation of the Great Basin. Paleoindian cultural material in a clearly stratified, datable context would be extremely significant in this regard. Further, while many sites have been proposed as early man sites, all have problems ranging from verification of the association of cultural material with dated material, to verification of human origin of the artifacts.

### *Paleoenvironmental Reconstruction*

Past climates: Test and refine existing models of climate reconstructions. Can the effect of climate change on human occupation be discerned in the archaeological record? Relevant data can be found in faunal and floral remains, fossil pollen, and tephra.

Local environment: Investigate floral succession and changes in faunal distributions and their effect on human occupation.

### *Formation Processes*

Site formation processes: What postoccupational human or natural agencies have altered the presence, condition, distribution and nature of archaeological remains? What kinds of materials may have been present, but not preserved in archaeological deposits? Can some activities be identified through soil chemistry (Burton 1985, 1986a, 1986b, 1987; Clay and Hall 1988; Goldberg et al. 1990) or other ancillary studies? How has mixing (see, for example, Weaver and Hall 1984) affected the archaeological record?

Obsidian hydration: Clarify source-specific obsidian hydration rates. Can problems in application be overcome (Burton 1988, 1990; Green 1986, Jackson 1984a, b)?

Scavenging and reuse: Have the deposits or cultural materials been reworked or disturbed by past occupants? There is a growing body of data suggesting that scavenging of both flaked and ground stone artifacts is common (Bettinger 1989; Burton 1985a, 1986b; Goldberg et al. 1986; Wilke, personal communication, 1989); what is the effect on the archaeological record? Detailed lithic analysis, in combination with precise temporal control, is generally needed to address this issue.

### *Historical Period*

The following general research themes are adapted from those suggested by Hardesty (1990) for historical sites in the intermountain West.

Economics and land-use: What are the characteristics of boom-bust cycles? How does the retraction and expansion of capital for mining and ranching (often from distant sources) affect the local economy and culture? Hardesty notes that during the nineteenth century change was often more rapid in the countryside than in towns, because of rural ties with urban capitalism. How rapidly did change in styles or technology reach the eastern Sierra? How are economic ties to metropolitan areas structured? Although the West is famous for images of rugged individualism and independence recently manifest in the "Sagebrush Rebellion," to what extent are the western economies actually dependent upon the Federal government (e.g., dam projects, military bases)? How accurately does the historic record reflect actual land use patterns and economies?

Acculturation and adaptation: What are the mechanisms of acculturation and adaptation when groups of different cultural backgrounds (e.g., Anglo settlers and native Paiute) meet?

Development of tourism: Tourism is now a major component of the economy of the eastern Sierra Nevada. How has the social and economic importance of tourism changed? How has changing transportation and access affected tourist developments and the social status of those participating? Did



the physical environment, as well as finances, play a part in unsuccessful ventures? How do cultural formation processes of tourism differ from that of residential use (Morris 1990)?

## Methods

Background research was conducted at the Eastern Information Center of the California Historical Resources Inventory System (CHRIS), located at the University of California, Riverside (Appendix A). As mentioned above, five sites had been previously recorded as within or extending into the project area, and many other prehistoric and historic sites have been recorded in the vicinity.

Archaeological fieldwork, totaling 16 person-days, was conducted between July 10 and 15, 1996. The project area was intensively surveyed by a team of between three and five archaeologists walking at 25-meter intervals. Excluded from survey were cliffs at the far western and eastern ends of the project area, judged too steep to safely examine. No substantial historic or prehistoric resources were seen during visual inspection of these areas, but there may be isolated artifacts present. The only other portion of the parcel not surveyed is that small area which lies west of Highway 395, within the Dogtown site. This site had been recently recorded (White and Weisbrod 1985) and is well away from the project area.

Sites were defined following the California Archaeological Inventory criteria (15 items per 100 square meters or a feature). Items not meeting this definition were recorded as isolates. Isolates were recorded by the survey crew as they were found. Sites, on the other hand, were revisited after the initial survey and recorded by a two- or three-person crew.

Standardized site survey records were completed for each newly-discovered site and the record for each previously-recorded site was updated to reflect the site's current condition. Artifact concentrations, features, and modern intrusions were recorded, photographed, and mapped. No subsurface testing or surface collection was conducted for this project.

## Results

Approximately 130 acres were examined (Figure 3); 20 archaeological sites (including 3 previously recorded) and 43 isolates were recorded within the survey area. Two other previously recorded sites extend into the parcel, Dogtown (CA-MNO-2237-H) and the Old Country Road (CA-MNO-2761-H). Only a very small portion of Dogtown extends into the Lapham parcel, at the far western edge west of Highway 395. Because the site record appears complete and up-to-date, and because this site is well away from any proposed developments, no site record update was completed. The old Country Road is State Highway 270 itself; a site update was completed for the short segment of this site within the project area. Site locations are depicted in Figure 4, and Archaeological Site Survey Records are provided in Appendix B and C. The sites and isolates are summarized below.

The site locations depicted in Figure 4 show two of the three previously recorded prehistoric sites in slightly different locations than the regional clearinghouse records indicate. The sites had been recorded



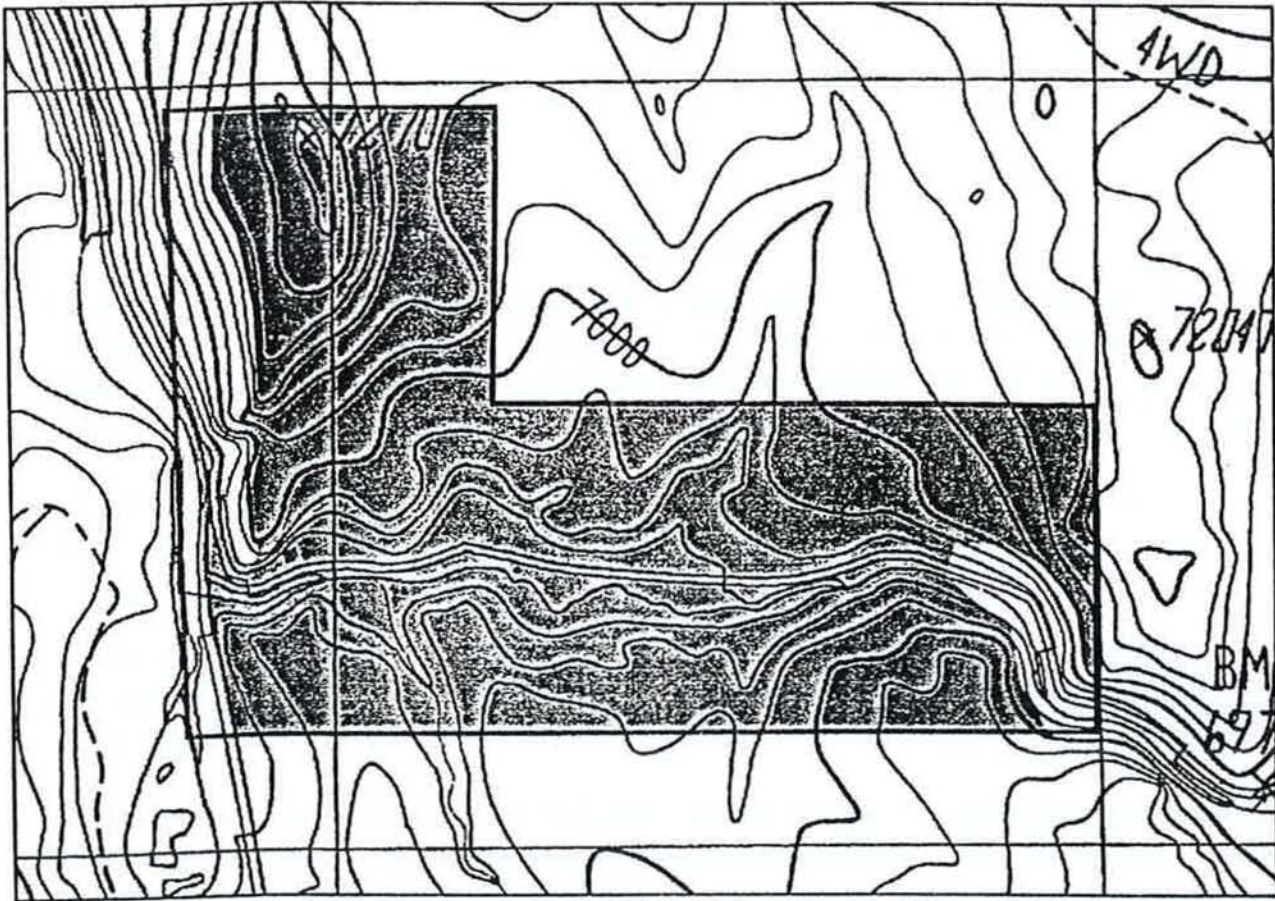


Figure 3. Archaeological survey coverage, Bodie Hills R.V. Park (1 cm = 100 m; adapted from USGS 7.5' map Big Alkali, California, provision edition 1989).

in 1953, before 7.5 minute topographic maps were available; although the 1953 site descriptions were very cursory and brief, they seemed to better match nearby sites than field conditions at the plotted locations. Although some discrepancies remain, the locations plotted in this report reflect those site characteristic descriptions we judge least susceptible to error.

about 30 feet by 10 feet in size, located 0.2 mile the west side of a small tributary. The site that ocaation provided by the CHRIS clearinghouse well as obsidian, scattered downslope from the pear to be about 20 cm deep, with additional rhyritic rhyolite with two ground striations on osed access road to the upper residences passes ject to indirect impacts with increased recreation

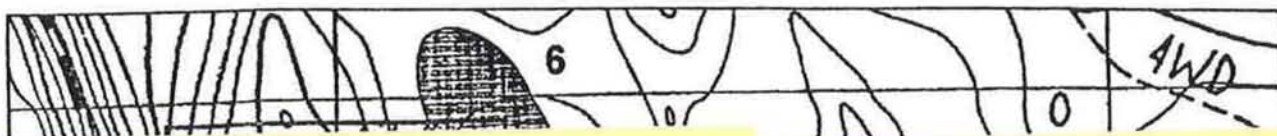
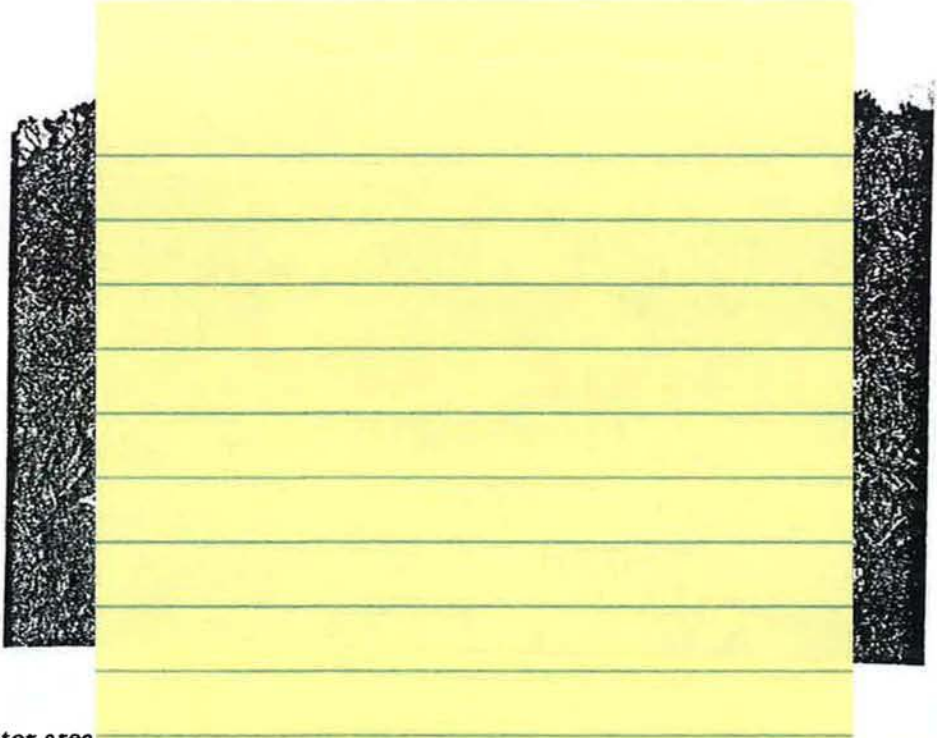


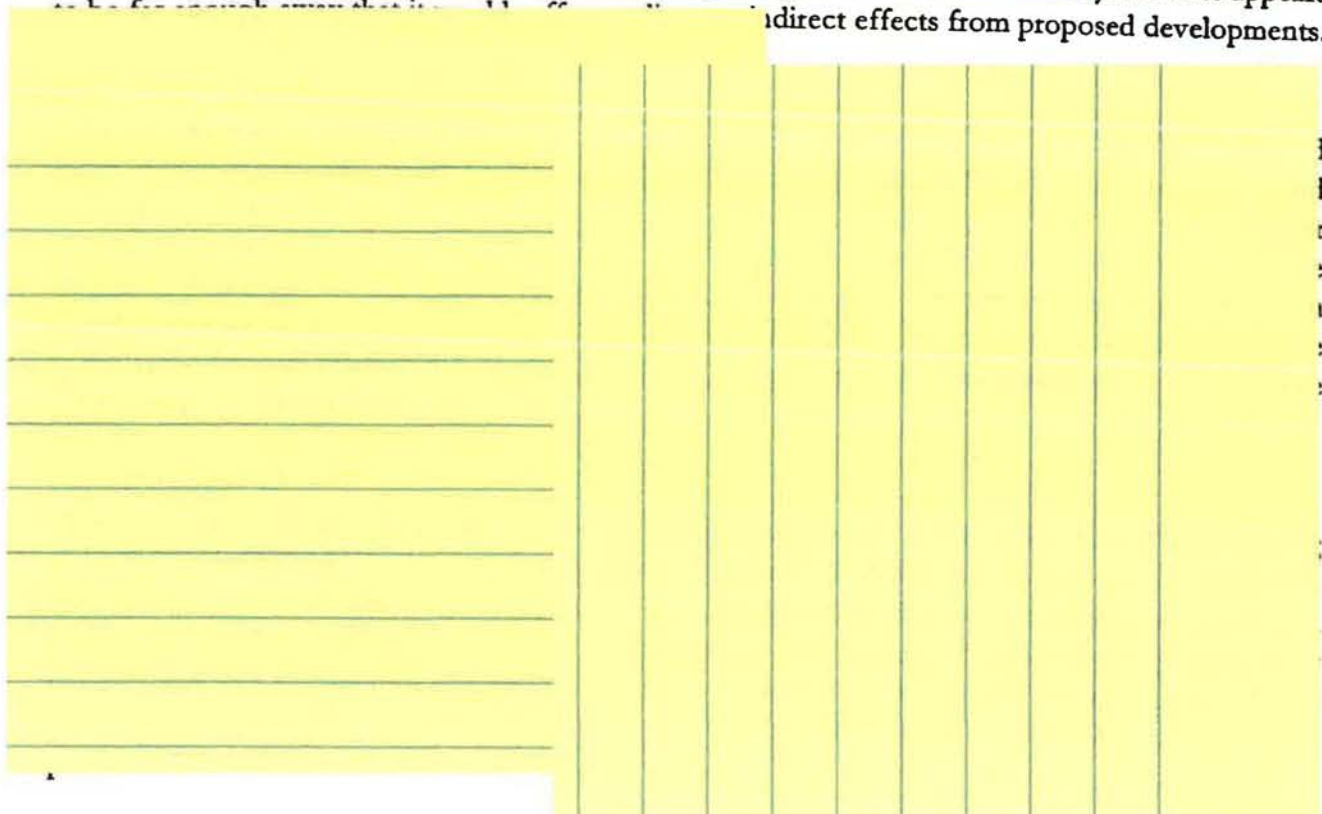
Figure 4. Archaeological site locations, Bodie Hills R.V. Park (1 cm = 100 m; adapted from USGS 7.5' map Big Alkali, California, provisional edition 1989).

00 yards in diameter, located on a ridge 150  
 at the location plotted, there is indeed a flake  
 believe this is *not* site CA-MNO-265. First, the  
 gh a recorder could transpose directions or  
 el a landform. Second, the flake scatter seen  
 areas; less than a dozen flakes were seen on  
 ons were very different 40 years ago, it seems  
 ention of an early archaeological survey. The  
 w. Third, given our high confidence for the  
 d also be further east. The site that appears  
 out 200 meters east of CA-MNO-264, on a  
 record may reflect the inclusion of isolated  
 parsely scattered to meet current regional  
 out 25 chert flakes, 25 obsidian flakes, some  
 use (Figure 6a), and four biface fragments in





a 40 by 30 meter area [redacted] ty. The site appears to be far enough away that it [redacted] indirect effects from proposed developments.



*CA-MNO-2761-H*  
State Highway 270 follows the general alignment of a small portion of the "Old County Road,"



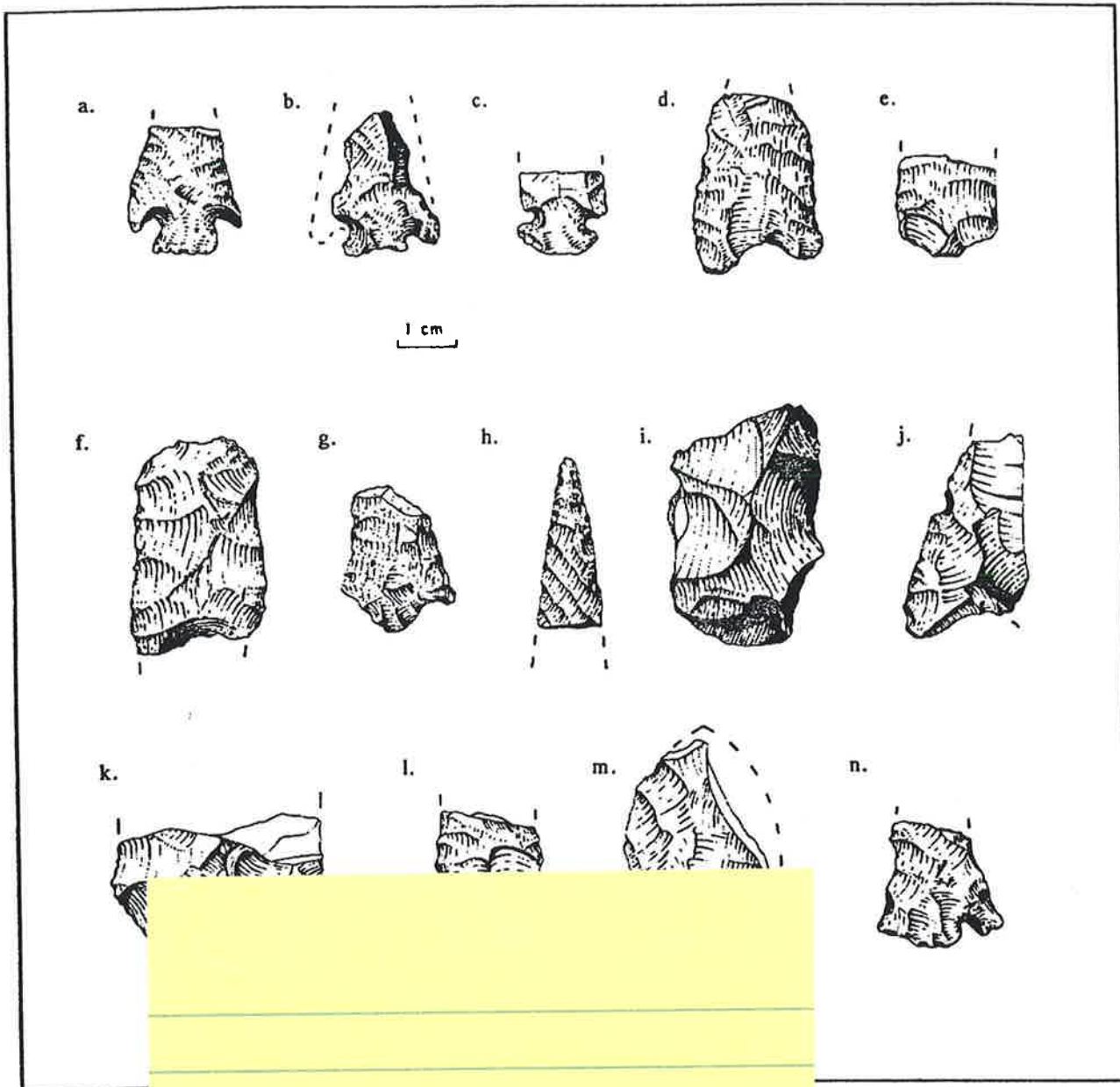
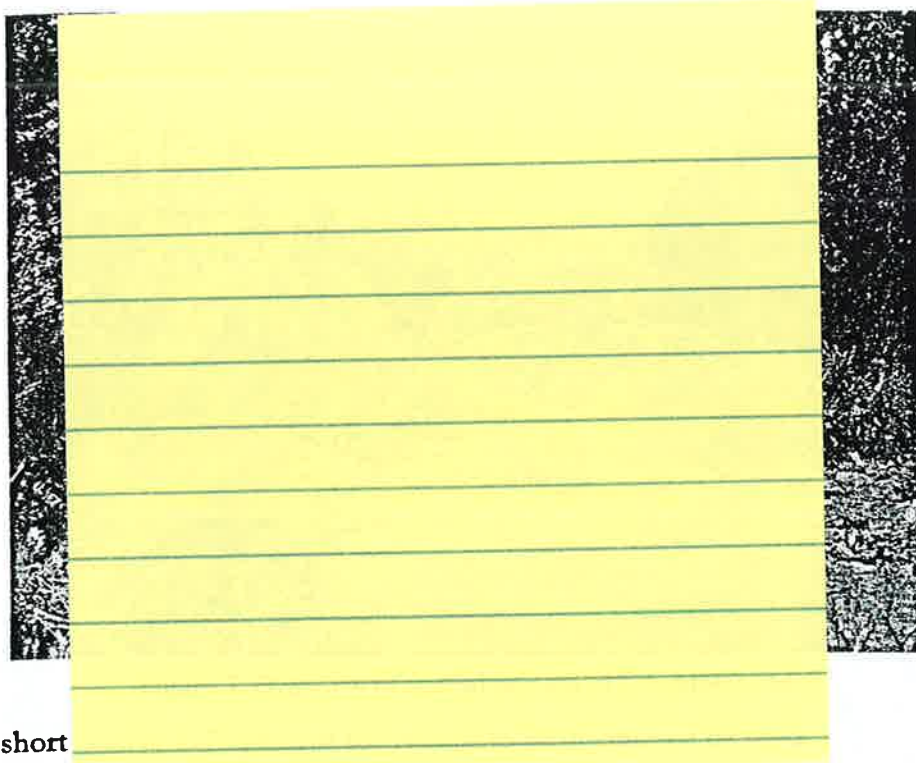


Figure 6. Ty  
m. Humbold  
#13, l. BHR

the Spring projectile points, d, f,  
#3, c-g. BHRV #10, h-k. BHRV

formalized  
Mammoth  
trails which  
travel route  
alignment r  
are propose  
encountere  
1975 survey  
road was di

sa Diablo Hot Springs near  
ncorporated older roads and  
ely followed earlier prehistoric  
he current U.S. Highway 395  
(midt plats). No modifications  
small segment of asphalt was  
ment is uncertain; Peak, in her  
(1970), states that at that time the  
an earlier, paved segment of



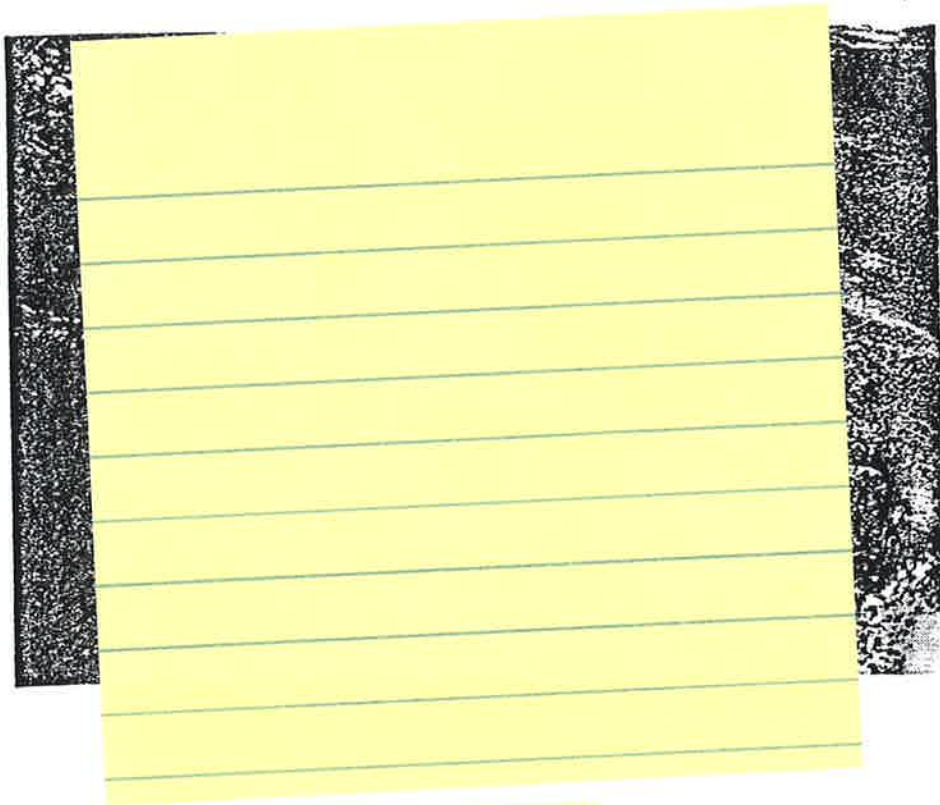
the road too short

**Newly Recorded Sites**  
*BHRV #1*

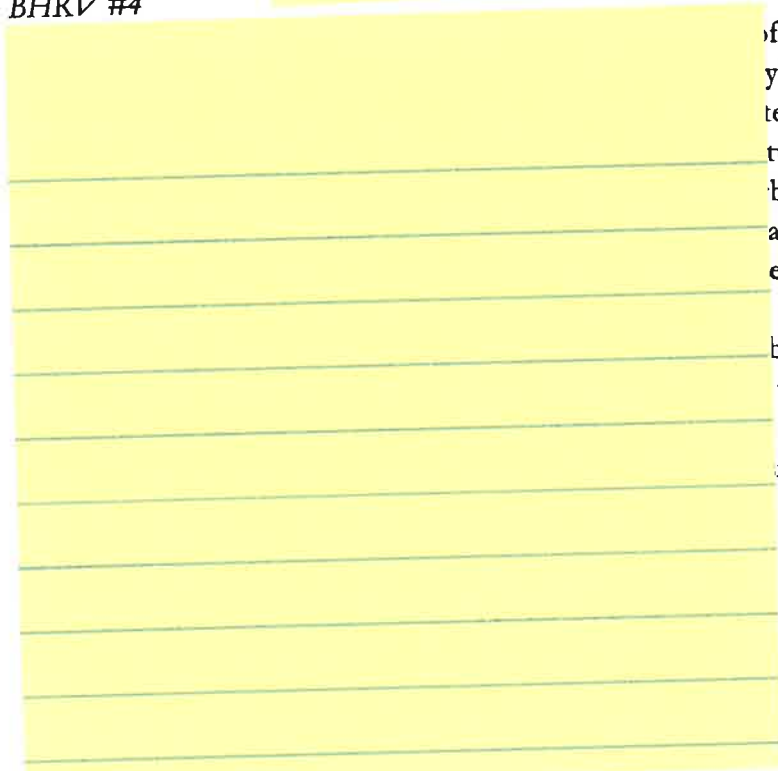
270, about 100 meters east of its intersection because the location made it a candidate for 2 meters north of the road, and only about altered area is only 4 by 3 meters in size; and no e area. There are sediments within the shelter, ts are expected: the shelter is well away from

20 to the present in an area about 250 meters 270. Several R.V. parking areas and auxiliary from Bridgeport to Casa Diablo Hot Springs trash recorded in the parcel along the highway roadside trash appears to represent numerous entury to the present. No evidence of features

270, this is a very small rockshelter with an adjacent low rock wall and scraps of lumber. The entire site is about 4 by 3 meters, besides a projectile point found 8 meters southeast of the shelter (Figure 6b), no artifacts other than the lumber scraps were found in the site vicinity. No impacts are expected.



BHRV #4



of about 50 flakes in a small flat terrace at  
y 270. Most of the flakes are of obsidian,  
te and basalt. There are heavy equipment  
turbid areas. The densest material (up to  
bance around a small trench that appears  
arser, with only one flake per 20 or more  
e of this site based on surface evidence:  
regional clearinghouse site criteria, but  
biting visibility. The existing disturbance,  
trench up to a meter deep, has probably  
of the site. Proposed developments, the  
ite.

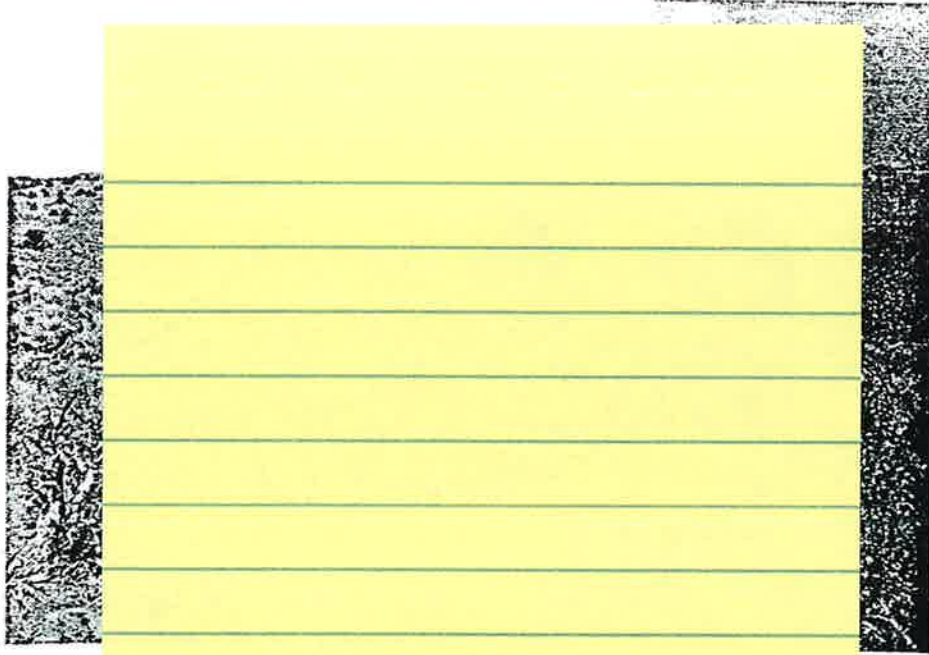
and two biface fragments, is located on  
f Virginia Creek (Figure 8). The artifacts  
rea The site may have been a temporary  
project.



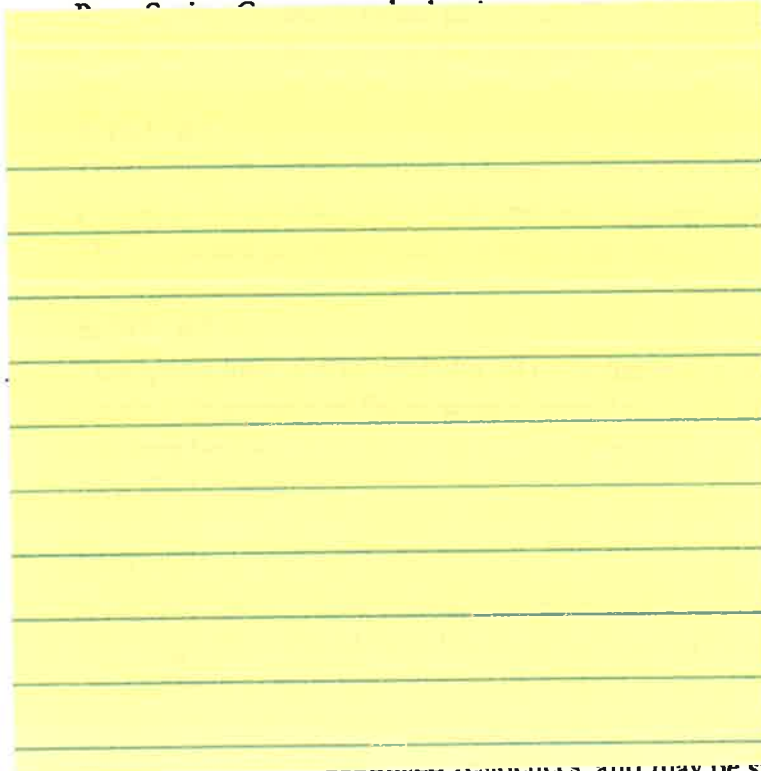
open  
a large  
ost all o



nolls, consists of several dense  
0 m by 100 m in size. It includes  
Highest density appears to occur



in rocky areas, perhaps [redacted] site. In the southern part of the site, very [redacted] counted. The only tools seen at the site were an obsidian biface fragment and a projectile point fragment, both on the west edge of the site. Although a midsection, the point has part of a tang, suggesting it might have been a [redacted] between A.D. 600 and 1300. No impacts are



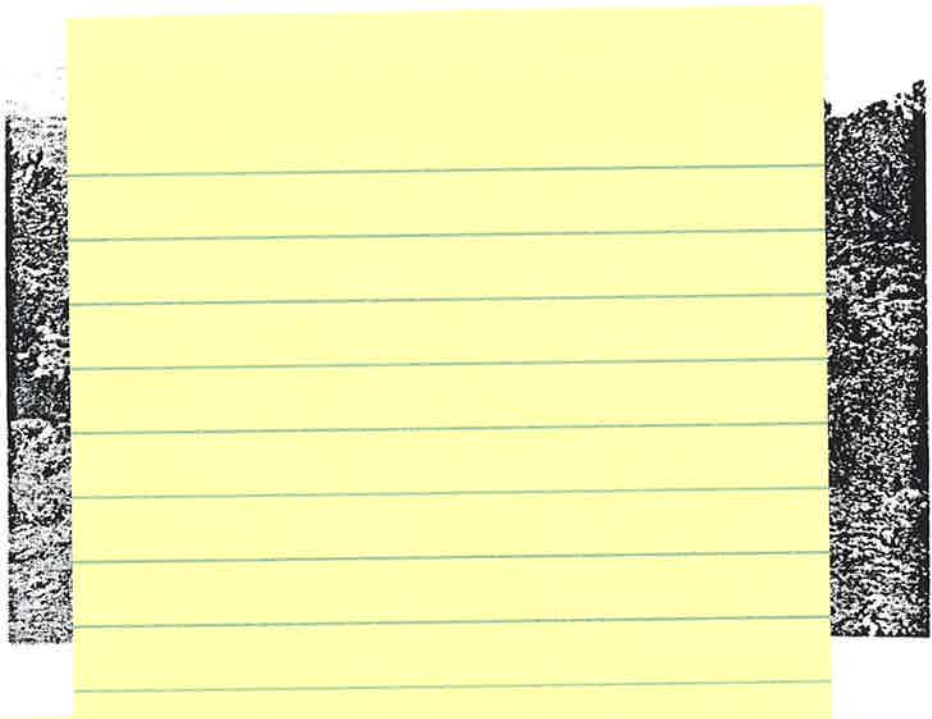
[redacted] than 10 obsidian flakes and one chert flake in rock suggest little potential for buried deposits.

[redacted] m by 30 m area on a bench above Clearwater [redacted], too sparse to meet site definition criteria. The caretaker residences are built, depending upon

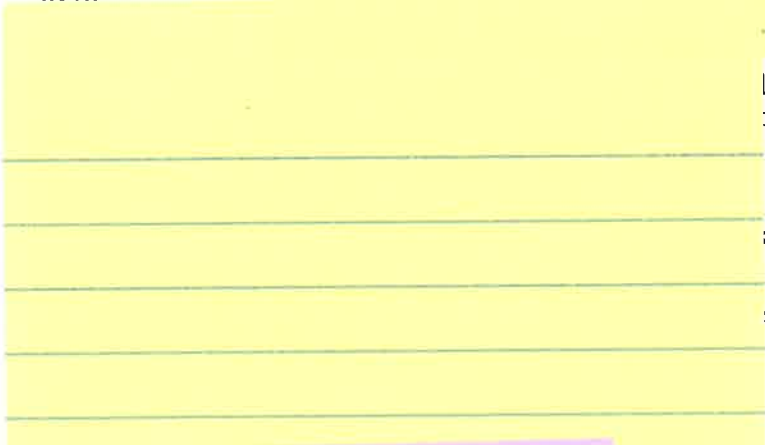
[redacted] 0 flakes in a 20 m by 20 m area on the edge of [redacted] nded obsidian, but there are a few of dark fine-flakes. There are many bedrock outcrops and [redacted] up and buried cultural deposits. The site is not

[redacted] proposed residences, and may be subject to direct or indirect impacts, depending on the final design.

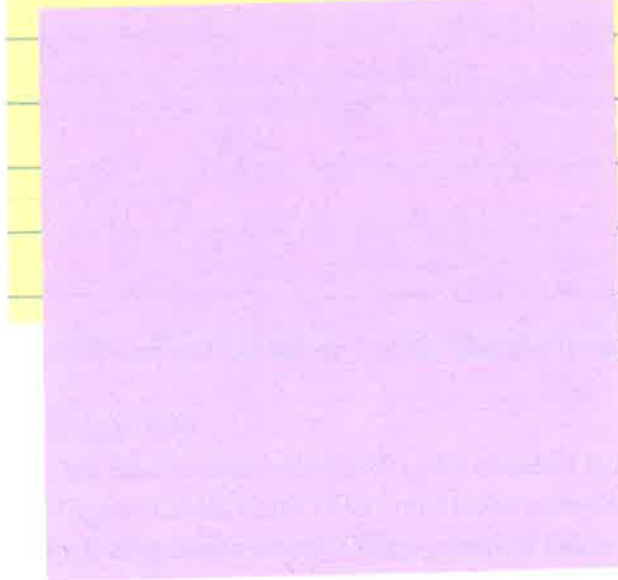




DIIRK #10



ci (Figure 10). Overall (square meter) in several small concentrations of point fragments, bifacial tools, and roughouts, two possible incipient mortars, as well as a bone, and a rock alignment that appears to be used by Paiute in the late nineteenth or early twentieth century. The site is well away from proposed developments, especially if cabins are built on the bench to



Northwest-aspect slope, includes thousands of artifacts that suggests occupation or use as a pinyon nut cache. The site is well away from proposed developments.

One projectile point tip, in a 45-by-20-meter area just below the ridge top at the far eastern end of the site. There are no concentrations, where density reaches up to 100 artifacts per square meter. The site is well away from proposed developments.

Artifacts within a 50-m-by-40-m area located on a slope above Bearwater Creek. A variety of flaked stone was observed, including biface fragments, and a Humboldt concave base point

erall, in some areas density reaches 5 flakes  
Creek, well outside proposed development

iles or cairns, a mining claim marker, and  
k, well outside proposed development areas.

veral with cortex and several with utilization  
Clearwater Creek. It is located well outside

dge of the bluff above Clearwater Creek. It  
a, and at least one chert flake. Most of the  
y be some subsurface cultural material. This  
posed development areas.

**BHRI/ #17**

includes hundreds of flakes (mostly obsidian,  
e, mano and metate fragments, and a possible  
may have been a temporary occupation site,  
l outside proposed development areas.

course of fieldwork (Figure 11, Table 2). Nine  
4 are prehistoric.

**ificance**

aeological sites on private land are contained  
mine whether a site is significant according  
ramework contained in Appendix K, which

When a project may affect an archaeological resource, the agency shall determine whether the effect may be a significant effect on the environment. If the project may cause damage to an important archaeological resource, the project may have a significant effect on the environment. For the purposes of CEQA, an "important archaeological resource" is one which:

- A. Is associated with an event or person of:

Proposed Bodie Hills R.V. Park.

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nt

of.

20. obsidian flake

21. obsidian flake

t

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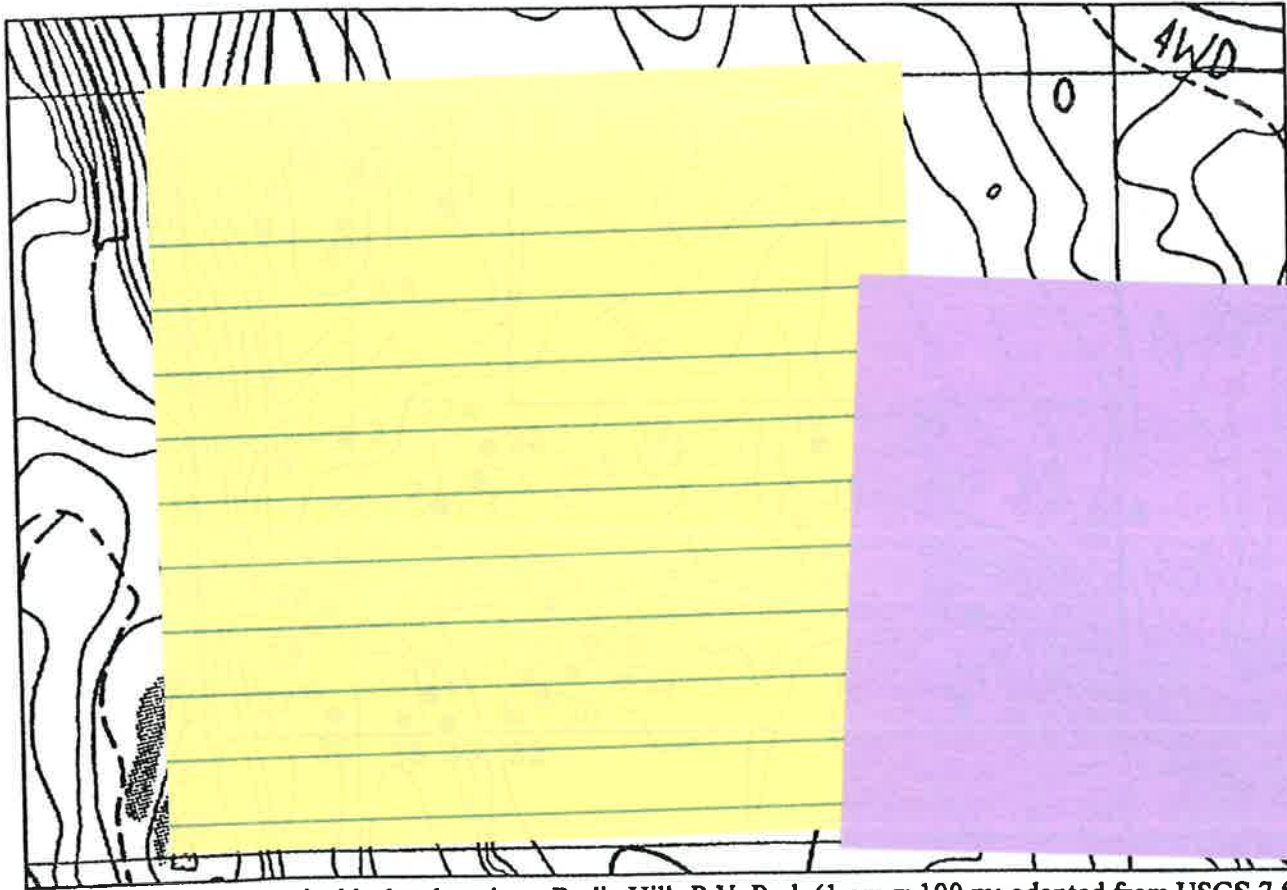


Figure 11. Archaeological isolate locations, Bodie Hills R.V. Park (1 cm = 100 m; adapted from USGS 7.5' map Big Alkali, California, provisional edition 1989).

1 Recognized significance in California or American history, or

[Redacted text block]

public interest and useful in addressing scientifically  
 questions;

able, largest, or last surviving example of its kind;

archic integrity; or

research has shown can be answered only with

resource, both the resource and the effect on it  
 considered further in the CEQA process.

the Old County Road (CA-MNO-2761-H)  
 criteria as well. Neither of these sites would

#3, and #14, are not considered significant.



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er 100 years old, these constitute a mixed  
eral use. BHRV #3, the small historic  
artifacts, and little information potential  
ee historical sites do not appear to be  
nce in California or American history  
t, best example, largest, or last surviving  
igraphic integrity (criterion D).

oric archaeological resources can best be  
are associated with events of recognized  
ional survey data. Determining whether  
n C) requires more specific information  
a whole, than is currently available.

B would ideally consider (1) the relative  
hich specific kinds of data are confined  
the resources may contribute, and (4)  
y in and near the project area (Scovill et  
given our incomplete knowledge of the

resources in the region. Developments in archaeological methodology, in general, and past research in the region provide information for the last two factors.

While it can be argued that some data can be recovered from any site, such work is not always justifiable. Reliable reconstructions of past behavior rely first upon the strength of the data. Strong analytic cases are characterized by high-resolution data that are relatively undistorted by numerical errors, multiple occupations, or vandalism. Low-resolution data creates suspicion about the reliability of the data and its usefulness in subsequent analysis by other researchers. Sites that constitute strong analytic cases are therefore more significant than sites that are characterized by low-resolution data.

As an example, a site with a few small flake scatters is likely to be significant: "Sometimes such sites are undoubtedly stopped briefly to rest or for other activities. Such a site representing this activity may not be significant. The site may be a relations, and may be a redundant aspect of the site. The site may be a many small flake scatters are not significant. The site may be a no data need be collected beyond that observed." Sites with a few small flake scatters are likely to be significant: "Sometimes such sites are undoubtedly stopped briefly to rest or for other activities. Such a site representing this activity may not be significant. The site may be a relations, and may be a redundant aspect of the site. The site may be a many small flake scatters are not significant. The site may be a no data need be collected beyond that observed."

Following this approach, sites with a few small flake scatters are likely to be significant. These sites have few artifacts and little information potential of each of these is likely to be significant. These sites have few artifacts and little information potential of each of these is likely to be significant.

evaluate from surface evidence alone. That  
quate sample numerically, but the data may  
d intermittently over a thousand years, with  
remains. The accumulated archaeological  
ging subsistence strategies. At such sites it  
articular time period. Therefore, sites with  
be the resolution of the data. An additional  
rough small sites can often yield important  
can limit chronometric potential in surface  
l. Subsurface testing is often important in  
ance. Therefore, the remaining sites within  
potentially significant, but testing would be  
is includes sites CA-MNO-264, CA-MNO-  
1, #12, #13, #15, #16, and #17.

## Recommendations

The following section summarizes the California requirements for treatment of archaeological resources, outlines the potential impacts of the project on the archaeological resources within the project area, and recommends mitigation measures to avoid significant effects on the environment. The State requirements for dealing with prehistoric and historic archaeological resources are outlined in Appendix K of the *California Environmental Quality Act (CEQA)*.

### II. Public agency avoidance is not required.

source whenever feasible. If  
criteria outlined in Section III.

#### A. In-situ preservation Preservation of artifacts removed Preservation

to archaeological resources.  
cause the relationship of the  
lost when the artifacts are  
ed future research methods.  
s associated with the site.

#### B. Avoiding

1.

2.

3.

aeological sites;

building tennis courts, parking

- c. The site is one in which the natural processes of deterioration have been effectively arrested; and

d. The site has been recorded.

4. Deeding archaeological sites into permanent conservation easements.

V. If avoidance of the important archaeological resource is not feasible, the Lead Agency should include an excavation plan for mitigating the effect of the project on the qualities which make the resource important under Section 111.

A. If an excavation plan is prepared, it shall:

1. Be a brief summary of the excavation proposed as part of a mitigation plan;
2. Be available for review only on a need-to-know basis;
3. Not include the specific location of any archaeological resources if the plan will be made known to the general public.

B. An excavation plan may:

1. List and briefly discuss the important information the archaeological resources contain or are likely to contain;
2. Explain how the information should be recovered to be useful in addressing scientifically valid research questions and other concerns identified in subdivision (a);
3. Explain the methods of analysis and, if feasible, display of excavated materials;
4. Provide for final report preparation and distribution, and
5. Explain the estimated cost of and required to complete all activities undertaken under the plan.

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out as a condition of approval of the project.

visible, the project has the potential to  
the project area, the first from the actual  
people in the area as a result of the  
pe ditches, etc., tend to be more severe  
m "souvenir collecting," uncontrolled  
to be substantial over time (see Wildesen  
tion centers and roads is a major factor  
0).

lates do not meet the CEQA definition  
archaeological work under the CEQA  
portions of the Old County Road (CA-  
A. Neither would be affected by the  
work to allow a fair assessment of their  
k is recommended only for those sites

The next stage of the project as proposed has the potential to directly impact two of the sites, and

indirectly impact and State Highway 270,

modern trash along at additional work.

The second site that of the road. Artifacts the site; it should be

scatter located north sits elsewhere within

A third site would likely resulting from the R.V. scatter, located within old road alignment flood plain. Limited

of people in the area with associated artifact 15 meters from an the bench above the is site's significance.

Three other sites may recommended if the testing would be no significance and if ac

plans. Other work is Limited subsurface to determine their

To summarize these recommendations by project component and development plans:

**Store and Office, 1** indirectly impact site

**Well:** Would likely sites' significance.

**R.V. Spaces and Ac** to meet CEQA criteria #2. However, construction the development may MNO-265 to determine

site does not appear nmented at BHRV site BHRV #4, and BHRV #4 and CA-

**Residences:** Could d road access. Testing a the project is initiated

; on final design and before this phase of

**Tent Camping Area**

mmended.

**Housekeeping Cabi** to determine the site'

ing is recommended

**Water Storage Tank** is ground disturbance created to access the site (e.g. reconstruction of the old road currently to the east).

acts to sites if there

**Leach Field:** No sites are located in this area; no further work is recommended.

## References Cited

- Ambler, J. Richard, and Mark Q. Sutton  
 1989 The Anasazi Abandonment of the San Juan Drainage and the Numic Expansion. *North American Archaeologist* 10(1):39-53.
- Basgall, Mark E.  
 1983 Archaeology of the Forest Service Forty Site (CA-MNO-529), Mono County, California. Report on file, Inyo National Forest, Bishop, California.
- Basgall, Mark E., and Kelly R. McGuire  
 1988 *The Archaeology of CA-MNO-30: Prehistoric Culture Change in the Southern Owens Valley*. California Department of Transportation, Sacramento.
- Bettinger, Robert L.  
 1975 The Surface Archaeology of Owens Valley, Eastern California: Prehistoric Man-land Relations in the Great Basin. Ph.D. dissertation, Department of Anthropology, University of California, Riverside.  
 1976 The Development of Pinyon Exploitation in Central Eastern California. *Journal of California Anthropology* 3(1):27-46.  
 1977a The Surface Archaeology of the Long Valley Caldera, Mono County, California. *Archaeological Research Unit Monograph* 1. Riverside, California.  
 1977b Aboriginal Human Ecology in Owens Valley, Eastern California: Prehistoric Change in the Great Basin. *American Antiquity* 43:3-17.  
 1979 Curation, Statistics and Settlement Studies: A Reply to Munday and Lincoln. *American Antiquity* 44:352-359.  
 1981 Sampling and Statistical Inference in the Owens Valley: A Reply to Hall. *American Antiquity* 46:656-660.  
 1982a Archaeology East of the Range of Light: Aboriginal Human Ecology of the Inyo-Mono Region of Central-Eastern California. *Monographs in California and Great Basin Anthropology* 1. Davis, California.  
 1982b Aboriginal Exchange and Territoriality in Owens Valley, California. In *Contexts for Prehistoric Exchange*. Jonathon E. Ericson and Timothy K. Earle, editors. Academic Press, New York.  
 1983 Aboriginal sociopolitical organization in Owens Valley, California. In *The Development of Political Organization in Native North America*, edited by E. Tooker and M.H. Fried, pp. 45-58. *Proceedings of the American Ethnological Society*, 1979.  
 1989 The Archaeology of Pinyon House, Two Eagles, and Crater Middens: Three Residential Sites in the Owens Valley, Eastern California. *Anthropological Papers of the American Museum of Natural History* 67. New York.

- Bettinger, Robert L., and Martin A. Baumhoff  
 1982 The Numic Spread: Great Basin Cultures in Competition. *American Antiquity* 47(3):485-503.
- Bettinger, Robert L., Michael Delacorte, and Kelly R. McGuire  
 1984 *Archaeological Excavations at the Partridge Ranch Site (CA-INY-2146), Inyo County, California*. California Department of Transportation, Sacramento.
- Bettinger, Robert L., and Thomas F. King  
 1971 Interaction and Political Organization: A Theoretical Framework for Archaeology in the Owens Valley. *University of California Archaeological Survey Annual Report* 13:138-150. Berkeley.
- Bettinger, Robert L., and R. E. Taylor  
 1974 Suggested Revisions in Archaeological Sequences of the Great Basin in Interior Southern California. *Nevada Archaeological Survey Research Papers* 5:1-26.
- Bouscaren, Stephen J., Matthew C. Hall, and J.D. Swenson  
 1982 Archaeological Test Excavations at Four Sites (CA-MNO-11, -823, -1644, -1645) near Mammoth Creek, Mono County, California. Report on file, Inyo National Forest, Bishop, California.
- Bouey, Paul D., and Mark E. Basgall  
 1984 Trans-Sierran Exchange in Prehistoric California and the Concept of Economic Articulation. In *Obsidian Studies in the Great Basin*, edited by Richard E. Hughes, pp. 135-172. *Contributions of the University of California Archaeological Research Facility* 45. Berkeley.
- Burton, Jeffery F.  
 1985a The Archaeology of the Chance Well Site (CA-MNO-458/630), Mono County, California. Report on file, Bonneville Pacific Corporation, Salt Lake City, Utah.  
 1985b Test Excavation and Analysis of a Portion of Site CA-MNO-382, Mono County, California. Report on file, Wood and Associates, Auburn, California.  
 1986a Cultural Resources of the Doe Ridge Project Area. Report on file, Triad Engineering, Mammoth Lakes, California.  
 1986b Archaeological Investigations at Bajada Camp (CA-INY-2596), Inyo County California. Report on file, Baxter Ranch, Independence, California.  
 1987 Cultural Resources of Conway Ranch, Mono Basin, California. Report on file, Triad Engineering, Mammoth Lakes, California.  
 1988 Volcanism, Obsidian Hydration, and Archaeological Reality in the Western Great Basin. Paper presented at the 53rd Annual Meeting of the Society for American Archaeology, Phoenix, Arizona.  
 1990 Cultural Resources of the Royal Gold Project Area, Mono County, California. *Contributions to Trans-sierran Archaeology* 24. Trans-Sierran Archaeological Research, Tucson, Arizona.

- Busby, Colin I., John M. Findlay, and James C. Bard  
 1980 *A Cultural Resource Overview of the Bureau of Land Management Coleville, Bodie, Benton, and Owens Valley Planning Units, California*. Cultural Resources Publications, Bureau of Land Management, Bakersfield, California.
- Cain, Ella M.  
 1961 *The Story of Early Mono County*. Fearon Publishers, San Francisco.
- Clay, Vickie L., and Matthew C. Hall  
 1988 Results of the 1987 Field Season Cultural Resources Survey for the Historic and Archaeological Preservation Plan for the Lee Vining Creek Hydroelectric Project (FERC Project Number 1388) and the Rush Creek Hydroelectric Project (FERC Project Number 1389). Report on file, Southern California Edison Company, Rosemead, California.
- Costello, Julia, and Judith Marvin  
 1993 CA-MNO-2761 Archaeological Site Survey Record. On file Eastern Information Center, University of California, Riverside.
- Curry,  
 1969 Holocene Climate and Glacial History of the Central Sierra Nevada, California. In "United States Contributions to Quaternary Research" edited by S.A. Schumm and W.C. Bradley. *Geological Society of America Special Paper* 123.
- Davis, Emma Lou  
 1964 An Archaeological Survey of the Mono Basin and Excavations of Two Rockshelters, Mono County, California. *University of California Archaeological Survey Annual Report 1963-1964*:251-392. Los Angeles.  
 1965 An Ethnography of the Kuzedika Paiute of Mono Lake, Mono County, California. *University of Utah Anthropological Papers* 8:1-56.
- Dohrenwend, John C.  
 1982 *Surficial Geology, Walker Lake 1° by 2° Quad., Nevada-California*. U.S. Geological Survey, Denver, Colorado.
- Flenniken, J. Jeffrey  
 1985 Stone Tool Reduction Techniques as Cultural Markers. In *Stone Tool Analysis: Essays in Honor of Don E. Crabtree*, edited by Mark G. Plew, James C. Woods, and Max G. Pavesic, pp. 265-276. University of New Mexico Press, Albuquerque.
- Flenniken, J. Jeffrey, and Anan W. Raymond  
 1986 Morphological Projectile Point Typology: Replication, Experimentation and Technological Analysis. *American Antiquity* 51:603-614.
- Fletcher, Thomas C.  
 1987 *Paiute, Prospector, Pioneer: A History of the Bodie-Mono Lake Area in the Nineteenth Century*. Artemisia Press, Lee Vining, California.



- Gifford, E. W.  
 1932 The Northfork Mono. *University of California Publications in American Archaeology and Ethnology* 31(2):15-65. Berkeley.
- Goldberg, Susan K., Elizabeth Skinner, and Jeffery F. Burton  
 1990 *Archaeological Excavations at Sites CA-MNO-574, -577, -578, and -833: Stoneworking in Mono County, California*. California Department of Transportation, Sacramento.
- Goldberg, Susan J., Sally S. Salzman, Elizabeth J. Skinner, Jeffery F. Burton, Margaret E. Scully, John J. Holson, and Michael J. Moratto  
 1986 *Cultural Resources of the Crane Valley Hydroelectric Project Area, Madera County, California, Volume III, Archaeological Testing, Resource Evaluation, Impact assessment, and Management Planning*. Pacific Gas and Electric Company, San Francisco, California.
- Green, James P.  
 1986 Obsidian Hydration Measurement: Are We Getting What We Expect? Paper presented at the Great Basin Anthropological Conference, 20th Biennial Meeting, Las Vegas, Nevada.
- Hall, Matthew C.  
 1980 Surface Archaeology of the Bodie Hills Geothermal Area, Mono County, California. Report on file, Bureau of Land Management, Bishop, California.  
 1981 Land-use Change in Owens Valley Prehistory: A Matter of Statistical Inference. *American Antiquity* 46:648-656.  
 1983 Late Holocene Hunter-Gatherers and Volcanism in the Long Valley-Mono Basin Region: Prehistoric Culture Change in the Eastern Sierra Nevada. Unpublished Ph.D. dissertation, University of California, Riverside.  
 1984 Obsidian, Paleoecology, and Volcanism in the Eastern Sierra Nevada. Paper presented at the Great Basin Anthropological Conference, 19th Biennial Meeting, Boise, Idaho.
- Hardesty, Donald L.  
 1990 Historical Archaeology in the Intermountain West: Retrospect and Prospect. Paper presented at the Society for Historical Archaeology Conference on Historical and Underwater Archaeology, Tucson, Arizona.
- Hassan, Fekri A.  
 1978 Demographic Archaeology. In *Advances in Archaeological Method and Theory*, Volume 1, edited by Michael B. Schiffer, pp. 49-103. Academic Press, New York.
- Heizer, Robert F., editor  
 1978 *Indian Names for Plants and Animals among Californian and other Western North American Tribes by C. Hart Merriam*. Ballena Press, Socorro, New Mexico.
- Heizer, Robert F., and Thomas R. Hester  
 1978 Great Basin. In *Chronologies in New World Archaeology*, edited by R. E. Taylor and Clement W. Meighan, pp. 147-199. Academic Press, New York.



Hughes, Richard E., and Robert L. Bettinger

- 1984 Obsidian and Prehistoric Sociocultural Systems in California. In "Exploring the Limits: Frontiers and Boundaries in Prehistory," edited by S.P. DeAtley and F.J. Findlow, pp. 153-172. *British Archaeological Reports, International Series 223*.

Jackson, Robert J.

- 1984a Obsidian Hydration: Applications in the Western Great Basin. In "Obsidian Studies in the Great Basin," edited by Richard E. Hughes, pp. 173-192. *Contributions of the University of California Archaeological Research Facility 45*. Berkeley.
- 1984b Current Problems in Obsidian Hydration Analysis. In "Obsidian Studies in the Great Basin," edited by Richard E. Hughes, pp. 173-192. *Contributions of the University of California Archaeological Research Facility 45*. Berkeley.
- 1985 An Archaeological Survey of the Wet, Antelope, Railroad, and Ford Timber Sale Compartments in the Inyo National Forest. Report on file, Inyo National Forest, Bishop, California.

Jackson, Robert J., and Robert L. Bettinger

- 1985 Projectile Points. In "An Archaeological Survey of the Wet, Antelope, Railroad, and Ford Timber Sale Compartments in the Inyo National Forest," by Robert J. Jackson, pp. 49-70. Report on file, Inyo National Forest, Bishop, California.

Lamb, Sydney M.

- 1958 Linguistic Prehistory in the Great Basin. *International Journal of American Linguistics 24*(2):95-100.

Levy, Richard

- 1978 Eastern Miwok. In *Handbook of North American Indians, Volume 8: California*, edited by Robert F. Heizer. Smithsonian Institution, Washington, D.C.

Lyneis, Margaret M., David L. Weide, and Elizabeth vonTill Warren

- 1980 *Impacts: Damage to Cultural Resources in the California Desert*. Bureau of Land Management, Riverside, California.

McCarthy, Daniel, and Dan Young

- 1978 CA-MNO-33/H Archaeological Site Survey Record. On file Eastern Information Center, University of California, Riverside.

Mehring, Peter J., Jr.

- 1986 Prehistoric Environments. In *Handbook of North American Indians 11: Great Basin*, edited by Warren L. D'Azevedo, pp. 31-50. Smithsonian Institution, Washington, D.C.

Meighan, Clement W.

- 1955 Notes on the Archaeology of Mono County, California. *University of California Archaeological Survey Report 28*:6-29.

Moratto, Michael J.

- 1972 A Study of Prehistory in the Southern Sierra Nevada Foothills, California. Ph.D. dissertation, Department of Anthropology, University of Oregon, Eugene.

Moratto, Michael J. (continued)

- 1981 An Archaeological Research Design for Yosemite National Park, California. *Western Archaeological and Conservation Center Publications in Anthropology* 19. National Park Service, Tucson, Arizona.

Morris, Rick

- 1990 Pleasure Seeking in the 1880s: Evaluation of the Economic and Social Importance of a Seasonal California Resort Destination Resort During the Gold Rush Era. Paper presented at the Society for Historical Archaeology Conference on Historical and Underwater Archaeology, Tucson, Arizona.

Munday, F. C., and T. R. Lincoln

- 1979 A Comment on Bettinger: Problems in Archaeological Interpretation. *American Antiquity* 44(2):345-351.

Peak, Ann

- 1975 Cultural Resources Assessment of the Bodie Road from State (sic) Highway 395 to a Point Near the State Park of Bodie, Mono County, California. Report on file, Mono County Department of Public Work, Bridgeport, California.

Reid, J. Jefferson, and Stephanie M. Whittlesey

- 1982 Archaeological Research for the Practical Prehistorian. In "Cholla Project Archaeology, Volume 1: Introduction and Special Studies," edited by J. Jefferson Reid, pp. 13-26. *Arizona State Museum Archaeological Series* 161. Tucson.

Scovill, Douglas H., Garland J. Gordon, and Keith M. Anderson

- 1972 Guidelines for the Preparation of Statements of Environmental Impacts on Archaeological Resources. Report on file, Western Archaeological Center, National Park Service, Tucson, Arizona.

Singer, Clay A., and Jonathon E. Ericson

- 1977 Quarry Analysis at Bodie Hills, Mono County, California: A Case Study. In *Exchange Systems in Prehistory* edited by Timothy K. Earle and Johothon E. Ericson, pp. 171-188. Academic Press, New York.

Spier, Robert F. G.

- 1978 Monache. In *Handbook of North American Indians, Volume 8: California*, edited by Robert F. Heizer. Smithsonian Institution, Washington, D.C.

Sterud, Gene L.

- 1965 Preliminary Report of Archaeological Investigations at the Mammoth Junction Site: A Second Season (1964). Report on file, California Department of Transportation, Environmental Studies Branch, Sacramento.

Steward, Julian H.

- 1933 Ethnography of the Owens Valley Paiute. *University of California Publications in American Archaeology and Ethnology* 34(5):355-440. Berkeley.
- 1938 Basin-Plateau Aboriginal Sociopolitical Groups. *Bureau of American Ethnology Bulletin* 120. Smithsonian Institution, Washington, D.C.

Stewart, Omer C.

1939 The Northern Paiute Bands. *University of California Anthropological Records* 2(3). Berkeley.

1941 Culture Element Distributions XIV: Northern Paiute. *University of California Anthropological Records* 4(3):361-446. Berkeley.

Sutton, Mark Q.

1986 A Consideration of the Numic Spread. Ph.D. dissertation, University of California, Riverside.

Theodoratus Cultural Research

1984 Cultural Resource Overview of the Southern Sierra Nevada. Report on file, Sierra National Forest, Fresno, California.

Thomas, David H.

1973 An Empirical Test for Steward's Model of Great Basin Settlement Patterns. *American Antiquity* 38:155-176.

1981 How to Key the Projectile Points from Monitor Valley. *Journal of California and Great Basin Anthropology* 3:7-44.

Weaver, Richard A., and Matthew C. Hall

1984 The Archaeology of Obsidian Stoneworking Camps in the Western Great Basin. Paper presented at the Great Basin Anthropological Conference, 19th Biennial Meeting, Boise, Idaho.

White, David R.M.

1986 Cultural Resources Inventory of the Conway Summit 16 KV D/L (Part II: Northern Portion), Mono County, California. Report on file, Southern California Edison, Rosemead, California.

White, David R.M., and J. Weisbrod

1985 CA-MNO-2237-H Archaeological Site Survey Record. On file Eastern Information Center, University of California, Riverside.

Whitley, David S.

1987 Socioreligious Context and Rock Art in East-Central California. *Journal of Anthropological Archaeology* 6:159-188.

Wildesen, Leslie E.

1982 The Study of Impacts on Archaeological Sites. In *Advances in Archaeological Method and Theory* 5, edited by Michael B. Schiffer, pp. 51-96. Academic Press, New York.





# TRANS-SIERRAN ARCHAEOLOGICAL RESEARCH

332 EAST MABEL STREET, TUCSON, ARIZONA 85705

(520) 620-6804

## Contributions to Trans-sierran Archaeology

1. An Archaeological Survey of Mammoth Meadow, Mammoth Lakes, California.
2. The Eagles Nest Condominium Project Archaeological Survey, Mammoth Lakes, California.
3. An Archaeological Survey of Mammoth Bluff, Mammoth Lakes, California.
4. The Pinebrooke Condominium Project Archaeological Survey, Mammoth Lakes, California.
5. Archaeological Impact Report, Chance Valley Geothermal Power Plant, Mono County, California.
6. An Archaeological Assessment of the Chance Valley Geothermal Project Area, Mono County, California.
7. An Archaeological Survey of 80 Acres near Lee Vining, Mono County, California.
8. An Archaeological Survey of the Upper Piute Creek Hydroelectric Project, Mono County, California.
9. An Archaeological Survey of the Coldwater Canyon Hydroelectric Project, Mono County, California.
10. Test Excavation and Analysis of a Portion of Site CA-MNO-382, Mono County, California.
11. An Archaeological Survey of the Bridgeport Geothermal Project Area, Mono County, California.
12. The Archaeology of the Chance Well Site, CA-MNO-458/630, Mono County, California.
13. Archaeological Investigations at Bajada Camp, CA-INY-2596, Inyo County, California.
14. Cultural Resources of the Doe Ridge Project Area, Mono County, California.
15. Cultural Resources of Conway Ranch, Mono Basin, California.
16. Cultural Resources of the Sierra Spring Subdivision, Mono County, California.
17. An Archaeological Survey of the Minaret Road Extension, Mammoth Lakes, California.
18. An Archaeological Survey of the Contel Mammoth to Bishop Fiber Optics Line, Mono and Inyo Counties, California.
19. An Archaeological Survey of the North Village Project Area, Mammoth Lakes, California.
20. An Archaeological Survey of the Lodestar Property, Mammoth Lakes, California.
21. An Archaeological Survey of the Snowcreek Golf Course Expansion, Mammoth Lakes, California.
22. An Archaeological Survey of the Contel Bishop to Inyokern Fiber Optics Line, Inyo and Kern Counties, California.
23. Archaeological Test Excavations at the Snowcreek Site (CA-MNO-3), Mono County, California.
24. Cultural Resources of the Royal Gold Project Area, Mono County, California.
25. Archaeological Testing at the Minaret Road Site (CA-MNO-2482), Mammoth Lakes, California.
26. The Archaeology of Whisky Creek Rockshelter: A Late Prehistoric Site in Long Valley, California.
27. Preliminary Report on Archaeological Excavations at CA-MNO-905: A Single Component Stoneworking Site at Mammoth Lakes, California.
28. Archaeological Testing and Survey for the Proposed Mammoth Creek Park and Trail System, Mammoth Lakes, California.
29. Cultural Resources of the Arcularius Ranch, Long Valley, California.
30. Archaeological Testing at the Eagle's Nest Site (CA-MNO-907), Mammoth Lakes, California.
31. Further Investigations at the Snowcreek Archaeological Site, Mammoth Lakes, California.
32. An Archaeological Survey and Assessment of the Sweetwater Ranch Subdivision, Mono County, California.
33. An Archaeological Survey of the Proposed South Gateway Land Exchange, Mammoth Lakes, California.
34. An Archaeological Survey of the June Lake Alternative Access Route, Mono County, California.
35. Archaeological Excavations at the Mammoth Creek Site (CA-MNO-561), Mammoth Lakes, California.
36. An Archaeological Survey of the Eastern Sierra College Center, Inyo County, California.
37. Archaeological Testing of Eight Sites Within the Proposed Sherwin Ski Area, Mono County, California.
38. Cultural Resources of the Inaja Land Company Holdings, Long Valley, California.
39. An Archaeological Survey of the Royal Gold Project Area, Long Valley, California.
40. Archaeological Excavations at Two Sites Near Bridgeport, Mono County, California.
41. An Archaeological Survey of the Proposed Bodie Hills R.V. Park, Mono County, California.



## 2. Botanical Study





## Botanical Survey of the Proposed Bodie Hills RV Park, Mono County, California

*Prepared for:* Mono County Planning Department  
P.O. Box 8, Bridgeport, CA 93517

*Prepared by:* Mark Bagley, Consulting Biologist  
P.O. Box 1431, Bishop, CA 93515

February 1997

### INTRODUCTION

The proposed project area is located in the southwestern portion of the Bodie Hills, in Clearwater Creek Canyon and adjacent slopes, from near the intersection of Bodie Road (SR 270) and Highway 395, eastward up the canyon for approximately 3/4 mile (Sec. 26, T4N, R25E, MDB&M). Both Clearwater Creek and Bodie Road traverse the length of the project area (Figures 1 and 2). The seasonal creek runs within a 14 foot deep channel that varies from about 30 to 60 feet wide. The width of the canyon area varies from approximately 100 to 400 feet, with steep canyon walls rising 100-200 feet to the north and south. Elevations in the project area range from about 6860 to 7000 feet.

The proposed Bodie Hills RV Park includes development on approximately 13 acres in the relatively flat sites in the canyon for the following main features (Figures 1 and 2):

- a recreational vehicle (RV) park with 40 full hook-up spaces and a laundry/shower/restroom facility;
- a 6000 gallon septic tank and sewer lift station to service the RV park;
- a 10 unit motel;
- a general store with restroom facilities and office;
- a 3000 gallon septic tank and leach field to service the general store and motel;
- 8 camping cabins and a laundry/shower/restroom facility;
- a 3000 gallon septic tank and leach field to service the camping cabins;
- a tent camping area including 14 spaces and a restroom facility;
- a 1000 gallon septic tank and leach field to service the tent camping area;
- an old west museum; and
- a maintenance building.

Proposed developments on the slopes on the south side of the canyon include:

- a sewage leach field to service the RV park, located on a relatively flat ridge top and a sewer force main pipeline up to the leach field from the canyon bottom (Figures 1 and 3); and
- an overhead power line to the leach field (from approximately 800 feet to the southwest) and underground power down to the canyon following the sewer force main.

Proposed developments on the slopes on the north side of the canyon include:

- a 20,000 gallon water storage tank and a pipeline from the well in the canyon to the tank (Figure 1); and
- 1 owner's residence and 2 caretakers residences on the relatively flat slopes above the canyon, including an access road from the canyon following an old abandoned dirt road (Figure 3).

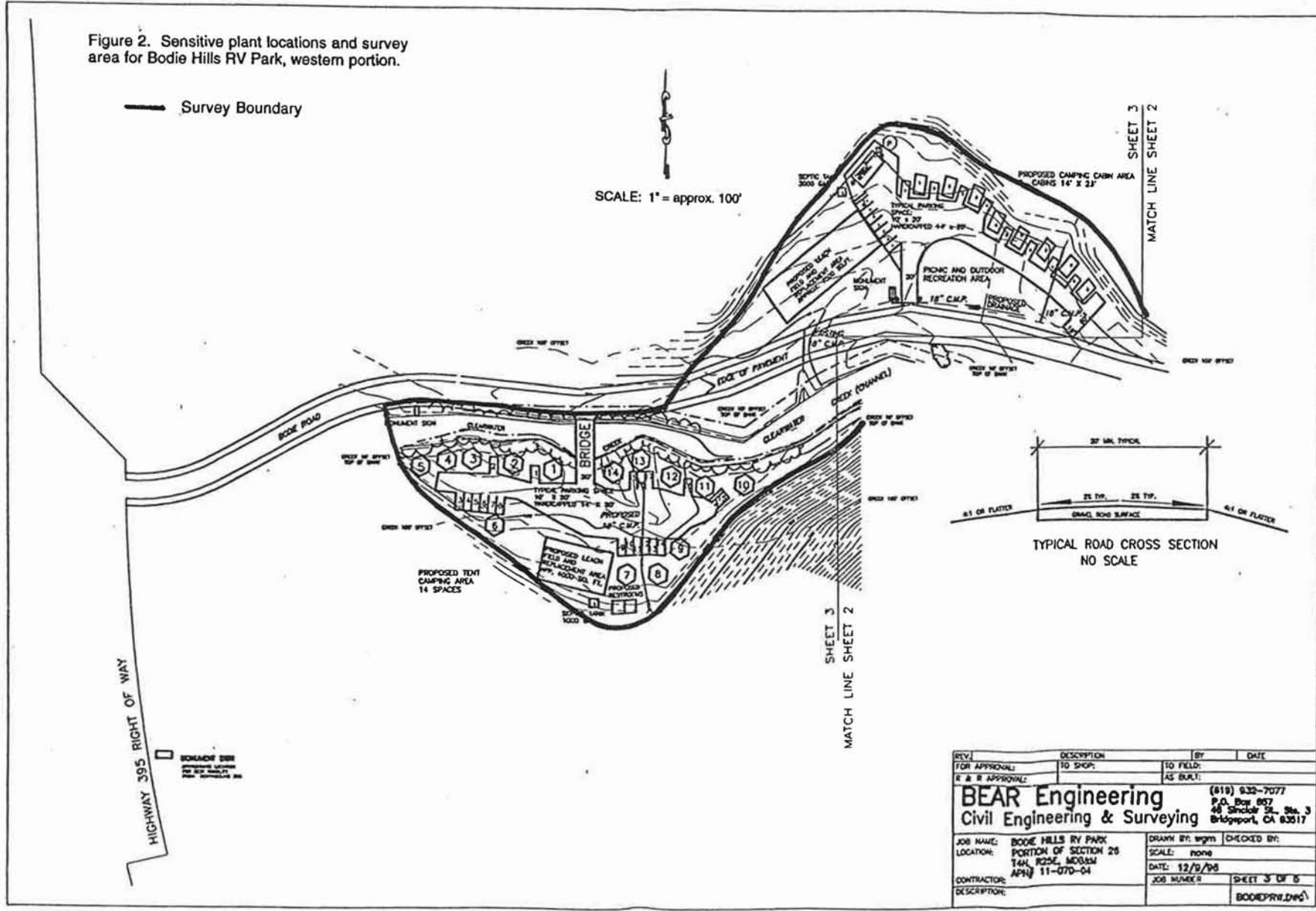
The survey areas for the proposed project are shown on Figures 1-3. The survey areas were based on a preliminary plan map and project description, dated August 7, 1995, and from a site reconnaissance with one of the project proponents, Mr. Bill Lapham. However, significant changes were made in the proposed project in December 1996, well after the field surveys were completed in June 1996. The base maps for Figures 1 and 2 of this report are revised project layout maps, dated December 9, 1996, provided by the Mono County Planning Department. No revised written project description was provided. It appears that the revised project no longer proposes the owner's and caretakers residences above the canyon on the north side. In addition to redesigning the layout of the RV spaces, tent spaces and the camping cabins, other significant changes to the project included the addition of the proposed overhead power line, relocation of the general store and office to accommodate the addition of the motel, expansion of store and motel parking and adjacent leach field up the base of the north slope, and relocation to the north of the proposed 20,000 gallon water storage tank and its water supply line.

The objectives of this botanical survey are to provide a description of the vegetation in the project area and determine if any rare, threatened, endangered or otherwise sensitive plant species or communities occur within the proposed project area. This information will be used by Mono County in preparation of environmental compliance documents for the project.

## METHODS

A list of plant species of concern that appear to have some potential to occur in the project area was prepared using information on file with the Bureau of Land Management (BLM) Bishop Resource Area Office, the BLM field guide to Special Status plants (Halford and Fatooh 1994), consultation with BLM Botanist Anne Halford, data from the California Natural Diversity Data Base (CNDDDB), and local and regional floras (Abrams and Ferris 1923-1960, Hickman 1993, Messick 1982,

Figure 2. Sensitive plant locations and survey area for Bodie Hills RV Park, western portion.



HIGHWAY 395 RIGHT OF WAY

BOUNDARY DIM  
 DIMENSIONS SHOWN  
 ARE IN FEET AND INCHES  
 UNLESS OTHERWISE NOTED

SCALE: 1" = approx. 100'

REV.	DESCRIPTION	BY	DATE
FOR APPROVAL:	TO SHOP:	TO FIELD:	
R & R APPROVAL:	AS BUILT:		
<b>BEAR Engineering</b> Civil Engineering & Surveying			(818) 932-7077 P.O. Box 887 46 Shodor St., Ste. 3 Bridgeport, CA 93517
JOB NAME: BODIE HILLS RV PARK LOCATION: PORTION OF SECTION 28 T4N, R22E, M20WSH CONTRACTOR: APN 11-070-04		DRAWN BY: wpm SCALE: none DATE: 12/8/98 JOB NUMBER	CHECKED BY: SHEET 3 OF 5
DESCRIPTION:		BODIEHILLS.DWG	

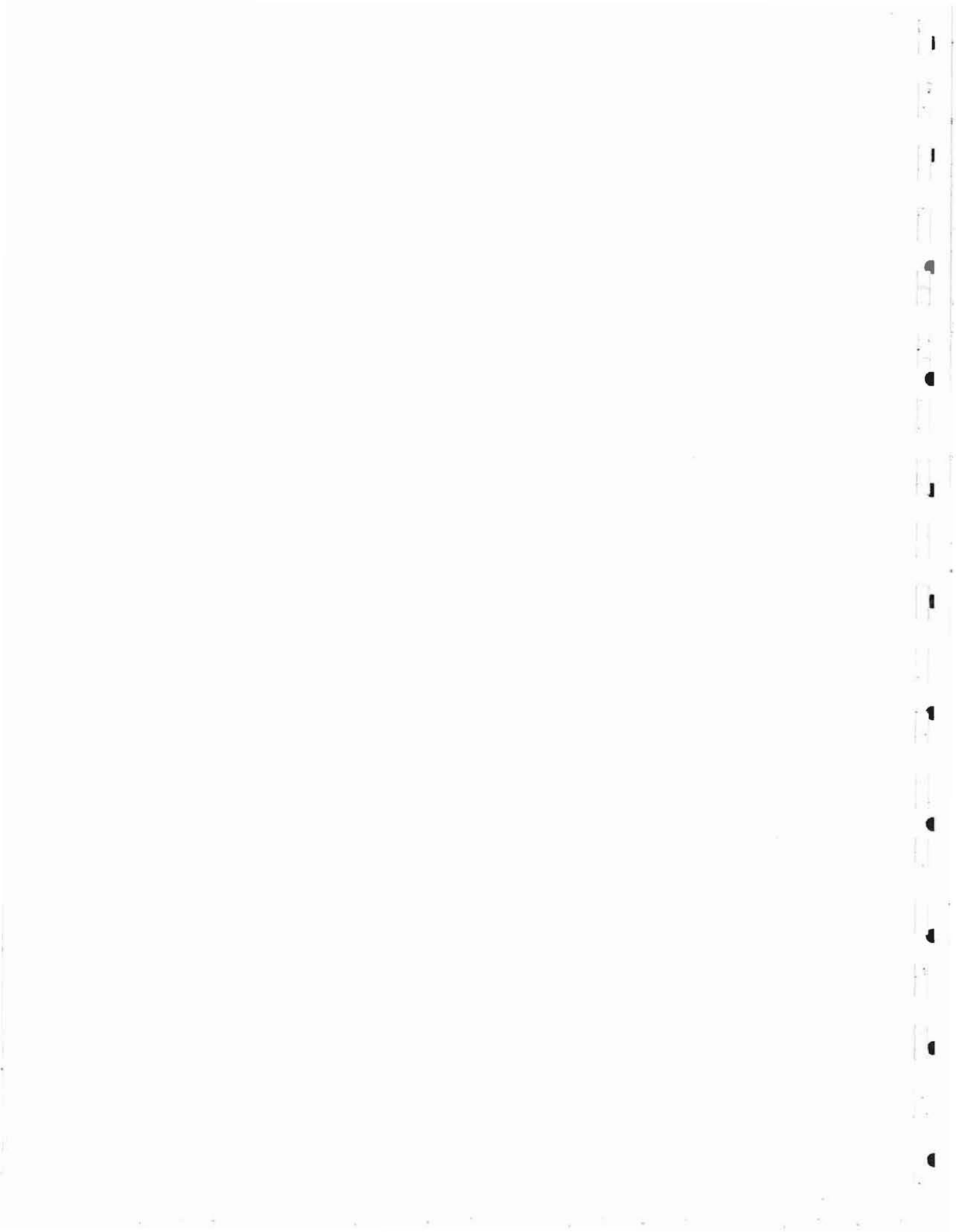


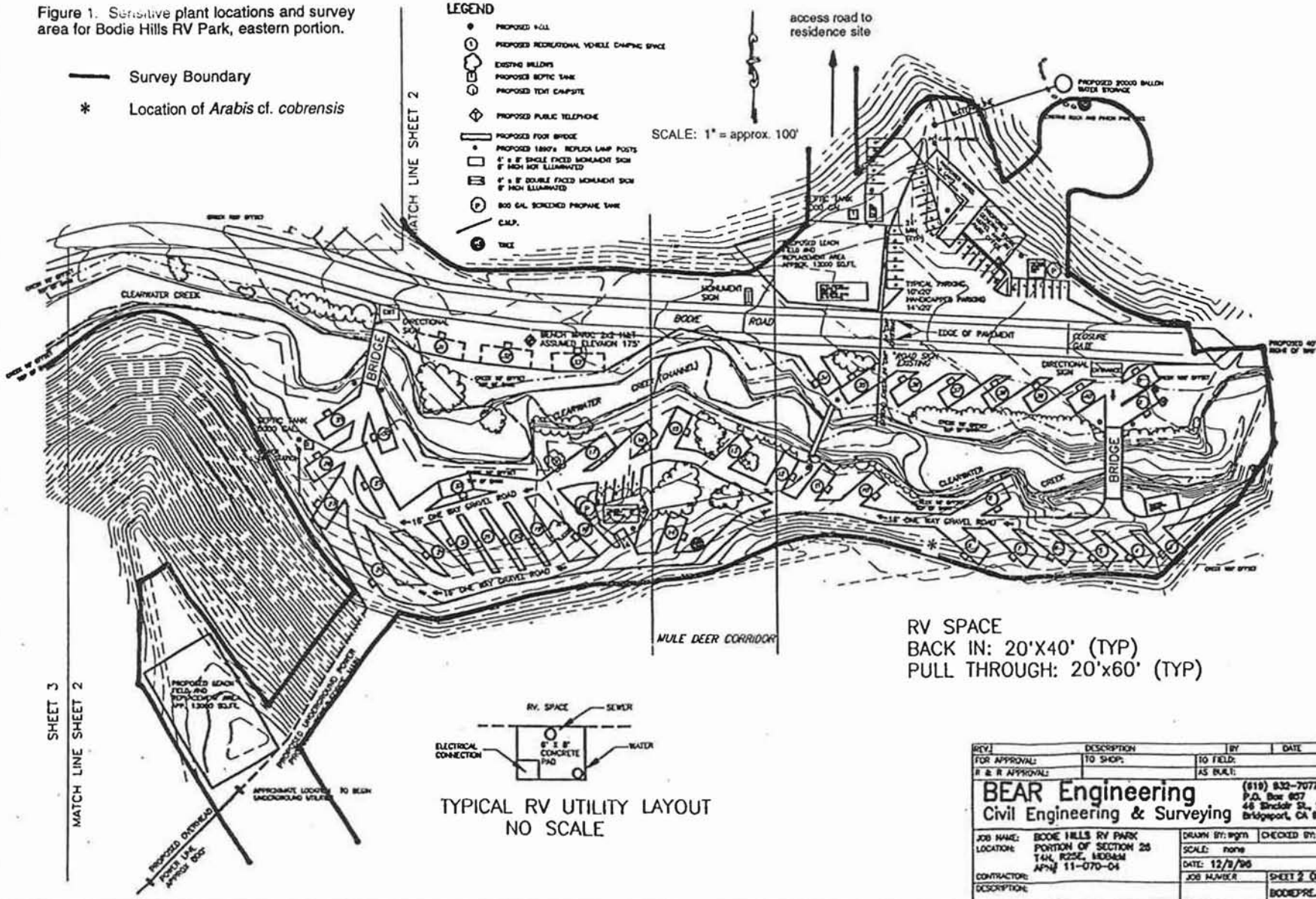
Figure 1. Sensitive plant locations and survey area for Bodie Hills RV Park, eastern portion.

— Survey Boundary  
 \* Location of *Arabis cf. cobrensis*

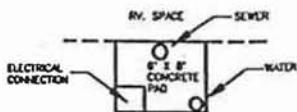
LEGEND

- PROPOSED P.U.L.
- PROPOSED RECREATIONAL VEHICLE CHANGING SPACE
- EXISTING MILDONS
- PROPOSED OPTIC TANK
- PROPOSED TENT CAMP SITE
- ◇ PROPOSED PUBLIC TELEPHONE
- ▭ PROPOSED POOL BRIDGE
- ▭ PROPOSED 1800'± REFLECTOR LAMP POSTS
- 4' x 8' SINGLE FACED MONUMENT SIGN 8' HIGH NOT ILLUMINATED
- 4' x 8' DOUBLE FACED MONUMENT SIGN 8' HIGH ILLUMINATED
- 800 GAL. SCREENED PROPANE TANK
- C.A.P.
- TREE

SCALE: 1" = approx. 100'



RV SPACE  
 BACK IN: 20'x40' (TYP)  
 PULL THROUGH: 20'x60' (TYP)



TYPICAL RV UTILITY LAYOUT  
 NO SCALE

REV	DESCRIPTION	BY	DATE
FOR APPROVAL:	TO SHOP:	TO FIELD:	
R. & R. APPROVAL:	AS BUILT:		
<b>BEAR Engineering</b> Civil Engineering & Surveying			(916) 832-7077 P.O. Box 857 46 Brindley St., Ste. 3 Bridgeport, CA 93517
JOB NAME: BODIE HILLS RV PARK LOCATION: PORTION OF SECTION 28 T4N, R22E, M066M APR 11-070-04		DRAWN BY: wgm SCALE: none DATE: 12/9/98	CHECKED BY: JOB NUMBER SHEET 2 OF 5
CONTRACTOR: DESCRIPTION:		BODIEPREL.DWG	

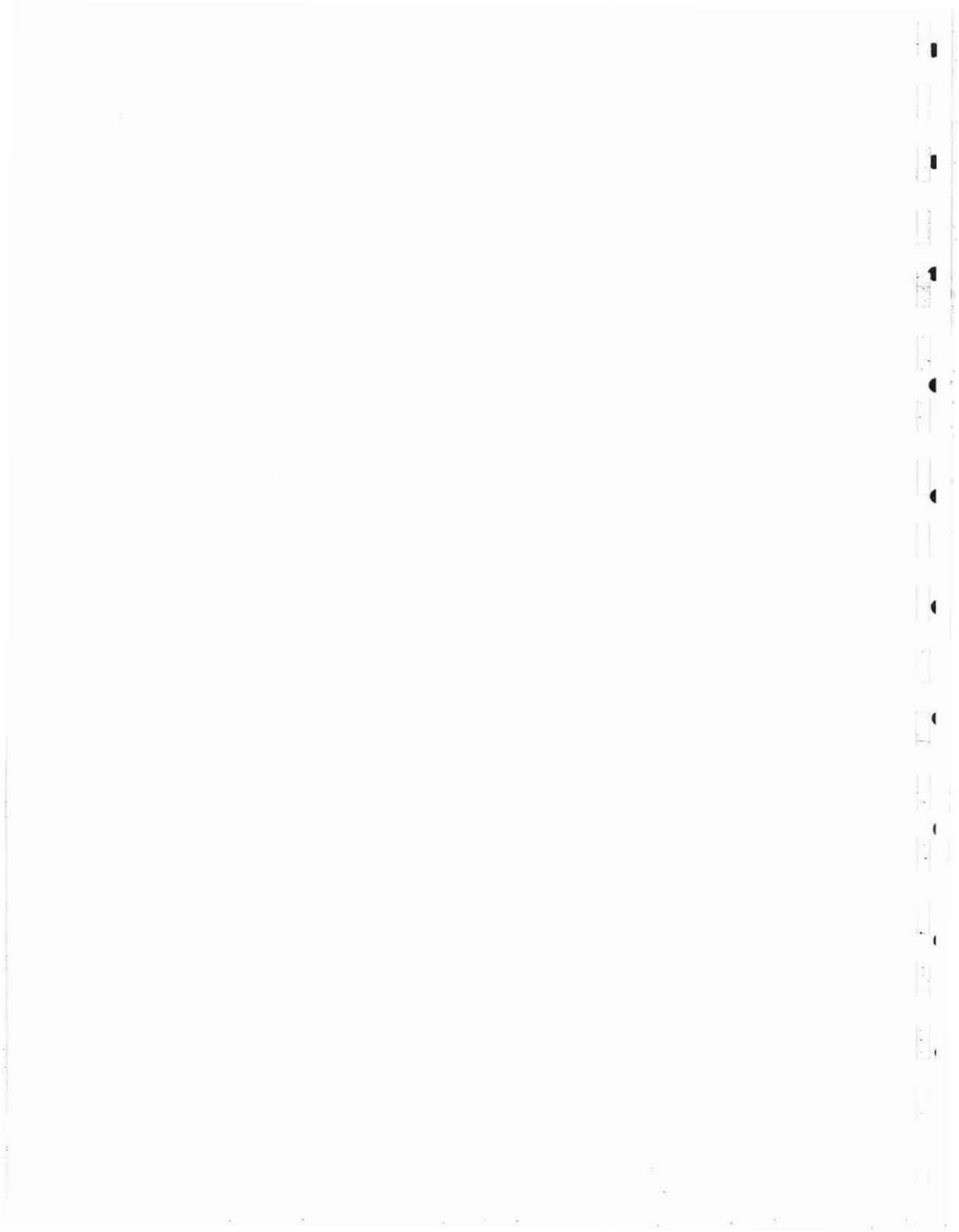
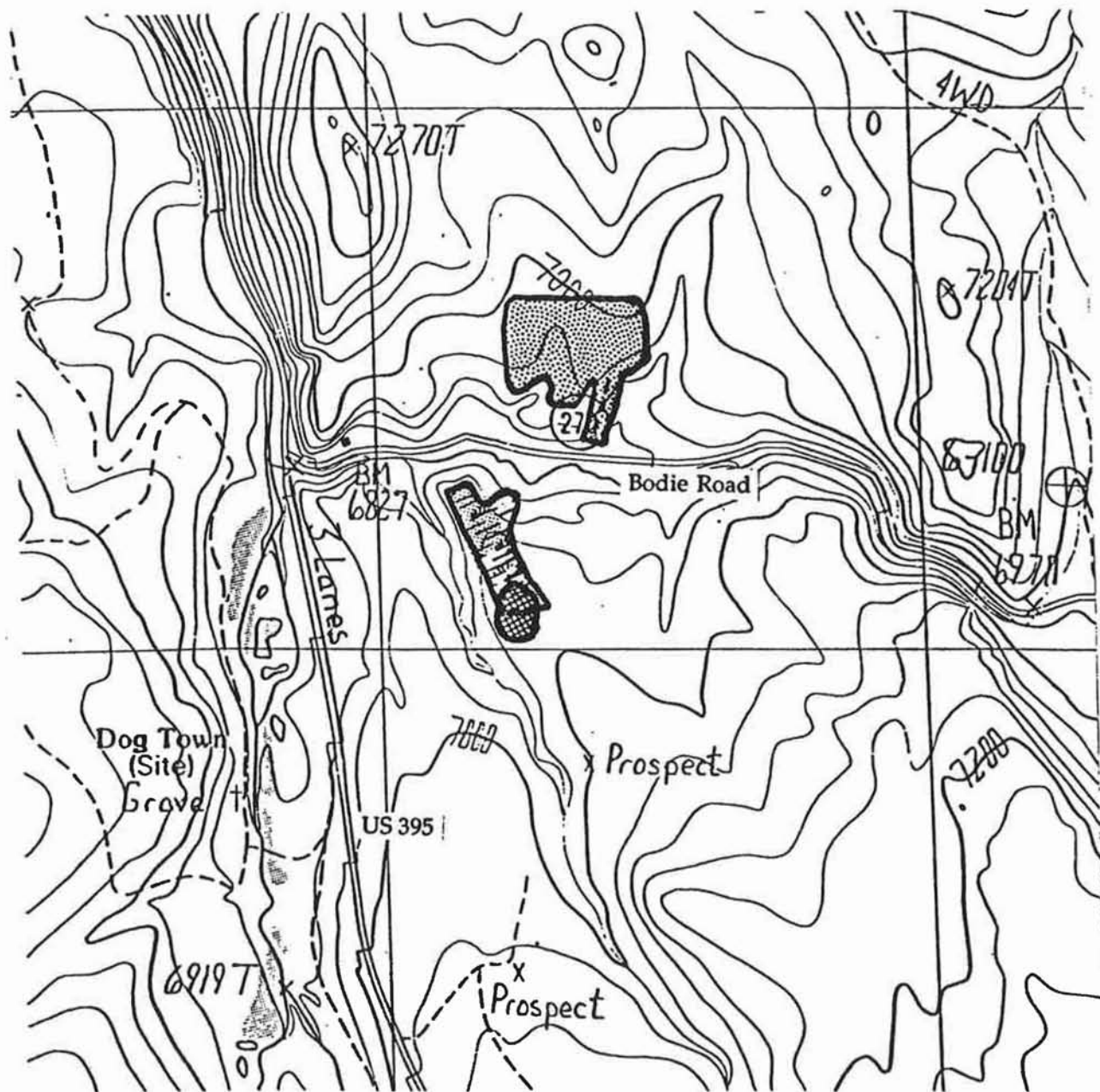







Figure 3. Sensitive plant locations and survey areas for proposed leach field and residence sites for the Bodie Hills RV Park.



-  Survey area for home sites
-  Survey area for leach field
-  Location of *Cusickiella quadricostata*

-  Proposed Access road
-  Proposed leach field

Scale: 1 inch = approximately  
1625 feet





Munz 1968, Munz and Keck 1959). A plant was considered a species of concern if it was federally or state listed or proposed as a rare, threatened, or endangered species; or a federal candidate for listing, Category 1 or 2 (USFWS 1993, 1996 a&b); or a CNDDDB special plant (CDFG 1996); or listed by the California Native Plant Society (CNPS) in their inventory of rare and endangered plants of California (Skinner and Pavlik 1994). A species was judged to have some potential for occurring in the study area if it was known to occur in the region of the project in a habitat type and at an elevation range thought likely to be found in the study area.

Seven plant species of concern were determined to have some potential to occur in the study area (Table 1). These plants make up the plant species of concern search list used in planning and conducting the field surveys. For each species on Table 1, information was gathered from the above sources on status, distribution, known elevational range, habitat preferences and flowering period.

None of the search list species have previously been reported to occur within the project area. Bodie Hills rock cress (*Arabis bodiensis*), Bodie Hills cusickiella (*Cusickiella quadricostata*) and Mono County phacelia (*Phacelia monoensis*) are all known about 1.5-2 miles east of the project area in Clearwater Creek Canyon. None of the search list species are state or federally listed or proposed for listing. Bodie Hills rock cress, Bodie Hills cusickiella, Mono County phacelia, and Masonic Mountain jewelflower (*Streptanthus oliganthus*) were until recently federal candidates for listing (USFWS 1993, 1996b). These species are still BLM Special Status plants and are also listed as rare or endangered in California by CNPS (List 1B). Of the remaining three search list species, two are listed by CNPS as rare or endangered in California, but more common elsewhere (List 2), and one is listed on the CNPS watch list (list 4).

Prior to conducting field surveys in the study area, known populations of Bodie Hills cusickiella and Mono County phacelia were field checked. These checks were conducted to help develop a visual search image for these species, to see the microhabitats the plants occur in, and to determine their current phenological state. This is especially important for Mono County phacelia, the only annual species on the species of concern search list. A reported population of Bodie Hills cusickiella and Mono County phacelia was checked on May 22, 1996, at a location in Clearwater Creek Canyon approximately 2 miles southeast of the project area. At this site, Bodie Hills cusickiella was found in bud and early flowering stages, but no phacelia were observed. One hundred to two hundred Mono County phacelia were reported here on May 25, 1994, by Anne Halford and Mary DeDecker. Two other reported populations of Mono County phacelia were then checked in the Morman Meadow area, about one mile east of the first site. No phacelia were observed at these two sites. One of these sites is a historic Mono County phacelia population which has not been observed in many years; it appears to have been heavily disturbed by sheep bedding. The other site, near Bodie Road, was last reported by Kathleen Frawley Nelson on May 16, 1984, when she observed six plants in the disturbed area along the edge of Bridgeport Canyon Road.

Table 1. Plant species of concern with some potential to occur on the proposed Bodie Hills RV Park project area.

Scientific/Common Name (Plant Family)/Life Form	Rank or Status <sup>1</sup>					Distribution	Elevational Range, Habitat Preferences and Flowering Period
	1996 FWS	1993 FWS	DFG	NDDB	CNPS		
<i>Arabis bodiensis</i> Bodie Hills rock cress (Brassicaceae) herbaceous perennial	-	C2	-	S1.2	1B	Bodie Hills (seven sites), Sierra Nevada and White- Inyo Range, Mono, Inyo, Fresno, and Tulare Co., Calif.; to W Nev.	7200-10,170ft (2200-3100 m) Great Basin scrub, pinyon- juniper wood-land, subalpine coniferous forest. June-August.
<i>Arabis cobrensis</i> Masonic rock cress (Brassicaceae) herbaceous perennial	-	-	-	S1S2	2	Panamint Mts., Inyo Co.; Mono and Modoc Co., Calif.; across Nev. to E. Ore, than E through S Idaho to Wyo.	4510-9200 ft (1375-2800 m) Above 7000 ft in Bodie Hills, on dry slopes (Messick 1982). Great Basin scrub, pinyon-juniper woodland, sandy soils. June-July.
<i>Arabis microphylla</i> var. <i>microphylla</i> small-leaved rock cress (Brassicaceae) herbaceous perennial	-	-	-	S3.3	4	N. Sierra Nevada and Great Basin; Mono, Modoc, and Plumas Co., Calif., to Nev., Wash., and Wyo. In Bodie Hills only on NE slope of Masonic Mtn. and upper Rough Creek (Messick 1982).	5580-8860 ft (1700-2700 m) Pinyon-juniper woodland, rock crevices, granitic or basaltic outcrops. July.
<i>Cusickiella quadricostata</i> Bodie Hills cusickiella (Brassicaceae) herbaceous perennial	-	C2	-	S2.2	1B	Bodie Hills, Mono Co., Calif.; and adjacent W Nev. Mostly in W and S Bodie Hills, also near Masonic Mtn. and Beauty Peak.	6500-9200 ft (1980-2800 m) Great Basin scrub, pinyon- juniper woodland, gravelly or clayey slopes, ridges, or flats. May-July.
<i>Eriogonum beatleyae</i> Beatley's buckwheat (Polygonaceae) herbaceous perennial	-	-	-	-	2	One Calif. occurrence in the Bodie Hills, S of Mormon Meadow; central and W Nev.	7200-10,170ft (2195-3100 m) Great Basin scrub. In Bodie Hills in gravelly and clayey soils at 7500 ft (Messick 1982). May-August.
<i>Phacelia monoensis</i> Mono County phacelia (Hydrophyllaceae) annual	-	C2	-	S2.1	1B	Bodie Hills and Sweetwater Mts., Mono Co., Calif.; and W Nev. Fewer than 20 occurrences in Calif.	5500-9500 ft (1680-2900 m) Great Basin scrub, pinyon- juniper woodland, some at edge of meadows; only on red-brown clayey soils. June-July.
<i>Streptanthus oliganthus</i> Masonic Mountain jewelflower (Brassicaceae) herbaceous perennial	-	C2	-	S2.2	1B	Bodie Hills, Sweetwater and White mts., Mono and Inyo Co., Calif.; and W-central Nev.	6000-9200 ft (1830-2800 m) Rocky sites or talus. In Bodie Hills, "common in shade of pinyon pines in northern third of range, infrequent or rare elsewhere" (Messick 1982). June-July.

<sup>1</sup> Rank or status:

1996 FWS (U.S. Fish and Wildlife Service) listings under the Endangered Species Act (USFWS 1996a, 1996b); these are the most recent lists of candidate species.

1993 FWS (U.S. Fish and Wildlife Service) listings under the Endangered Species Act (USFWS 1993): C2 - category 2 candidate species, vulnerable but not enough data to support listing at this time.

DFG (California Department of Fish and Game) listings are (CDFG 1996): E - endangered, R - rare under the California Native Plant Protection Act and California Endangered Species Act.

NDDB (California Natural Diversity Data Base, a section within DFG) ranks are (CDFG 1996): S1- extremely endangered; S2- endangered; S3- restricted range, rare. A more precise degree of threat is expressed by a decimal followed by a number. Possible range of values is 1-3 with 1 signifying the most threatened and 3 the least threatened. Example: A species ranked S2.1 is endangered and extremely threatened in California.

CNPS (California Native Plant Society, Skinner and Pavlik 1994) ranks are: 1B - plants rare and endangered in California and elsewhere; 2 - plants rare and endangered in California, but more common elsewhere; 4 - plants of limited distribution, a watch list.

Also on May 22, 1996, Mark Bagley met with one of the project proponents, Mr. Bill Lapham, at the project site in order to be shown the locations of the boundaries of the project area, including the RV park leach field and pipeline, the three residences and access road, and the water storage tank and pipeline. After this reconnaissance of the site it was determined that the timing was a little early as most herbaceous plants were not yet flowering. With the absence of Mono County phacelia at the nearby known populations, it was also considered important to see this species prior to conducting the surveys in order to confirm the appropriateness of the timing for this species. The survey of the project area was therefore postponed for about two weeks.

On June 3, 1996, a previously reported site for both Mono County phacelia and Bodie Hills cusickiella was checked. This site was in the northern Bodie Hills, on a dirt road just east of Aurora Canyon. Mono County phacelia was observed here in bud and flower; about 100-200 plants were observed growing in open areas on red-brown clay soil in the road cut, shoulder and road bed. Bodie Hills cusickiella was also observed in flower; growing in several patches on the gentle slope near the road.

Field surveys were conducted in the project area on June 4, 1996, by Mark Bagley. Surveys were conducted by systematically walking transects approximately 15-30 feet apart over the survey areas, with the exception that the home site area was surveyed with transects spaced approximately 50 feet apart (Figures 1 through 3). Field surveys were floristically based, that is all parts of the project area were surveyed and all plant species encountered in the survey area were identified to at least genus and to the level necessary to ensure that they were not plant species of concern. A list of all plant species encountered was recorded. Plant communities were classified according to the California Natural Diversity Data Base system (Holland 1986). If plant species of concern were found in the study area, their locations were mapped, the extent and size of the populations determined, and a California Natural Diversity Data Base field survey form completed for each.

## RESULTS AND DISCUSSION

### Vegetation

Three natural vegetation community types occurred in the project area. These types included big sagebrush scrub, which occurred over most of the area, Modoc-Great Basin riparian scrub, which occurred in the Clearwater Creek channel, and Great Basin pinyon-juniper woodland, which occurred only at the eastern edge of the home site survey area and the upper slope around the water storage area.

**Big Sagebrush Scrub.** Big sagebrush scrub is widely distributed in the eastern Sierra Nevada from the northern Owens Valley northward through the Modoc Plateau and eastward throughout the Great Basin (Holland 1986, Young, et al. 1977).



This is an open, shrub dominated type, typically dominated by big sagebrush (*Artemisia tridentata*) with scattered grasses and herbs, and often with other associated shrubs.

Big sagebrush scrub was widespread over the project area, covering the entire survey area except the creek channel and small parts of the home site area and the upper slope around the water storage tank area. On the canyon flats, big sagebrush scrub occurred in deep sandy, silty alluvial soils. It was strongly dominated by big sagebrush with rubber rabbitbrush (*Chrysothamnus nauseosus*) and scattered ashy wildrye (*Leymus cinereus*). Other common associated species included Douglas sedge (*Carex douglasii*), creeping wildrye (*Leymus triticoides*), wheatgrass (*Agropyron* sp.), mat muhly (*Muhlenbergia richardsonis*), and diffuse gayophytum (*Gayophytum diffusum*). Scattered narrow-leaf willow (*Salix exigua*) and golden current (*Ribes aureum*) occurred in many areas near the creek channel bank, in a somewhat transitional area with the riparian scrub in the channel. Many of the willows up on the flats were dead or had many dead branches, probably indicating water stress that may be due to the deep down cutting of the channel.

Several areas on the flats, particularly near Bodie Road, have been disturbed by heavy equipment fairly recently, within the past year or two it appeared. In these areas the vegetation was scraped off and the soil disturbed. Bill Lapham indicated that this was done partly for the surveyors and partly for percolation tests.

A different type of big sagebrush scrub occurred in the rocky soils along the base of the canyon walls, in the leach field survey area, and on the slopes included in the survey area. These slopes included the road to the home site area and the pipeline corridors for the leach field and the water storage tank. Here there was more shrub diversity and fewer grasses and herbs than on the flats. Common associates with big sagebrush in these areas included bitterbrush (*Purshia tridentata*) and curl leaf rabbitbrush (*Chrysothamnus viscidiflorus*), with occasional green ephedra (*Ephedra viridis*), plateau gooseberry (*Ribes velutinum*), snowberry (*Symphoricarpos rotundifolius*), mountain pennyroyal (*Monardella glauca*), prickly phlox (*Leptodactylon pungens*), sulfur buckwheat (*Eriogonum umbellatum*), desert peach (*Prunus andersonii*), ricegrass (*Achnatherum hymenoides*), big squirreltail (*Elymus elymoides*), and a few scattered single-needle pinyon (*Pinus monophylla*).

On the home site survey area, in thin, rocky soils, big sagebrush scrub was dominated by big sagebrush and bitterbrush with big squirreltail, cheat grass (*Bromus tectorum*), and occasional ashy wildrye, curl leaf rabbitbrush, green ephedra, and broom sagebrush (*Artemisia nova*).

**Modoc-Great Basin Riparian Scrub.** Found along perennial or intermittent streams in the Modoc Plateau and Great Basin deserts, Modoc-Great Basin riparian scrub typically forms open to dense thickets dominated by shrubby willows (*Salix* species), often with wild rose (*Rosa woodsii*), big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and herbs such as sedges (*Carex* species), rushes (*Juncus* species), and grasses (Holland 1986).

considered a sensitive vegetation type. The project will result in the loss of fewer than 22 acres of big sagebrush scrub. This would affect only a very small portion of the thousands of acres of this vegetation type that occur in the project vicinity. Project impacts to big sagebrush scrub would therefore be considered less-than-significant.

Great Basin pinyon-juniper woodland occurred in the project survey area only in the eastern portion of the home site area and on the upper slope around the water storage area. This is a common and widespread community type found in the mountains east of the Sierra Nevada and eastward throughout the Great Basin (Holland 1986, Vasek and Thorne 1977). This is not considered a sensitive vegetation type. It covered no more than 3 or 4 acres in the survey area and only a small portion of that is likely to be impacted by the proposed project. Project impacts to Great Basin pinyon-juniper woodland would therefore be considered less-than-significant.

Modoc-Great Basin riparian scrub occurred throughout the Clearwater Creek channel and along the banks in the project area. This riparian vegetation is dominated by wetland plant species and it appears to qualify as wetland vegetation under the U.S. Fish and Wildlife Service and California Department of Fish and Game criteria (Radovich 1993). Wetlands are considered sensitive vegetation. The California Fish and Game commission has adopted the Fish and Wildlife wetland definition for Department of Fish and Game use in conjunction with the Commission's Wetland Resources Policy (Radovich 1993). This policy requires Fish and Game to object to development proposals that will result in net loss of either wetland habitat values or acreage.

Wetlands protected under the EPA and Army Corps of Engineers Section 404 permit program are defined more narrowly than the U.S. Fish and Wildlife definition. In the Section 404 permit program, in addition to the criteria for hydrophytic vegetation, two other criteria must be independently met to qualify an area as jurisdictional wetland; these are hydric soils and wetland hydrology. Analysis of either of these parameters was beyond the scope of the current study, but it appears that the channel would meet these criteria.

Based on the project map provided (Figures 1 and 2), three 20-foot wide bridges and a foot bridge are proposed to be constructed across the stream channel. Construction of these bridges has the potential to have significant adverse impacts to the stream and the riparian scrub wetland in the stream channel. Other project components would not have potential adverse impacts on the wetland vegetation in the stream channel. The project description and maps provided to us do not provide a description of how the bridges would be constructed, so their potential impacts cannot be fully assessed at this time. Mr. Stephen Higa, of the Mono County Planning Department, has told us that the footings for the bridges are proposed to be located outside of the stream channel and that construction activities would not occur in the channel, except for the need to drive equipment across the stream.

The locations of the stream crossings, the type of equipment, and the number of crossings needed to be made have not been specified. A California Department of Fish and Game stream alteration permit will probably be required. The Planning Department should contact Fish and Game regarding this permit and mitigation measures that would minimize the impacts of vehicles fording the stream. Additionally, the following measures are recommended:

- Vehicles should be required to cross at only one specified location in the RV park area and one location in the tent camping area. These crossings should be located to minimize the impacts on vegetation and bank stability.
- The number of times vehicles drive across the channel should be minimized to minimize the severity of impacts to plant roots and soils. Nearly all of the plants in the riparian vegetation are perennials that would be expected to resprout from roots and rhizomes if the plants are crushed by vehicles but the soil is not eroded away.
- As soon as possible after the bridges are operational and the stream crossings are no longer needed, the banks should be stabilized as needed to prevent erosion.

Actual construction plans for the bridges should be provided to insure that the stream channel is avoided. The most recent project maps (Figures 1 and 2) show three of the four bridges with one end just at the top edge of the stream bank. Construction of bridge supports too close to the bank could cause erosion of the banks and adverse impacts to the stream and riparian vegetation. This could be avoided by providing construction specifications that avoid causing bank erosion.

The proposed maintenance building in the southeast portion of the project area is shown overlapping the top of the stream bank (Figure 1). This would appear to require filling in a portion of the stream channel which would have significant adverse impacts to the wetlands. This impact could be avoided by relocating this building away from the bank far enough that it would not require any construction in the channel and not have the potential to cause erosion of the bank.

The end of the road about 100 feet east of the maintenance building and RV space 3 is proposed to cut into the canyon wall just at the top of the stream bank. This appears likely to cause adverse impacts to the stream bank and channel as it would probably require cut and fill. This impact could be avoided by ending the road before it reaches the slope and stream bank.

In addition, several of the RV spaces drawn on the project maps (Figures 1 and 2) are shown within the 10-foot offset from the top of the stream bank (spaces 8, 10-13). Construction of these spaces so close to the bank appears to have the potential to cause bank erosion resulting in significant adverse impacts to the wetlands. The stability of the stream banks adjacent to these spaces and the construction details for building these should be investigated to determine if bank erosion is likely to result from construction of these proposed spaces. Potential impacts could be mitigated by moving the spaces away from the channel bank, thus avoiding the impacts.



**Plant Species of Concern.** Two plant species of concern were found to occur within the project survey area. These species were Bodie Hills cusickiella (*Cusickiella quadricostata*) and Masonic rock cress (*Arabis cobrensis*), although as discussed above the identification of this rock cress is somewhat uncertain (however, if it is not this species it is another, more rare, species of concern, Bodie Hill rockcress, *Arabis bodiensis*).

Bodie Hills cusickiella occurred at the south end of the leach field survey area, at a slightly higher level and a few hundred feet south of the proposed leach field (Figure 3). This population can easily be avoided by following the proposed plan to locate the leach field to the north and to access the leach field site via the proposed pipeline corridor (Bill Lapham, pers. comm.).

Two plants of Masonic rock cress occurred at the base of the north-facing canyon wall, on the south edge of the survey area approximately 15 feet west of proposed RV space number 9 (Figure 1). The project map does not show the extent of the slopes that would need to be cut back on the south and west portions of the RV space, but there is a 6-foot vertical cut needed which would normally require the slope to extend back 12 feet from the edge of the space (at a 1:2 slope). This could potentially affect the Masonic rock cress. This impact could be avoided by keeping the disturbance from construction of RV space 9 away from the rock cress. A 10 foot buffer zone from the plants to the top of the cut slope is recommended in order to avoid impacts. Prior to construction, the Masonic rock cress should be located and a buffer zone flagged off.

No other plant species of concern were found to occur within the survey area. By avoiding the locations where Bodie Hills cusickiella and Masonic rock cress occur, the project would not affect rare, threatened or endangered plant species, or other plant species of concern in the survey area.

**Project Areas Not Included In The Botanical Field Survey.** Several portions of the project area were not included in the botanical field surveys due to subsequent changes in the project layout. These include the following areas (Figure 1):

- the proposed overhead power line;
- the north end of the parking area west of the proposed motel;
- the proposed water storage tank and supply pipeline northeast of the proposed motel;
- the northwest end of the proposed leach field southwest of the proposed motel;
- the end of the road about 100 feet east of the maintenance building and RV space 3;
- the proposed RV space 3, at the southeast edge of the site; and
- possibly the cut slopes (not shown on Figure 1) of proposed RV spaces 4 through 7, and 9.



The proposed overhead power line crosses one canyon with a blue-line stream shown on the USGS 7.5 min. topographic map (Big Alkali Quadrangle, California). Other than in that canyon, the rest of the overhead power line and all the other areas not included in the field surveys occur in either big sagebrush scrub or Great Basin pinyon-juniper woodland. Potential project impacts in these areas to big sagebrush scrub or Great Basin pinyon-juniper woodland would not be significant. However, the canyon crossed by the power line could contain sensitive wetland vegetation; if it does, potential project impacts could be significant.

Additionally, in the unsurveyed portions of the project area there is the potential for the occurrence of sensitive plant species. Masonic rock cress and Bodie Hills cusickiella were two sensitive plant species found to occur in the study area as noted above. Bodie Hills rock cress (*Arabis bodiensis*) and Mono County phacelia (*Phacelia monoensis*) are other sensitive plants known to occur about 1.5-2 miles east of the project area in Clearwater Creek Canyon. These sensitive species appear to have the highest potential to occur in the unsurveyed project areas due to their known close proximity. However, the soils in the unsurveyed project areas, except for the power line corridor which is unknown, are not of the type expected to support Bodie Hills cusickiella or Mono County phacelia. Since Masonic rock cress (or possibly Bodie Hills rock cress) occurs on the south slope of the survey area, within about 50 to 500 feet of all of the unsurveyed areas, except for the power line, and on a similar rocky slope as most of the unsurveyed areas, it appears that there is a good possibility that it could occur in those unsurveyed areas. If the project is not modified to avoid the unsurveyed areas, then early summer field surveys should be conducted for sensitive plant species in those areas.

#### REFERENCES CITED

- Abrams, L.R. and R.S. Ferris. 1923-1960. Illustrated flora of the Pacific States. Vol. 1-4. Stanford Univ. Press, Stanford, Calif. 2770 pp.
- California Department of Fish and Game (CDFG). 1994. California Natural Diversity Data Base, special plants list. CDFG Natural Heritage Division, Sacramento, Calif. Jan. 1994. 74 pp.
- California Department of Fish and Game (CDFG). 1996. California Natural Diversity Data Base, special plants list. CDFG Natural Heritage Division, Sacramento, Calif. Quarterly publication, Jan. 1996. Mimeo. 74 pp.
- Halford, A. and J. Fatooh. 1994. Bishop Resource Area special status plant field guide. Bureau of Land Management, Bishop Resource Area, Bishop, Calif. 37 pp.
- Hickman, J.C., ed. 1993. The Jepson manual: higher plants of California. Univ. of Calif. Press, Berkeley, Calif. 1400 pp.

- Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Calif. Dept. of Fish and Game Natural Diversity Data Base, Sacramento, Calif. 156 pp.
- Messick, T. 1983. February 23ed memo to J.P. Smith, Jr. and Rick York, CNPS Rare Plant Program, regarding *Arabis bodiensis* and *A. fernaldiana* var. *stylosa*. On file at the Calif. Natural Diversity Data Base, Sacramento, Calif. 2 pp.
- Messick, T. 1982. The flora and phytogeography of the Bodie Hills of Mono County, CA & Mineral County, NV. Master's Thesis, Humboldt State University, Arcata, Calif.
- Munz, P.A. 1968. Supplement to a California flora. Univ. of Calif. Press, Berkeley, Calif. 224 pp.
- Munz, P.A. and D.D. Keck. 1959. A California flora. Univ. of Calif. Press, Berkeley, Calif. 1681 pp.
- Radovich, R.A. 1993. An identification and generalized classification of the wetlands of California (with an accompanying key). California Department of Fish and Game, Sacramento, Calif. Admin. Report No. 93-2. 33 pp.
- Rollins, R.C. 1982. Studies on *Arabis* (Cruciferae) of western North America II. Contributions from The Gray Herbarium of Harvard University 212 : 103-114.
- Skinner, M.W. and B.M. Pavlik, ed. 1994. Inventory of rare and endangered vascular plants of California. Special Pub. No. 1 (5th edition). California Native Plant Society, Sacramento, Calif. 338 pp.
- U.S. Fish and Wildlife Service (USFWS). 1993. Plant taxa for listing as endangered or threatened species; Notice of review. Federal Register 58(188): 51144-51190. Sept. 30, 1993.
- U.S. Fish and Wildlife Service (USFWS). 1996a. Endangered and threatened species; Notice of reclassification of 96 candidate taxa. Federal Register 61(40): 7457-7463. Feb. 28, 1996.
- U.S. Fish and Wildlife Service (USFWS). 1996b. Endangered and threatened wildlife and plants; Review of plant and animal taxa that are candidates for listing as endangered or threatened species. Federal Register 61(40): 7596-7613. Feb. 28, 1996.
- Vasek, F.C. and R.F. Thorne. 1977. Transmontane coniferous vegetation. In Terrestrial vegetation of California. Edited by M. G. Barbour and J. Major. John Wiley & Sons, New York. pp. 797-832.
- Young, J.A., R.A. Evans and J. Major. 1977. Sagebrush steppe. In: Terrestrial vegetation of California. Edited by M. G. Barbour and J. Major. John Wiley & Sons, New York. pp. 763-796.

Table 2. Plant species observed in June, 1996, on the Proposed Bodie Hills RV Park (nomenclature from Hickman 1993).

FAMILY Species <sup>1</sup>	Habit
<b>PTERIDOPHYTES (FERNS AND FERN-ALLIES)</b>	
<b>EQUISETACEAE</b>	
<i>Equisetum arvense</i>	perennial
<b>GYMNOSPERMS (CONIFERS)</b>	
<b>CUPRESSACEAE</b>	
<i>Juniperus osteosperma</i>	tree
<b>EPHEDRACEAE</b>	
<i>Ephedra viridis</i>	shrub
<b>PINACEAE</b>	
<i>Pinus monophylla</i>	tree
<b>DICOT ANGIOSPERMS (FLOWERING PLANTS)</b>	
<b>ASTERACEAE</b>	
<i>Achillea millefolium</i>	perennial
<i>Antennaria dimorpha</i>	perennial
<i>Artemisia cana</i> ssp. <i>bolanderi</i>	shrub
<i>Artemisia dracunculus</i>	perennial
<i>Artemisia nova</i>	shrub
<i>Artemisia tridentata</i>	shrub
<i>Aster scopulorum</i>	perennial
<i>Brickellia oblongifolia</i> var. <i>linifolia</i>	subshrub
<i>Chaenactis douglasii</i> var. <i>douglasii</i>	perennial
<i>Chrysothamnus nauseosus</i>	shrub
<i>Chrysothamnus viscidiflorus</i>	shrub
<i>Cirsium scariosum</i> (incl <i>C. drummondii</i> ; <i>C. foliosum</i> ; <i>C. tioganum</i> )	perennial
<i>Conyza</i> sp.	annual
<i>Crepis</i> cf. <i>intermedia</i>	perennial
<i>Erigeron aphanactis</i>	perennial
<i>Erigeron</i> sp.	perennial
* <i>Lactuca serriola</i> ( <i>L. sativa</i> )	annual
<i>Layia glandulosa</i>	annual
<i>Machaeranthera canescens</i> var. <i>canescens</i>	annual to perennial

<sup>1</sup> \* = exotic (non-native) species

Table 2. (Continued) Plant species observed in June, 1996, on the Proposed Bodie Hills RV Park (nomenclature from Hickman 1993).

FAMILY	Species	Habit
	<i>Senecio integerrimus</i>	biennial or perennial
	<i>Senecio multilobatus</i>	annual
	<i>Stephanomeria spinosa</i> ( <i>Lygodesmia</i> s.)	perennial
	* <i>Taraxacum officinale</i>	perennial
	<i>Tetradymia canescens</i>	shrub
	unknown Asteraceae	
	<i>Wyethia mollis</i>	perennial
<b>BORAGINACEAE</b>		
	<i>Cryptantha circumscissa</i>	annual
	<i>Cryptantha flavoculata</i>	perennial
	<i>Cryptantha torreyana</i>	annual
	<i>Plagiobothrys</i> sp.	annual
<b>BRASSICACEAE</b>		
	<i>Arabis</i> cf. <i>cobrensis</i> (possibly <i>A. bodiensis</i> )	perennial
	<i>Arabis pulchra</i>	perennial
	<i>Arabis sparsiflora</i> var. <i>subvillosa</i>	perennial
	<i>Descurainia pinnata</i>	annual
	* <i>Descurainia sophia</i>	annual
	<i>Phoenicautis cheiranthoides</i>	perennial
	* <i>Sisymbrium altissimum</i>	annual
<b>CAPRIFOLIACEAE</b>		
	<i>Symphoricarpos rotundifolius</i> ( <i>S. vaccinoides</i> )	shrub
<b>CARYOPHYLLACEAE</b>		
	<i>Silene bernardina</i>	perennial
	<i>Silene menziesii</i>	perennial
<b>CHENOPODIACEAE</b>		
	<i>Chenopodium</i> sp.	annual
	<i>Grayia spinosa</i>	shrub
	<i>Monolepis nuttalliana</i>	annual
	* <i>Salsola tragus</i>	annual
<b>FABACEAE</b>		
	<i>Astragalus</i> cf. <i>malacus</i>	perennial
	<i>Astragalus iodanthus</i> var. <i>iodanthus</i>	perennial

Table 2. (Continued) Plant species observed in June, 1996, on the Proposed Bodie Hills RV Park (nomenclature from Hickman 1993).

FAMILY	Species	Habit
	<i>Astragalus</i> sp.	perennial
	<i>Lupinus argenteus</i> var. <i>heteranthus</i> (incl <i>L. caudatus</i> ; <i>L. inyoensis</i> )	perennial
GROSSULARIACEAE		
	<i>Ribes aureum</i>	shrub
	<i>Ribes velutinum</i>	shrub
HYDROPHYLLACEAE		
	<i>Nama densum</i>	annual
	<i>Phacelia humilis</i>	annual
LAMIACEAE		
	<i>Mentha arvensis</i>	perennial
	<i>Monardella glauca</i>	perennial
LOASACEAE		
	<i>Mentzelia</i> sp.	annual
ONAGRACEAE		
	<i>Camissonia pusilla</i>	annual
	<i>Gayophytum diffusum</i> var. <i>parviflorum</i>	annual
	<i>Gayophytum ramosissimum</i>	annual
POLEMONIACEAE		
	<i>Eriastrum wilcoxii</i>	annual
	<i>Gilia</i> sp.	annual
	<i>Leptodactylon pungens</i>	subshrub
	<i>Linanthus septentrionalis</i>	annual
	<i>Navarretia breweri</i>	annual
	<i>Phlox condensata</i> ( <i>P. covillei</i> ; <i>P. caespitosa</i> var. <i>condensata</i> )	perennial
	<i>Phlox stansburyi</i>	perennial
POLYGONACEAE		
	<i>Chorizanthe watsonii</i>	annual
	<i>Eriogonum</i> cf. <i>elatum</i>	perennial
	<i>Eriogonum microthecum</i>	shrub
	<i>Eriogonum ovalifolium</i> var. <i>nivale</i>	perennial
	<i>Eriogonum</i> sp.	annual
	<i>Eriogonum umbellatum</i>	shrub
	* <i>Polygonum</i> cf. <i>aviculare</i>	annual
	<i>Rumex salicifolius</i>	perennial

Table 2. (Continued) Plant species observed in June, 1996, on the Proposed Bodie Hills RV Park (nomenclature from Hickman 1993).

FAMILY	Species	Habit
<b>PORTULACACEAE</b>		
	<i>Calyptridium roseum</i>	annual
	<i>Lewisia rediviva</i>	perennial
<b>RANUNCULACEAE</b>		
	<i>Delphinium</i> sp.	perennial
	* <i>Ranunculus aquatilis</i>	perennial
<b>ROSACEAE</b>		
	<i>Amelanchier utahensis</i>	shrub
	<i>Holodiscus microphyllus</i>	shrub
	<i>Potentilla biennis</i>	annual or biennial
	<i>Prunus andersonii</i>	shrub
	<i>Purshia tridentata</i> var. <i>tridentata</i>	shrub
	<i>Rosa woodsii</i> var. <i>ultramontana</i>	shrub
<b>RUBIACEAE</b>		
	<i>Galium</i> sp.	perennial
<b>SALICACEAE</b>		
	<i>Salix exigua</i>	shrub
	<i>Salix lutea</i>	shrub
	<i>Salix</i> sp.	shrub
<b>SCROPHULARIACEAE</b>		
	<i>Castilleja angustifolia</i> ( <i>C. chromosa</i> )	perennial
	<i>Castilleja linariifolia</i> ( <i>C. linariaefolia</i> )	perennial
	<i>Mimulus mephiticus</i> ( <i>M. densus</i> ; <i>M. coccineus</i> )	annual
	<i>Penstemon</i> sp.	perennial
	<i>Scrophularia desertorum</i>	perennial
	* <i>Verbascum thapsus</i>	biennial
<b>URTICACEAE</b>		
	<i>Urtica dioica</i> ssp. <i>holosericea</i> ( <i>U. holosericea</i> )	perennial
<b>VIOLACEAE</b>		
	<i>Viola purpurea</i> ssp. <i>aurea</i>	perennial
<b>MONOCOT ANGIOSPERMS (FLOWERING PLANTS)</b>		
<b>CYPERACEAE</b>		
	<i>Carex</i> cf. <i>praegracilis</i>	perennial

Table 2. (Continued) Plant species observed in June, 1996, on the Proposed Bodie Hills RV Park (nomenclature from Hickman 1993).

FAMILY	Species	Habit
	<i>Carex douglasii</i>	perennial
	<i>Carex lanuginosa</i>	perennial
	<i>Carex nebrascensis</i>	perennial
	<i>Carex</i> sp.	perennial
	<i>Carex vallicola</i>	perennial
	<i>Eleocharis</i> sp.	perennial
	<i>Scirpus microcarpus</i>	perennial
IRIDACEAE		
	<i>Iris missouriensis</i>	perennial
JUNCACEAE		
	<i>Juncus balticus</i> (incl var. <i>montanus</i> )	perennial
	<i>Juncus saximontanus</i> ( <i>J. ensifolius</i> var. <i>montanus</i> )	perennial
LILIACEAE		
	<i>Allium bisceptrum</i> var. <i>bisceptrum</i>	perennial
	<i>Smilacina stellata</i>	perennial
	<i>Zigadenus paniculatus</i>	perennial
POACEAE		
	<i>Achnatherum hymenoides</i> ( <i>Oryzopsis</i> h.)	perennial
	<i>Achnatherum occidentale</i> ssp. <i>pubescens</i> ( <i>Stipa elmeri</i> )	perennial
	<i>Achnatherum thurberianum</i> ( <i>Stipa thurberiana</i> )	perennial
	<i>Agropyron</i> sp.	perennial
	* <i>Bromus tectorum</i>	annual
	<i>Elymus elymoides</i> ( <i>Sitanion hystrix</i> )	annual
	<i>Leymus cinereus</i> ( <i>Elymus</i> c.)	perennial
	<i>Leymus triticoides</i> ( <i>Elymus</i> t.)	perennial
	<i>Melica stricta</i>	perennial
	<i>Muhlenbergia richardsonis</i>	perennial
	* <i>Poa</i> cf. <i>compressa</i>	perennial
	<i>Poa pratensis</i> ssp. <i>pratensis</i>	perennial
	<i>Poa secunda</i> ssp. <i>secunda</i>	perennial
	<i>Poa</i> sp.	perennial



**APPENDIX A**

**CNDDDB Native Species Field Survey Forms  
for  
Bodie Hills cusickiella (*Cusickiella quadricostata*) and  
Masonic rock cress (*Arabis cobrensis*)**

# California Native Species Field Survey Form

Mail to: **Natural Diversity Data Base**  
**California Dept. of Fish and Game**  
**1416 Ninth Street, 12th Floor**  
**Sacramento, CA 95814**

For office use only

Source Code \_\_\_\_\_ Quad Code \_\_\_\_\_  
 Elm Code \_\_\_\_\_ Occ # \_\_\_\_\_  
 Copy to \_\_\_\_\_ Map index # \_\_\_\_\_

Date of field work: June 4, 1996  
Mo day year

Scientific name (no codes) : Arabis cf. cobrensis Map pop #: \_\_\_\_\_

Species found?  [ ] yes no If not, why?

**Reporter:** Mark Bagley  
 Address: P.O. Box 1431, Bishop, CA 93515

Total # indiv: 2 Subsequent visit? [ ]   
yes no

Phone: 619-873-5326  
 Other knowledgeable individuals (name/address/phone): \_\_\_\_\_

[  ] 1-10 [ ] 11-50 [ ] 51-100 [ ] 101-1000 [ ] 1001+

Compared to your last visit: [ ] more [ ] same [ ] fewer

Is this an existing CNDDDB occurrence? [ ]  [ ]  
yes, Occ# no unk.

Population area: \_\_\_\_\_ [  ] < 1 m<sup>2</sup> [ ] 1-5 m<sup>2</sup>  
 [ ] 5-25 m<sup>2</sup> [ ] 25-100 m<sup>2</sup> [ ] 100 m-1 ha [ ] 1 ha+ (>2.5 ac)

Collection? If yes: \_\_\_\_\_  
number Museum/Herbarium

Survey intensity (time, area covered, method, etc.): Intense survey of canyon bottom and lower slopes. Did not survey very far upslope above the two plants found.

**Plant Information:** Phenology (%): \_\_\_\_\_ vegetative 50% bud 50% flowering \_\_\_\_\_ fruiting \_\_\_\_\_ dormant

Age class (%): \_\_\_\_\_ seedling \_\_\_\_\_ immature 100% mature \_\_\_\_\_ senescent \_\_\_\_\_ other age: \_\_\_\_\_

**Location:** (Please also attach or draw map on back.)

Region: Eastern Sierra Place: Bodie Hills General location: Clearwater Creek Canyon

Specific location: About 0.5 miles east of US Highway 395 on Bodie Road (State Route 270), about 150 feet west of closure gate on road and south on the base of the north-facing canyon slope.

County: Mono Landowner/Mgr: Private

Quad name: Big Alkali [  ] 7.5' [ ] 15' Elevation: 6900 feet

T. 4N R. 25E \_\_\_\_\_ unsurveyed Sec. \_\_\_\_\_ and T. \_\_\_\_\_ R. \_\_\_\_\_ Sec. \_\_\_\_\_

T. \_\_\_\_\_ R. \_\_\_\_\_ Sec. \_\_\_\_\_ UTM: \_\_\_\_\_

**Habitat Description:** (Plant communities, dominants, associates, substrate/soils, topography/aspect/slope)

North-facing canyon slope, near base of rocky slope. Big sagebrush scrub with Artemisia tridentata, Chrysothamnus viscidiflorus, Purshia tridentata var. tridentata, and occasional Ephedra viridis, Ribes velutinum, Leptodactylon pungens, and Eriogonum umbellatum.

Other rare ssp.? No

**Site Information:** Current/surrounding land use:

Open area, south of paved road. In proposed RV Park area.

Visible disturbances, RV Park development will avoid this site.

possible threats:

Overall site quality: [ ] excellent [ ? ] good [ ] fair [ ] poor Comments:

Many stems from the base of each plant. Fruit immature. ID is not certain due to immature fruit. Could possibly be Arabis bodiensis.

**Determination:**  
Mark Bagley, Jepson Manual 1993

Photographs: [  ] none [ ] side [ ] print  
 [ ] plant [ ] habitat [ ] diagnostic feature [ ] other  
 May we obtain duplicates at our expense? [ ] yes [ ] no

# California Native Species Field Survey Form

Mail to: *Natural Diversity Data Base*  
*California Dept. of Fish and Game*  
 1416 Ninth Street, 12th Floor  
 Sacramento, CA 95814

For office use only

Source Code \_\_\_\_\_ Quad Code \_\_\_\_\_  
 Elm Code \_\_\_\_\_ Occ # \_\_\_\_\_  
 Copy to \_\_\_\_\_ Map index # \_\_\_\_\_

Date of field work: June 4, 1996  
Mo day year

Scientific name (no codes): *Cusickiella quadricostata* Map pop #: \_\_\_\_\_

Species found?  [ ] yes no \_\_\_\_\_  
If not, why?

Total # indiv: 50-100 Subsequent visit? [ ]  [ ] yes no

[ ] 1-10 [ ] 11-50  51-100 [ ] 101-1000 [ ] 1001+

Compared to your last visit: [ ] more [ ] same [ ] fewer

Is this an existing CNDDDB occurrence? [ ]  [ ] yes, Occul no unk

Collection? If yes: no number \_\_\_\_\_ Museum/Herbarium

**Reporter:** Mark Bagley  
 Address: P.O. Box 1431, Bishop, CA 93515

Phone: 619-873-5326  
 Other knowledgeable individuals (name/address/phone): \_\_\_\_\_

Population area: \_\_\_\_\_ [ ] < 1 m<sup>2</sup> [ ] 1-5 m<sup>2</sup>  
 [ ] 5-25 m<sup>2</sup>  25-100 m<sup>2</sup> [ ] 100 m-1 ha [ ] 1 ha+ (>2.5 ac)

Survey intensity (time, area covered, method, etc.): Intense survey north of population, but extent to south of any additional patches not determined.

**Plant Information:** Phenology (%): \_\_\_\_\_ vegetative \_\_\_\_\_ bud \_\_\_\_\_ 100% flowering \_\_\_\_\_ fruiting \_\_\_\_\_ dormant  
 Age class (%): \_\_\_\_\_ seedling \_\_\_\_\_ immature \_\_\_\_\_ 100% mature \_\_\_\_\_ senescent \_\_\_\_\_ other age: \_\_\_\_\_

**Location:** (Please also attach or draw map on back.)

Region: Eastern Sierra Place: Bodie Hills General location: Clearwater Creek Canyon

Specific Approximately 0.3 miles southeast of the junction of US Highway 395 and Bodie Road (State Route 270), on ridge about location: 0.2 mi south of Bodie Road.

County: Mono Landowner/Mgr: Private

Quad name: Big Alkali [X] 7.5' [ ] 15' Elevation: 6980 feet

T. 4N R. 25E \_\_\_\_\_ unsurveyed Sec. \_\_\_\_\_ and T. \_\_\_\_\_ R. \_\_\_\_\_ Sec. \_\_\_\_\_

T. \_\_\_\_\_ R. \_\_\_\_\_ Sec. \_\_\_\_\_ UTM: \_\_\_\_\_

**Habitat Description:** (Plant communities, dominants, associates, substrate/soils, topography/aspect/slope)

Big sagebrush scrub with *Artemisia tridentata*, *Chrysothamnus viscidiflorus*, *Purshia tridentata* var. *tridentata*, and *Elymus elymoides*. Plants growing in a relatively open area with few shrubs, in clayey soil. Gentle slope on ridge top.

Other rare ssp.? No

**Site information:** Current/surrounding land use:

Open area. Leach field proposed a few hundred feet to the north.

Visible disturbances, No disturbance. Proposed leach field and RV Park to north should avoid this site.

possible threats:

Overall site quality: [ ] excellent  good [ ] fair [ ] poor Comments: \_\_\_\_\_

**Determination:**  
Mark Bagley, Jepson Manual 1993

Photographs:  none [ ] slide [ ] print  
 [ ] plant [ ] habitat [ ] diagnostic feature [ ] other  
 May we obtain duplicates at our expense? [ ] yes [ ] no

**Supplemental Botanical Survey  
for the  
Proposed Bodie Hills RV Park**

*Prepared for:*

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P.O. Box 1903  
Mammoth Lakes, CA 93546

*Prepared by:*

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July 16, 1998

# Supplemental Botanical Surveys for the Proposed Bodie Hills RV Park

June - July, 1998

## Introduction

This report communicates the results of a supplemental botanical survey performed at the site of a proposed recreational vehicle campground (RV Park) near Bodie, Mono County, California. The proposed RV park site is located adjacent to Clearwater Creek, in the area where it closely parallels Bodie Road, about 1/2 mile east of the junction with Highway 395. Previous botanical work at the site (Bagley, 1997) has documented the plant communities and species over most of this area. The work described here concerns four smaller areas that are located at the edges of the proposed development area. Together, these supplemental survey areas (collectively called the "study area" in this report) total 4.5 acres (Figures 1 and 2). About 27 % (1.2 acres) of the 1998 study area was also surveyed in 1996 by Mark Bagley, so only 3.3 acres represent newly investigated habitat.

Previous work at the site included properly timed field surveys that developed a species list and characterized the existing habitat for plants, and a literature search that identified potentially occurring sensitive plant species (Bagley, 1997). Intensive searches for sensitive species were conducted in the four supplemental areas during the months of June and July, 1998. In this report, previous sensitive plant species work is updated, the methods used for 1998 surveys are described, and the results of these surveys are reported.

## Methods

A literature search was conducted in 1996 by botanist Mark Bagley to identify sensitive plant species with potential to occur in the study area (Bagley, 1997). A search of the California Natural Diversity Data Base (CNDDDB) was included. This review was updated in 1998 (Table 1). Database search results, combined with information from local and regional floras (Halford and Fatooh, 1994, Hickman, 1993, Messick, 1982) indicated that seven sensitive plant species are known to occur near, but not within, the study area. Potentially occurring plant species were considered sensitive if they have current state or federal status as rare, threatened or endangered (California Department of Fish and Game, 1998a), are listed in the CNDDDB list of special plants (California Department of Fish and Game, 1998b), or are listed by the California Native Plant Society in their inventory of sensitive California plants (Skinner and Pavlik, 1994).

Figure 1. Map of the proposed Bodie Hills RV Park, showing three of four areas, designated "Water Tank", "Leach Field", and "Cut Slope" (see inset for the "Power Line" area). Transects within shaded areas were surveyed in June and July, 1998. Contours shown are not to scale.

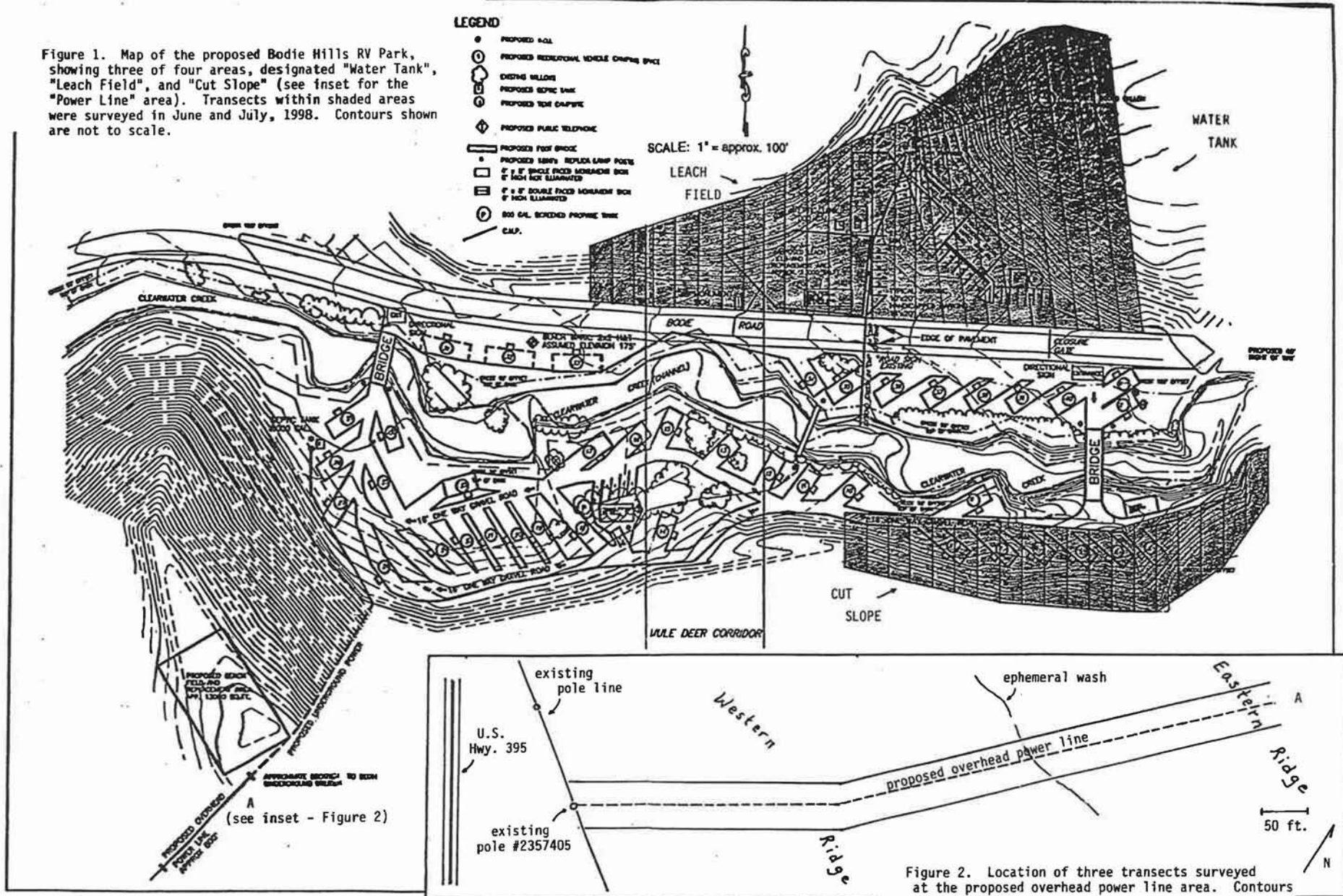


Figure 2. Location of three transects surveyed at the proposed overhead power line area. Contours are not shown.





Table 1. Sensitive plant species potentially occurring at the study area. Flowering period data is from Skinner and Pavlik (1994). Adapted from Bagley (1997). Key to symbols follows table.

Scientific/Common Name Life Form	Rank or Status <sup>1</sup>				Habitat	Flowering Period
	FWS	DFG	NDDB	CNPS		
<i>Arabis bodiensis</i> Bodie Hills rock cress perennial herb	SC	-	S1.3	1B	sagebrush scrub, pinyon juniper woodland	June - August
<i>Arabis cobrensis</i> Masonic rock cress perennial herb	-	-	S1... S2...	2	sagebrush scrub, pinyon juniper woodland, sandy soils	June - July
<i>Arabis microphylla</i> var. <i>microphylla</i> small lvd. rock cress perennial herb	-	-	S3.3	4	rocky outcrops, pinyon juniper woodland	June - July
<i>Cusickiella quadricostata</i> Bodie Hills cusickiella perennial herb	SC	-	S2.2	1B	sagebrush scrub, pinyon juniper woodland, ridges, clay soils	May - July
<i>Eriogonum beatleyae</i> Beatley's buckwheat perennial herb	-	-	-	2	sagebrush scrub	May - August
<i>Phacelia monoensis</i> Mono County phacelia annual herb	SC	-	S2.1	1B	sagebrush scrub, pinyon juniper woodland, red clay soils	June - July
<i>Streptanthus oliganthus</i> Masonic Mtn jewelflower perennial herb	SC	-	S2.2	1B	pinyon juniper woodland	June - July

1. Rank or status, by agency:

**FWS** = US Fish and Wildlife Service status. SC = Species of Concern (CDFG, 1998b).

**DFG** = California Department of Fish and Game listings under the Native Plant Protection Act and the California Endangered Species Act (none currently listed).

**NDDB** = California Natural Diversity Data Base rankings by the CDFG (CDFG, 1998b).

S1 is < 6 occurrences or < 1000 inds or < 1000 ac; S2 is 6-20 occ or 1000-3000 inds or 2000-10000 ac  
S3 is 21-100 occurrences or 3000-10000 inds or 10000-50000 ac; ranking uncertainty is shown by "..."

"threat numbers" follow decimal: .1 = very threatened, .2 = threatened, .3 = no threat currently known.

**CNPS** = California Native Plant Society listings (Skinner and Pavlik, 1994)

1B = rare and endangered in Calif. and elsewhere

2 = rare, threatened or endangered in Calif., but more common elsewhere

4 = plants of limited distribution, a watch list

Specific areas within the larger project area were identified for supplemental botanical characterization and sensitive species surveys in 1998, based on a request from the Mono County Planning Department. A field reconnaissance meeting between the consulting botanist and one of the project proponents (Mr. Bill Lapham, Yerington, Nevada) was held to provide assurance that the entire area would be surveyed as requested. Four specific areas, designated "water tank", "leach field" and "cut slope" (Figure 1), and "power line" (Figure 2), were mapped and marked with flagged lathe, clearly delimiting the extent of botanical survey work to be performed in 1998.

Directed field surveys for sensitive plants were performed on June 13, June 27-28, and July 12, 1998. These surveys were performed within the normal anthesis period for all of the previously targeted sensitive species (Table 1). The search pattern for sensitive plant species in each area used transects located every twenty five feet. Transects within the power line area (0.9 acres) paralleled the proposed overhead transmission portion, covering a corridor (50 feet wide, requiring three transects) that extends for 800 feet from the existing pole line (Figure 2). Within the water tank area (1.5 acres) and the leach field area (1.2 acres), all transects extended down slope from 20 feet beyond the lathe markers to the cleared area bordering Bodie Road (State Route 270). Within the cut slope area (0.9 acres), all transects extended down slope from the markers to roughly 10 feet from the channel of Clearwater Creek, where the transition from sagebrush scrub to riparian scrub was encountered. Transects were searched along their entire length while walking slowly. All field surveys were performed by James Paulus of Bishop, California, serving as a consulting botanist for L.K. Johnston and Associates, Mammoth Lakes, California.

## Results

### *Plant Communities*

Vegetation throughout the study area (*ie*, within all four areas surveyed in 1998) was found to consist of a single community, composed mainly of sagebrush (*Artemisia tridentata*), antelope bush (*Purshia tridentata*), and rabbitbrush (*Chrysothamnus viscidiflorus*). This plant species composition is typical of Holland's Big Sagebrush Scrub community (Holland, 1986), and it is the most common plant community found at the proposed RV park site (Bagley, 1997). Big Sagebrush Scrub is widespread in Mono County (Mono County Planning Department, 1993), and can be found in various forms across the eastern Sierra Nevada between Modoc and Inyo Counties. The density of living perennial cover, expressed as a percentage of the soil surface covered, ranged from < 5% (at the westernmost ridge top in the power line area) to about 60% (at the foot of the cut slope area). The median cover value for surveyed areas was 30% by Big Sagebrush Scrub.

The presence of sparse single needle pinyon (*Pinus monophylla*) at the northeastern part of the water tank area may be interpreted as signaling the presence of a second community, Great Basin Pinyon-Juniper Woodland (Bagley, 1997). This woodland is typically dominated by single needle pinyon and Utah juniper (*Juniperus osteosperma*), with an understory dominated by sagebrush (Holland, 1986). It also is common and widespread in

the surrounding Eastern Sierra and Great Basin. Within the water tank area, the community is probably best characterized as transitional between well developed Big Sagebrush Scrub and the more typical Great Basin Pinyon-Juniper Woodland that is located well up slope from the project area.

Big Sagebrush Scrub species (and occasional wild iris, *Iris missouriensis*) dominated all ephemeral drainages in the study area. Searches of the small drainages at the western edge of the water tank area, at the cut slope area, and at about the midpoints of the power line transects, found evidence of only seasonal flows. No populations of riparian forest or riparian scrub species were found in these drainages.

### *Plant Species Occurrences*

A total of 91 species from 27 plant families were found within the study area (Table 2). Eleven additional plant species were added to the project area species list developed from 1996 surveys by Bagley (1997). Most of the added species were restricted to two ridge top clay lenses habitats that will be crossed by the proposed overhead portion of the power line. Mat-like *Aster scopularum*, *Stenotus acaulis*, and *Antennaria dimorpha* were found among low *Artemisia* and *Eriogonum* in reddish clay with embedded cobbles -- exposed on the western ridge at 100 to 150 feet distance beyond the existing pole line (Figure 2), and on the eastern ridge at 750 to 800 feet distance (the end of the proposed overhead portion).

### *Sensitive Plant Species Occurrences*

No occurrences of state or federally listed plants were found in 1998 surveys conducted at the proposed Bodie Hills RV Park. All species that were observed but not immediately recognized were keyed by the consulting botanist to taxa sufficient to conclude that listed species were not present in 1998.

A large population of Bodie Hills cusickiella (*Cusickiella quadricostata*) was encountered during survey work in the power line area. Bodie Hills cusickiella, numbering in the hundreds of individuals, occurs on red clay soil bands exposed along the eastern side (near the top) of the first ridge that is to the east of U.S. Highway 395 and south of the junction with State Route 270 (Figure 3). This population stretches from approximately 250 feet to the north of the proposed power line corridor to approximately 200 feet to the south of the corridor. The location and extent of this population can be roughly distinguished from the surrounding typical Big Sagebrush Scrub by a noticeable change in the community structure and soil type (see the description of the low *Artemisia-Eriogonum* association described above). The maximum width of the population is 55 feet, at a point about 100 feet to the north of the proposed power line corridor. The proposed power line would appear to pass over this *C. quadricostata* occurrence, in a direction that is perpendicular to the overall shape of the population, for a distance of about 15 feet.

Spring wildflowers were present in great abundance in 1998, due to a favorably wet climate. This climate also favors the accuracy of sensitive species survey work in general.

When a favorable spring pattern occurs, potential diversity is realized to a greater degree than in drought years, while sufficient evidence in flowering and fruiting structures is more likely to be made available. During the transect surveys in both June and July, sign of heavy grazing use by deer was observed. However, there was no evidence that this area had been used for livestock during the 1998 growing season, and it is concluded that livestock activity had no influence on the ability to detect sensitive plants during this survey.

## References

- Bagley, M. 1997. Botanical Survey of the Proposed Bodie Hills RV Park, Mono County, California. Unpubl. report prepared for the Mono County Planning Department, Bridgeport.
- California Department of Fish and Game, 1998a. State and Federally Listed Endangered, Threatened, and Rare Plants of California (April, 1998, revised April 7, 1998). CDFG Natural Heritage Division, Plant Conservation Program, Sacramento.
- California Department of Fish and Game, 1998b. Natural Diversity Data Base: Special Plants List (April, 1998). CDFG Natural Heritage Division, Sacramento.
- Halford, A, and Fatooh, J. 1994. Bishop Resource Area special status plant field guide. Bureau of Land Management, Bishop Resource Area, Bishop.
- Hickman, JC. 1993. The Jepson Manual of Higher Plants of California. University of California Press, Berkeley.
- Holland, RF, 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Non-game Heritage Program, The Resources Agency, California Department of Fish and Game, Sacramento.
- Messick, T. 1982. The flora and phytogeography of the Bodie Hills of Mono County, California and Mineral County, Nevada. Unpubl. master's thesis, Humboldt State University, Arcata, California.
- Mono County Planning Department. 1993. Master Environmental Assessment for Mono County, Bridgeport.
- Skinner, MW, and Pavlik, BM, 1994. Inventory of Rare and Endangered Vascular Plants of California, Fifth Edition. Special Publication No. 1, California Native Plant Society, Sacramento.



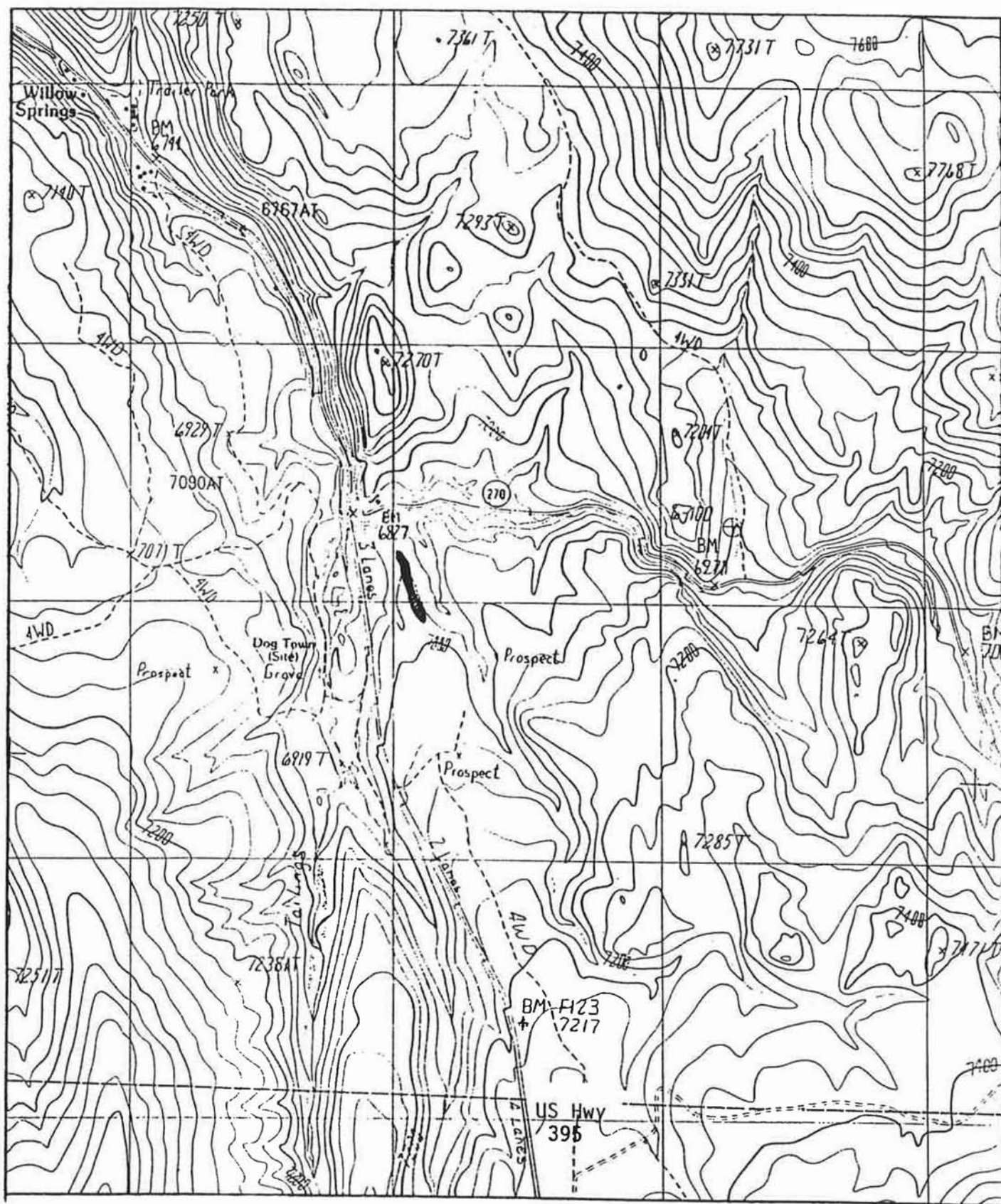


Figure 3. Location of *C. quadricostata* near the junction of U.S. Hwy. 395 and State Route 270 in Mono County, California. The approximate extent of this population is depicted a hatched area. The contour interval is 40 feet.

1" = 1500 ft.



Table 2. Bodie Hills RV Park Supplemental Botanical Survey

	1998 Survey Area			
	Water Tank	Leach Field	Cut Slope	Power Line
Gymnosperms				
Cupressaceae				
<i>Juniperus osteosperma</i>			x	
Ephedraceae				
<i>Ephedra viridis</i>	x	x	x	x
Pinaceae				
<i>Pinus monophylla</i>	x			x
Angiosperms (dicots)				
Apiaceae				
<i>Lomatium nevadense</i>				x
Asteraceae				
<i>Antennaria dimorpha</i>				x
<i>Artemisia cana</i> ssp. <i>bolanderi</i>			x	
<i>Artemisia nova</i>	x			x
<i>Artemisia tridentata</i>	x	x	x	x
<i>Aster scopularium</i>				x
<i>Brickellia oblongifolia</i> var. <i>linifolia</i>			x	x
* <i>Chaenactis douglasii</i> var. <i>douglasii</i>		x		x
* <i>Chaetopappa ericoides</i>	x			x
<i>Chrysothamnus nauseosus</i>			x	
<i>Chrysothamnus viscidiflorus</i>	x	x	x	x
<i>Cirsium</i> sp.			x	
<i>Crepis intermedia</i>	x			
* <i>Erigeron bloomeri</i> var. <i>bloomeri</i>	x	x	x	x
<i>Layla glandulosa</i>	x			
<i>Machaeranthera canescens</i> var. <i>canes</i>	x	x		
<i>Senecio multilobatus</i>	x	x	x	x
* <i>Stenotus acaulis</i>				x
<i>Stephanomeria spinosa</i>	x	x		
<i>Wyethia mollis</i>				
Brassicaceae				
* <i>Arabis holboellii</i>	x			
<i>Arabis pulchra</i>	x			x
<i>Arabis sparsiflora</i> var. <i>subvillosa</i>			x	
<i>Cusickiella quadricostata</i>				x
<i>Descurainia sophia</i>	x	x	x	x
<i>Phoenicaulis cheiranthoides</i>			x	
Cactaceae				
* <i>Opuntia</i> sp.	x			
Caprifoliaceae				
<i>Symphoricarpos rotundifolius</i>			x	x
Chenopodiaceae				
<i>Chenopodium</i> sp.		x		
<i>Grayia spinosa</i>		x		x
<i>Salsola tragus</i>		x		

	Water Tank	Leach Field	Cut Slope	Power Line
<b>Fabaceae</b>				
<i>Astragalus iodanthus</i> var. <i>iodanthus</i>	x			x
<i>Astragalus malacus</i>	x			x
<i>Astragalus purshii</i>				x
<i>Lupinus argenteus</i> var. <i>heteranthus</i>	x			x
<b>Grossulariaceae</b>				
<i>Ribes</i> sp.			x	x
<b>Hydrophyllaceae</b>				
<i>Cryptantha circumscissa</i>	x	x	x	x
<i>Cryptantha torreyana</i>	x	x	x	x
<i>Cryptantha flavoculata</i>	x	x	x	x
<i>Nama densum</i>	x	x	x	x
* <i>Phacelia glandulifera</i>	x	x	x	x
<i>Phacelia humilis</i>			x	x
<b>Loasaceae</b>				
<i>Mentzelia montana</i>	x	x	x	x
<b>Onagraceae</b>				
<i>Gayophytum diffusum</i> var. <i>parvifloru</i>	x	x	x	x
<i>Gayophytum ramosissimum</i>	x	x	x	x
<b>Polemoniaceae</b>				
<i>Eriastrum</i> sp.				x
<i>Linanthus septentrionalis</i>	x			x
<i>Navarretia breweri</i>	x			
<i>Phlox condensata</i>	x	x	x	x
<i>Phlox stansburyana</i>	x	x	x	x
<b>Polygonaceae</b>				
<i>Eriogonum microthecum</i>	x	x	x	x
<i>Eriogonum ovalifolium</i>	x	x	x	x
<i>Eriogonum umbellatum</i>		x	x	
<i>Eriogonum</i> sp. 1 (ann.)	x	x		
<i>Eriogonum</i> sp. 2 (per.)				x
<b>Portulacaceae</b>				
<i>Calyptridium roseum</i>	x			
<b>Ranunculaceae</b>				
<i>Delphinium parishii</i>				x
<b>Rosaceae</b>				
<i>Amelanchier utahensis</i>	x			x
<i>Holodiscus microphyllus</i>		x		x
<i>Prunus andersonii</i>				x
<i>Pushia tridentata</i> var. <i>tridentata</i>	x	x	x	x
<i>Rosa woodsii</i> var. <i>untramontana</i>			x	
<b>Rubiaceae</b>				
<i>Galium</i> sp. 1	x	x	x	x
<i>Galium</i> sp. 2		x		



	1998 Survey Area			
	Water Tank	Leach Field	Cut Slope	Power Line
Salicaceae				
<i>Salix sp.</i>			x	
Scrophulariaceae				
<i>Castilleja sp.</i>	x	x	x	x
<i>Mimulus mephiticus</i>	x	x		
Violaceae				
<i>Viola purpurea ssp. aurea</i>	x	x	x	x
Angiosperms (monocots)				
Cyperaceae				
<i>Carex sp.</i>			x	x
<i>Eleocharis sp.</i>			x	
Iridaceae				
<i>Iris missouriensis</i>				x
Juncaceae				
<i>Juncus sp.</i>			x	
Liliaceae				
* <i>Allium atrorubens var. atrorubens</i>				x
<i>Allium bisceptrum var. bisceptrum</i>			x	
* <i>Calochortus bruneaunis</i>				x
Poaceae				
<i>Achnatherum hymenoides</i>	x	x	x	x
<i>Achnatherum occidentale ssp. pubes</i>	x	x	x	x
<i>Achnatherum thurberianum</i>	x	x		x
<i>Agropyron sp.</i>	x			
<i>Bromus tectorum</i>	x	x	x	x
<i>Elymus elymoides</i>	x	x	x	x
* <i>Hesperostipa comata ssp. comata</i>	x	x		x
<i>Leymus cinereus</i>	x	x	x	x
<i>Leymus triticoides</i>		x		
<i>Melica stricta</i>	x	x	x	x
<i>Muhlenbergia sp</i>				x
<i>Poa pratensis ssp. pratensis</i>	x	x	x	x
<i>Poa secunda ssp. secunda</i>	x	x	x	x
* <i>Poa wheeleri</i>			x	x

### 3. Wildlife Study



**WILDLIFE ASSESSMENT SURVEY AT THE  
BODIE HILLS RV PARK**

*Submitted to:*

Mono County Planning Department  
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Contact: Steven Higa  
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*Submitted by:*

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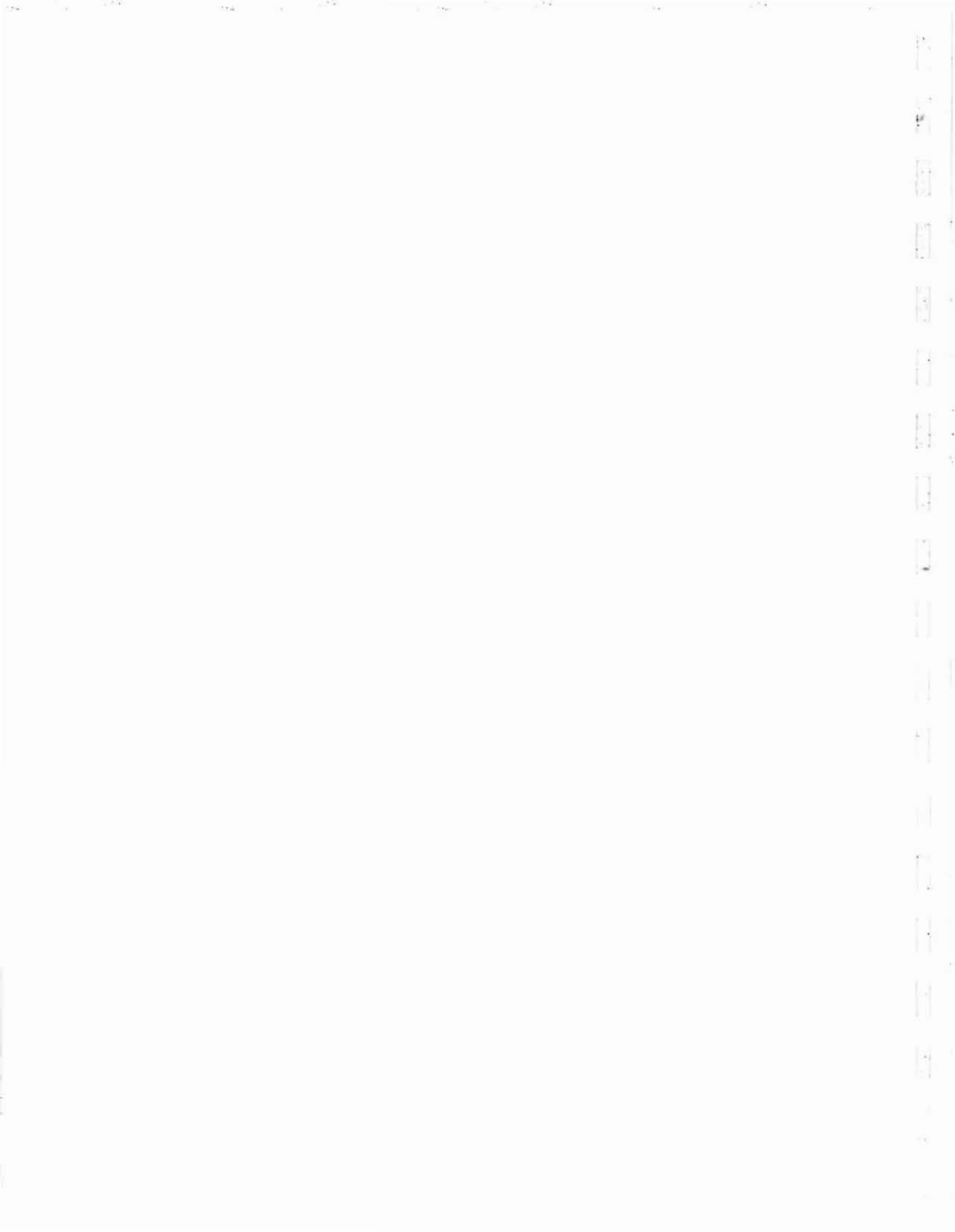
January 6, 1997



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# Introduction and Methods

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## INTRODUCTION

This report describes the wildlife resources occurring at the site of the proposed Bodie Hills RV Park. It is designed to meet the information needs of public resource management and planning agencies with respect to baseline conditions at the project site and to assist in assessing impacts of the proposed project on migratory mule deer (*Odocoileus hemionus*) and any special-status wildlife species that may occur on the site. The objectives of the report are to:

1. identify plant communities and characteristic species;
2. determine use patterns and habitat values for mule deer and any special-status wildlife species;
3. assess and quantify project-related impacts to mule deer and any special-status wildlife species; and
4. provide a mitigation plan designed to minimize potential impacts to mule deer and any special-status wildlife resulting from the proposed project.

## PROJECT LOCATION AND DESCRIPTION

The project area is situated on approximately 13 acres located immediately adjacent to State Route (SR) 270 in Clearwater Creek Canyon, Mono County, California (T4N, R25E, S25E) (Figure 1). The 13 acre project site is part of a larger 155 acre private parcel located within the Bureau of Land Management (BLM) Bridgeport Valley Management Area. Via roadway travel, the project is approximately 20 miles north of Lee Vining and 9 miles south of Bridgeport. The site encompasses relatively flat terrain in a narrow canyon bottom (100 to 400 feet wide) that extends from the intersection of SR 270 and SR 395, easterly up the canyon for approximately 3/4 mile. The site is bounded on the north and south by steep, rocky slopes that rise rapidly from the canyon floor. Clearwater Creek flows the entire length of the project area in a 14 foot deep channel that varies in width from 30 to 60 feet. The area is currently ungrazed but does show evidence of human disturbance (e.g., litter, campfire rings, etc.).

The proposed development includes the following: a general store, restaurant and office; a recreational vehicle park with 45 full hook-up spaces and a laundry, shower, and restroom facility; a tent camping area; eight camping cabins; 10 housekeeping units; an old west museum; a maintenance building; one owners residence; and two caretaker residences (Figures 2a and 2b).

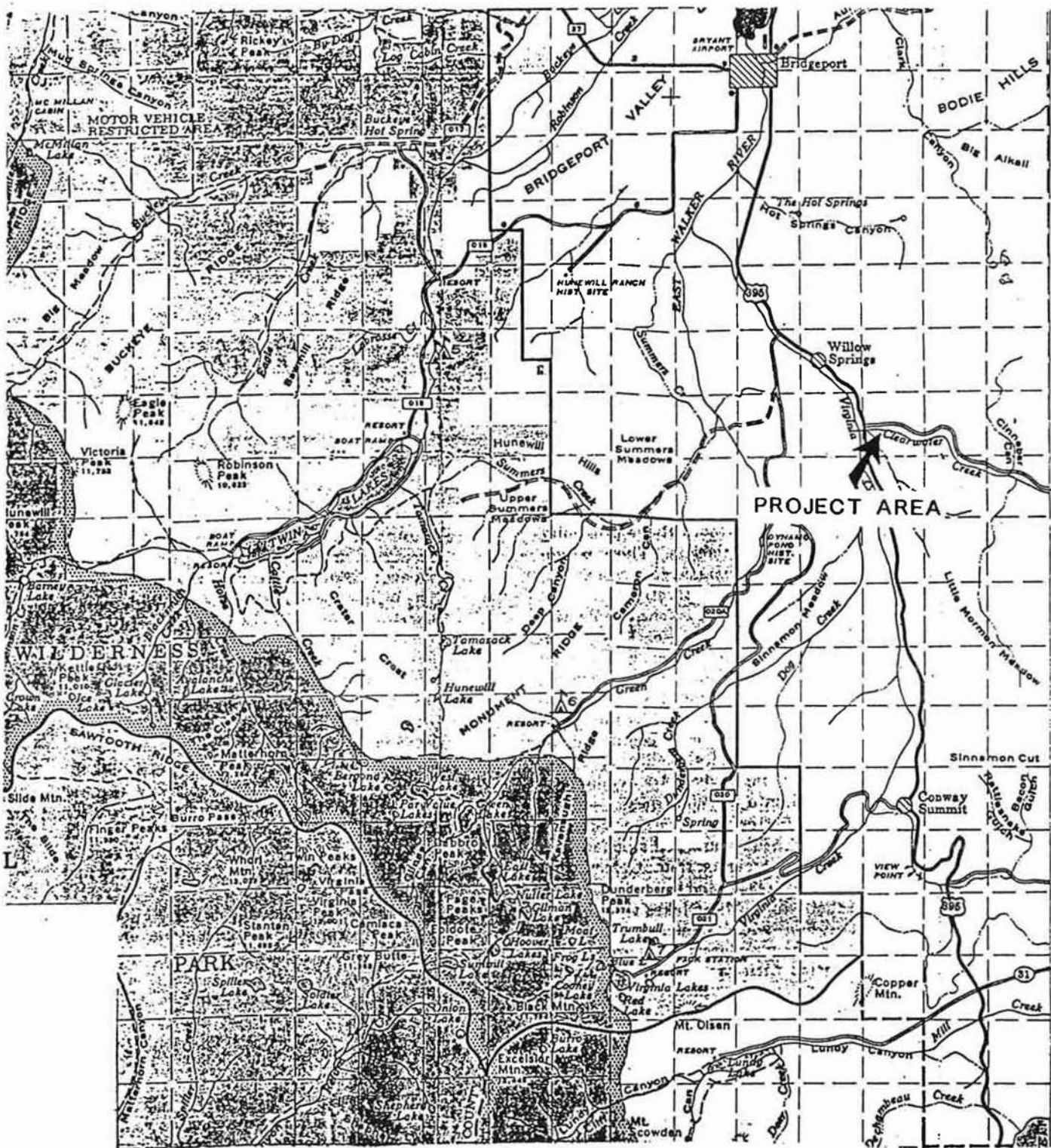


Figure 1. Location of the Bodie RV Park Project Area in Mono County, California.

## SURVEY METHODS

On October 23, 1995, the investigator met with the client, Bill Lampi, at the project site to discuss the project, exchange information, and agree on the exact boundary of the area to be included in the surveys. The investigator also obtained existing information pertaining to the project site including geographical maps and site plans.

Prior to the commencement of field work, the investigator consulted with Ron Thomas of the California Department of Fish and Game (CDFG) and referenced the CDFG Natural Diversity Data Base (NDDB 1995) for a list of special-status wildlife species that could possibly occur on the site. Special-status wildlife include all vertebrate and invertebrate taxa that are legally protected under state and federal Endangered Species Acts or other regulations. Species were included on the list if their geographical ranges encompassed the project area or if their habitats occurred there. Additionally, the investigator consulted with BLM biologist Terry Russi and referenced the BLM Bishop Resource Management Plan and Environmental Impact Statement (RMP/EIS) for a list of threatened, endangered, proposed, and sensitive wildlife species (TEPS) that could occur in the project area and surrounding vicinity.

The criterion applied in this investigation in determining whether the proposed project will have a significant effect on sensitive species wildlife include: 1) project effects interfere with the movement of any resident or migratory wildlife species; and 2) project effects that substantially diminish habitat for fish, wildlife, or plants (California Office of Planning and Research and the Office of Permit Assistance 1986).

Radio-telemetry data compiled by CDFG on the East Walker and Mono Lake deer herds (Taylor 1991) was consulted to determine deer migration patterns in the project area and vicinity.

### Field Surveys

Four field surveys were conducted in the project area during the months of November and December, 1995 to survey for mule deer and special-status wildlife species. Surveys consisted of walking the project site using meandering transects. During the surveys I recorded all wildlife species encountered, as well as other indicators of wildlife (e.g., tracks, droppings, trails, etc.), and assessed the plant communities on the site for their wildlife values. All wildlife species or sign observed during the surveys were recorded in field notes and plotted on a topographic map (1 in. = 40 ft. scale) of the area. In addition, any specific areas of mule deer movement or concentration (e.g., feeding or resting areas, travel routes, etc.) were also mapped.

Surveys for sage grouse were performed simultaneously with deer and other special-status species wildlife surveys. A trained dog was used to locate grouse along transects. Surveys were conducted by walking the transects and recording the number and

locations of grouse flushed by the dog and the locations of any grouse sign (e.g., droppings, tracks, feathers, etc.) observed. Habitat types in the project area were described following the wildlife habitat relationships classification system (Mayer and Laudenslayer 1988).



## Survey Results

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### RESULTS

#### Habitat Types in the Project Area

Three habitat types occur on the project area: big sagebrush scrub, pinyon pine forest and willow-riparian. Along Clearwater Creek, big sagebrush scrub and willow riparian vegetation form a mosaic type dominated by big sagebrush and willow. The following includes a brief description of each habitat type and the wildlife species most likely to inhabit them.

#### Big Sagebrush Scrub

**Vegetation.** Big sagebrush scrub is the most extensive habitat type in the project area. This vegetation type is widely distributed throughout the eastern Sierra and the Great Basin (Mayer and Laudenslayer 1988). It dominates vegetation on the canyon floor adjacent to Clearwater Creek and is characterized as a generally dense (60%-70% ground cover), tall (2-4 foot) scrub dominated by big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus spp.*). Other associated shrubs included bitterbrush (*Purshia tridentata*), Mormon tea (*Ephedra nevadensis*) and horsebush (*Tetradymia spp.*). The most common of the scattered herbs include Indian ricegrass (*Achnatherum hymenoides*), squirreltail (*Elymus elymoides*), brome grass (*Bromus spp.*), buckwheat (*Eriogonum spp.*) and sulphur buckwheat (*E. umbellatum*). A more open (30%-50% ground cover) and shorter (1-2 foot) big sagebrush scrub occurs on the plateau south of the canyon rim.

**Wildlife.** The big sagebrush community on the project area provides forage, cover, roosting and breeding sites for a variety of wildlife species. Some of the bird species observed in the big sagebrush community during the field surveys included the dark-eyed junco (*Junco hyemalis*), song sparrow (*Melospiza melodia*), dusky flycatcher (*Empidonax oberholseri*), northern flicker (*Colaptes auratus*), morning dove (*Zenaidura macroura*), and red-tailed hawk (*Buteo jamaicensis*). Sign of mule deer, mountain lion (*Felis concolor*), coyote (*Canis latrans*), Nuttall's cottontail rabbit (*Sylvilagus nuttallii*), black-tailed jackrabbit (*Lepus californicus*), and California ground squirrel (*Spermophilus beecheyi*) were observed in the big sagebrush community. During the survey on November 17, a mountain lion track was observed in big sagebrush vegetation on the south side of the Bodie Road near the site proposed for trailer space 38. During the same survey, a mountain lion carcass was found in a rock outcrop at the northwest corner of the project site.

## Pinyon Pine Forest

**Vegetation.** Pinyon pine forest dominates vegetation on the rocky slopes and flats lying north and south of the canyon rim. This was a rather open forest dominated by singleleaf pinyon pine (*Pinus monophylla*), with a few scattered western juniper (*Juniperus occidentalis*). Common understory associates included big sagebrush, bitterbrush, rabbitbrush, Mormon tea, squirreltail, and Indian ricegrass.

**Wildlife.** The pinyon pine forest on the project site provides shade, shelter, nesting, breeding, perching, roosting, and foraging habitat for many wildlife species. Primary cavity nesting birds (e.g., woodpeckers) excavate nest holes in pinyon pine snags, which are in turn used by other cavity nesting species, such as white-breasted nuthatches (*Sitta carolinensis*) and mountain chickadees (*Parus gambeli*). The forest canopy provides protection for mule deer against extreme weather conditions. Pine nuts are used as food by Douglas' squirrels (*Tamiasciurus douglasii*), golden-mantled ground squirrels (*Spermophilus lateralis*), pinyon jays (*Gymnorhinus cyanocephalus*), Stellar's jays (*Cyanocitta stelleri*), and Clark's nutcrackers (*Nucifraga columbiana*). Species observed in this habitat included the common raven (*Corvus corax*), northern flicker, mountain chickadee, house wren (*Troglodytes aedon*), and pinyon jay.

## Willow Riparian

**Vegetation.** Willow-riparian habitat dominates vegetation along Clearwater Creek. This habitat type is characterized by a dense scrub comprised of willow (*Salix spp.*), wild rose (*Rosa woodsii*) and big sagebrush.

**Wildlife.** The willow-riparian community along Clearwater Creek provides the highest quality wildlife habitat on the project area, offering escape and nesting cover, forage, and travel corridors for mule deer and many other wildlife species. A mosaic of dense willow and big sagebrush vegetation provides important hiding cover for mule deer fawns, and nesting and brood rearing habitat for mountain quail (*Oreortyx pictus*), cottontail rabbit, raccoon (*Procyon lotor*), and red-winged blackbird (*Agelaius phoeniceus*). Other common inhabitants of the willow-riparian community include long-tailed weasel (*Mustela frenata*), black-tailed jackrabbit, striped skunk (*Mephitis mephitis*), coyote, gray fox (*Urocyon cinereogentus*), Brewer's blackbird (*Euphagus cyanocephalus*), Stellar's jay, house wren, rufous-sided towhee (*Pipilo erythrophthalmus*), yellow-rumped warbler (*Dendroica coronata*), American robin (*Turdus migratorius*), and fox sparrow (*Passerella iliaca*).

Willow-riparian habitat on the site is also used as a movement corridor by a number of wildlife species. The dense willow and big sagebrush vegetation along the creek drainage provides security cover for species such as mule deer, coyote, gray fox,

mountain lion, and mountain quail, enabling them to move safely up and down the Clearwater Canyon drainage.

### SPECIAL-STATUS SPECIES IN THE PROJECT AREA

Wildlife surveys in the project area were conducted on November 2, 17 and 27 and December 17. Eleven special-status wildlife species were identified as having potential to occur in the project area (Table 1). Information on each special-status species identified in Table 1 is presented below.

Table 1. Special-Status Wildlife Species Known to Occur or with the Potential to Occur on the Bodie RV Park Project Area		
Species	Legal and Protection Status	Potential for Occurrence in the Project Area
Mule Deer	SSC, H, MIS	High
Sage Grouse	SSC, H, MIS	Low
Sierra Nevada Mountain Beaver	SMC, SSC	Low
Sierra Nevada Red Fox	ST, SMC, MIS	Moderate
California Wolverine	ST, SMC	Low
Golden Eagle	SSC, FP	Low
Prairie Falcon	SSC	Low
Cooper's Hawk	SSC	Low
Bank Swallow	ST	Low
Willow Flycatcher	SE	Low
Band-thigh Diving Beetle	SMC	Moderate-high
SSC = CDFG species of Special Concern ST = Listed as threatened under the California Endangered Species Act SE = Listed as endangered under the California Endangered Species Act H = Harvest species FP = Fully protected under the California Fish and Game Code SMC = Federal species of management concern MIS = USFS management indicator species		

#### Mule Deer

**Status and Range.** Mule deer are considered special-interest species because they are important harvest species in California. Deer which inhabit the project area and vicinity are from the Mono Lake herd, which winters at lower elevations near Hawthorne, Nevada, some 30 airline miles east of the project area (Taylor 1991). Beginning in mid-



April, deer leave the Mono Lake winter range and migrate to summer range located primarily on the east slope of the Sierra Nevada, from Lundy Canyon north to Sonora Pass. The migration corridor used by the Mono Lake herd between winter and summer ranges encompasses the entire width of the Bodie Hills, from the north shore of Mono Lake, north to the East Walker River drainage (Taylor 1991).

Radio-telemetry studies of the Mono Lake herd conducted by Taylor (1991) indicated that the project area and vicinity provided important transition range for mule deer. During the Taylor (1991) study, which was conducted from March 1988-June 1991, 7 of 30 radio-collared deer from the Mono Lake herd migrated through the project vicinity to summer range located on the east slope of the Sierra Nevada in the Dunderberg Creek, Green Creek, and Twin Lakes drainages. These 7 deer crossed SR 395 just south of its junction with SR 270. Assuming that the radioed sample of deer was representative of the entire population of deer wintering in the Mono Lake deer herd, a reasonable assumption given the trapping methods, about 24% of the Mono Lake population, or some 720 animals, moved through the project vicinity during the Taylor (1991) study.

Over the last ten years, the Mono Lake deer herd has experienced a population decline. This decline is attributed to poor forage conditions on seasonal ranges as a result of drought induced changes in habitat quality. Additionally, intensive livestock grazing, plant succession, predation, road kills, and residential development on portions of the summer range and in the migration corridor are factors which may adversely affect deer population numbers (Thomas 1986).

**Habitat.** Four habitat components are essential to deer: thermal cover, hiding cover, foraging areas, and watering areas. Thermal cover provides deer with protection from adverse weather, such as extremely high or low temperatures. Hiding cover is a feature of habitat that conceals deer from predators and human harassment. Foraging habitat is critical to deer, especially during spring and summer when the energy demands of deer are greater because of late-term fetal growth, lactation, weaning, and the growth and formation of tissues. Lactating does have high water requirements in the summer and therefore, rely heavily on sources of permanent water.

The project area and surrounding vicinity contains the four habitat components essential to deer and therefore, provides high quality mule deer habitat. It supports a number of plant communities that offer a wide range of cover and forage species. Optimal mule deer fawning and fawn rearing habitat occurs adjacent to Clearwater Creek where intermixing of the big sagebrush and willow-riparian plant communities forms a high degree of vegetational interspersion. Plant communities with high interspersion provide large amounts of edge habitat per unit area. Edge habitats or ecotones, such as where the big sagebrush, willow-riparian, and pinyon pine habitats come in contact, furnish a wide variety of food and cover along the contact zone.

**Occurrence in the Project Area:** No mule deer were observed on the site during the surveys, however, sign of mule deer (tracks, droppings and beds) was observed

throughout much of the project area and surrounding vicinity. During the first 3 field surveys conducted on November 2, 17, and 27, a total of 29 deer tracks were observed in the project area (Figures 2a and 2b). It is important to note that deer tracks were counted during these first three surveys for the purpose of determining important deer use areas, and do not reflect total numbers of deer using the project area. Of the 29 tracks recorded, 17 were observed south of the Bodie Road (SR 270), primarily in big sagebrush vegetation adjacent to Clearwater Creek. The remaining 12 tracks were observed north of the Bodie Road in both big sagebrush and pinyon pine habitat (Figures 2a and 2b). Most of the tracks observed were oriented in a generally north-south direction, indicating that they were made by summer resident deer as they moved between watering areas on Clearwater Creek and bedding sites located on adjacent upland areas. Because the project area is in proximity to permanent water, it provides suitable fawning and fawn rearing habitat for a small number of mule deer does. The rock outcrops, large boulders, and associated big sagebrush, willow-riparian, and pinyon pine stands on the site provide fawns with suitable hiding cover.

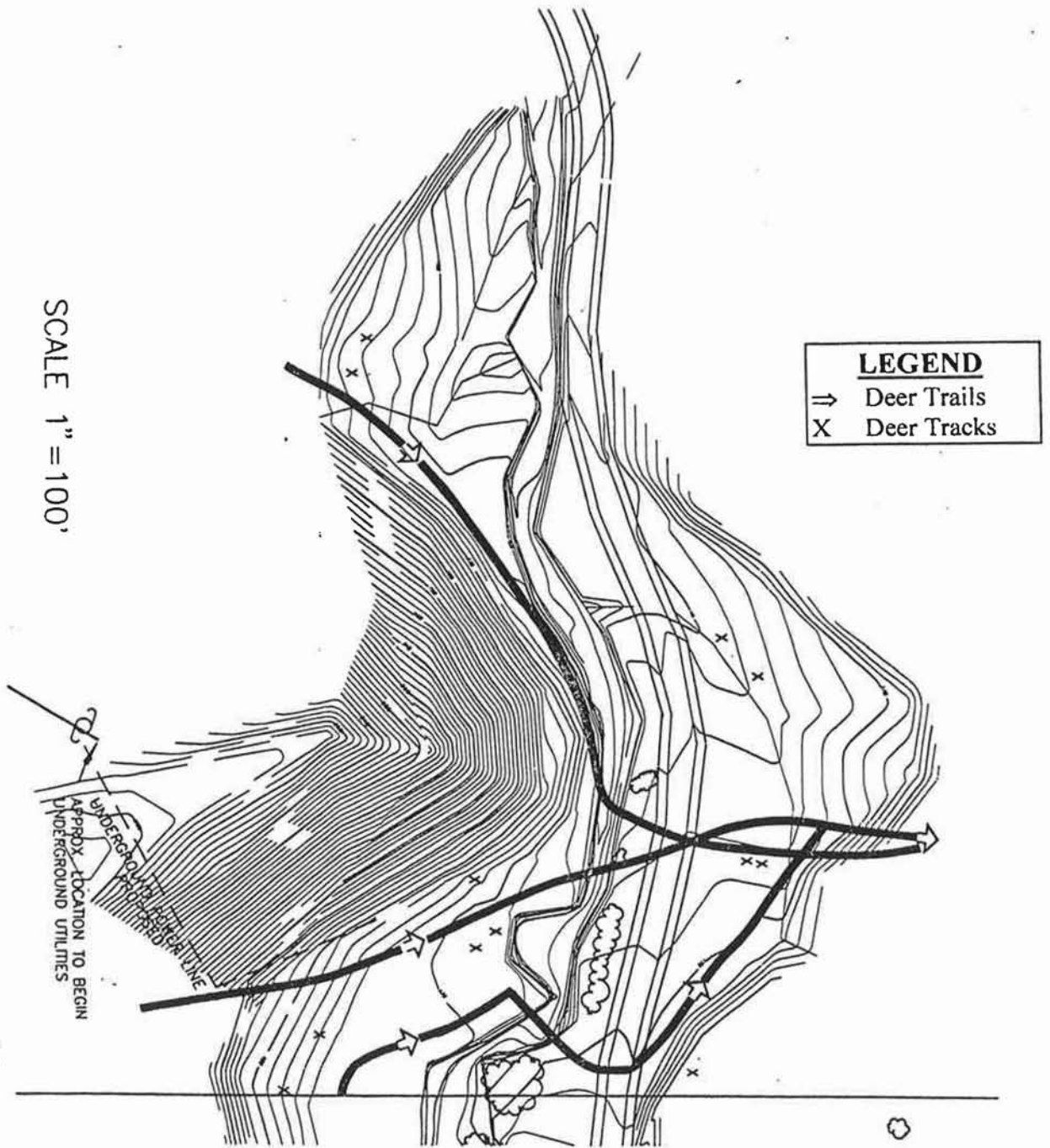
On December 12-15, the first snow storm of the winter deposited approximately 1 foot of snow on the project area. During a field survey conducted on December 17, tracks of an estimated 35 deer were observed in the snow crossing through the project area. All tracks observed were oriented in a northerly direction along 7 well-defined trails that crossed the entire width of Clearwater Canyon (Figures 2 and 2b). These trails were made by Mono Lake deer that migrated in response to the storm from summer ranges located west of the project area. Six of the trails observed were within an approximate 560 foot-wide corridor located in the central portion of the project area (Figures 2a and 2b). Vegetative and topographic features within this corridor facilitated deer movement through the project area. After crossing the canyon and exiting the project area, most of the trails turned east along the canyon rim toward the Mono Lake winter range.

## Sage Grouse

**Status and Range.** The sage grouse (*Centrocercus urophasianus*) is a special interest species because it is a harvest species in California and a U.S. Forest Service Management Indicator Species. This grouse is the largest species of grouse in North America and occurs throughout sagebrush dominated rangelands in eastern Sierra and the Great Basin. The sage grouse was once abundant throughout its range, however over-hunting, drought, and competing land uses, such as livestock grazing, have greatly reduced its numbers (USFS 1990).

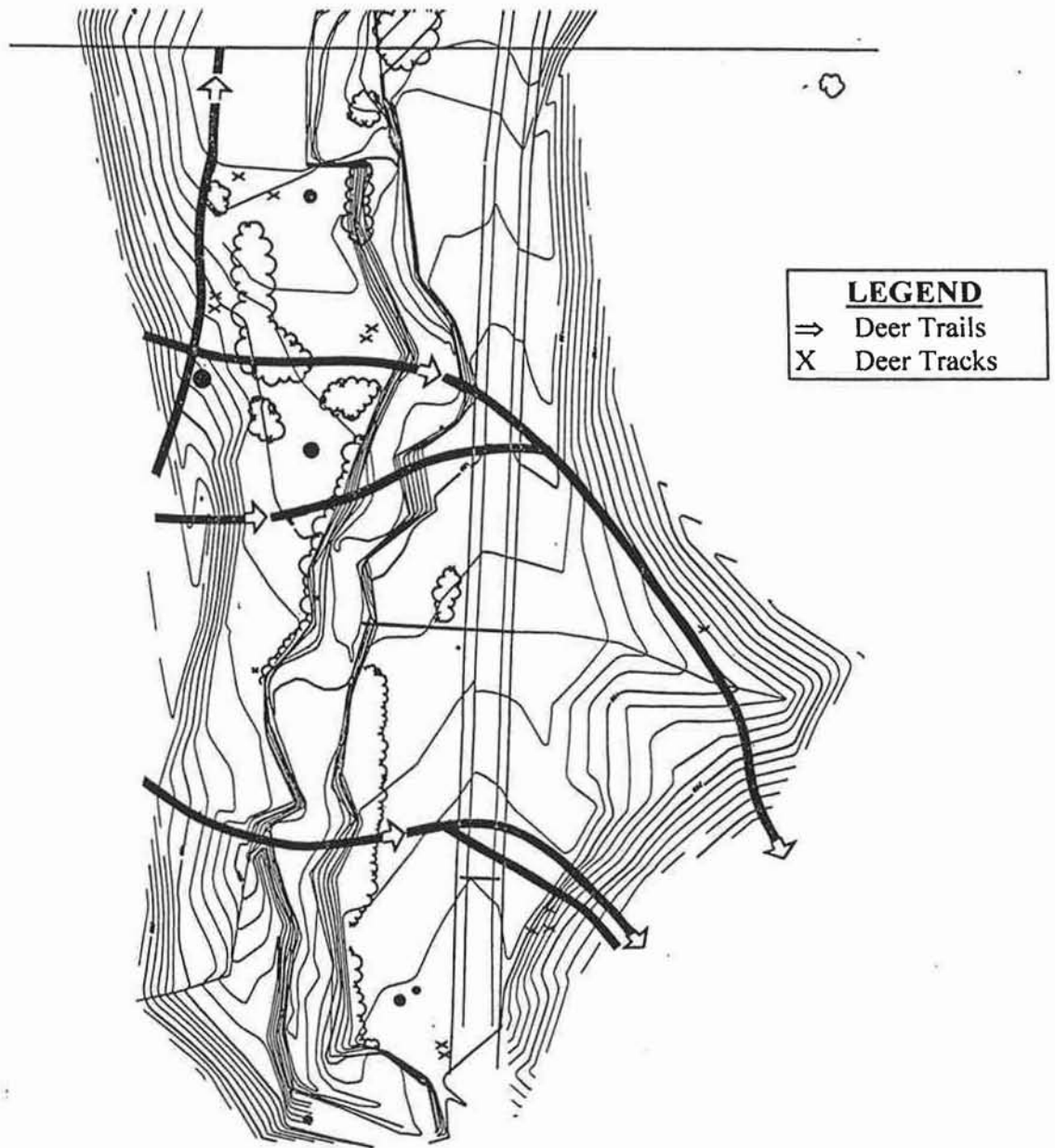
**Habitat.** Sage grouse are entirely dependent upon forms of sagebrush, primarily big sagebrush (*Artemisia tridentata*), for food from October through May, and for cover throughout the year. Sagebrush accounts for 95% of the grouse diet during the fall and winter; forbs and insects are an important item in spring and summer. Sage grouse are generally most abundant where sagebrush provides 15-50% ground cover. Breeding occurs in March and April on strutting grounds or mating leks, which are generally





**Figure 2a. Location of deer trails and deer tracks in the Bodie RV Park Project Area, Mono County, California.**

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**Figure 2b. Location of deer trails and deer tracks in the Bodie RV Park Project Area, Mono County, California.**





isolated areas in open sagebrush. Nesting occurs in May and June, generally within a two mile radius of lek sites.

**Occurrence in the Project Area.** No sage grouse or their sign were observed in the project area or vicinity. The nearest known sage grouse lek is approximately 4 miles southeast of the project area in Bridgeport Canyon (Terry Russi, BLM, pers. comm.). The project area does not support suitable sage grouse breeding, nesting, or foraging habitat.

### Sierra Nevada Mountain Beaver

**Status and Range.** Sierra Nevada mountain beaver (*Aplodontia rufa californica*) is a CDFG species of special concern. This is a noncontiguous subspecies that ranges from near Mt. Shasta southeastward through the Sierra Nevada (Bleich and Racine 1991), and its presence has been reported on the BLM land in the Bodie Hills Management Area (RMP/EIS 1991). Livestock grazing, road building, and herbicide applications have influenced habitat suitability for this species (Beier 1989).

**Habitat.** Mountain beaver occupy steep, high elevation areas characterized by flowing water next to meadows or dense riparian thickets which have not been noticeably disturbed by human use (Beier 1989, RMP/EIS 1991).

**Occurrence in the Project Area.** No mountain beaver or their sign were observed in the project area during the surveys. The project area does not provide suitable habitat for mountain beaver.

### California Wolverine

**Status and Range.** California wolverine (*Gulo gulo luteus*) is a State threatened species and a federal species of management concern. It occurs from northern Washington south along the Sierra Nevada to Walker Pass in Kern County (Ingles 1965, CDFG 1989). This species has been observed on BLM land in the Bridgeport Management Area (RMP/EIS 1991).

**Habitat.** Wolverine occupy a variety of habitat types between 1,600 and 14,000 feet elevation. Preferred habitat is characterized as open terrain above timberline. Birth of young takes place in dens of various configurations of rocks, hollow logs, and vegetation.

**Occurrence in the Project Area.** No wolverines or their sign were observed in the project area during the surveys. The project area does not provide suitable habitat for wolverine and the level of human disturbance in the area would probably preclude their occurrence.

## Sierra Nevada Red Fox

**Status and Range.** Sierra Nevada red fox (*Vulpes vulpes necator*) is a State threatened species, a U.S. Forest Service management indicator species (MIS) on the Toiyabe National Forest, and a Federal species of management concern. It occurs from the northern California Cascades eastward to the northern Sierra then south along the Sierra Crest to Tulare County (CDFG 1989). In the Sierra Nevada, the red fox is rare with scattered populations occurring primarily in higher elevation (5,000-7,000 feet) coniferous forests. Sightings of this species are infrequent and its status on adjacent BLM land is unknown (RMP/EIS 1991). There has been one recent confirmed sighting of red fox in the project vicinity. This sighting occurred in early August 1994 approximately 12 miles south of the project area at Dechambeau Creek (Genelle O'Connor, USFS, pers. comm.). In addition, sightings of red fox have been recorded on the BLM Bridgeport and Bodie Hills Management Areas (RMP/EIS 1991).

**Habitat.** Preferred habitat is characterized by mature coniferous forests interspersed with alpine meadows or alpine fell-fields. Red fox may, however, occupy a variety of habitats including alpine dwarf shrub, wet meadow, subalpine conifer, lodgepole pine, red fir, mixed conifer, montane chaparral, montane riparian and Jeffrey pine. High quality habitat also includes interspersed open areas for hunting; dense vegetation, rocky areas and rock outcrops for cover; and hollow logs, stumps and loose deep soil for den sites.

**Occurrence in the Project Area.** No red fox or their sign were observed during surveys in the project area. The project area provides marginally suitable habitat for red fox; however the level of human disturbance in the area probably precludes their occurrence.

## Bank Swallow

**Status and Range.** Bank swallow (*Riparia riparia*) is a State threatened species. The bank swallow has declined from loss of habitat resulting primarily from flood control projects.

**Habitat.** Bank swallow occurs in valleys and basins throughout California. It prefers streamside habitats with steep banks and very little vegetation.

**Occurrence in the Project Area.** No bank swallows were observed during the field surveys and suitable nesting habitat does not occur along the banks of Clearwater Creek at the project site.

**Habitat.** This species nests in riparian woodlands and conifer forests that support a dense canopy. The nesting territory is often located in a small patch of trees that may be less than 200 feet at the widest point (Herron et al. 1985). Nests are most often constructed in the largest available trees and are usually situated about 25 feet above ground. Cooper's hawks forage in woodlands, forests, and edge habitats.

**Occurrence in the Project Area.** No Cooper's hawks or their sign were observed in the project area. Pinyon pine habitat adjacent to the project area supports marginally suitable foraging habitat for Cooper's hawk. However, because this habitat will not be developed, the project will not adversely affect this species.

### **Willow Flycatcher**

**Status and Range.** Willow flycatcher (*Empidonax traillii*) is a state endangered species. The willow flycatcher was formerly a common summer resident throughout California, with its breeding range extending wherever extensive willow thickets occurred. The species has now been eliminated as a breeding bird from most of its former range in California (CDFG 1992). Loss of willow riparian habitat and nest parasitism by brown-headed cowbirds (*Molothrus ater*) are the principal reasons for the decline of this species.

**Habitat.** The willow flycatcher is typically found only where willow thickets are present. It prefers wet meadows larger than 8 hectares in size where willow cover is at least 2-3 meters high and divided into clumps separated by patches of open meadow (Fowler et al. 1991).

**Occurrence in the Project Area.** No willow flycatchers were observed during the surveys. The project area does not support suitable habitat for the willow flycatcher.

### **Band-Thigh Diving Beetle**

**Status and Range.** The band-thigh diving beetle (*Hygrotus fontinalis*) is a federal species of management concern. This species occurs at four sites within the BLM Bishop Resource Management Area (NDDDB 1995). Livestock grazing and human foot traffic are current threats to habitat quality where the species occurs (RMP/EIS 1991).

**Habitat.** This species is apparently associated with thermal water sources and may be tolerant to a range of temperatures. Little is known about the life cycle and habits of this species.

**Occurrence in the Project Area.** No surveys for the band-thigh diving beetle were conducted in the project area. However, according to Terry Russi (BLM, pers.

## **Impacts and Mitigation Measures**

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This section describes potential impacts on wildlife from development of the Bodie RV Park in the project area. Mitigation measures are also provided to avoid or minimize impacts on special-status wildlife species.

### **Overview**

No special-status wildlife species were observed in the project area during the surveys. However, mule deer sign was abundant on the site, especially in big sagebrush habitat near Clearwater Creek. Additionally, the band-thigh diving beetle was not found during field surveys, but could occur in the project area based upon its presence in Clearwater Creek. Special-status species that were identified as potentially occurring on the site but would be unaffected by development of the project would be sage grouse, California wolverine, Sierra Nevada red fox, Sierra Nevada mountain beaver, bank swallow, prairie falcon, golden eagle, Cooper's hawk, and willow flycatcher. These species were not located during field surveys, and low-quality habitat was identified at the project area.

### **IMPACTS TO WILDLIFE**

The following discussion describes potential direct and indirect impacts to wildlife that could be affected by the proposed project. Mitigation measures are also provided to avoid or minimize impacts to wildlife species.

**Potential Impact 1:** Noise, visual stimulus and other forms of human intrusion generated during construction and operation phases of the proposed development could discourage wildlife use of undisturbed habitat at the project area and within adjacent natural areas.

Human intrusion reflects disturbances to animal behavior that would render undisturbed habitat at the project area and adjacent natural areas unsuitable for a species, without physically impacting habitat. Indirect effects of human intrusion could occur in the form of construction activities, visual stimulus (e.g., lights, motion), noise, and domestic pets as the result of net population increase within the Bodie RV Park project area.

A typical problem associated with many rural developments is harassment of wildlife by free roaming pets. Free roaming domestic dogs can create an intolerable stress to deer (Reed 1981) and other wildlife, while free roaming house cats can interfere with the courtship and feeding activities of small birds and mammals (Most 1980). An increase in the local dog population is expected to occur within the Bodie RV Park project area. It is likely that employees and patrons of the RV park will have dogs, thereby increasing the seriousness of this threat to local wildlife, both at the project site and in adjacent undisturbed areas.

When considering the proposed project, it is imperative to maintain a regional perspective, keeping in mind that while the impact of an individual project may not be significant, the cumulative effect of present and future developments in the Bridgeport area may well be significant.

The willow-riparian community along Clearwater Creek is cooler and more mesic than adjacent habitats, attracting a variety of wildlife species. This highly valuable resource provides an important source of water, cover and forage for wildlife, and also serves as a movement corridor. The loss and fragmentation of riparian habitat from roads, bridges, building pads, drives and other features could adversely affect daily and seasonal movement patterns of mule deer, coyotes, mountain lions, mountain quail and other wide ranging species by substantially altering traditional travel routes. These species require movement corridors to allow individuals to move between two areas in discrete events of brief duration (e.g., seasonal migrations or moving between parts of a large home range) (Beier and Loe 1992).

Natural plant revegetation within disturbed areas can be expected to develop extremely slow due to severe climate and poor soils. Secondary succession in disturbed areas would probably, initially become dominated with a mixture of herbaceous species (grasses and forbs) and weeds. It is likely that shrub species would eventually become reestablished on these disturbed sites provided that soil resources were left intact.

Natural areas, such as the project area, characterized by low levels of disturbance and relatively harsh climates, typically support few weed species (Howald 1982). However, soil disturbance over large areas results in the decline of native plant species (decreasers) and encourages the spread of more tolerant weed species (invaders) into the area. There are numerous plants from throughout the world that have been introduced into California. These plants have the ability to survive without cultivation (Raven and Axelrod 1977). The presence of weeds can inhibit the regrowth of native vegetation and also alter the availability of food supplies for herbivores (Howald 1982). In addition, some species of weeds can also produce toxins that can be debilitating to some wildlife species (Cronin et al. 1978).

Potential environmental effects to wildlife resulting from vegetation removal and alteration include:

- decreased availability of forage and cover: Breeding, resting and feeding areas for wildlife will be lost through removal of vegetation in the project area;
- increased erosion; and
- increased spread of weeds.

**Potential Impact 3:** Construction activities may disrupt wildlife movements and reproductive activities.



Implementation of these measures will minimize impacts resulting from visual stimulus, noise and other forms of human intrusion generated during the operation phase of the proposed development.

**Potential Impact 2: Removal and alteration of habitat.**

**Mitigation Measures**

1. removal of vegetation shall be limited to only those areas identified on the approved land use plan to protect surrounding vegetation;
2. management of remaining open space land within the Bodie RV Park project area shall include restrictions on brush clearing, snag removal, clearing of underbrush, disposal of trash and hazardous materials, and livestock use;
3. development designers are encouraged to use techniques to reduce the amount of area altered by trailer pads, drives and building sites;
4. with the exception of bridge crossings, willow-riparian habitat along Clearwater Creek shall be preserved and maintained within a zone of no development. Vegetation management within this zone should be designed to foster wildlife cover and minimize human disturbance;
5. where possible, the project proponent shall protect valuable habitat features such as existing trees, downed logs, snags, rock piles, and water sources;
6. access to building sites shall utilize existing dirt roads to avoid unnecessary disturbance to native vegetation at the project site and in adjacent undisturbed areas;
7. revegetation of disturbed areas not slated for development shall be conducted immediately following construction in order to prevent erosion. Native plants grown from seeds and seedlings obtained from local native stock should be used in the revegetation of disturbed areas. At the project site, the spread of weeds can be deterred by revegetating disturbed sites as soon as possible, using mulches free of weed seeds and covering stockpiled topsoil.

Implementation of these measures will minimize impacts resulting from habitat removal and alteration.

**Potential Impact 3: Construction activities may disrupt wildlife movements and reproductive activities.**

**Mitigation Measures**

1. construction activities shall be scheduled during daytime hours only to reduce disturbance to nocturnal wildlife species;
2. control of dust generated during site clearing and movement of heavy machinery shall be controlled through watering or other acceptable measures.

used the project site as a foraging and resting area. Later, in mid-December, an estimated 35 deer migrated through the area following a major snowstorm. Migration through the project area was oriented from south to north and concentrated primarily within a 560 foot-wide corridor located in the central portion of the project area (Figures 2a and 2b).

Impacts to mule deer are generally the same as those identified for other special-status wildlife species. However, it is important to emphasize that noise, visual stimulus, free-roaming dogs, increased human activity, and other forms of human intrusion generated during construction and operation phases of the proposed project could discourage summer resident and migratory deer use of the project area and adjacent vicinity. Construction of the project will permanently displace a mosaic of big sagebrush and willow-riparian habitat with roads, drives, trailer pads, and buildings. This could directly impact migratory and summer resident mule deer use of the site by reducing the amount of habitat available for these animals. Some of the impacts to mule deer resulting from development of the project site can be mitigated, but impacts from habitat removal and alteration are unavoidable consequences of the project that cannot be mitigated to less than significant levels.

### **Mitigation Measures for Impacts to Mule Deer**

1. **Restrictions on Fencing**
  - a) solid or wire fencing (barbed wire, chainlink, etc.) could obstruct the movements of deer and other wildlife through the project area. Therefore, no solid or wire fences of any kind will be constructed along project area boundaries. This type of fencing shall, however, be used to control pets within private yard areas;
  - b) fencing used for public safety along the steep banks of Clearwater Creek shall incorporate the use of wood poles, split rails, or other natural materials to facilitate deer movement through the project area;
  - c) fencing placed along the banks of Clearwater Creek will incorporate a minimum 10 foot setback between the fenceline and the creek bank.
  
2. **Establish and Maintain a Deer Movement Corridor**
  - a) the presence of trailers, cabins, and other structures in the central portion of the project area could present a barrier to deer migration. Therefore, a deer movement corridor will be established in the central portion of the project area to facilitate deer passage through the area (Figure 3). The purpose of the corridor will be to maintain connectivity among contiguous wildlands occurring on each side of the project area;
  - b) the corridor shall maintain a minimum width of 150 feet and expand the entire width of Clearwater Canyon (Figure 3). It will be linked to adjacent undisturbed areas on both the north and south sides of Clearwater Creek and the north side of SR 270;





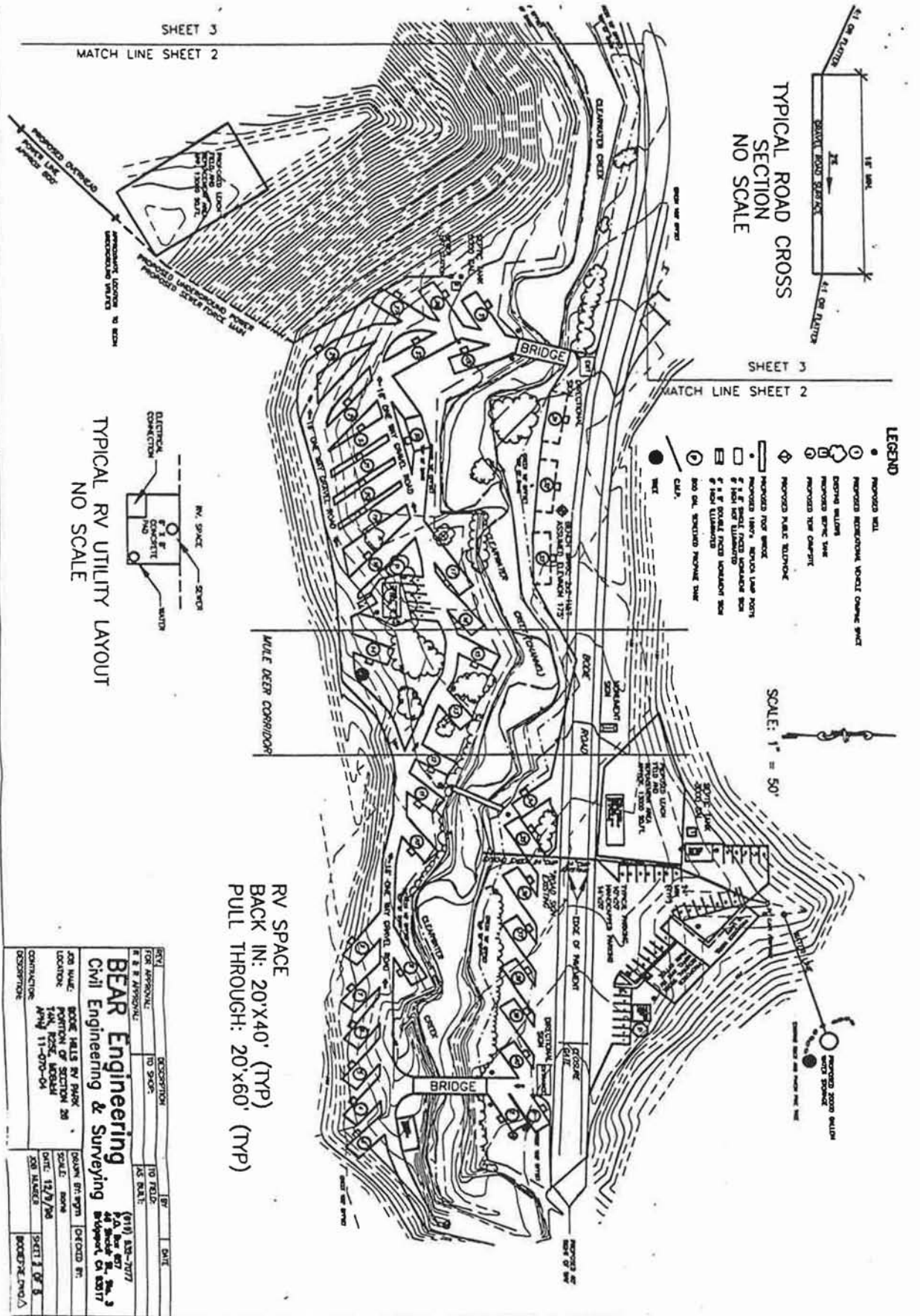


Figure 3. Location of proposed wildlife movement corridor in the Bodie RV Park Project Area, Mono County, California.



## Literature Cited

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### Printed References

- Beedy, E. C., and S. L. Granholm. 1985. Discovering Sierra birds: western slope. Yosemite Natural History Association and Sequoia Natural History Association. Yosemite National Park, CA.
- Beier, P. 1989. Use of habitat by mountain beaver in the Sierra Nevada. *J. Wildl. Manage.* 53:649-654.
- \_\_\_\_\_ and S. Loe. 1992. A checklist for evaluating impacts to wildlife movement corridors *Wildl. Soc. Bull.* 20:434-440.
- Bleich, V.C., and D. Racine. 1991. Mountain beaver (*Aplodontia rufa*) from Inyo County, California. *Calif. Fish and Game* 77(3):153-155.
- California Office of Planning and Research and the Office of Permit Assistance. 1986. CEQA: California Environmental Quality Act statutes and guidelines. Sacramento, CA.
- CDFG. 1989. Annual report on the status of California state listed threatened and endangered animal and plants. Calif. Dept. of Fish and Game
- CDFG. 1992. Annual report on the status of California state listed threatened and endangered animal and plants. Calif. Dept. of Fish and Game.
- Cronin, E. H., P. Ogden, J. A. Young, and E. Laycock. 1978. The ecological niches of poisonous plants in range communities. *L. Range Manage.* 41:328-334.
- Fowler, C., B. Valentine, S. Sanders, and M. Stafford. 1991. Habitat suitability index model: willow flycatcher (*Empidonax traillii*). U.S.D.A. Forst Service, Pacific Southwest Region, Tahoe National Forest. 15 pp.
- Herron, G. B., C. A. Mortimore, and M. S. Rawlings. 1985. Nevada raptors-their biology and management. Nevada Dept. of Wildlife. 114 pp.
- Howald, A. M. 1982. The Bluffs development site-Existing conditions and potential impacts to biological resources. 23 pp.
- Ingles, L. C. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California. 506 pp.
- Mayer, K. E., and W. F. Laudenslayer Jr. 1988. A guide to wildlife habitats of California. California Dept. of Forestry and Fire Protection, Sacramento, Ca.



- Most, B. W. 1980. Free roaming pets destroy wildlife; control efforts draw howls from owners. *Defenders*. 63:170-173.
- NDDB, 1994. Natural Diversity Data Base. California Department of Fish and Game, Sacramento, CA.
- Owen, O. S., 1975. Natural resource conservation: an ecological approach. MacMillan Publishing Co. Inc., New York. 700 pp.
- Raven, P. H., and D. I. Axelrod. 1978. Origin and relationships of the California flora. *Univ. of Calif. Publications in Botany*. Vol. 72. 134 pp.
- Reed, D. F. 1981. Conflicts with civilization. Pp. 509-536 in O. C. Wallmo (ed.) *Mule and black-tailed deer of North America*. Univ. of Nebraska Press, Lincoln. 605 pp.
- RMP/EIS. 1991. Bishop Resource Management Plan and Environmental Impact Statement. U.S. Dept. of Interior, Bureau of Land Manage., Bishop Resource Area.
- Short, H. L. 1981. Nutrition and metabolism. Pages 99-128 in O. C. Wallmo (ed.) *Mule and black-tailed deer of North America*. Univ. of Nebraska Press, Lincoln. 605 pp.
- \_\_\_\_\_. 1991. Ecology and productivity of two interstate deer herds in the eastern Sierra Nevada. *Calif. Dept. of Fish and Game*. 155 pp.
- Thomas, R. D., 1986. Mono Lake deer herd management plan. *Calif. Dept. of Fish and Game*. 59 pp.
- U.S. Forest Service. 1990. Final Environmental Impact Statement for the Doe Ridge Golf Course.

### Personal Communications

- Ron Thomas, Wildlife biologist. California Department of Fish and Game, Bishop, CA  
May 18, 1995 - telephone conversation
- Terry Russi, Wildlife biologist. Bureau of Land Management, Bishop, CA. December 21,  
1995 - Telephone conversation.





**Addendum to Wildlife Assessment Survey  
at the Bodie Hills RV Park**

**By Timothy Taylor**

**November 1997**



**TIMOTHY TAYLOR, CONSULTING BIOLOGIST**

*Biological Studies and Environmental Impact Analysis*

---

November 25, 1997

Mr. Steve Higa  
Mono County Planning Department  
P.O. Box 347  
Mammoth Lakes, CA 93546

**RECEIVED**

**DEC - 2 1997**

MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

Dear Mr. Higa:

As you requested, I have reviewed comments from Desert Survivors on the Bodie RV Park Draft Specific Plan and EIR. The following comments are keyed to pages, paragraphs, and/or topics.

Page 69, Animal Life/Comments on "Wildlife Assessment Survey at the Bodie Hills RV Park"

Second Paragraph

Your comment regarding the importance of riparian corridors to wildlife on a regional basis is noted. The wildlife report (Taylor 1996) provided a detailed discussion of the importance of willow riparian habitat to local wildlife at the project site and surrounding vicinity. On page 6, the report acknowledged willow riparian habitat as providing the highest quality wildlife habitat on the site, offering breeding, nesting, brood rearing, hiding and escape cover, foraging areas, and travel corridors for a variety of local wildlife. It also provided both common and scientific names of many of the more common wildlife species that could inhabit the riparian corridor during some portion of their life cycles. The report (pages 6-7) also discussed the importance of the riparian corridor as a travel corridor, which enables a variety of wildlife to move safely up and down the Clearwater Creek drainage. On page 19, the wildlife report further emphasized the importance of the riparian corridor to local wildlife and discussed potential impacts to wildlife resulting from loss and fragmentation of this important habitat type.

Third Paragraph

Your comments are noted. The wildlife study identified wildlife species having potential to occur in the project area based on the presence of suitable habitat. Even though the project site is located within the range of the northern harrier and loggerhead shrike, it was the opinion of the wildlife biologist that the project area did not contain suitable habitat for these species. Likewise, the lack of wet meadow habitat in the project area would preclude the occurrence of the Owens Valley vole. We acknowledge, however, that these species, along with the mountain quail, yellow warbler, western white-tailed hare, and pygmy rabbit should be included in the list of potential species presented in Table 1 of the Taylor (1997) report. The wildlife report (Taylor 1997) has been revised to provide

Mr. Steve I  
November 25, 1997

information on the status and distribution, habitat requirements, and occurrence in the project area of these additional special-status species.

#### Fourth Paragraph

Your comments are noted. The wildlife report has been revised to include explanations as to why suitable habitat for mountain beaver does not occur in the project area.

#### Page 70, first paragraph

We acknowledge that wildlife surveys for neotropical migrants (e.g., willow flycatcher and bank swallow) were conducted too late in the year to detect the presence of individual birds. The wildlife report has been revised to include this as a potential reason why these species were not observed in the project area. However, as indicated in the "Introduction" and "Methods" sections of the wildlife report, the primary purpose of the wildlife surveys was to determine if the project site contained suitable habitat for these species. A search of the CNDDDB revealed no records of willow flycatchers and/or bank swallows in the project area or vicinity, indicating that the chance of detecting either of these species at the project site was rather remote, even during migration. Furthermore, it was the opinion of CDFG wildlife biologist Ron Thomas<sup>1,2</sup> (pers. comm.) that the project area provided poor quality habitat for both bank swallow, willow flycatcher, and mountain beaver. As a result, a habitat suitability survey for these species was deemed adequate by the contract biologist for the study, Timothy Taylor. Your opinion regarding the project area supporting marginal habitat for the willow flycatcher is noted.

As stated in the wildlife report (pages 9-10), sage grouse breed on strutting grounds called mating leks, which are generally isolated areas in open sagebrush. Moreover, the "Results" section of the wildlife report (Taylor 1997, pages 5-6) revealed that no such areas occur at the project site or surrounding vicinity. The wildlife report (page 10) also stated that the nearest known sage grouse lek to the project site is located some 4 miles to the southeast in Bridgeport Canyon (Terry Russi, BLM, pers. comm.). The presence of this lek as the closest one to the project area was confirmed by CDFG biologist Ron Thomas<sup>2</sup> (pers. comm.). We acknowledge that the presence of a mating lek is more important than the presence of individual birds when determining sage grouse abundance. However, during fall, big sagebrush scrub vegetation can provide important foraging and roosting areas for sage grouse. Use of these foraging areas can only be determined through the presence or absence of individual birds, which usually occur in family groups. Therefore, the surveys conducted for sage grouse in the project area were appropriate for that time of year. The timing and intensity of these surveys was also determined adequate by CDFG biologist Ron Thomas<sup>2</sup> (pers. comm.).

Mr. Steve Higa  
November 25, 1997

#### Paragraph 2

A single dusky flycatcher was observed by Timothy Taylor, Consulting Biologist, on September 15, during a brief site visit (10-15 minutes) to the project area. The site visit was conducted for the purpose of formulating a cost estimate for the wildlife assessment. The wildlife report has been revised to clarify the timing of this observation.

#### Paragraph 3

Your comments are noted. We will attempt to contact the local chapter of the Audubon Society and to provide any relevant survey information in the wildlife report.

#### Paragraph 4

Your comments are noted. As mentioned earlier, the wildlife surveys were sufficient to determine if the project area contained suitable habitat for TES neotropical migrants, sage grouse and other sensitive wildlife. The project area was evaluated by Taylor (1997) and Thomas<sup>1,2</sup> (pers. comm.) as providing poor quality habitat for bank swallow and willow flycatcher, thus eliminating the need for further survey. Additionally, because no suitable lekking habitat was located on the site and the nearest known lek is located some 4 miles from the project area (Terry Russi, BLM, pers. comm., Ron Thomas<sup>2</sup>, CDFG, pers. comm.), surveys conducted in February and March to locate leks are, in the opinion of Timothy Taylor, Consulting Biologist, unwarranted.

#### Page 70, mule deer, paragraph 1

Your comments are noted. The wildlife section in the EIR has been revised to include relevant information regarding the importance of the migration corridor to the Mono Lake deer herd. However, it is important to clarify that the Taylor (1997) report did not state that "24% of the Mono Lake deer herd (about 720 animals) moves **directly** through the project corridor." Instead, the Taylor (1997) report (page 8) states that the project area and vicinity provided important transition range for the Mono Lake deer herd and that about 24% of the Mono Lake deer population, or some 720 animals, moved through the project vicinity during the Taylor (1991) study. The report identified the Mono Lake deer herd migration corridor as encompassing the entire width of the Bodie Hills, from the north shore of Mono Lake, north to the East Walker River drainage.

#### Paragraph 3

To the extent feasible, the project has been designed to mitigate potential impacts to deer and other wildlife. The project analyzes all of the applicable potential impacts and proposes either design changes or mitigation to reduce impacts.

Mr. Steve F. ...  
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Specifically, the EIR includes the following measures to reduce potential impacts to deer and other wildlife.

#### Summary of Mitigation Measures Applicable to Mule Deer

- 1) Restrictions on Fencing. Precludes use of solid or wire fences that could present barriers to deer movement through the project area.
- 2) Establish and Maintain a Deer Movement Corridor. Provides for a deer movement to facilitate deer passage through the project area. The corridor shall maintain a minimum width of 150 feet and expand the entire width of Clearwater Canyon. The corridor will retain existing vegetation with restrictions on vegetation removal, control of domestic dogs, outdoor lighting, and human activity.
- 3) Timing of Construction Activities. Limits construction activity in the project area during the spring and fall migration periods. Construction shall occur during the interim period between spring and fall migrations (May 15 to October 15).

#### Summary of Mitigation Measures Applicable to Other Wildlife

- 1) Control of domestic dogs;
- 2) screen lights to reduce offsite visibility;
- 3) retain native vegetation to provide visual screening barriers for wildlife;
- 4) restrict disposal of hazardous materials, livestock use, and vegetation removal, including clearing of underbrush and snag removal;
- 5) maintain a zone of no development along Clearwater Creek to foster wildlife cover and minimize human disturbance;
- 6) preserve valuable habitat features such as existing trees, downed logs, snags, and rock piles;
- 7) utilize existing dirt roads;
- 8) revegetate disturbed areas with native plant species immediately after construction to prevent erosion;
- 9) control spread of weeds by using mulches free of weed seeds and covering stockpiled topsoil;
- 10) limit construction to daytime hours only, and
- 11) control dust through watering or other acceptable measures.

#### Paragraph 4

Your comment is noted. Whether or not a NEPA document would be required for the proposed project is a matter for legal interpretation that should be addressed by the Mono County, County Council.

Mr. Steve [unclear]  
November 25, 1997

**Paragraph 5**

The DEIR, page XXX, does include language to limit construction activity to May 15 to October 15 as proposed by Taylor (1997, p 24).

**Literature Cited**

Taylor, T. 1997. Wildlife survey at the Bodie Hills RV Park, Mono County, CA. January 6, 1997. Prepared for Mono County Planning Department, Mammoth Lakes, CA.

**Personal Communications**

Terry Russi, Wildlife biologist. Bureau of Land Management, Bishop, CA. December 21, 1995 - telephone conversation.

Ron Thomas<sup>1</sup>, Wildlife biologist. California Department of Fish and Game, Bishop. CA  
May 18, 1995 - telephone conversation

Ron Thomas<sup>2</sup>, Wildlife biologist. California Department of Fish and Game, Bishop. CA  
November 25, 1997 - telephone conversation



## Addendum to Bodie Hills RV Park Wildlife Assessment

### Special-Status Species in the Project Area

Wildlife surveys in the project area were conducted on November 2, 17 and 27 and December 17. Seventeen special-status wildlife species were identified as having potential to occur in the project area (Table 1). Information on each special-status species identified in Table 1 is presented below.

Table 1. Special-Status Wildlife Species Known to Occur or with the Potential to Occur on the Bodie RV Park Project Area		
Species	Legal and Protection Status	Potential for Occurrence in the Project Area
Mule Deer	SSC, H, MIS	High
Sage Grouse	SSC, H, MIS	Low
Sierra Nevada Mountain Beaver	SMC, SSC	Low
Sierra Nevada Red Fox	ST, SMC, MIS	Moderate
California Wolverine	ST, SMC	Low
Western White-tailed Hare	SSC	Moderate
Pygmy Rabbit	SSC	Moderate
Golden Eagle	SSC, FP	Low
Prairie Falcon	SSC	Low
Northern Harrier	SSC	Low
Cooper's Hawk	SSC	Low
Yellow Warbler	SSC	Moderate
Bank Swallow	ST	Low
Loggerhead Shrike	SSC	Low
Mountain Quail	SSC	High
Willow Flycatcher	SE	Low
Band-thigh Diving Beetle	SMC	Moderate-High
SSC = CDFG species of Special Concern ST = Listed as threatened under the California Endangered Species Act SE = Listed as endangered under the California Endangered Species Act H = Harvest species FP = Fully protected under the California Fish and Game Code SMC = Federal species of management concern MIS = USFS management indicator species		

## **Sierra Nevada Mountain Beaver**

*Occurrence in the Project Area.* No mountain beaver or their sign were observed in the project area during the surveys. The project area does not provide suitable habitat for mountain beaver because it lacks the high elevations and steep gradients required for adequate soil drainage, and succulent meadow vegetation required for foraging.

## **Pygmy Rabbit**

*Status and Range.* The pygmy rabbit (*Brachylagus idahoensis*) is a CDFG species of special concern. It occurs in the Great Basin portions of Lassen, Modoc, and Mono Counties.

*Habitat.* Pygmy rabbits are generally associated with tall dense sagebrush scrub, greasewood scrub or riparian thickets and require soft soils for digging and constructing burrows (Ingles 1965).

*Occurrence in the Project Area.* There are no records of pygmy rabbits in the project area. However, the pygmy rabbit has been reported near Bodie State Park California, where it ranges up to about 8,500 feet (Ingles 1965). The project area provides suitable habitat for pygmy rabbits because it supports dense sagebrush and riparian vegetation required for cover and soft soils for digging.

## **Western-White-tailed Hare**

*Status and Range.* The western white-tailed hare (*Lepus townsendii townsendii*) ranges from the crest of the Sierra Nevada eastward from the Oregon border to Tulare County and Inyo County.

*Habitat.* The white-tailed hare uses open meadows and flat topped hills with scattered brush and open stands of trees for cover.

*Occurrence in the Project Area.* There are no records of hares at the project area and no hares were observed during the surveys. The lack of open areas supporting a mixture of shrubs, meadow, and trees suggests that the project area does not provide prime hare habitat. However, this species could conceivably use the project area during the winter or as migration corridor.

## Northern Harrier

**Status and Range.** The northern harrier (*Circus cyaneus*) is a CDFG species of special concern. It is a fairly common winter resident to the eastern Sierra, but a rare summer resident and fall transient (Gaines 1992).

**Habitat.** The northern harrier is associated with marshes, meadows, and agricultural wetlands (Gaines 1992).

**Occurrence in the Project Area.** The project area does not provide suitable habitat for the marsh hawk because it lacks open wetland habitat required for foraging.

## Mountain Quail

**Status and Range.** The mountain quail (*Oreoryx pictus*) is a CDFG species of special concern. It is a fairly common resident in the eastern Sierra Nevada, occupying the higher elevation slopes and canyons in the summer, and lower elevation shrublands in the winter.

**Habitat.** In the eastern Sierra Nevada, mountain quail inhabit brushy, steep slopes and canyons supporting dense stands of montane chaparral vegetation (Gaines 1992).

**Occurrence in the Project Area.** The dense willow riparian and sagebrush scrub vegetation at the project site, along with the adjacent pinyon pine forest, provides suitable habitat for fall migrating mountain quail.

## Loggerhead Shrike

**Status and Range.** The loggerhead shrike (*Lanius ludovicianus*) is a CDFG species of special concern. It is a fairly common resident and winter transient to lowland and foothill areas throughout most of California (Gaines 1992).

**Habitat** The loggerhead shrike prefers open terrain with sparse shrubs, trees, or other suitable perching structures (Gaines 1992).

**Occurrence in the Project Area.** The dense willow riparian and sagebrush scrub vegetation at the project site does not provide suitable foraging habitat for the loggerhead shrike.

## **Yellow Warbler**

*Status and Range.* The yellow warbler (*Dendroica petechia brewsteri*) is a common summer resident below 7,500 feet on the Sierra east slope, but extremely rare at the higher elevations (Gaines 1992).

*Habitat.* Yellow warblers nest in riparian forests and riparian scrub habitats and are partial to areas comprised of willows, aspen, and cottonwoods (Gaines 1992).

*Occurrence in the Project Area.* There are no records of yellow warblers at the project site or surrounding vicinity. Willow riparian habitat at the project area provides marginally suitable habitat for yellow warblers during migration.

## **SUMMARY AND CONCLUSIONS**

No federal or state-listed rare, threatened, or endangered birds or mammals were found to occur in the project area. The project area does, however, provide marginally suitable habitat for Sierra Nevada red fox, western white-tailed hare, and yellow warbler, and suitable habitat for pygmy rabbit and mountain quail. Additionally, the band-thigh diving beetle, a federal species of management concern, has been reported in Clearwater Creek and may be present in the project area (Terry Russi, BLM, pers. comm.).

## **IMPACTS TO SPECIAL-STATUS WILDLIFE SPECIES**

The following discussion addresses potential impacts to special-status wildlife that could be affected by the proposed project. Mitigation measures are also provided to avoid or minimize impacts to special-status species.

### **Yellow Warbler**

The project area supports marginally suitable habitat for yellow warblers. Yellow warblers could inhabit willow riparian habitat at the project site during migration. However, there are no records of this species at the project area and no evidence to suggest that it breeds there. Yellow warblers would not be significantly affected by the project because most of the riparian corridor would remain as open space.

### **Pygmy Rabbit**

The tall, dense sagebrush scrub and associated willow riparian habitat at the project area provides suitable habitat for the pygmy rabbit. However, there are no records of this species at the project area and no evidence to suggest that it occurs there. Pygmy rabbits could be directly impacted from construction of the proposed project, which would

eliminate rabbits and their burrows. Livestock and domestic dogs could damage burrows by trampling and digging, and dogs could fatally harm individual rabbits. Noise from construction could displace rabbits, forcing them to occupy marginal habitats and increasing their risk of predation. These impacts can be minimized through the following measures: 1) confine pets to enclosed areas; 2) confine livestock to corrals located on previously disturbed sites away from dense vegetation; 3) limit site disturbances to approved areas only; 4) protect valuable habitat features such as rock piles, downed logs, and brushy areas; and 5) muffle engines and generators to reduce noise emissions.

### **Mountain Quail**

Mountain quail could inhabit big sagebrush scrub and willow riparian habitat at the project site during fall migration. However, this species is locally abundant and would not be significantly affected by the project. Mountain quail could continue to use the project site provided the riparian corridor remains intact and domestic pets are confined to enclosed areas.

### **Western White-tailed Hare**

The project area provides marginally suitable habitat for the western white-tailed hare, which could use the project site during winter or as a migration corridor. However, no wintering hares were observed and there are no records of this species at the project site. The lack of open areas with meadows and trees at the site suggests there is no potential for adverse impacts to this species.

### **Literature Cited**

#### **Printed References**

- Gaines, D. 1992. Birds of Yosemite and the East Slope. Artemisia Press, Lee Vining, CA.
- Ingles, L. C. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California. 506 pp.

#### **Personal Communications**

- Terry Russi, Wildlife biologist. Bureau of Land Management, Bishop, CA. December 21, 1995 - Telephone conversation.

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(619) 935-4536

November 12, 1996

Stephen Higa  
Mono County Planning Department

RE: Report on Survey for the Band-Thigh Beetle on Clearwater Creek Bodie Hills RV Park Project Site

Dear Stephen:

On October 26, 1996 I surveyed Clearwater Creek at and below the proposed Bodie Hills RV Park site as per our phone agreement (that the county and developer wanted the surveys done) and the FAXed information you sent to me on September 27.

Using an aquatic D-frame net (250 micron mesh size) I conducted kick and sweep samples in riffle and pool habitats, flowing water and channel margin waters, in vegetation and in stream cobble and sediment habitats. This sampling was done in the vicinity of the project site and at two locations immediately downstream (100-500 meters below). These live collections were returned to the laboratory for sorting and searching for larval and/or adult stages of the dytiscid diving beetle *Hygrotus fontinellis* (the band-thigh beetle). I found no evidence of the presence of this beetle in any of the collections. If occurring on Clearwater Creek this species is not present in the proposed project area or potentially affected downstream reaches.

Collections were dominated by the small capniid stonefly *Mesocapnia*, with other aquatic insects present including blackflies, mayflies, caddisflies, and riffle beetles. The only diving beetles present were *Stictotarsus striatellus* and *Agabus* sp. This collection or others could be used as a biological monitoring baseline for evaluating any potential post-project impacts.

**Work Invoice:**

4 field collecting hours + 4 hours lab sorting / sample processing (@\$50/hr = \$400)  
mileage traveled - 160 miles (@\$0.30/mile = \$48)

**TOTAL INVOICE = \$448**

Please make the payment check out to David B. Herbst and send to the address above.

*David B. Herbst*



**MITIGATION MONITORING PROGRAM**

Pol #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
	<b>EARTH</b>					
LU 3	Designate the remainder of Assessor's Parcel No. 11-070-04 as Rural Resort/Resource Conservation (RU/RC).	D, O	Specific Plan process	PD	Developer	Life of project
LU 4	<p>Permitted uses for the Rural Resort/Resource Conservation (RU/RC) designation shall include the following:</p> <p>A. A leachfield for the RVPark and utility lines on the southern bluff.</p> <p>B. Two (2) non-illuminate free standing signs along U.S. 395.</p> <p>C. Two (2) single family residences (approximately one single family residence per 80 acres).</p> <p>D. Horse corrals and stables for the occupants of the single family residences. Corrals and stables shall be located near the residences and shall not be located in cultural resources sites or in areas occupied by sensitive plants.</p> <p>E. Development of the single family residences on the northern bluff, shall require additional site specific studies for sensitive plant species.</p> <p>F. Livestock grazing.</p> <p>G. Passive recreation such as hiking, photography, wildlife observation, etc.</p>	D, O	On-site inspections	PD, PW, CEO, BD	Developer	Life of project



Pol #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
LU 4	<p>H. Other similar uses, as determined by the Planning Director in accordance with MCZDC §19.02.040, interpretation of similar uses.</p> <p>I. The areas immediately north and south of the proposed development shall be maintained as natural buffer zones between the development and surrounding public lands.</p> <p>J. No more than 10% of the entire parcel may be disturbed.</p>	D, O	On-site inspections	PD, PW, CEO, BD	Developer	Life of project
LU 5	<p>Designate the Clearwater Creek Channel as Open Space (OS). The designation establishes a riparian buffer zone area along the entire length of Clearwater Creek through the project site, including the entire channel area from ten (10) feet north of the top of the north bank to ten (10) feet south of the top of the south bank.</p> <p>The ten foot setback from the top of the streambank shall be maintained in perpetuity. In the future, if the streambank erodes and an existing use is no longer at least ten feet from the top of the bank, that use shall be discontinued or moved to the minimum 10' setback.</p>	D, O	On-site inspections	PD, PW	Developer	On-going compliance review
LU 6	<p>Permitted uses for the Open Space (OS) designation along Clearwater Creek shall include the following:</p> <p>A. Three (3) roadway bridges and one pedestrian bridge as indicated on the Plot Plans (see Figure 3 and 4). Bridge supports shall be located outside of the stream channel but in the 10' stream setback.</p>	D, O	On-site inspections	PD, BD, PW	Developer	On-going compliance review

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
LU 6	<p>B. One temporary crossing of the Clearwater Creek channel for construction purposes. The temporary crossing shall be reclaimed as soon as the bridges are operable.</p> <p>C. Recreational use of Clearwater Creek (e.g. fishing).</p> <p>D. No other uses shall be permitted.</p>	D, O	On-site inspections	PD, BD, PW	Developer	On-going compliance review
I 10	Prior to the initiation of any grading activity, the applicant shall process a grading permit. The grading permit shall be consistent with the preliminary grading plan, which estimates 1,000 cubic yards of cut and 600 cubic yards of fill. The drainage plan shall address applicable provisions of the Mono County Grading Ordinance, including the provisions for adequate surety. The bridges shall be designed to accommodate a 100 year storm and be consistent with a hydrology study prepared by a qualified engineer registered in the State of California.	D, O	Prior to any grading activity	PW, PD	Developer	On-going compliance review
I 11	The Lahontan Regional Water Quality Control Board shall review the grading and drainage plan for consistency with the NPDES permit requirements.	D, O	Prior to any grading activity	PW, Lahontan, PD	Developer	On-going compliance review
DG 8	Cut and fill shall be limited areas shown on the preliminary grading plan to reduce visual impacts and to minimize potential impacts to air and water quality from erosion and sedimentation. Areas not committed to development, where cut and fill is required, shall be revegetated as soon as possible with native, indigenous species in accordance with the preliminary landscape plan (see Figures 12 and 13).	D, O	Prior to construction	PW, Lahontan, DF&G	Developer	On-going compliance review

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
NRC 2	<p>No development is permitted within the Open Space area along Clearwater Creek. The area along the Creek includes the Creek channel and the area 10 feet back from the top of bank on both sides of the Creek. The purpose of the district is to avoid any potential impacts to the Clearwater Creek riparian corridor. Final development plans shall comply with the following performance standards:</p> <p>A. Bridge supports shall avoid the stream channel but can be located in the 10' setback.</p> <p>B. The maintenance building shall be placed at least ten feet from the top of the streambank.</p> <p>C. The road adjacent to the maintenance building shall be relocated outside of the OS area and designed to avoid any cut and fill.</p> <p>D. All RV spaces adjacent to the stream shall be placed outside of the OS area.</p> <p>E. Fencing installed between RV spaces and the OS corridor shall be wildlife friendly two-rail fence and shall be placed along the line delineating the ten foot setback from the top of the streambank.</p>	D, O	On-site inspection	PD, CEO, Lahontan	Developer	Life of project
NRC 3	<p>Temporary impacts to the stream channel and associated riparian vegetation resulting from construction of the proposed bridges shall be minimized by implementing the following performance standards:</p> <p>A. Prior to construction of any bridge, the applicant shall obtain a Stream Alteration Permit from the California Department of Fish and Game.</p>	D, O	On-site inspection	PD, CEO, DF&G, Lahontan	Developer	Phases II and III

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
NRC 3	<p>B. Prior to construction of the bridges, one designated stream crossing shall be identified in the RV Park area and one designated stream crossing shall be identified in the tent camping area. During construction of the bridges, all vehicles shall be required to cross only at the specified location. These crossings shall be located to minimize the impacts on vegetation and bank stability.</p> <p>C. During construction, park and store heavy equipment on the south side of the Creek to limit the number of times vehicles drive across the channel, minimizing the severity of impacts to plant roots and soils.</p> <p>D. Once the bridges are operational, the stream crossings shall be restored to natural conditions as soon as possible. Streambanks shall be stabilized and native plant species shall be replanted where necessary.</p>	D, O	On-site inspection	PD, CEO, DF&G, Lahontan	Developer	Phases II and III
NRC 4	All disturbed areas on the project site except areas dedicated to development such as building foot prints, RV and tent camping spaces, roadways and parking areas (i.e. cut and fill slopes, utility trenches, etc.) shall be revegetated.	D	On-site inspections	PD, PW, CEO	Developer	Phases II and III
NRC 5	<p>All revegetation on the project site shall comply with the following revegetation performance standards:</p> <p>A. Use of native, indigenous species grown from seeds or seedlings obtained from local native stock shall be required.</p> <p>B. Revegetation shall occur as soon as possible following construction to prevent erosion.</p>	D, O	On-site inspections	PD, CEO	Developer	Life of project

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
NRC 5	<p>C. Revegetated areas may require soil amendments prior to planting.</p> <p>D. Revegetated areas shall be irrigated as necessary to establish the plants.</p> <p>E. Weed-free mulches or mulch made by "chipping" native vegetation shall be used where necessary.</p> <p>F. Stockpiled topsoil shall be covered to prevent the spread of weeds. Stockpiled material which contains a viable native seed bank shall be used within one year and evenly distributed over the areas proposed for revegetation.</p> <p>G. Prior to topsoil application, open areas shall be ripped to decrease soil compaction and increase water infiltration which will greatly enhance seedling establishment.</p> <p>H. Revegetated areas shall be replanted necessary to assure success. Prior to starting construction, the project proponent shall consult with qualified agencies or a qualified botanist, to identify the appropriate planting techniques and seed mix in the areas identified for revegetation. Revegetation in disturbed areas shall occur so that the species mix and the vegetative cover density is similar to the surrounding undisturbed area and sufficient to stabilize the surface against the effects of long-term erosion.</p>	D, O	On-site inspections	PD, CEO	Developer	Life of project

Pol #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
NRC 5	I. Revegetated areas shall be monitored on an annual basis for a period of five years from initial planting to ensure the success of the project. The cost of monitoring shall not exceed \$500 per year. Revegetation to the level specified for each phase shall be complete or remedial action shall be initiated, prior to starting construction for the subsequent phases.	D, O	On-site inspections	PD, CEO	Developer	Life of project
NRC 15	Disturbance of natural habitat shall be kept to a minimum. Only areas indicated for development on the final plot plan and the preliminary grading plan shall be disturbed. Minor deviations from this requirement may be approved through the Director Review permit process and grading permit process.	D, O	On-site inspections	PD	Developer	Life of project
	<b>AIR QUALITY</b>					
NRC 4,5	See Earth above.					
NRC 15	See Earth above.					
DG 8	See Earth above.					
I 10	See Earth above.					
	<b>WATER</b>					
I 10	See Earth above.					
LU 3,4, 5,6	See Earth above.					

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
NRC 12	<p>Potential impacts to ground and surface waters resulting from pumping of groundwater shall be avoided.- A well permit shall be obtained from the Mono County Health Department prior to on-site water development. The proposed well shall be constructed to conform to California Well Standards Bulletin 74-90 and water well permit requirements established in conformance with applicable provisions of the Mono County Code. Prior to well permit issuance, the applicant's engineer shall submit a technical report containing detailed plans and specifications, and water quality and water quantity information including production rates, static water levels and water level draw down rates. Based upon this information, the Health Department shall make a finding that an adequate groundwater supply of sufficient quality and quantity is available for Phase I and issue a well permit.</p> <p>Prior to the development of Phases II and III, the Health Department shall make a finding that an adequate groundwater supply of sufficient quality and quantity is available for future phases. This finding shall be based upon the contents of a technical report containing information similar to Phase I.</p>	D, O	Prior to well construction	MCEHD	Developer	Prior to phases I, II, and III
NRC 13	The project shall comply with all applicable water quality standards and water quality control measures of the Lahontan Regional Water Quality Control Plan.	D, O	Prior to construction	MCEHD, Lahontan	Developer	Prior to initiation of Phase I and on-going
NRC 14	The project shall obtain a National Pollution Discharge Elimination System permit (NPDES) if more than five acres of site disturbance will take place.	D	Prior to construction	PW, MCEHD, Lahontan	Developer	Prior to initiation of Phase I



Pol #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
	<b>PLANT LIFE</b>					
LU 5, 6	See Earth above.					
DG 8	See Earth above.					
NRC 2,3,4, 5,15	See Earth above.					
NRC 6	<p>Disturbance of known populations of rare and endangered plants shall be avoided. The project shall comply with the following performance standards:</p> <p>A. The proposed leech field for the RV Park shall be located to the north of the identified population of Bodie Hills cusickiella.</p> <p>B. Construction of the RV spaces shall avoid the identified Masonic rock cress plants. The RV spaces shall be constructed to provide a 10 foot buffer zone from the plants to the top of the cut slope. Prior to construction, the Masonic rock cress shall be located and a buffer zone flagged off. The applicant shall fund the field work necessary for locating and flagging the Masonic rock cress.</p> <p>C. To avoid potential impacts to rare and endangered plants, there shall be no cut and fill outside of areas specified for cut and fill on the preliminary grading plans.</p>	D, O	Prior to construction	PD, CEO, PW, DF&G	Developer	Life of project

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
NRC 7	<p>Prior to beginning Phase I of the project, early summer field surveys for sensitive plant species shall be conducted, under contract with Mono County, funded by the project proponent, in the previously unsurveyed areas, i.e.:</p> <ul style="list-style-type: none"> <li>A. the proposed overhead power line;</li> <li>B. the north end of the parking area west of the proposed motel;</li> <li>C. the proposed water storage tank and supply pipeline northeast of the proposed motel;</li> <li>D. the northwest end of the proposed leach field southwest of the proposed motel;</li> <li>E. the end of the road about 100 feet east of the maintenance building and RV space 3;</li> <li>F. the proposed RV space 3, at the southeast edge of the site; and</li> <li>G. the cut slopes of proposed RV spaces 4 through 7 and 9.</li> </ul> <p>Following these surveys, if necessary, the project shall be redesigned to avoid potential impacts to sensitive plant species. Significant changes shall require amendment of this specific plan. Minor changes consistent with the Specific Plan may be allowed subject to Director Review Permit.</p>	D	Prior to construction	PD, PW, CEO, DF&G	Developer	Life of project

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
	<b>ANIMAL LIFE</b>					
LU 3A, 5,6	See Earth above.					
LU 7	Designate a Wildlife Movement Corridor (WMC). The corridor shall be a minimum of 150 feet wide at all points.	D	Specific Plan process, prior to construction	PD, DF&G	PD	Prior to initiation of Phase I
LU 8	Permitted uses for the Wildlife Movement Corridor (WMC) shall include the following:  A. Three (3) recreational vehicle spaces as indicated on the Plot Plan. The recreational vehicles spaces shall not be occupied during the months of April, May and October.  B. Roadway as indicated on the Plot Plan.  C. Existing vegetation shall be retained in the corridor to provide concealment cover for mule deer and other wildlife species.  D. No other uses shall be permitted.	D, O	Building permit process on-going inspections	PD, BD, CEO	Developer	On-going
DG 8	See Earth above.					
NRC 4,5, 15	See Earth above.					

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
NRC 8	<p>The project shall comply with the following performance standards to avoid and/or minimize potential impacts to wildlife habitat and wildlife use of the site and surrounding areas:</p> <p>A. Domestic animals shall be restrained at all times, either through the use of leashes or other means.</p> <p>B. Dogs shall be prohibited in the project area during construction activities.</p> <p>C. Construction shall be scheduled to minimize disturbance to wildlife during peak use periods. Construction shall be limited to daylight hours in accordance with the County's Noise Ordinance, in order to minimize impacts to nocturnal wildlife. Construction shall only occur between the spring and fall mule deer migration periods (i.e. May 15 to October 15).</p> <p>D. Dust generated during construction shall be controlled through watering or other acceptable measures.</p> <p>E. Noise levels during construction shall be kept to a minimum by equipping all on-site equipment with noise attenuation equipment and by compliance with all requirements of the County's Noise Ordinance.</p>	D, O	On-site inspections	PD, CEO, DF&G	Developer	Life of project

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
NRC 8	<p>F. Except as necessary for fuel modification purposes, native vegetation shall be retained, to the maximum extent possible, around the RV spaces, cabins and other buildings to provide visual screening barriers for wildlife, to reduce visual impacts of the project, and to minimize the potential for erosion impacts.</p> <p>G. Where possible, valuable wildlife features such as existing trees, downed logs, snags, rock piles, and water sources, shall be protected.</p>	D, O	On-site inspections	PD, CEO, DF&G	Developer	Life of project
NRC 9	To minimize potential noise impacts, use of RV generators shall be prohibited after 10 p.m.	O	On-site inspections	CEO, DF&G	Developer	Life of project
	<b>NOISE</b>					
NRC 8, 9	See Animal Life above.					
	<b>LIGHT AND GLARE</b>					
DG 1	<p>Buildings may be designed and constructed to have a rustic, nineteenth century appearance in harmony with Bodie State Historic Park, i.e.:</p> <p>A. Buildings shall be constructed primarily of wood and other materials compatible with the character of Bodie State Historic Park.</p> <p>B. The wood shall be stained, painted or otherwise finished to have a weathered aged appearance.</p> <p>C. Roofing shall be firesafe wood shingles, fiberglass shingles or metal in colors compatible with the area (e.g. sage, rust or similar colors).</p>	D, O	Prior to building permits	BD, PD, CEO	Developer	Life of project

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
DG 1	D. Bright colors or reflective materials shall not be used for any component of any structure.  E. Final building and landscaping plans shall be reviewed with State Parks to ensure that the structures blend in with the surrounding environment.	D, O	Prior to building permits	BD, PD, CEO	Developer	Life of project
DG 5	Outdoor lighting shall be designed and maintained to minimize the effects of lighting on the surrounding environment. Exterior lighting shall be limited to that necessary for health and safety purposes. High intensity outdoor lighting shall be avoided or shielded.	D, O	Prior to building permits	BD, PD, CEO	Developer	Life of project
DG 6	The nineteen lamps and lampposts proposed for installation on the project shall be painted a non-reflective color that blends in with the surrounding environment. Lamps will feature low intensity lighting.	D, O	Prior to building permits	BD, PD, CEO	Developer	Life of project
	<b>EXPOSURE TO RISK</b>					
ER 15	Disturbance of natural habitat shall be kept to a minimum. Only areas indicated for development of the final plot plan and the preliminary grading plan shall be disturbed. The amount of cut and fill on the project shall not exceed 1,000 cubic yards and 600 cubic yards, respectively, as specified on the Preliminary Grading Plan. Bonding to ensure site remediation shall be required, prior to starting construction on each project phase.	D, O	Prior to any grading activity	PW, PD	Developer	On-going compliance review

Pol #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
ER 16	Should the hydrology study prepared in accordance with Infrastructure Policy 10 shows that the project's development components are located in the 100 year flood plain, the project shall be redesigned to incorporate measures to reduce flood impacts to a level of non-significance and/or to relocate development components outside of the 100 year flood plain. The redesigned project shall require amendment of the Specific Plan and may require additional environmental review consistent with CEQA.	D, O	Prior to any grading activity	PW, PD	Developer	On-going compliance review
	<b>PUBLIC SERVICE</b>					
I 7	Prior to initiation of Phase I, the project proponent shall provide the County with a copy of the service contract between the project proponent and the Bridgeport Valley Fire Protection District.	D, O	Prior to building permits	PD, BD	Developer	Prior to initiation of Phase I
DG 13	The following shall serve as the Fire Protection Plan required by the Mono County General Plan:  A. Constructing roadways with a minimum width of two-nine foot travel lanes providing for two-way travel. One-way roads shall provide a minimum of one ten-foot travel lane and shall connect to a two-lane roadway at both ends. A turnout shall be placed and constructed at the approximate mid-point of each one-way road.	D, O	Prior to building permits	PD, BD	Developer	Prior to initiation of Phase I



Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
DG 13	<p>B. Using roadway surfaces with unobstructed access to conventional drive vehicles and capable of supporting a forty thousand pound load.</p> <p>C. If necessary for controlling winter access, gates shall be at least two feet wider than the width of the traffic lanes serving the gate. All gates providing access from a road to a driveway shall be located at least 30 feet from the roadway and shall open to allow a vehicle to stop without obstructing traffic on that road. Where a one-way road with single traffic lane provides access to a gated entrance, a forty-foot turning radius shall be used.</p>	D, O	Prior to building permits	PD, BD	Developer	Prior to initiation of Phase I
TC 1	All access routes within the project shall comply with Mono County Fire Safe Standards and the project's Fire Protection Plan (see DG Policy 13).	D	Prior to construction	PW, PD, BD	Developer	Life of project
	<b>AESTHETICS</b>					
DG 1	See Light and Glare above					
DG 2	Solid wood fencing shall be used to screen the propane tanks and dumpsters. A wildlife friendly two-rail fence shall be installed along Clearwater Creek to delineate the 10 foot setback from the top of the streambank. Fencing shall be stained, painted or otherwise finished to have a weathered aged appearance.	D, O	On-site inspections	PD, BD, CEO	Developer	At time of construction and on-going
DG 4	Trash cans placed throughout the camping and RV areas shall be painted with a non-reflective color that blends in with the surrounding environment.					At time of construction and on-going
DG 5	See Light and Glare above.					

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
DG 6	See Light and Glare above					
DG 7	<p>The water storage tank shall be shielded from view to the greatest extent possible, using the following measures:</p> <p>A. It shall be placed to take maximum advantage of the topography and existing vegetation to help shield it from view from Highway 270.</p> <p>B. It shall be painted a non-reflective color that blends in with the surrounding environment.</p> <p>C. If necessary, additional junipers shall be planted to help shield it, <u>as determined by the Planning Commission.</u></p>	D, O	On-site inspections	PD, BD, CEO	Developer	At time of construction and on-going
DG 8	See Earth above.					
DG 12	<p>Signs shall be unobtrusive in color, material and design.</p> <p>A. The project will include up to 1 illuminated monument sign, 2 non-illuminated monument signs, 4 wall signs (1 illuminated) and two directional signs.</p> <p>B. The applicant shall request that Caltrans and State Parks coordinate their existing signs along Highway-270-with the proposed signage of the project. <i>The applicant shall also review the existing sign plan with State Parks.</i></p> <p>C. The applicant may request that Caltrans place International symbols for services on existing signs along U.S. 395.</p>	D, O	<p>Building permit process</p> <p>On-site inspections</p>	PD, BD, CEO, State Parks	Developer	At time of construction and on-going
NRC 2	See Earth above.					

Pol. #	Mitigation Measure	Type <sup>1</sup>	Monitoring Process <sup>2</sup>	Monitoring Agency <sup>3</sup>	Implementing Entity	Compliance Schedule
	<b>CULTURAL RESOURCES</b>					
NRC 10	<p>The project shall avoid impacts to identified archaeological sites by avoiding development in those areas. Where development causes direct (site BHRV 4, 8, 9) or indirect impacts (site CA-MNO-264), limited testing and surface collection is required prior to development.</p> <p>A. If limited testing confirms that BHRV 4, 8, 9, and CA-MNO-264 are important archaeological resources, then the project proponent shall fund and the County will hire a qualified Archaeologist, to prepare an excavation plan and mitigation plan in conformance with Appendix K of the CEQA Guidelines.</p> <p>Mitigation fees paid by the applicant shall not exceed one half of one percent of the projected cost of the entire project.</p>	D, O	Prior to and during construction	PD, CEO	Developer	Life of project
NRC 11	<p>The project proponent shall stop work and notify appropriate agencies and officials if archaeological evidence is encountered during earthwork activities. No disturbance of an archaeological site shall be permitted until such time as the project proponent funds a qualified consultant, under contract with the County and an appropriate report is filed with the County Planning Department which identifies acceptable site mitigation measures to avoid significant archaeological impacts. Any further construction activities must comply with the archaeological resource mitigation plan.</p>	D, O	Prior to and during construction	PD, CEO	Developer	Life of project

- NOTES**
1. **D = Design Measure/Condition** incorporated into the project to prevent environmental impacts (e.g. project designs, drainage retention basins, etc.).  
**O = Ongoing Measure/Condition** associated with the project over time (e.g. dust control, landscape maintenance, etc.).
  2. This section addresses any specialized monitoring techniques, where applicable.
  3. The designated compliance officer is the Code Enforcement Officer (CEO). The CEO shall be responsible for coordinating all monitoring efforts and ensuring that all mitigation measures are being enforced.

**PW = Mono County Public Works Dept.**

**PD = Mono County Planning Dept.**

**MCEHD = Mono County Environmental Health Dept.**

**BD = Mono County Building Dept.**

**"NA" = Not Applicable.**

**Lahontan = Lahontan Regional Water Quality Control Board**

**DF&G = Department of Fish and Game**

**State Parks = California State Parks**

## 4. Traffic Study



**TRAFFIC IMPACT STUDY**

**BODIE HILLS R.V. PROJECT**

**Both Sides of State Route 270 (Bodie Road)  
East of State Route 395  
County of Mono, California**

**Revised**

**FEBRUARY 18, 1998**

**PREPARED FOR:**

**County of Mono  
P. O. Box 8; Courthouse Annex 1  
Bridgeport, CA 93517**



**CRENSHAW TRAFFIC ENGINEERING**

**Traffic and Transportation Consulting**

**29950 Pinedale Drive**

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**(805) 821-3909**

**Fax (805) 821-1740**





**TRAFFIC IMPACT STUDY**

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**PREPARED BY:**

**CRENSHAW TRAFFIC ENGINEERING**

  
**WALLACE W. CRENSHAW, P.E. TR# 0366**



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# TRAFFIC IMPACT STUDY

## BODIE HILLS R. V. PARK PROJECT

Both Sides of State Route 270 (Bodie Road)

East of State Route 3

County of Mono, California

### INTRODUCTION

This traffic study has been prepared to determine the traffic impact on the State Route 270 for present condition and future roadway system from traffic generated by the development of a Bodie Hills R. V. project located on the north and south side of State Route 270 (Bodie Road), east of State Route 395 in the County of Mono, California. The traffic (trips) estimated to be generated by this project has been added to the existing on-street traffic volumes and their impact has been analyzed on the existing and proposed street network within this project area. Future traffic volumes have also been added to this scenario. The following material sets forth existing traffic counts, estimated trip generation, distribution of project related traffic and capacity analysis in the vicinity of the project, for project conditions before and after the proposed development.



This traffic analysis may be used as part of the draft environmental impact report for this project and shall be used in conjunction with the draft environmental impact report's existing analysis of traffic impacts.

## **PROJECT**

The proposed project consists of developing a Commercial Project on property located north and south of State Route 270 (Bodie Road), east of State Route 395. The commercial site consists of a 32 Space Recreation Vehicle Park, a 14 Space Tent Area, 8 Camping Cabins, a 10 Unit Motel and a General Store all on approximately 13 acres of land. See Exhibit 1 and Bear Engineering's development plan dated June 1998, plans available from Mono County engineering department. This study is based on physical configuration taken from said Bear Engineering plans.

## **TRAFFIC AND CIRCULATION**

At the present time State Route 270 and State Route 395 are wide two-lane highways in this area and provide access to regional residential, recreational and employment centers.

## **STREETS AND HIGHWAYS**

Following is a summary description of the streets and highways which could be affected by project traffic.

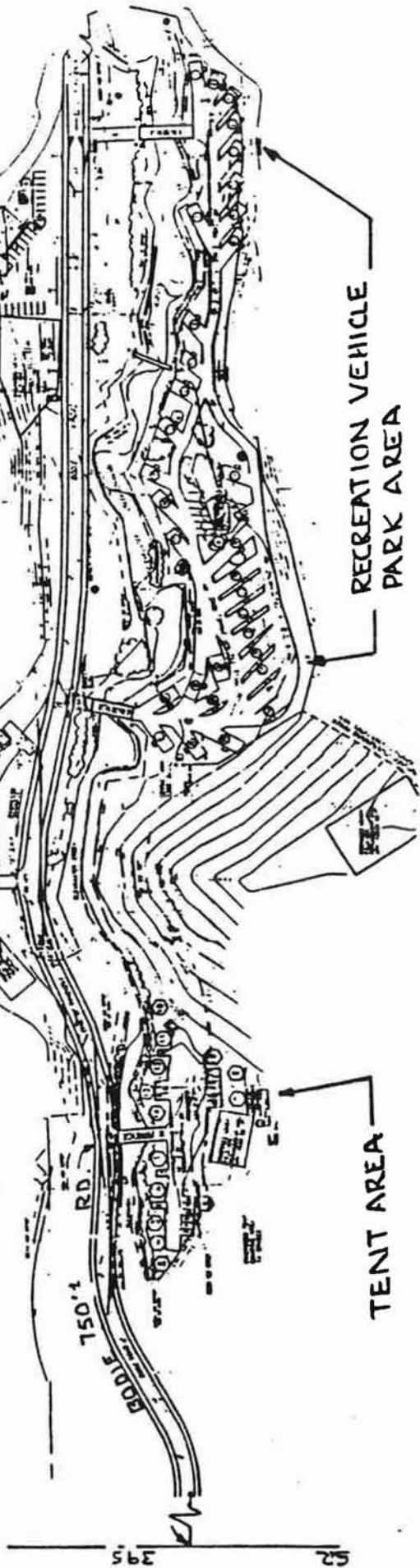
N  
NTS

MOTEL & STORE AREA

CABIN AREA

RECREATION VEHICLE  
PARK AREA

TENT AREA



LOCATION PLAN AND  
PLOT PLAN BODIE HILLS R.V. PARK

State Route 270 (Bodie Road) is a highway in Mono County. At present it is a two-lane road that extends from SR-395 to the town of Bodie. The road is generally posted for 55 miles per hour, but the road has numerous curves and the speed limit is marked to state specification in the range of 25 mph to 35 mph in the vicinity of the project.

State Route 395 is a wide two-lane and four lane road that is designated a a major highway in the County of Mono. State Route 395 extends from San Bernardino County into the State of Oregon.

## RECENT AREA TRAFFIC COUNTS

Traffic volumes on State Route 270 and State Route 395 and other major thoroughfares in the area show typical peak periods associated with major streets in this area.

The volumes show a peak during the morning, and a second peak during the afternoon period. The afternoon peak has the highest volume of traffic of the two peak periods. Table 1 shows a summary of recent traffic counts taken in the area. These counts were conducted at the project site along SR-270 in the PM peak hour. These counts were used in this analysis. The vehicle mix noted during the count was: east bound 94% passenger vehicles; 6% truck or recreational vehicles; and west bound 18% truck and recreational vehicles with 82% passenger vehicles. See Table 1 and Exhibit 2.

## TABLE 1

### P.M. MANUAL TURN MOVEMENT COUNTS

<u>STREET LOCATION</u>	<u>COUNT DATE</u>	<u>DIR.</u>	<u>P.M. PEAK HOUR BEGAN</u>	<u>HOUR VOL.</u>
SR 270 at project site	8-17-98	EB WB	4:00 4:00	104 26

## TABLE 2

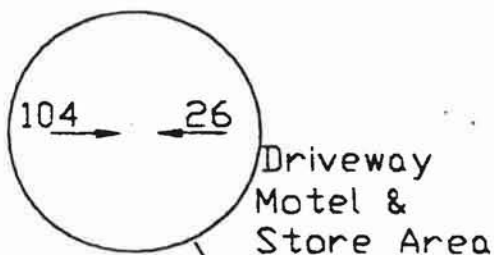
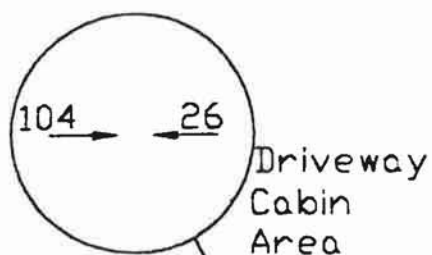
### SPEED CHECKS

SR 270 at project site

East Bound  
West Bound

35 mph  
40 mph

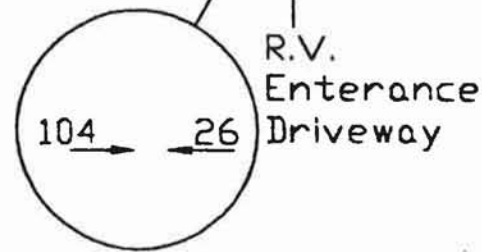
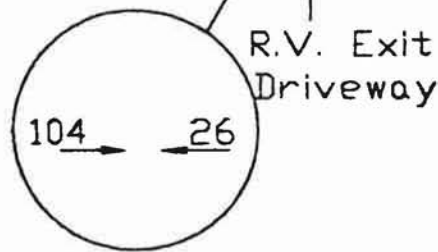
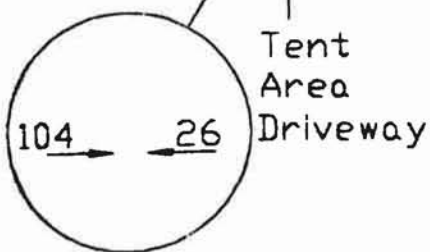
85 Percentile  
85 Percentile



State

Route

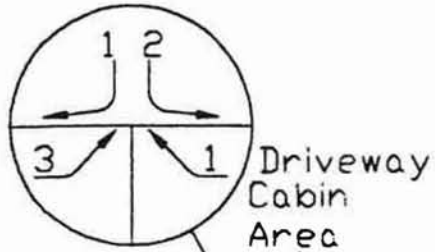
270



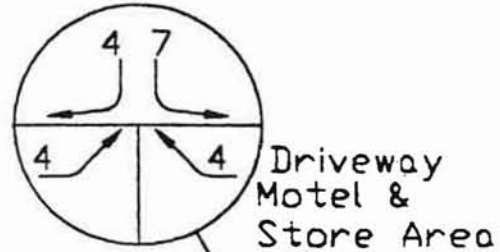
← R.V. Area →

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P.M. Peak Hour Distribution  
Existing Volumes



Driveway  
Cabin  
Area

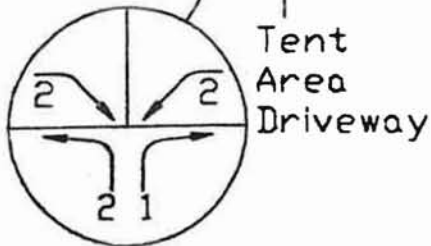


Driveway  
Motel &  
Store Area

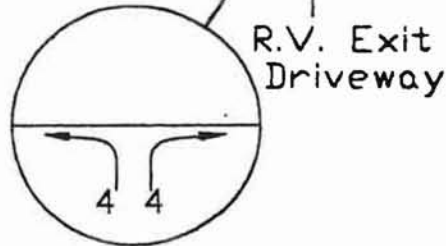
State

Route

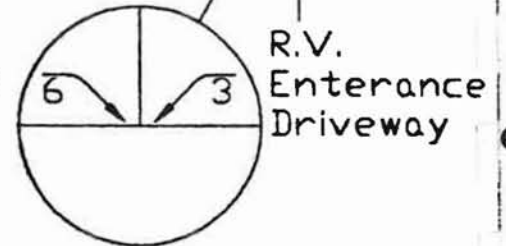
270



Tent  
Area  
Driveway



R.V. Exit  
Driveway



R.V.  
Entrance  
Driveway

← R.V. Area →

SEE TABLE 3

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P.M. Peak Hour Distribution  
Project Generation Only

## TRAFFIC GENERATION AND DISTRIBUTION

The daily traffic volumes estimated to be generated in the study area by the proposed development were based on data obtained from the 5th Edition of the Institute of Transportation Engineers Handbook "Traffic Generation" dated January 1, 1991 and supplement thereto, dated February 1995. See Exhibit 3.

An ambient growth rate of 2% per year was estimated for use for existing streets in the project area. The ambient factor was multiplied by the existing volumes for a computation of future volumes.

Trips generated with ambient factors ratio and other projects in the area are shown on Exhibits 4 and 6 entitled "Future Without Project."

At year 1999 it is estimated that this development will generate a total of approximately 570 vehicular trip ends per day, 257 of these trip ends will be bypass trips. By definition a bypass trip is a trip that is already within the traffic stream and not one which is specifically generated by the development.

It is also anticipated that 21 vehicles inbound and 22 vehicles outbound will be traversing the entrance drives to



this development during the PM peak hour. Of these, the project will generate 9 inbound and 7 outbound not already in the traffic stream. See Table 3. This increase in vehicles is an insignificant amount. See Mitigation Section page 24.

By pass trips are estimated at 45% of total volume of project. Same use volume camping site and general store to be 40%. Trips generated with project added to Future PM Volumes are shown as "Future With Project" on Exhibits 5 and 7.

## TRAFFIC ANALYSIS AND IMPACT

This development is expected to be completed on or before year 1999. Analysis assumptions include the following:

1. The proposed development will be completed by 1999, with traffic patterns established.
2. That traffic will access this development from SR-270 (Bodie Road) by way of driveways as shown on Plot Plan enclosed herein. These driveways must be clearly marked for ingress and egress to development.
3. That the actual PM peak hour traffic conditions are appropriate for this analysis.

**TABLE 3**

**RECREATION R.V. PARK AND DEVELOPMENT**

**TRAFFIC GENERATION**

**RECREATION VEHICLE PARK (#240)**  
32 Spaces

Average Total Daily Trips:	Factor Volume	6/Spaces* 192
PM Peak Hour Trips: (50% in; 50% out)	Factor Volume	0.56/Space 17
	Volume In	9
	Out	8

**TENT CAMPING AREA (#413)**  
8 Spaces

	Factor Volume	7.9/Spaces* 64
PM Peak Hour Trips:	Factor Volume	0.79/Space 7
	Volume In	4
	Out	3

**GENERAL STORE (#810)**  
2700 Square Feet (Usable Floor Space)

Average Total Daily Trips:	Factor Volume	48/1000 SF 130
PM Peak Hour Trips:	Factor Volume	4.8/1000 SF 13
	Volume In	7
	Out	6

\*Factored from P.M. Peak Hour

**TABLE 3 - CONTINUED**  
**RECREATION R.V. PARK AND DEVELOPMENT**  
**TRAFFIC GENERATION**

**MOTEL (#320)**  
 10 Units

Average Total Daily Trips:	Factor Volume	10.19/Units 102
PM Peak Hour Trips: (56% in; 44% out)	Factor Volume	0.60/Unit 6
	Volume In	4
	Out	2

**CABIN AREA (#320)**  
 8 Cabins

Average Total Daily Trips:	Factor Volume	10.19/Units 82
PM Peak Hour Trips: (56% in; 44% out)	Factor Volume	0.60/Unit 5
	Volume In	3
	Out	2

**TOTAL FOR DEVELOPMENT**

		IN	OUT
ADT	570	285	285
PM	48	27	21

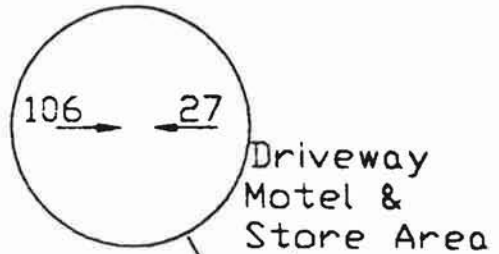
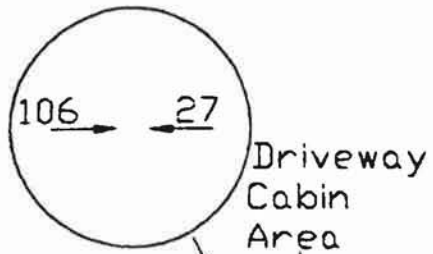
Camping Sites, General Store, Motel and Cabins will share 40% of volume attributed to this facility. 45% of trips will be By Pass.

ADT Project = 570 x 60% = 342 Generation  
 342 x 45% = 154 By Pass Trips = 188 Non By Pass Trips

PM 48 x 60% = 29 x 45% = 13 By Pass Trips = 16 Non By Pass Trips

Generated Volume not already in Traffic Stream: PM 9 in; 7 out

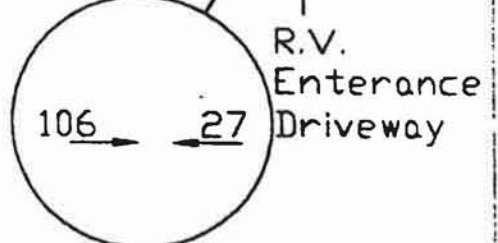
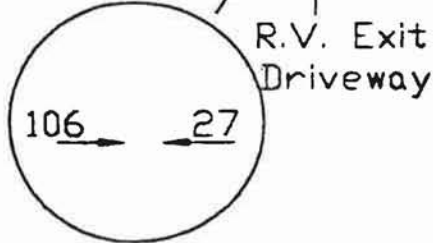
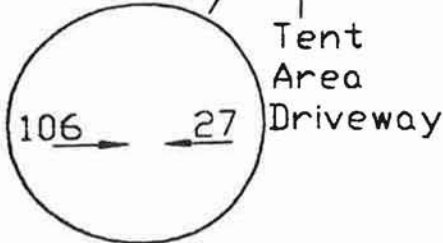
See Exhibit 3 page 7 herein



State

Route

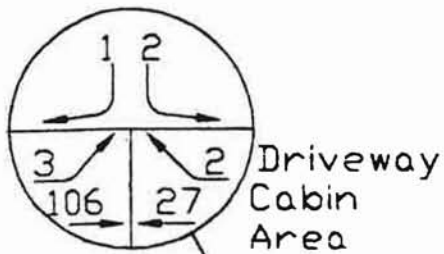
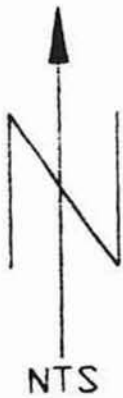
270



← R.V. Area →

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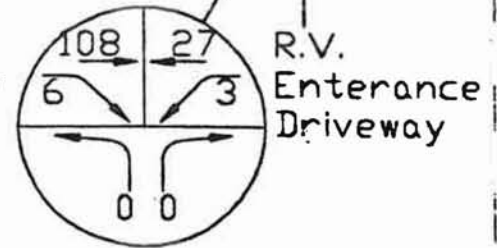
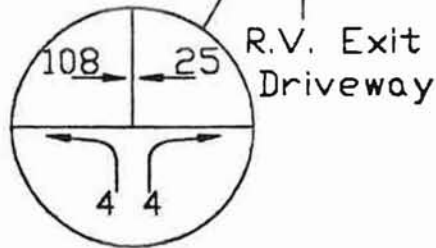
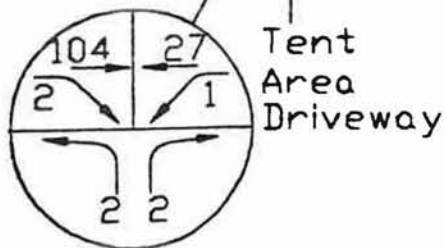
P.M. Peak Hour Distribution  
Year 1999 Without Project



State

Route

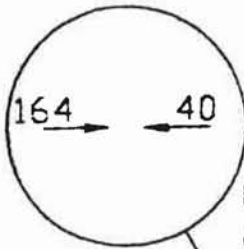
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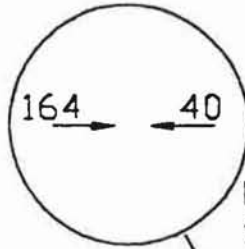
← R.V. Area →

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P.M. Peak Hour Distribution  
Year 1999 With Project



Driveway  
Cabin  
Area

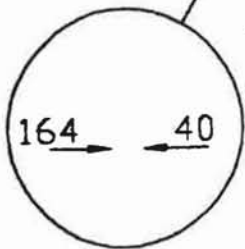


Driveway  
Motel &  
Store Area

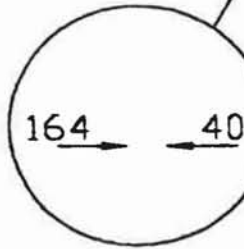
State

Route

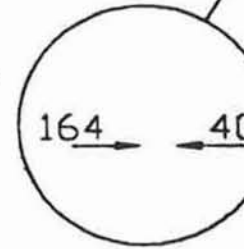
270



Tent  
Area  
Driveway



R.V. Exit  
Driveway

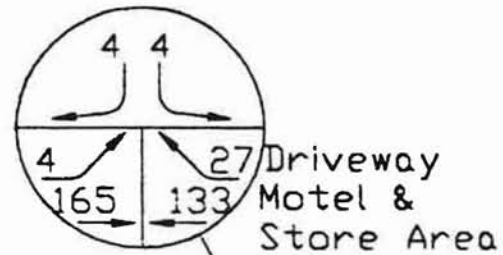
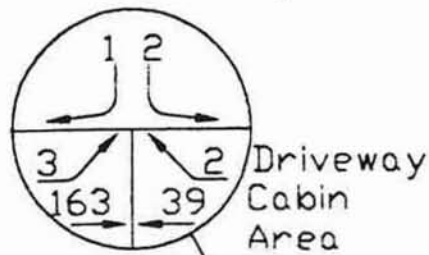


R.V.  
Entrance  
Driveway

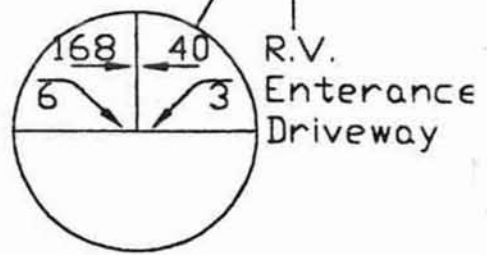
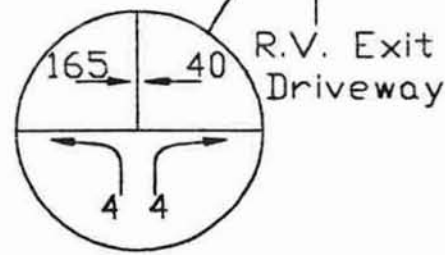
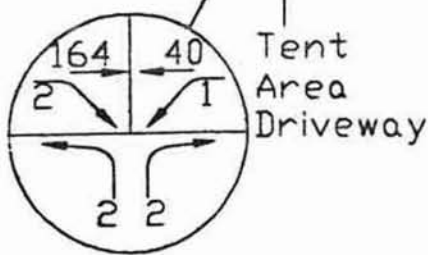
← R.V. Area →

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P.M. Peak Hour Distribution  
Year 2020 Without Project



State Route 270



← R.V. Area →

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P.M. Peak Hour Distribution  
 Year 2020 With Project



4. Ambient growth factors as stated elsewhere in this report are appropriate for use in this report.
  
5. Due to the remoteness of this project and the established traffic patterns, it is assumed that approximately 45% of the generated volume of this project will be by pass traffic (see Traffic Generation Section herein) that will originate from and return to SR-270. The generated volume expected to patronize more than one of the recreation sites, motel and/or general store facilities is estimated to be 40%. This figure was used in this report to account for multi-usage trips.

## **INTERSECTION ANALYSIS (Driveways)**

The driveway intersection analysis was based on information obtained from observation of traffic patterns and manual counts.

## **LEVEL OF SERVICE**

### Intersections

The capacity and Level of Service (LOS) of the driveways were determined for existing conditions and conditions in year 1999 and year 2020 with and without project, using the

**TABLE 4**  
**LEVEL OF SERVICE (LOS) PM PEAK HOUR**

<u>INTERSECTIONS</u>	<u>EXISTING</u> PM	<u>1999</u> <u>FUTURE</u> <u>W/PROJECT</u> PM	<u>2020 WITH</u> <u>PROJECT</u> PM
<u>SR 270 &amp; Tent Sites Driveway</u>			
NB Left	N/A	A	A
NB Right	N/A	A	A
WB Left	N/A	A	A
<u>General Store, Motel Driveway &amp; SR 270</u>			
SB Left	N/A	A	A
SB Right	N/A	A	A
EB Left	N/A	A	A
<u>Recreation Vehicle Site Entrance Drive &amp; SR 270</u>			
WB Right	N/A	A	A
EB Left	N/A	A	A
<u>Recreation Vehicle Exit and SR 270</u>			
NB Left	N/A	A	A
NB Right	N/A		
<u>Cabin Area Driveway and SR 270</u>			
SB Left	N/A	A	A
SB Right	N/A	A	A
EB Left	N/A	A	A

1995 Highway Capacity Manual method for unsignalized intersections. (See Appendix for worksheet on these intersections). See Table 4.

The Level of Service for the intersection of State Route 270 and drive entrances (and exits) for the project shows a level of "A" on all legs at year 1999 and year 2020. See Conclusion Section herein.

## TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic Signal Warrants were prepared for the intersections of SR-270 and driveways. Warrants for this analysis were Warrant #1 and Warrant #2. (State Division of Highway Warrants). Results of these warrant analyses are shown in Table 5.

None of intersection of State Route 270 and Bodies Hills R. V. Park warrants a traffic signal under existing and future 1999 and 2020 conditions.

**TABLE 5**  
**SIGNAL WARRANT ANALYSIS**  
**AM AND PM PEAK HOUR VOLUMES**

INTERSECTIONS	SIGNAL WARRANTS SATISFIED				
	Warrant No.	1		2	
		AM	PM	AM	PM
<u>Existing Volumes</u>					
Driveways and SR 270	No	No	No	No	
<u>1999 Future Volumes With Project</u>					
Driveways and SR 270	No	No	No	No	
<u>2020 With Project</u>					
Driveway and SR 270	No	No	No	No	

## STREET SEGMENT ANALYSIS

### Descriptions of Assumed Roadway Capacities

The capacity of a roadway is affected by a number of factors, including the width of the roadway, the number of crossing arterials and collectors, the presence or absence of on-street parking, and the number of driveways.

By policy for daily traffic analysis, Level of Service "D" is the basis for identifying whether a capacity problem exists at a midblock location. The highway capacity method for two lane highway was used to compute the level of service on this street section.

### Arterial Operations

As noted in Table 6, the arterial network in the general area of the project currently operates at excellent levels of service, i.e., Level of Service "A".

### FUTURE CAPACITIES, WITHOUT PROJECT

This section describes the future circulation and operating conditions, and potential capacity deficiencies in the study

area, based on the forecast volumes to year 1999, and year 2020 with the stated growth factors applied to the scenario but without the study project.

As noted in Table 6, State Route 270 will operate at LOS "A". Worksheets are included in the appendix section.

#### FUTURE CAPACITIES, WITH PROJECT

In order to assess the effect of developing this project on the surrounding highway system, the future volumes that may utilize the new street were added to the future without project volumes. State Route 270 will continue to operate at LOS "A". See Table 6.

### **SPEED SURVEY**

A speed survey was conducted using a radar gun at two locations along State Route 270 adjacent to the proposed development: 1. At a point approximately 700' East of State Route 395 and 2. approximately 2000' East of State Route 395.

The 85 percentile rate was calculated for each of these locations. At location 1. the 85 percentile speed is 35 mph and at location 2. it was 40 mph.

## SIGHT DISTANCE

Sight distance measurements were performed along SR-270 at drive entrance to the Recreational Park. The horizontal sight distance was used. The vertical sight distance in the area is not a factor because of relatively flat grade.

A 85 percentile speed in the area of the R. V. Entrance, motel and general store entrance is 40 mph, the 85 percentile speed at the tent area and cabin area driveway was 35 mph. The 40 mph and 35 mph speeds were used for analyzing horizontal sight distance in the report. The State of California Design Manual for Highways was used for a guide to establish the minimum stopping distance required at various speeds. (Copy of page 200-1 enclosed in appendix herein).

Table 201.1 shows various minimum sight distance stopping values. At 35 mph the minimum stripping distance is 250 feet and at 40 mph the minimum stripping distance is 300 feet.

The horizontal sight distance of 250 feet is the minimum requirement for 35 mph speed and 300 feet is required for 40 mph, as stated in the State Division of Highway Design Manual, latest edition thereof. The driveway for the tent area at westerly end of development has the most critical sight distance, the measured sight distance is 270 feet.



If this driveway was moved easterly approximately 50 feet, the sight distance would be greater than 300 feet.

The most easterly driveway (to R.V. area) has a horizontal sight distance of 430 feet. The remainder of the access driveways are well above minimum requirements.

## MITIGATION MEASURES

In order to mitigate the impact of this development on future streets and intersections, the following mitigation measures should be made.

### Year 1999 and 2020 Mitigation

1. Relocate tent area driveway about 50 feet easterly (as topography allows) to increase the horizontal sight distance at this location.
2. Clearly mark driveway entrance and exits on State Route 270 with applicable state signs.
3. Construct tapers in to and out of driveways a minimum of 100 feet long x 10 feet wide. Either asphaltic cement or graded shoulders may be used as specified by Caltrans.

## CONCLUSION

The overall traffic volumes expected to be generated from the proposed development will require no mitigation measures as stated herein.

This development should comply with all requirements of the Congestion Management Plan for the County of Mono and State of California. This may include, but is not limited to: Trip reduction, deficiency plan, traffic and public transportation requirements and improvements, and any impact fees requirements that are applicable.

While turn channelization is not required for the development, tapers into and out of driveways would be a benefit to protect the turning vehicle as well as the through vehicle. It is suggested that a minimum of 100' x 10' taper be constructed at entrances and exits of driveway for this development. These tapers may be either asphaltic concrete or graded shoulders, provided that sufficient lateral clearance is available that will allow the tapers to be constructed.

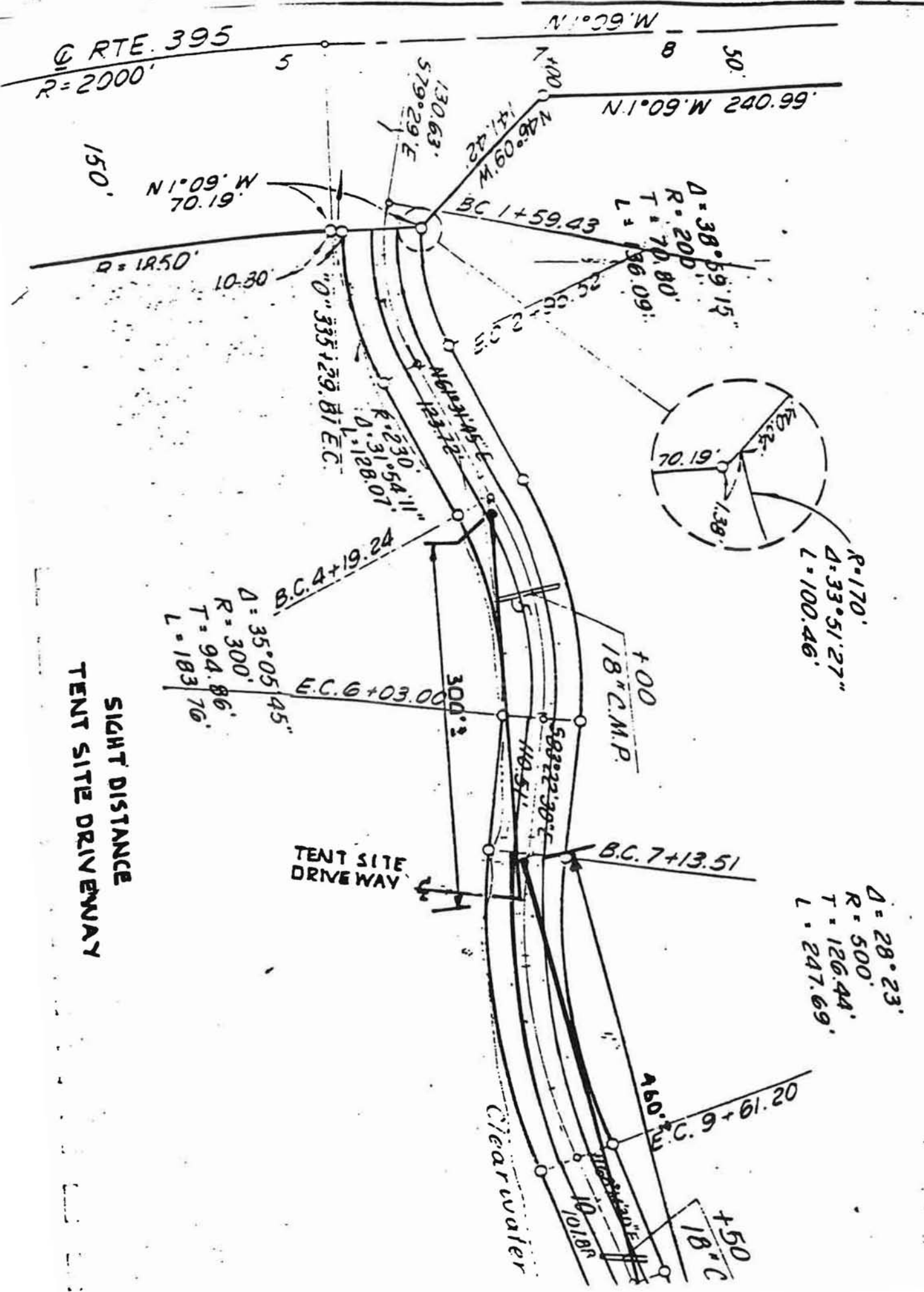
Also, for safety consideration it is suggested that cross traffic and pedestrian crossing signs be installed in advance of this development as per requirement of the County of Mono and Caltrans.

Interior circulation has been examined and found to be adequate for turning movements of vehicles. As mentioned under Mitigation Measures, the relocation of the driveway into the tent area to a point about 50 feet easterly would increase sight distance at that location for east bound traffic.

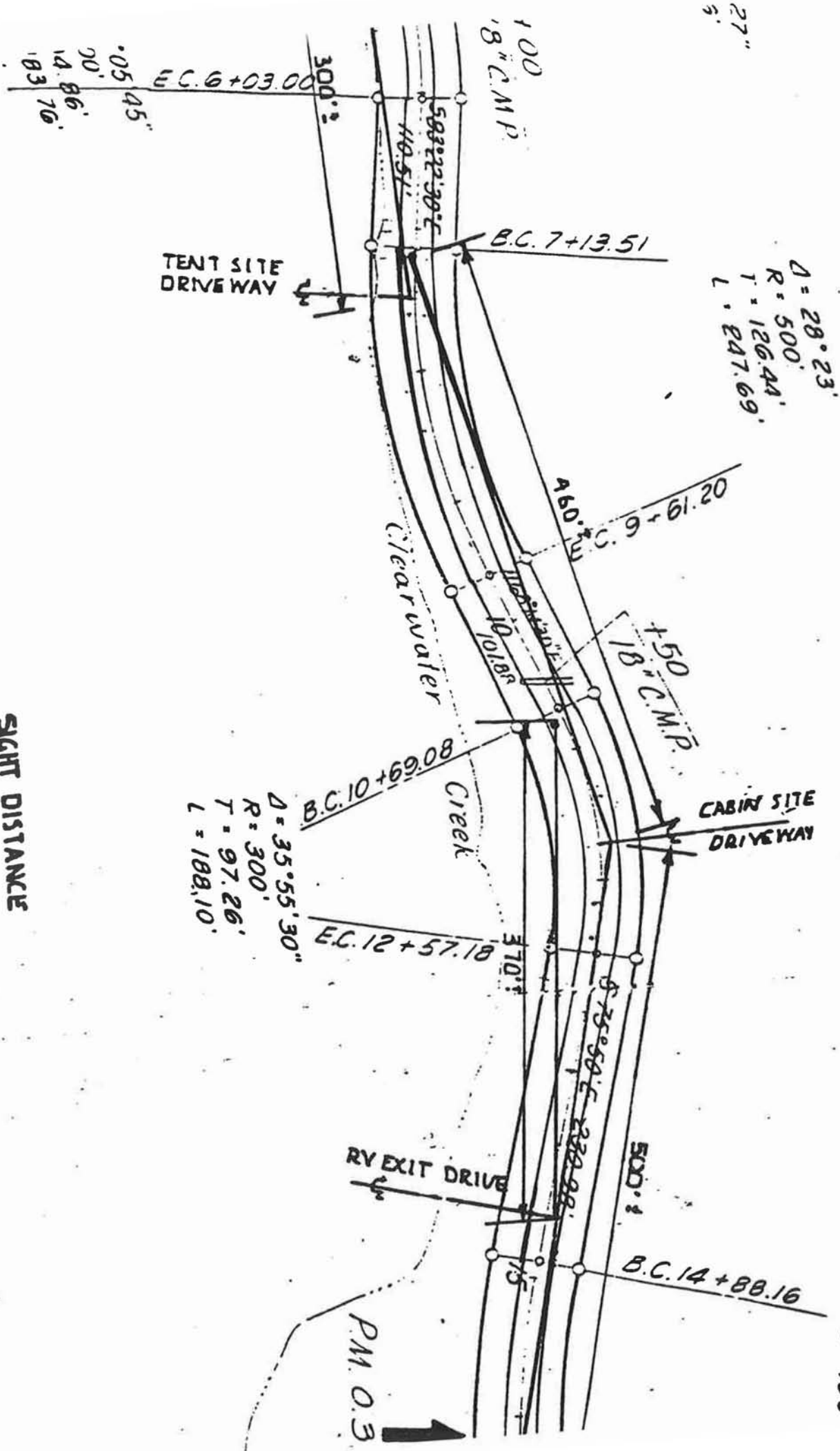
There is no pedestrian traffic presently in this area. Pedestrian traffic should not be a problem when the project is in place, due to the low volume and speed of traffic in this area. To determine if flashing warning lights and/or crosswalk may be required after project is in operation the vicinity could be monitored.

**APPENDIX**

SECTION 27



SIGHT DISTANCE  
TENT SITE DRIVEWAY



SIGHT DISTANCE  
 CABIN SITE DRIVEWAY

E.C. 16+46.69

(2060)

750'±

587'±

20

24" C.M.P.

+62

MOTEL & GENERAL STORE AREA

1000'±

510'±

B.C. 23+77.53

D = 10°50'45"  
R = 800'  
T = 75.94'  
L = 151.44'

E.C. 25+28.97

525'±

197.59

N 81° 58' E

60' R/W WIDTH SHOWN ON MONO CO CONST. PLANS

SIGHT DISTANCE  
MOTEL & STORE DRIVEWAY

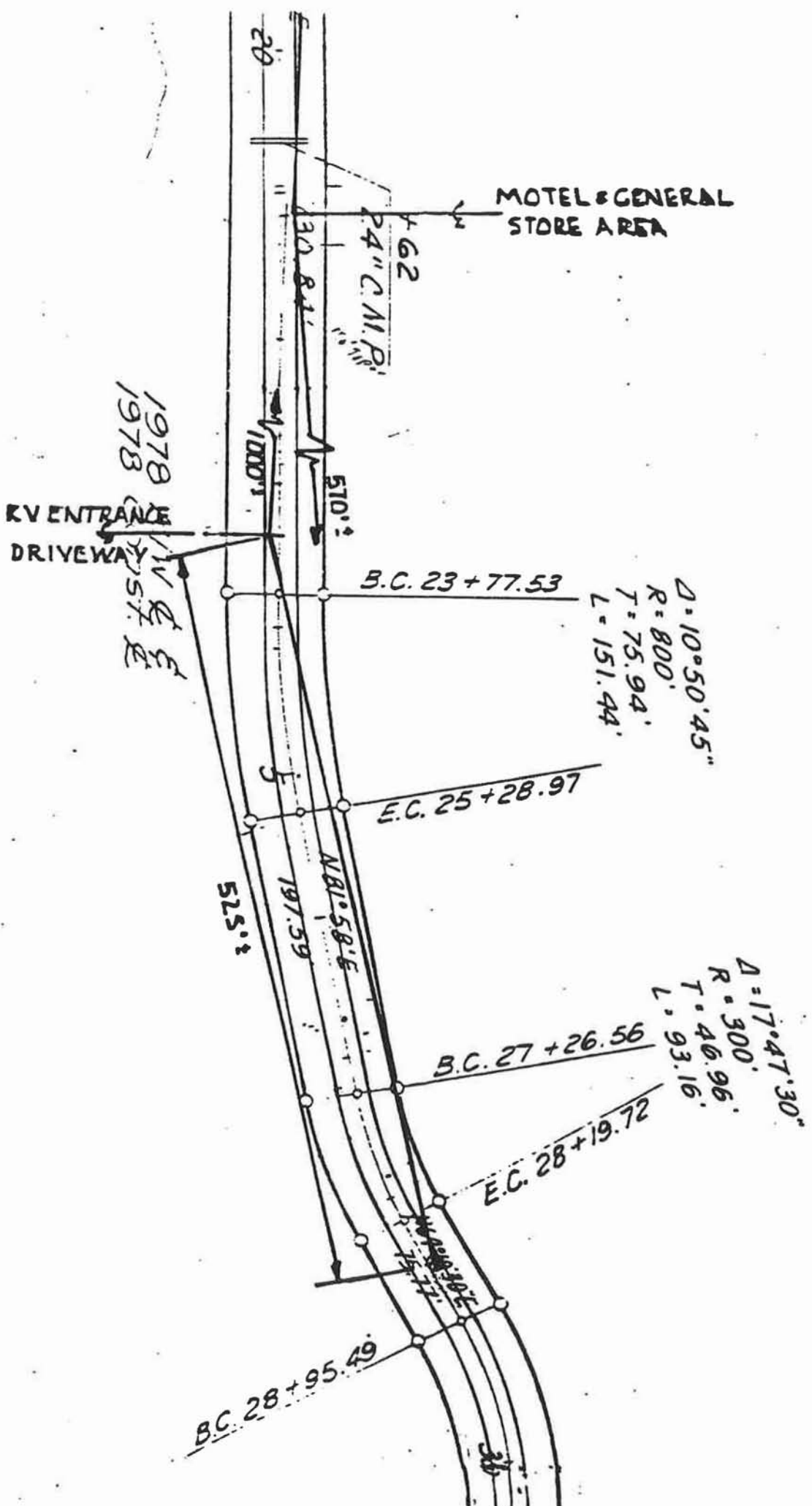
1978  
1978

RV ENTRANCE  
DRIVEWAY

N 75° E  
N 57° E



**SIGHT DISTANCE  
KV ENTRANCE DRIVEWAY**



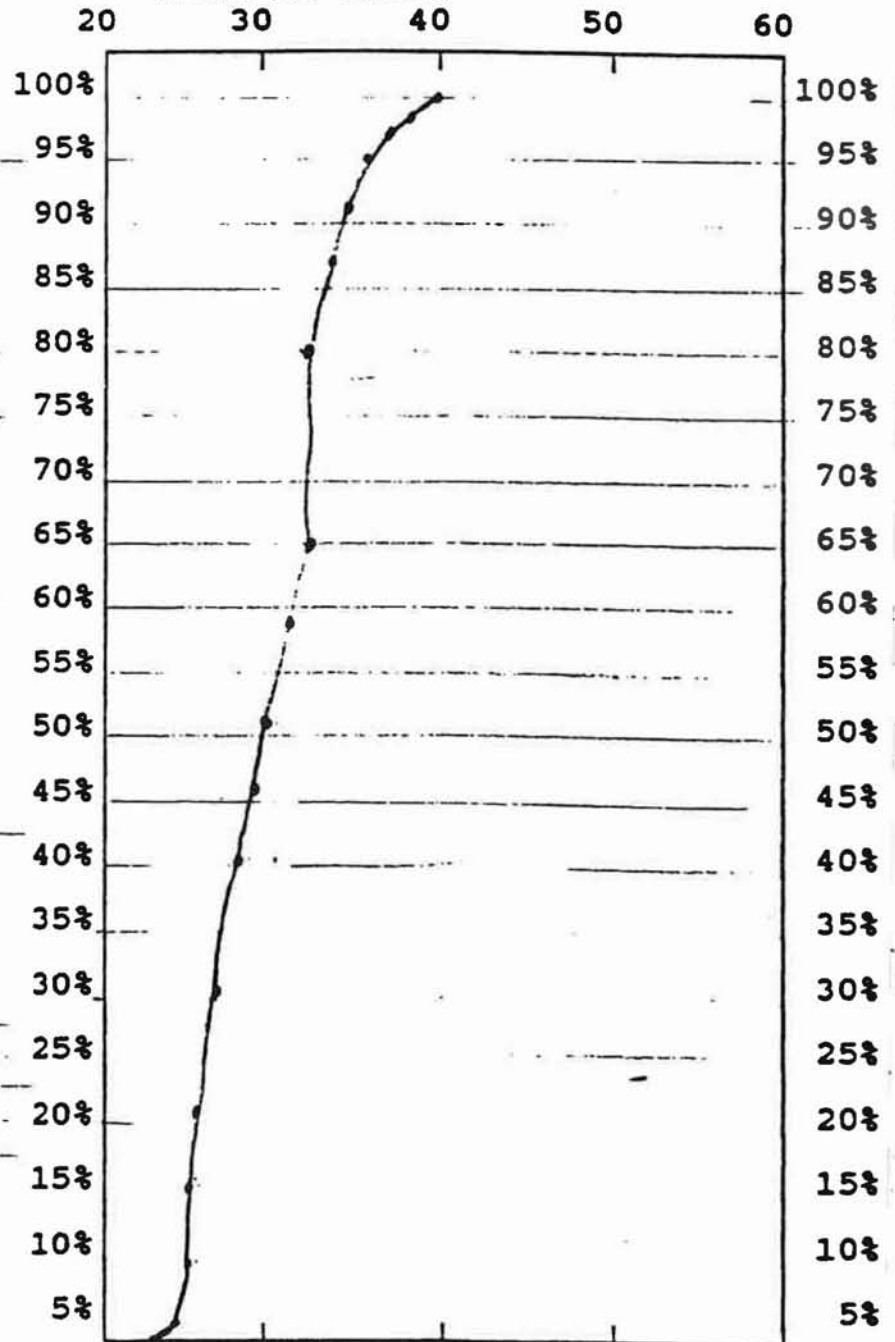
# RADAR SPEED SURVEY

CITY MONROE COUNTY  
 LOCATION SR 270 900'E W05R395

DIRECTION BOTH  
 DATE 9-15-98  
 DAY OF WEEK TUE  
 TIME OF DAY 3PM-5PM  
 POSTED SPEED LIMIT 50  
 NUMBER OF LANES 2  
 DEVELOPMENT —  
 WEATHER CLEAR  
 ROAD CONDITIONS PAVED  
 95% CONFIDENCE GAP

15th PERCENTILE SPEED 25  
 50th PERCENTILE SPEED 30  
 85th PERCENTILE SPEED 35  
 95th PERCENTILE SPEED 38  
 RANGE OF SPEEDS 23-40  
 10 MPH PACE SPEED 25-35  
 PERCENT IN PACE 76%  
 CALCULATED MEAN 30  
 STANDARD DEVIATION  
 KEWNESS INDEX

SPEED	NUM	PCT	ACC %
60			
59			
58			
57			
56			
55			
54			
53			
52			
51			
50			
49			
48			
47			
46			
45			
44			
43			
42			
41			
40	1	2	20
39			
38	1	2	99
37	1	2	97
36	1	2	95
35	3	5	92
34	4	7	88
33	8	15	80
32	4	7	65
31	4	6	58
30	3	6	52
29	3	6	46
28	5	9	44
27	6	10	32
26	3	8	22
25	4	7	16
24	4	7	9
23	1	2	2
22			
21			



VEHICLES OBSERVED 55

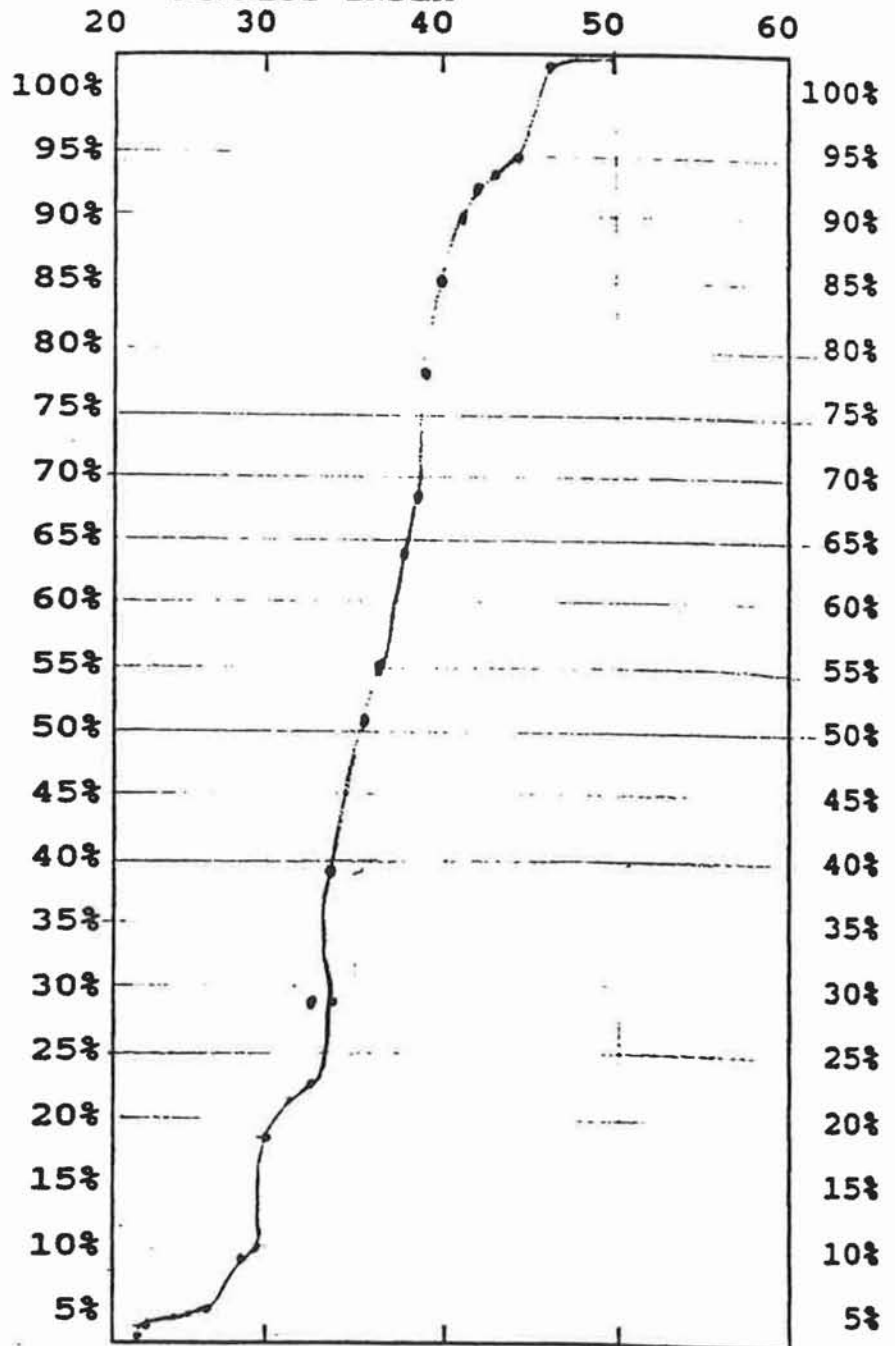
# RADAR SPEED SURVEY

CITY MONROE COUNTY  
 LOCATION SR 270 - 2000' I E10375

DIRECTION BOTH  
 DATE 9-15-98  
 DAY OF WEEK TUE  
 TIME OF DAY 3-5PM  
 POSTED SPEED LIMIT 50  
 NUMBER OF LANES 2  
 DEVELOPMENT NO  
 WEATHER CLEAR  
 ROAD CONDITIONS PAVED  
 95% CONFIDENCE GAP

15th PERCENTILE SPEED 29  
 50th PERCENTILE SPEED 35  
 85TH PERCENTILE SPEED 40  
 95TH PERCENTILE SPEED 47  
 RANGE OF SPEEDS 21-50  
 10 MPH PACE SPEED 3.1-41  
 PERCENT IN PACE 68  
 CALCULATED MEAN 35  
 STANDARD DEVIATION  
 KEWNESS INDEX

SPEED	NUM	PCT	ACC %
60			
59			
58			
57			
56			
55			
54			
53			
52			
51			
50	1	105	100
49			
48			
47			
46			
45	4	164	99
44	2	100	95
43	3	95	93
42	4	90	91
41	4	90	90
40	9	90	88
39	9	81	77
38	4	72	68
37	10	68	64
36	4	51	55
35	13	54	51
34	12	41	39
33	4	29	28
32	2	25	24
31	4	23	22
30	9	19	18
29	1	10	10
28	4	9	9
27	1	5	5
26	1	4	4
25	1	3	3
24			
23	1	2	2
22			
21	1	1	1



VEHICLES OBSERVED 105

## CHAPTER 200 GEOMETRIC DESIGN AND STRUCTURE STANDARDS

### Topic 201 - Sight Distance

#### Index 201.1 - General

Sight distance is the continuous length of highway ahead visible to the driver. Three types of sight distance are considered here: passing, stopping, and decision. Stopping sight distance is the minimum sight distance to be provided on multilane highways and on 2-lane roads when passing sight distance is not economically obtainable. Stopping sight distance also is to be provided for all elements of interchanges and intersections at grade, including private road connections (see Indexes 405.1, 504.1 and Figure 405.7). Decision sight distance is used at major decision points (see Indexes 201.7 and 504.2).

The following table shows the standards for passing and stopping sight distance related to design speed. **These are the minimum values that shall be used in design.**

**Table 201.1  
Sight Distance Standards**

Design Speed <sup>(1)</sup> (mph)	Stopping <sup>(2)</sup> (ft)	Passing (ft)
20	125	800
25	150	950
30	200	1100
35	250	1300
40	300	1500
45	360	1650
50	430	1800
55	500	1950
60	580	2100
65	660	2300
70	750	2500
75	840	2600
80	930	2700

(1) See Topic 101 for selection of design speed.

(2) Increase by 20% on sustained downgrades >3% & >1 mile.

Chapter III of "A Policy on Geometric Design of Highways and Streets," AASHTO, 1984, contains a thorough discussion of the derivation of stopping sight distance.

#### 201.2 Passing Sight Distance

Passing sight distance is the minimum sight distance required for the driver of one vehicle to pass another vehicle safely and comfortably. Passing must be accomplished without reducing the speed of an oncoming vehicle traveling at the design speed should it come into view after the overtaking maneuver is started. The sight distance available for passing at any place is the longest distance at which a driver whose eyes are 3.5 feet above the pavement surface can see the top of an object 4.25 feet high on the road.

Passing sight distance is considered only on 2-lane roads. At critical locations, a stretch of 3- or 4-lane passing section with stopping sight distance is sometimes more economical than two lanes with passing sight distance (see Index 204.4).

Figure 201.2 shows graphically the relationship among length of vertical curve, design speed, and algebraic difference in grades. Any one factor can be determined when the other two are known.

See Chapter 6 of the Traffic Manual for criteria relating to barrier striping of no-passing zones.

#### 201.3 Stopping Sight Distance

The minimum stopping sight distance is the distance required by the driver of a vehicle, traveling at a given speed, to bring his vehicle to a stop after an object on the road becomes visible. Stopping sight distance is measured from the driver's eyes, which are assumed to be 3.5 feet above the pavement surface, to an object 0.5-foot high on the road.

The stopping sight distances in Table 201.1 should be increased by 20% on sustained downgrades steeper than 3% and longer than 1 mile.

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Streets: (N-S) Tent Site (E-W) SR 270  
 Major Street Direction.... EW  
 Length of Time Analyzed... 60 (min)  
 Analyst..... wc 8-117  
 Date of Analysis..... 9/10/98  
 Other Information.....Year 2020 with project  
 Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	0	> 1	0	1	0	1	0	0	0
Stop/Yield			N			N						
Volumes		164	2	2	40		4		4			
PHF		.95	.95	.95	.95		.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

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Streets: (N-S) Cabin Area (E-W) SR 270  
 Major Street Direction.... EW  
 Length of Time Analyzed... 60 (min)  
 Analyst..... wc 8-117  
 Date of Analysis..... 9/10/98  
 Other Information.....Year 2020 with project  
 Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	3	164			40	1				2		1
PHF	.95	.95			.95	.95				.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10 1.10		

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40



Worksheet for TWSC Intersection

Step 1: RT from Minor Street		NB	SB
Conflicting Flows: (vph)			42
Potential Capacity: (pcph)			1318
Movement Capacity: (pcph)			1318
Prob. of Queue-Free State:			1.00
Step 2: LT from Major Street		WB	EB
Conflicting Flows: (vph)			43
Potential Capacity: (pcph)			1635
Movement Capacity: (pcph)			1635
Prob. of Queue-Free State:			1.00
TH Saturation Flow Rate: (pcphpl)			1700
RT Saturation Flow Rate: (pcphpl)			
Major LT Shared Lane Prob. of Queue-Free State:			1.00
Step 4: LT from Minor Street		NB	SB
Conflicting Flows: (vph)			218
Potential Capacity: (pcph)			792
Major LT, Minor TH Impedance Factor:			1.00
Adjusted Impedance Factor:			1.00
Capacity Adjustment Factor due to Impeding Movements			1.00
Movement Capacity: (pcph)			790

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	2	790		4.6	0.0	A	4.0
SB R	1	1318		2.7	0.0	A	
EB L	3	1635		2.2	0.0	A	0.0

Intersection Delay = 0.1 sec/veh



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 Major Street Direction.... EW  
 Length of Time Analyzed... 60 (min)  
 Analyst..... wc 8-117  
 Date of Analysis..... 9/10/98  
 Other Information.....Year 1999 with project  
 Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	3	106			27	1				2		1
PHF	.95	.95			.95	.95				.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street		NB	SB
Conflicting Flows: (vph)			28
Potential Capacity: (pcph)			1340
Movement Capacity: (pcph)			1340
Prob. of Queue-Free State:			1.00
Step 2: LT from Major Street		WB	EB
Conflicting Flows: (vph)			29
Potential Capacity: (pcph)			1661
Movement Capacity: (pcph)			1661
Prob. of Queue-Free State:			1.00
TH Saturation Flow Rate: (pcphpl)			1700
RT Saturation Flow Rate: (pcphpl)			
Major LT Shared Lane Prob. of Queue-Free State:			1.00
Step 4: LT from Minor Street		NB	SB
Conflicting Flows: (vph)			144
Potential Capacity: (pcph)			874
Major LT, Minor TH Impedance Factor:			1.00
Adjusted Impedance Factor:			1.00
Capacity Adjustment Factor due to Impeding Movements			1.00
Movement Capacity: (pcph)			872

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	2	872		4.1	0.0	A	3.7
SB R	1	1340		2.7	0.0	A	
EB L	3	1661		2.2	0.0	A	0.1

Intersection Delay = 0.1 sec/veh

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Streets: (N-S) Motel & Store Area (E-W) SR 270  
 Major Street Direction.... EW  
 Length of Time Analyzed... 60 (min)  
 Analyst..... wc 8-117  
 Date of Analysis..... 9/10/98  
 Other Information.....Year 1999 with project  
 Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	4	110			29	7				4		4
PHF	.95	.95			.95	.95				.95		.95
Grade		0			0						0	
NC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

-----		
Step 1: RT from Minor Street	NB	SB
-----		
Conflicting Flows: (vph)		34
Potential Capacity: (pcph)		1331
Movement Capacity: (pcph)		1331
Prob. of Queue-Free State:		1.00
-----		
Step 2: LT from Major Street	WB	EB
-----		
Conflicting Flows: (vph)		38
Potential Capacity: (pcph)		1644
Movement Capacity: (pcph)		1644
Prob. of Queue-Free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		1.00
-----		
Step 4: LT from Minor Street	NB	SB
-----		
Conflicting Flows: (vph)		154
Potential Capacity: (pcph)		862
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		860
-----		

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	4	860		4.2	0.0	A	3.5
SB R	4	1331		2.7	0.0	A	
EB L	4	1644		2.2	0.0	A	0.1

Intersection Delay = 0.2 sec/veh

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Streets: (N-S) Motel & Store Area (E-W) SR 270  
 Major Street Direction.... EW  
 Length of Time Analyzed... 60 (min)  
 Analyst..... wc 8-117  
 Date of Analysis..... 9/10/98  
 Other Information.....Year 2020 with project  
 Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	4	170			27	7				4		4
PHF	.95	.95			.95	.95				.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street		NB	SB
Conflicting Flows: (vph)			32
Potential Capacity: (pcph)			1334
Movement Capacity: (pcph)			1334
Prob. of Queue-Free State:			1.00
Step 2: LT from Major Street		WB	EB
Conflicting Flows: (vph)			35
Potential Capacity: (pcph)			1650
Movement Capacity: (pcph)			1650
Prob. of Queue-Free State:			1.00
TH Saturation Flow Rate: (pcphpl)			1700
RT Saturation Flow Rate: (pcphpl)			
Major LT Shared Lane Prob. of Queue-Free State:			1.00
Step 4: LT from Minor Street		NB	SB
Conflicting Flows: (vph)			214
Potential Capacity: (pcph)			796
Major LT, Minor TH Impedance Factor:			1.00
Adjusted Impedance Factor:			1.00
Capacity Adjustment Factor due to Impeding Movements			1.00
Movement Capacity: (pcph)			794

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	4	794		4.6	0.0	A	3.6
SB R	4	1334		2.7	0.0	A	
EB L	4	1650		2.2	0.0	A	0.1

Intersection Delay = 0.2 sec/veh

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Streets: (N-S) R.V. Area (E-W) SR 270  
 Major Street Direction.... EW  
 Length of Time Analyzed... 60 (min)  
 Analyst..... wc 8-117  
 Date of Analysis..... 9/10/98  
 Other Information.....Year 1999 with project  
 Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	0	> 1	0	0	0	0	0	0	0
Stop/Yield			Y			N						
Volumes		110	6	3	27							
PHF		.95	.95	.95	.95							
Grade		0			0							
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10								

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40



-----  
 Worksheet for TWSC Intersection  
 -----

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	116	
Potential Capacity: (pcph)	1509	
Movement Capacity: (pcph)	1509	
Prob. of Queue-Free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	1.00	

-----

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	3	1509		2.4	0.0	A	0.2

Intersection Delay = 0.0 sec/veh

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Streets: (N-S) R.V. Area (E-W) SR 270  
 Major Street Direction.... EW  
 Length of Time Analyzed... 60 (min)  
 Analyst..... wc 8-117  
 Date of Analysis..... 9/10/98  
 Other Information.....Year 2020 with project  
 Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	0	> 1	0	0	0	0	0	0	0
Stop/Yield			Y			N						
Volumes		170	6	3	40							
PHF		.95	.95	.95	.95							
Grade		0			0							
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10								

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 2: LT from Major Street		WB	EB
Conflicting Flows: (vph)		179	
Potential Capacity: (pcph)		1409	
Movement Capacity: (pcph)		1409	
Prob. of Queue-Free State:		1.00	
TH Saturation Flow Rate: (pcphpl)		1700	
RT Saturation Flow Rate: (pcphpl)			
Major LT Shared Lane Prob. of Queue-Free State:		1.00	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	3	1409		2.6	0.0	A	0.2

Intersection Delay = 0.0 sec/veh

1985 HCM:TWO-LANE HIGHWAYS

\*\*\*\*\*

FACILITY LOCATION.... SR 270 E/o SR395 to 1400 E/O 395  
 ANALYST..... wwc 8-117  
 TIME OF ANALYSIS..... PM Peak  
 DATE OF ANALYSIS..... 09-10-1998  
 OTHER INFORMATION.... Existing Volumes Without Project

A) ADJUSTMENT FACTORS

-----  
 PERCENTAGE OF TRUCKS..... 2  
 PERCENTAGE OF BUSES..... 0  
 PERCENTAGE OF RECREATIONAL VEHICLES..... 5  
 DESIGN SPEED (MPH)..... 50  
 PEAK HOUR FACTOR..... .9  
 DIRECTIONAL DISTRIBUTION (UP/DOWN)..... 80 / 20  
 LANE WIDTH (FT)..... 11  
 USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)... 6  
 PERCENT NO PASSING ZONES..... 0

B) CORRECTION FACTORS

-----  
 ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	.93	.83	.85
B	5	3.4	3.9	.93	.83	.82
C	5	3.4	3.9	.93	.83	.82
D	5	2.9	3.3	.93	.83	.84
E	5	2.9	3.3	.94	.83	.84

C) LEVEL OF SERVICE RESULTS

-----  
 INPUT VOLUME(vph): 130  
 ACTUAL FLOW RATE: 144

LOS	SERVICE FLOW RATE	V/C
A	277	.15
B	459	.26
C	741	.42
D	1121	.62
E	1773	.97

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

\*\*\*\*\*

FACILITY LOCATION.... SR 270 E/o SR395 to 1400 E/O 395  
 ANALYST..... wwc 8-117  
 TIME OF ANALYSIS..... PM Peak  
 DATE OF ANALYSIS..... 09-10-1998  
 OTHER INFORMATION.... Year 1999 Volumes

A) ADJUSTMENT FACTORS

-----  
 PERCENTAGE OF TRUCKS..... 2  
 PERCENTAGE OF BUSES..... 0  
 PERCENTAGE OF RECREATIONAL VEHICLES..... 5  
 DESIGN SPEED (MPH)..... 50  
 PEAK HOUR FACTOR..... .9  
 DIRECTIONAL DISTRIBUTION (UP/DOWN)..... 80 / 20  
 LANE WIDTH (FT)..... 11  
 USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)... 6  
 PERCENT NO PASSING ZONES..... 0

B) CORRECTION FACTORS

-----  
 ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	.93	.83	.85
B	5	3.4	3.9	.93	.83	.82
C	5	3.4	3.9	.93	.83	.82
D	5	2.9	3.3	.93	.83	.84
E	5	2.9	3.3	.94	.83	.84

C) LEVEL OF SERVICE RESULTS

-----  
 INPUT VOLUME(vph): 133  
 ACTUAL FLOW RATE: 148

LOS	SERVICE FLOW RATE	V/C
A	277	.15
B	459	.26
C	741	.42
D	1121	.62
E	1773	.97

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

\*\*\*\*\*

FACILITY LOCATION.... SR 270 E/o SR395 to 1400 E/O 395  
 ANALYST..... wwc 8-117  
 TIME OF ANALYSIS..... PM Peak  
 DATE OF ANALYSIS..... 09-10-1998  
 OTHER INFORMATION.... Year 2020 Volumes

A) ADJUSTMENT FACTORS

-----  
 PERCENTAGE OF TRUCKS..... 2  
 PERCENTAGE OF BUSES..... 0  
 PERCENTAGE OF RECREATIONAL VEHICLES..... 5  
 DESIGN SPEED (MPH)..... 50  
 PEAK HOUR FACTOR..... .9  
 DIRECTIONAL DISTRIBUTION (UP/DOWN)..... 80 / 20  
 LANE WIDTH (FT)..... 11  
 USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)... 6  
 PERCENT NO PASSING ZONES..... 0

B) CORRECTION FACTORS

-----  
 ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	.93	.83	.85
B	5	3.4	3.9	.93	.83	.82
C	5	3.4	3.9	.93	.83	.82
D	5	2.9	3.3	.93	.83	.84
E	5	2.9	3.3	.94	.83	.84

C) LEVEL OF SERVICE RESULTS

-----  
 INPUT VOLUME(vph): 204  
 ACTUAL FLOW RATE: 227

LOS	SERVICE FLOW RATE	V/C
A	277	.15
B	459	.26
C	741	.42
D	1121	.62
E	1773	.97

LOS FOR GIVEN CONDITIONS: A

**5. Hydrology and Stream  
Bank Studies**





**HYDROLOGY AND  
FLOOD PLAIN  
STUDY**

**FOR**

**BODIE HILLS RV PARK**

**NEAR**

**BODIE ON CLEARWATER CREEK  
MONO COUNTY, CALIFORNIA**

**By: Denio & Associates Engineering  
136 E. Line Street, Suite E  
Bishop, California, 93514  
(760) 873-8812 fax (760) 873-8821**

**February, 1999**



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Exhibit 3 – Cross Sections	
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# BODIE R.V. PARK HYDROLOGY AND FLOOD PLAIN STUDY

## 1.0 INTRODUCTION

### 1.1 Purpose of Study

This Flood Plain Study investigates the existence and severity of flood hazards in and near the area of the Clearwater Creek, upstream from State Route 395 on State Route 270 (Bodie Road) in Mono County, California. The study was performed for the purpose of evaluating the flood hazards associated with a proposed RV Park development, the "Bodie Hills RV Park". (Ref. #1). The proposed development includes RV parking/camping sites, service buildings, streets, paths, and bridges over the Clearwater Creek. The development is proposed in two areas along the Clearwater Creek adjacent to Bodie Road, just east of State Route 395. This study developed flood risk data for the area and established the approximate boundary of the 100 year flood plain for Clearwater Creek in and near the area of the proposed development.

### 1.2 Authority and Acknowledgments

Denio & Associates Engineering of Bishop, California was retained by Mono County in November, 1998 to perform this study as part of the environmental process. The developer is William Lapham.

The hydrologic and hydraulic analyses for this study were performed by Truman Denio, PE and David Norcross, EIT of Denio & Associates Engineering. This study was completed in December, 1998.

Mr. John Langford of Bear Engineering (Ref. #2) is the Project Engineer and has provided preliminary grading plans of the proposed development, dated 1/31/97.

A copy of digital topographic survey information in metric units for the area was obtained from Caltrans (Ref. #3). This survey for the highway included the project area. This survey was supplemented with survey information provided by Bear Engineering.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

The project area is located in an unincorporated area in Mono County, about 10 miles south of Bridgeport and about 10 miles west of the historical ghost town of Bodie. The location of the study is shown on the Vicinity Map / Drainage Basin map (Figure 1).

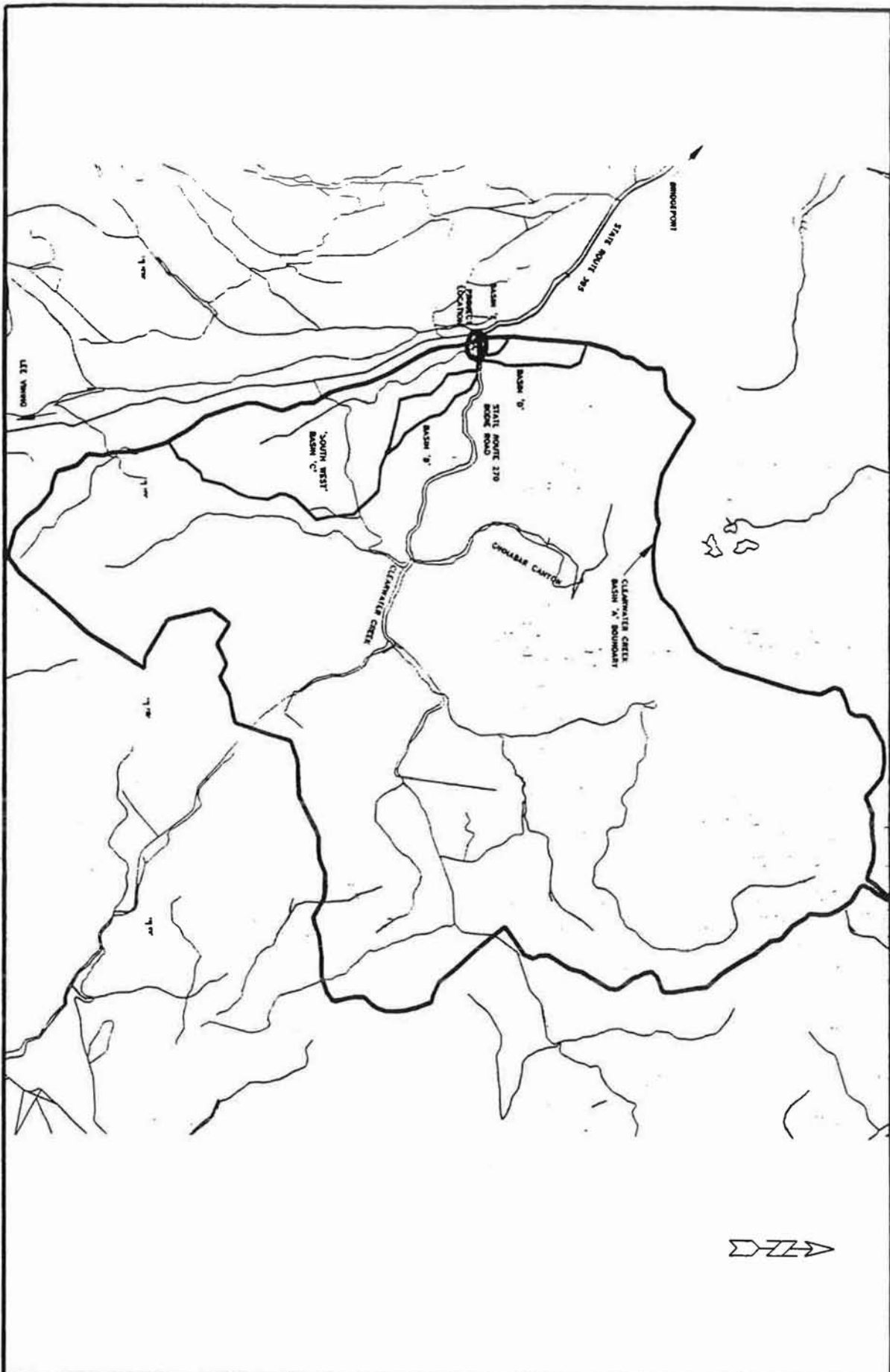


FIGURE 1

	COUNTY OF MONO, CALIFORNIA BODIE HILLS RV PARK HYDROLOGY STUDY DRAINAGE BASIN & VICINITY MAP	<b>DENIO &amp; ASSOC. ENGINEERING</b> 136 B. LINE ST. SUITE B BISHOP CALIFORNIA 93514-3531 TEL (760) 873-8812 FAX (760) 873-8821	SCALE: 1" = 5000' DATE: 2/6/98 DRAWN BY: DAN CHECKED BY: TPD	REVISIONS <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>								



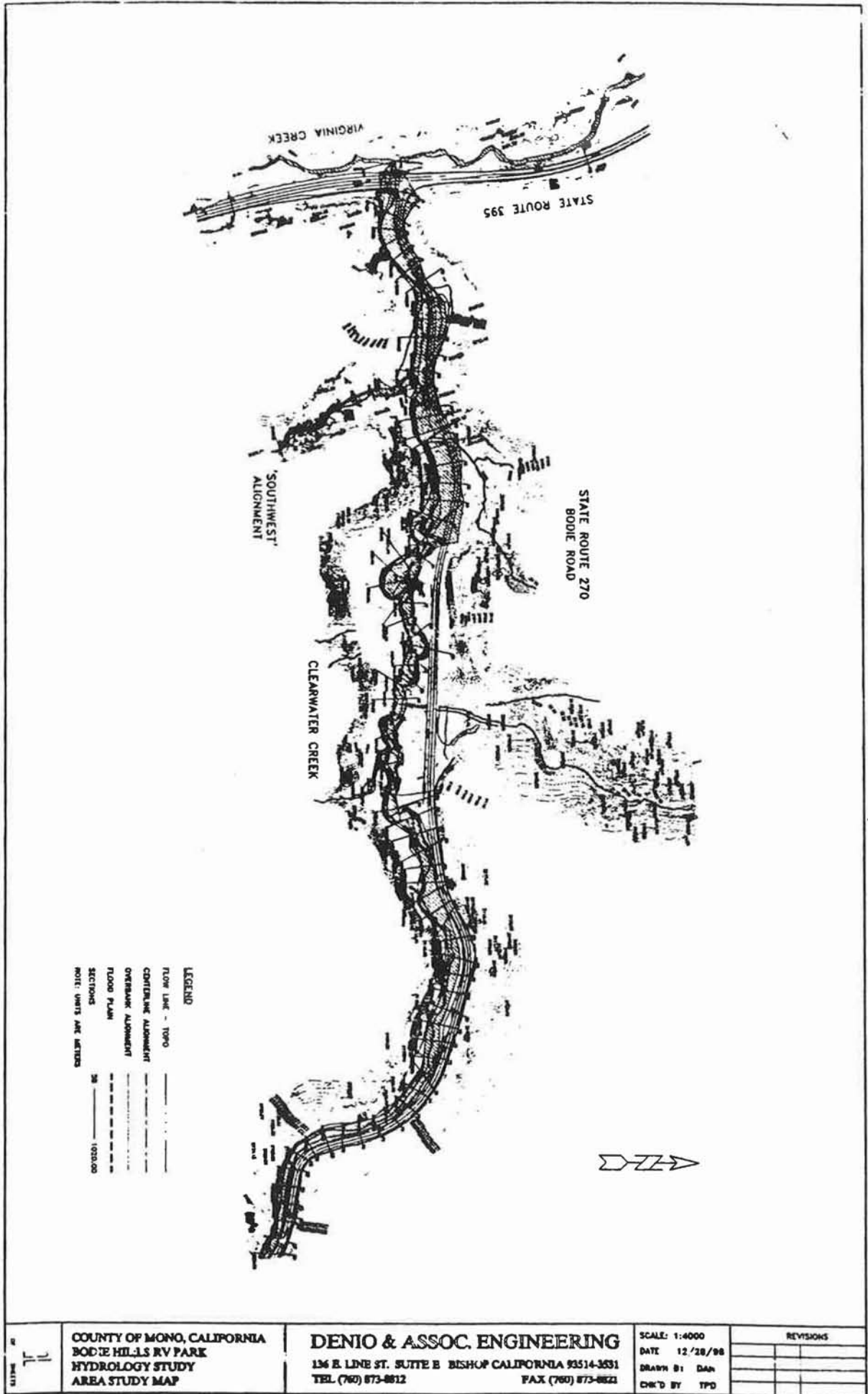


Figure 1

This Flood Plain Study covers the area of Clearwater Creek from the intersection of SR 395 and Bodie Road to about 1 mile upstream (east) of the intersection. The study area is shown on the Study Area Map (Figure 2).

## 2.2 Watershed Description

The Clearwater Creek drainage basin is in the eastern Sierra Nevada's Bodie Hills, which lie to the east of the project site. Clearwater Creek, a tributary of Virginia Creek, is one of the few creeks in the Eastern Sierra's that flows from east to west. The crest of the Sierras, the source of Virginia Creek, is to the west about 12 to 15 miles. The confluence of Clearwater Creek and Virginia Creek is on the west side of the SR 395 / Bodie Road intersection. Virginia Creek flows northward to the East Walker River. These Clearwater and Virginia Creek drainage basins are part of the East Walker River watershed that flows through the Bridgeport Reservoir and terminating in Nevada's Walker Basin.

Clearwater Creek is fed by springs for year round flow and the higher flows come from snowmelt and summer thunderstorm activity.

There is currently no development in the Clearwater Creek basin. Except for the privately owned area of the proposed project site, the open space is primarily owned and managed by the United States Bureau of Land Management. The land is utilized for some livestock grazing and recreational activities such as hunting, hiking, and cross-country skiing. Bodie Road serves the Bodie Ghost Town, which is situated in the Bodie Creek drainage basin to the east. The Bodie Ghost town receives approximately 200,000 visitors a year, primarily in the summertime. Caltrans has winter closure for vehicles; however, there is cross-country ski and snowmobile winter activity.

The Clearwater Creek basin that drains to the proposed project is about 35 square miles in area. The crest of the basin ranges from 8,000 ft. (2440 m) to 10,000 ft. (3050 m) at Potato Peak situated in the northeast edge of the basin. The elevation of the project site is about 6800 ft. (2070 m). The mean elevation of the Clearwater basin is about 7900 ft. (2400 m). The average gradient of the basin drainage is about 5%. The Bodie Hills is generally rolling terrain with some steep hillsides in the drainage courses. Clearwater basin consists of three main sub-basins; Clearwater to the east, Cinnabar Canyon to the north and Little Mormon Meadow to the south. The headwaters of Cinnabar is the Big Alkali Flats. There are no drainage controls in the basin above the project site such as dams or impoundment facilities.

The soil complexes generally range from fine to coarse sandy loam with gravelly subsoils in the valleys, to coarse sand, gravel, cobbles, and rock outcrops in the hills. They are moderately to well drained, and may be locally high in either alkali or organics. The natural vegetation of the Clearwater Creek basin is primarily sage brush with some scattered pinon trees. There are some grassy meadows (Mormon Meadow) at the higher reaches of the basin. The creekbed has willows and riparian vegetation.

The climate in the study area is generally dry and cool. The mean annual precipitation at the Bodie rain gage located about 10 miles east of the site is about 14 inches. In the Clearwater basin the mean annual precipitation is estimated at 20 inches per year. (Ref. #4). Temperatures range from an average summer high of about 75 - 85

degrees F to an average winter low of about 10 - 15 degrees F. (Ref. #5) Most of the precipitation falls as snow between November and April. Summer thunderstorms, which may be of locally high intensity, typically occur between May and September.

### 2.3 Principal Flood Problems

Caltrans has experienced problems with highway overtopping from Clearwater Creek in the past. In the area between the SR 395 box culvert and the westerly portion of the proposed RV park, high flows have overtopped the Bodie Road and SR 395. Also, above the RV park area the highway has experienced roadway washout due to impinging flow against the highway embankment. In the area of the proposed development there has been significant bank erosion.

## 3.0 ENGINEERING METHODS

For the flooding sources studied in detail, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 25-, 50-, and 100-year period (recurrence interval) have been selected as having special significance for flood plain management. These events, commonly termed the 10-, 25-, 50-, and 100-year floods, have a 10, 4, 2, and 1 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The analyses reported herein reflect flooding potentials based on conditions existing in the area at the time of this study. Any changes to the streambeds such as re-channelization, diversions, additional flow control structures or flood plain encroachments may invalidate all or portions of this study.

### 3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for Clearwater Creek. Three different methods for estimating peak flows in this ungaged basin were considered and evaluated:

Method #1 is the USGS Regional Flood Frequency Equations for the "Sierra" Region (Ref. #6). This method is a three parameter regression equation developed from stream gage data from streams throughout the Sierra Nevada's primarily including the wet northern and western slopes. The parameters are; 1) basin area in square miles; and 2) mean annual precipitation, and 3) the altitude index.

Method #2 is the regional method developed by USGS for Southwestern United States (Ref. #7). This method developed generalized least-squares regression equations, based on stream flow data, for 12 regions throughout the southwest U.S. including all of Arizona, Nevada, and Utah, and parts of California, Colorado, Idaho, New Mexico, Oregon, Texas, and Wyoming. This area includes the Great Basin, Snake River Basin, Colorado River Basin, and Upper Rio Grande Basin. Equations were developed for the Eastern Sierra Nevada Region 5. Another set of equations was developed for high

altitude areas (Region 1) for the entire southwest U.S. study area as it was determined that the watershed characteristics of these high altitude areas were similar. The high altitude Region 1 equations applied to the Clearwater Creek basin. The parameters used in the regression equation are 1) basin area in square miles, 2) mean basin elevation and 3) latitude.

Method #3 is the Mono County Area Flood Frequency Analysis "Index Flood" method (Ref. #8 and #9). Data from stream gages in the Eastern Sierras from Convict Creek to Carson River was analyzed to develop a flood frequency relationship based on basin area. The analysis provides two curves. The first curve expresses the flood discharge-time relation, showing variation of peak discharge, expressed as a ratio to the mean annual flood, with recurrence interval. The second curve relates the mean annual flood to the size of the drainage basin.

These results of each of these three methods are independent of the variations which occur in seasonal flows.

The basin boundaries were delineated on USGS 7.5 minute quadrangle maps (Ref. #10) and the areas were planimeted. The basin area draining into the upper (east) end of the project, which we called the Clearwater Creek basin "A", is 33.3 square miles.

The results of the three methods using Basin "A" are tabulated as follows:

	<u>Clearwater Creek Basin "A" Flow, cfs (cms)</u>			
	Recurrence Interval in Years			
	10	25	50	100
#1) Sierra Region Analysis	410 (11.6)	1000 (28.3)	1300 (36.8)	2000 (56.6)
#2) Southwest US Analysis	400 (11.3)	520 (14.7)	600 (17.0)	700 (19.8)
#3) Mono Area Analysis	330 (9.3)	440 (12.5)	520 (14.7)	650 (18.4)

The results of Method #2, Southwest United States USGS Regression analysis is selected to best represent the estimated flows for the Clearwater Creek Basin. Method #2 is developed from extensive flow data on streams of similar characteristics at high altitude. The results from method #3, Mono County Area Flood Frequency analysis are close to Method #2. The 100 year flow-per-area ratio for five neighboring gaged streams in the Eastern Sierras ranges from 20 cfs/square mile (0.57 cms/square mile) at Swager Creek to 29 cfs/square mile (0.82 cms/square mile) at Virginia Creek (Ref. #7). These are streams whose watershed originates in the Sierra Nevada crest which have 50 - 60 inches annual precipitation. Method #2 100 year flow estimate yields 21 cfs per square mile (.59 cms/square mile). Clearwater Creek basin, originating in the drier Bodie Hills, would be expected to yield lower flows and indeed it falls within the

lower range of the neighboring streams flow/area relation. This further confirms the reasonableness of Method #2. Although the site lies at the northern edge of latitude range where thunderstorms may cause peak flow, it has been determined that large floods from thunderstorm events are unlikely to occur above an elevation threshold. For sites between 29 degrees and 41 degrees latitude the elevation threshold for large floods caused by thunderstorms is about 7,500 ft. (Ref. #7). The project lies at about 38 degrees latitude.

There are four smaller tributaries that flow into the project site; 1) the "Southwest Basin C" at south side section 15, 2) Basin "B" at south side section 51, 3) Basin "D" at north side section 46 and 4) Basin "E" at north side section 20.

The total flow summary using Method #2 analysis for all the drainage basins are as follows:

	<u>Flow Summary, cfs (cms)</u>			
	Recurrence Interval in Years			
	10	25	50	100
Main Clearwater (19.8) Basin "A" 33.3 sq. mi.	400 (11.3)	520 (14.7)	600 (17.0)	700
South Basin "B" 0.3 sq. mi.	10 (.28)	14 (.40)	17 (.48)	20 (.57)
North Basin "D" 0.4 sq. mi.	13 (.37)	18 (.51)	23 (.65)	27 (.76)
North Basin "E" 0.13 sq. mi.	5 (.14)	7 (.20)	9 (.26)	11 (.31)
Southwest Basin "C" (2.58) 2.2 sq. mi.	47 (1.33)	64 (1.81)	77 (2.18)	91
<b>Total (24.0)</b>	<b>475 (13.5)</b>	<b>623 (17.6)</b>	<b>726 (20.6)</b>	<b>849</b>

### 3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding were carried out to provide estimates of the water surface elevations of the 100 year recurrence interval flood.



Water-surface elevations for 100 year flood on Clearwater Creek within the study area was computed using the U.S. Army Corps of Engineers HEC-2 (Ref. #11) computer program within the Eagle Point Water Surface Profiling engineering module (Ref. #12). The Eagle Point program with AutoCAD creates the reach alignments and cross sections from the digital terrain data from the photogrammetric contour map (1 m (3.2 ft.) contour interval). 20 meter (65 ft.) interval cross sections were used for the water surface profile analysis with additional sections at the entrance locations of tributary washes (added flow points). Also, additional sections were scribed at the curving channel locations in the meandering channel to analyze the superelevation (runup) of the water surface. The water surface profile analysis was performed using subcritical flow regime. The analysis was also performed with HEC-RAS (Ref. # 13) program to confirm the Eagle Point analysis. All reaches were field checked to confirm the aerial topo map, especially in areas of dense vegetation. The channel analysis extended well beyond the limits of the proposed R.V. park, both upstream and downstream, to insure an accurate model. The extent of the study area is from State Route 395 at the downstream limit to a point approximately 1300' upstream of the east end of the project. The 8' by 4' reinforced concrete box culvert at SR 395 was included at the downstream end of the model to evaluate backwater effects of the culvert. The upstream end of the model was checked for the potential of roadway overtopping and flow down the north side of Bodie Road. Sections of stream with low banks and potential for overtopping were identified.

Hydraulic roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the streambeds and flood plain areas. Roughness values used for Clearwater Creek through the R.V. park site is .0625 for the main channel (some weeds, light brush on banks, gravel bottom and irregular channel) and 0.07 for the overbanks (medium brush). Upstream and downstream of the R.V. Park area the main channel "n" value used was .075 (heavy brush, rocky bottom and irregular) and .07 to .08 for overbanks (medium to heavy brush) (Ref. #14 and #15).

The channel meander will result in significant superelevation of the water surface in the event of extreme flows. The superelevation was calculated using the "HYCHL" module of the "HYDRAIN" (Ref. #16) computer program. This program evaluates the superelevation based on the channel sideslope, curve radius and the flow velocity (See attached Exhibit #3 Cross Sections).

To evaluate erosion potential and stream bank stability, the channel velocity for straight tangent channel sections and impingement flow against curving banks was estimated for the 100 year flow using HEC-RAS and HYCHL /HYDRAIN programs, respectively.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if the flood plain remains unobstructed.

#### 4.0 FLOOD PLAIN BOUNDARIES

The 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 100 year flood plain boundaries have been delineated using the flood elevations determined at each cross section. The floodplain boundary was calculated from the digital mapping with the Eagle Point software.

The 100 -year flood plain boundary for the Clearwater Creek reach within the study area is shown on the 100 Year Flood Plain Map (Exhibit 2).

Although it is unknown if a "100 year event" has occurred in recent history, the acceptability of the model results were checked by comparing calculated water-surface elevations with historical information and physical evidence. The flood boundary shows overtopping of the channel to the north on Bodie Road near SR 395 which matches historical reports of what occurs during high flows. Otherwise, the model shows the 100 year flow to stay within the main channel banks considering superelevation.

#### 5.0 CHANNEL EROSION

##### 5.1 Channel Erosion Potential

In the easterly area of the proposed RV park (Sections 25 to 55) there is high potential for erosion of the channel banks. In this area the soil is fine alluvial silt, colloidal in nature, and it will tend to erode at mean flow velocities of greater than approximately 3 ft/sec (1 m/s) (Ref. # 12). The main channel banks are vertical in places indicating toe erosion and bank undercutting and caving.

The mean channel velocities for the 100 year flow in this area ranged from 3 ft./sec to 6 ft./s (1 m/s to 2 m/s). The velocity distribution varies across the channel section. In straight channel the maximum velocity is in the middle and decreases towards the banks. At channel curves the velocity increases towards the outer curve bank (impinging flow) and is estimated at about 4/3 times the mean channel velocity. The impinging velocity is as high as 8 ft./sec (2.5 m/s).

The high erosion potential and steep banks result in an unstable bank. A large event such as a 100 year flow could cause rapid bank erosion. Smaller flows will tend to work at the toe of the unstable vertical banks and cause significant erosion over a period of time. This is evident at the tributary flowing into the easterly RV park area from the south. This drainage basin and flows are relatively small in comparison to the main Clearwater Creek basin; however, significant erosion has occurred where it flows into this area. The banks are vertical 4-6 ft. deep.

In those areas where the existing bank is already sloped 2:1 or flatter and is fully vegetated there is less potential for erosion. Heavily vegetated banks will withstand higher velocities.



## 5.2 Channel Erosion Mitigation Alternatives

The proposed development includes RV park improvements on the south side of the streambank. The proximity of these improvements to the channel should be dependent on the anticipated effectiveness of the channel slope protection.

Direct impact to the road bridge crossings will occur from channel erosion. The bridge foundations, abutments, and road approaches should be designed and protected accordingly.

Three streambank mitigation alternatives are considered and their relative effectiveness evaluated:

### **Alternative #1)**

To mitigate this instability it is recommended that the banks be sloped back to about 2:1 (2 horiz. to 1 vert.) or flatter slope in the area of proposed development. At the areas of impingement flow against curved banks, it is recommended that rock slope protection be placed on the bank extending up to the superelevated water surface. The stone should be at about 1' (.3 m) in diameter, on the average, and placed in a layer about 1.8' (0.6 m) thick. At the toe, the slope protection should extend about 3.6' (1.2 m) below the channel bottom elevation to protect against undermining. Layers of smaller rock or non-woven filter fabric should be placed under the rock slope protection to protect against soil fines migrating out from behind the slope protection. (See attached Exhibit #4 Alternative #1 Typical Slope Protection Details).

In the non-impinging bank sections between Sections 25 and 55, where the vertical banks are excavated back to 2:1 or flatter, it is recommended to place rock slope protection at the toe. This stone should extend up about 2 ft. (0.6 m) above channel bottom and about 2 ft. (0.6 m) below channel bottom. The average stone size should be at least 0.5' (0.15 m) and layer thickness about 1' (0.3 m). Above the rock slope protection it is recommended to place a temporary erosion control blanket such as jute or excelsior mat stapled to the slope along with plantings. This will protect the slopes until vegetation becomes established. The sloped banks will enhance the establishment of vegetation. Currently the vegetation cannot become established on the unstable vertical banks. The vegetation will help stabilize the slope.

This alternative #1 will provide the best protection for the R. V. Park improvements and the highest degree of life safety in the event of a major storm event.

### **Alternative #2)**

A modified version of Alternative #1 is to reduce the height of the rock slope protection on the outer curved banks to the superelevated water surface level from an estimated 25 year event. For the higher slope area between the 25 year water surface and the 100 year water surface, use vegetation planting to provide erosion protection. In the area of the bridge crossings the maximum slope protection per Alternative #1 should still be provided.

This Alternative #2 will provide the next lower level of protection. If a greater than 25 year flow occurs before vegetation is established on the higher banks, there will be

some erosion. However, the stone at the toe should prevent major bank sloughing. Once the vegetation gets established, then a level of protection would be about equal to Alternative #1. For this alternative a buffer offset distance should be maintained from the top of bank to the RV Park improvements. Future repair of the slope protection may be necessary if damage occurs prior to vegetation protection becoming established.

**Alternative #3)**

Place tree trunks/root ball material revetment along the banks to provide bank protection and stability. Large tree trunks with root wads can be imported and imbedded into the bank. Various conceptual details are shown in Exhibits' 1A. This design should be modified and refined to match the available material and specific locations. In the area of the bridge crossings the maximum slope protection per Alternative #1 should still be provided.

The root wads anchored into the banks with large rock will help reduce the velocity against the outer curved banks and slow the rate of erosion. However, this method provides less assurance of protection than the other alternatives. There is more likely to be weak spots that could result in some erosion. A generous buffer offset distance should be maintained between the bank and the improvements. To reduce the risk of these tree stump/root wads washing down the stream and clogging drainage facilities, the tree stumps should be anchored well back into the bank and/or large boulders surrounding the roots. Future repair of the slope protection may be necessary to maintain protection of the RV Park facilities.

**6.0 BRIDGE HYDRAULICS**

The proposed project has three vehicle bridges and one pedestrian bridge. The bridges should be designed to convey the 100 year flow. The soffit of the bridge should be above the 100 year water surface elevation to avoid creating a backwater condition that would raise the upstream water surface, as well as avoiding washout of the bridge. If bridge piers and/or abutments are placed in the floodplain, the effect on the backwater and pier scour should be evaluated.

Proposed Bridge Design Capacity

	100 year flow cfs (cms)
Traffic Bridge #1 (Sect. 14).....	849 cfs (24.0 cms)
Traffic Bridge #2 (Sect. 31).....	747 cfs (21.2 cms)
Pedestrian Bridge (Sect. 44).....	747 cfs (21.2 cms)
Traffic Bridge #3 (Sect. 54).....	700 cfs (19.8 cms)

Slope protection is recommended around the bridge abutments / road approaches to protect against washout.

## **7.0 OTHER DRAINAGE CONCERNS**

The Southwest Drainage Basin "C" is a significant drainage with a 100 year estimated flow of 91 cfs (2.6 cms). This wash flows directly into the westerly R.V. Park site. Recommend a diversion channel or armored berm around the proposed improvements. The other tributary washes "B", "D" and "E" should be considered and designed for accordingly with drainage ditches/channels. Pipe storm drains have a high potential for clogging, especially when there are horizontal and vertical angle points.

## **8.0 PROJECT AFFECTS ON STREAMBED/FLOODPLAIN AND OTHER PROPERTIES**

The proposed project in the vicinity of the floodplain includes R.V. Park facilities; access roads, bridges, RV parking spaces, restroom buildings, motel, store and service buildings. Improvements that could have an effect on the streambed and floodplain are channel slope treatment and bridge crossings.

The recommended slope treatment described herein would not cause a significant increase in the floodplain limits and water surface elevations as there would not be encroachment into the floodplain. The erosion protection would decrease the sediment load that would be transported downstream.

The bridge crossings designed to convey the 100 year design as recommended herein will not cause a significant increase in the floodplain limits and water surface elevations. If bridge piers and/or abutments are placed within the floodplain, the effect on the backwater surface elevations should be evaluated.

Construction operations performed within the channel should be in accordance with standard erosion/sedimentation prevention practices to minimize sediment transport downstream.

Construction of the RV Park project as currently proposed would not affect the extent or elevation of the 100 year flood plain as determined by this report, nor would it affect the potential for erosion in the stream channel as it naturally exists.

Inclusion of the slope protection (as recommended in this report) as part of the project may warrant consideration of design changes to the project in areas adjacent to the steam channel.

## **9.0 BIBLIOGRAPHY AND REFERENCES**


- #1: Bodie Hills R.V. Park, Portion of Section 26: T4N, R25E, MDB & M, APN #11-070-04 in Mono County, Developer William Lapham, and others.
- #2: John Langford, Bear Engineering, PO Box 657, 46 Sinclair St., Ste 3 Bridgeport, CA

- #3: Caltrans District 09, Bishop CA, Aerial Topo Survey for SR 395 North Conway 4-lane Project.
- #4: USGS Mean Annual Precipitation California Isohyetal Map by SE Rantz, 1969
- #5: Local Climatological Data, Bridgeport, Ca, National Oceanic and Atmospheric Administration.
- #6: Magnitude and Frequency of Floods in California, USGS Water Resources Investigations 77-21
- #7: Methods for Estimating Magnitude and Frequency of Floods in South-western United States, USGS
- #8: USGS Water Supply Paper 1543-A Flood Frequency Analysis by Tate Dalrymple, 1960
- #9: Hydrology Report on State Highway Rte 395 in Mono County From 0.2 mile South of South Junction Rte 158 to South Rush Creek Bridge, by Dan Appelbaum & Truman Denio
- #10: USGS 7.5 minute quadrangle maps: Negit Island, Lundy, Bodie and Big Alkali
- #11: HEC-2 by Army Corp of Engineers Hydrologic Engineering Center, Davis, CA.
- #12: Eagle Point Software, Advantage Series 13, "Water Surface Profile" module
- #13: HEC-RAS River Analysis System Version 2.1 by Army Corp. of Engineers Hydrologic Engineering Center, Davis, CA.
- #14: Roughness Characteristics of Natural Channels, USGS Water Supply Paper 1849, 1969.
- #15: Street and Highway Drainage, Institute of Transportation Studies, University of California Berkeley, 1982
- #16: HYDRAIN Drainage System Design Version 6.0 Federal Highway Administration (FHWA) by GKY & Associates, Springfield, VA.
- #17: Caltrans Storm Water Quality Handbook, Camp Dresser & McGee, September, 1997

10.0 ENGINEERS CERTIFICATION:

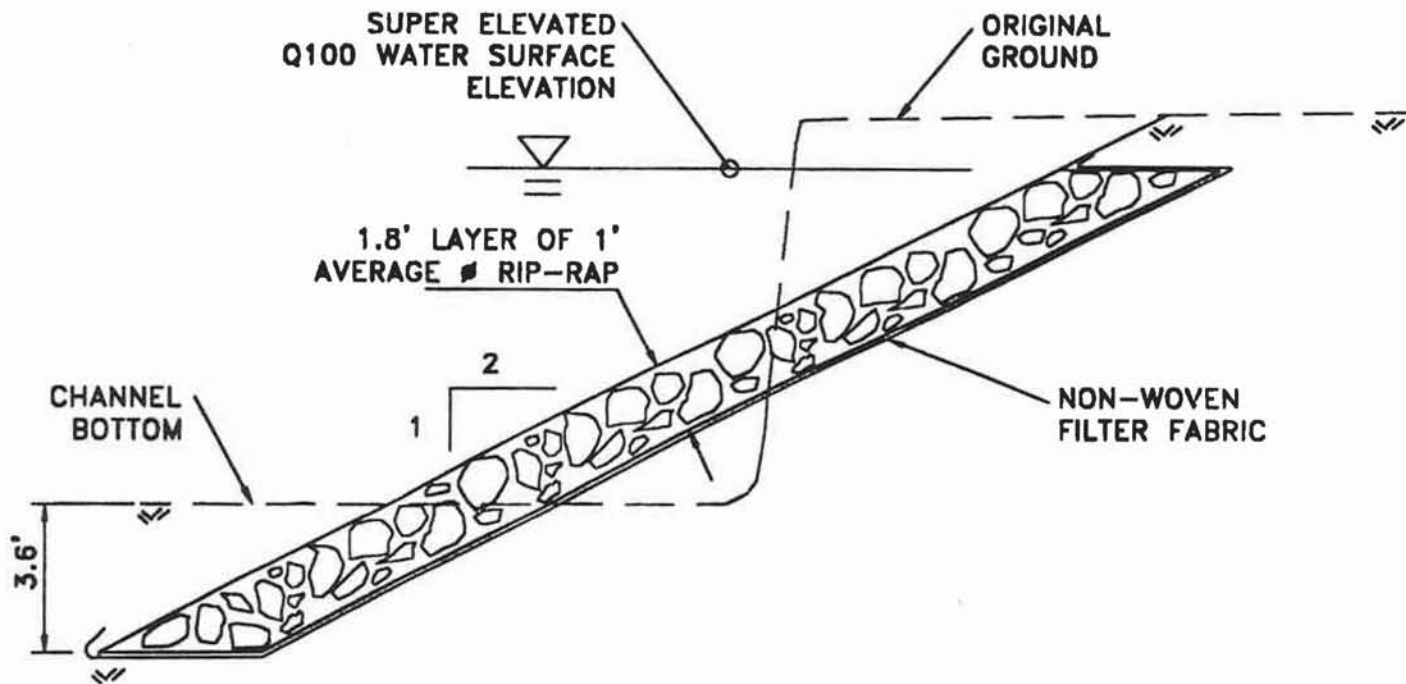
**Hydrology and Flood Plain Study for Bodie RV Park**

This Hydrology and Flood Plain Study was prepared by and under the direction of the undersigned Registered Civil Engineer. The Registered Civil Engineer attests the technical information contained herein and the engineering data upon which recommendations, conclusions and decisions are based.

  
\_\_\_\_\_  
Truman P. Denio, RCE # 34556  
Denio & Associates Engineering

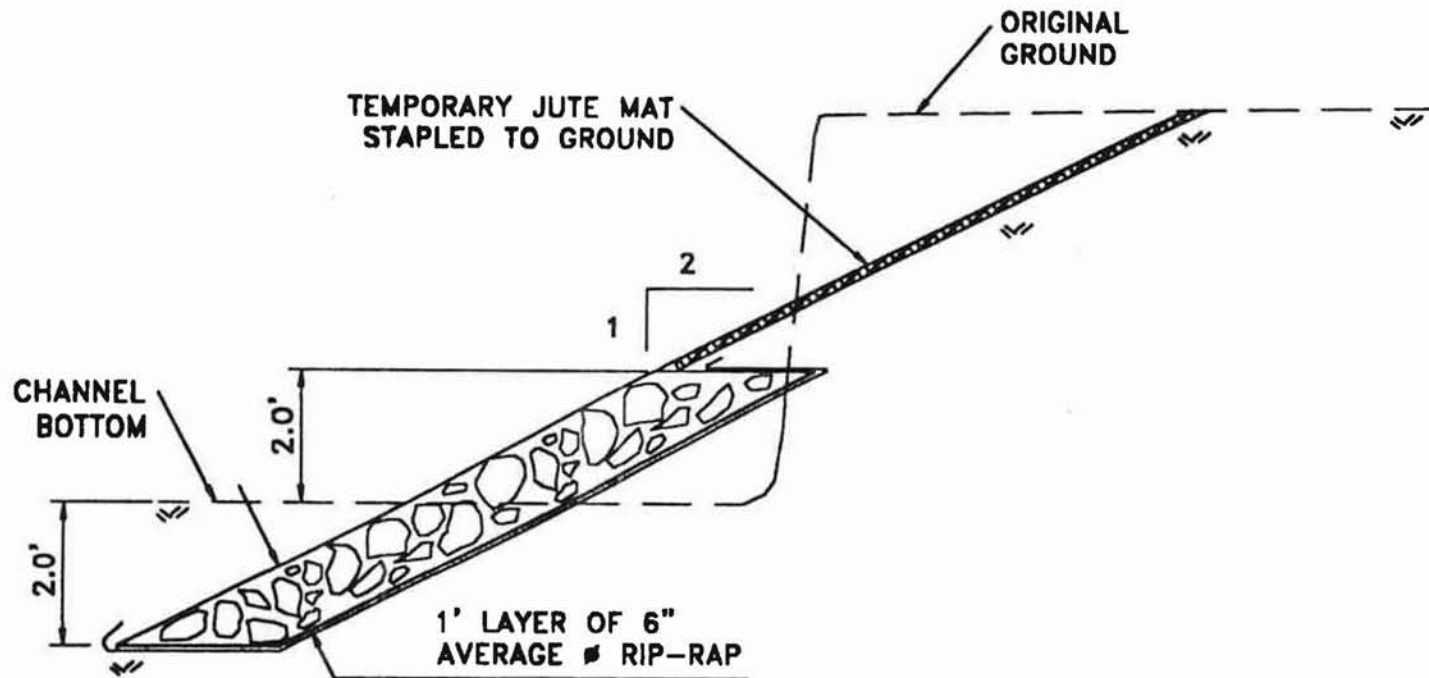
2/11/99  
Date





TYPICAL SLOPE PROTECTION DETAIL  
 IMPINGING FLOW - CURVED BANK  
 BODIE RV PARK HYDROLOGY STUDY  
 BODIE HILLS, CALIFORNIA

1/4/99  
 DENIO & ASSOCIATES ENGINEERING

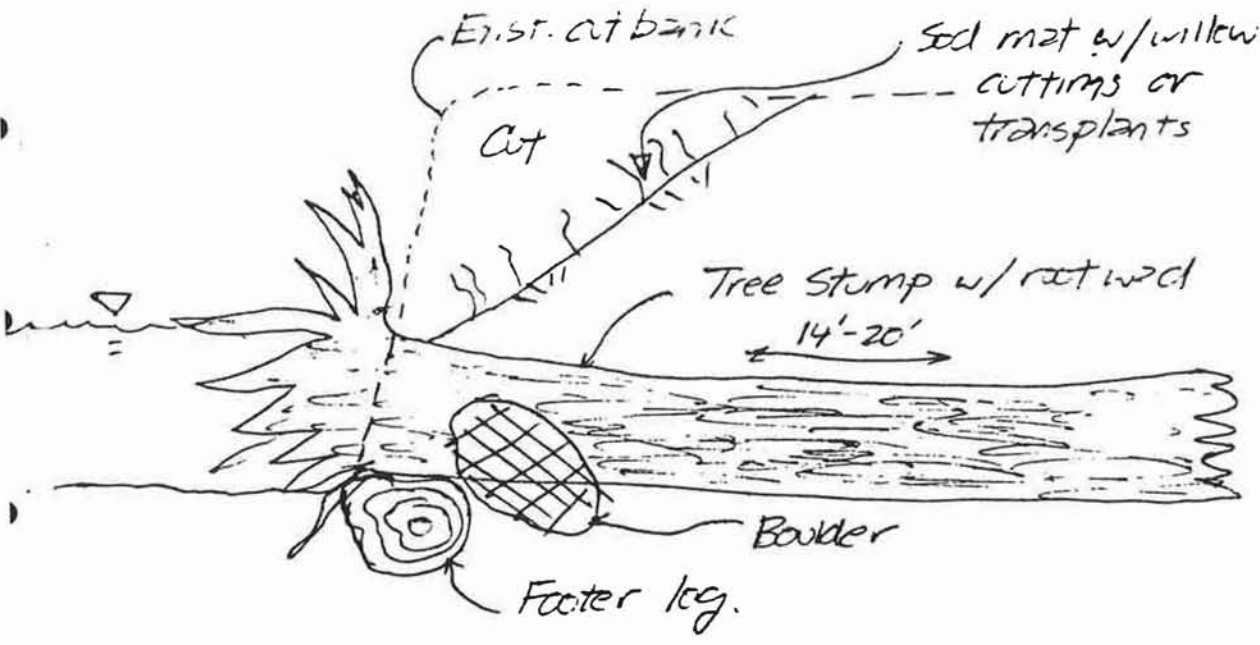


TYPICAL SLOPE PROTECTION DETAIL  
 STRAIGHT TANGENT BANKS  
 BODIE RV PARK HYDROLOGY STUDY  
 BODIE HILLS, CALIFORNIA

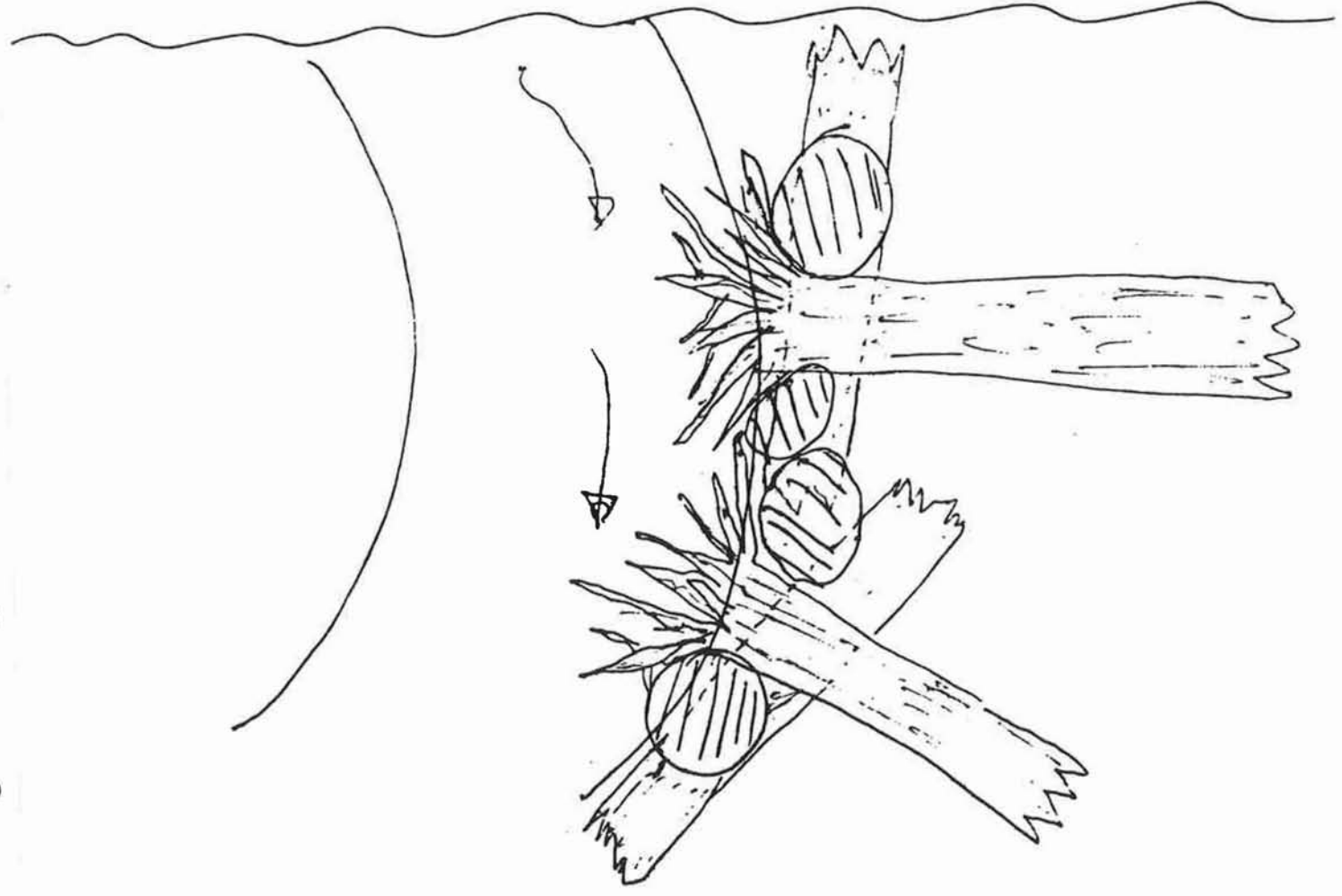
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DENIO & ASSOCIATES ENGINEERING



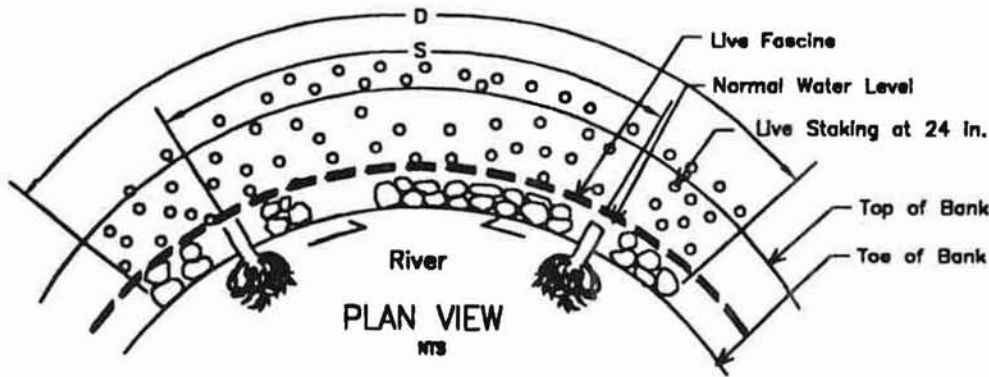


Typical Cross-Section: Root wad / stump Revetment



Plan view: Root wad / stump Revetment

T. Denio



PLAN VIEW  
NTS

**ROCK GRADATION:**

Rock Riprap	Filter Material
D100 = _____ inches	D100 = _____ inches
D50 = _____ inches	D50 = _____ inches
D25 = _____ inches	D25 = _____ inches

**DEMONSTRATIONS:**

**Protected Bank:**

D = \_\_\_\_\_ ft.  
H = \_\_\_\_\_ ft.  
L = \_\_\_\_\_ ft.  
S = \_\_\_\_\_ ft.  
Z = \_\_\_\_\_

**Rock Riprap:**

L<sub>R</sub> = \_\_\_\_\_ ft.  
H<sub>R</sub> = \_\_\_\_\_ ft.

**Tree Stump:**

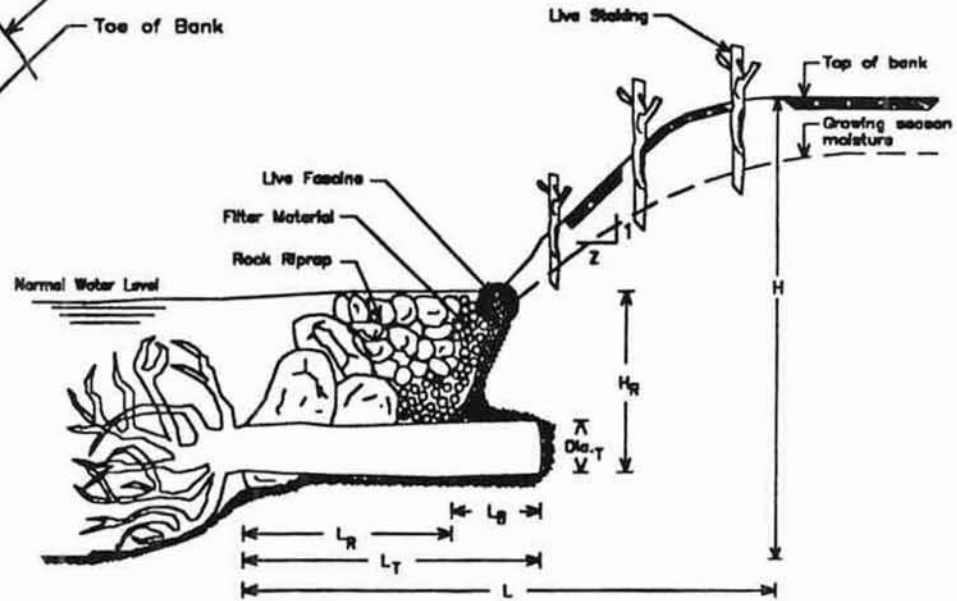
Dia<sub>T</sub> = \_\_\_\_\_ inches  
L<sub>T</sub> = \_\_\_\_\_ ft.  
L<sub>B</sub> = \_\_\_\_\_ ft.

**Fascine:**

Species \_\_\_\_\_  
Dia \_\_\_\_\_ inches

**Live Staking:**

Species \_\_\_\_\_  
Dia \_\_\_\_\_ inches  
Length \_\_\_\_\_ ft.



SECTION VIEW  
NTS

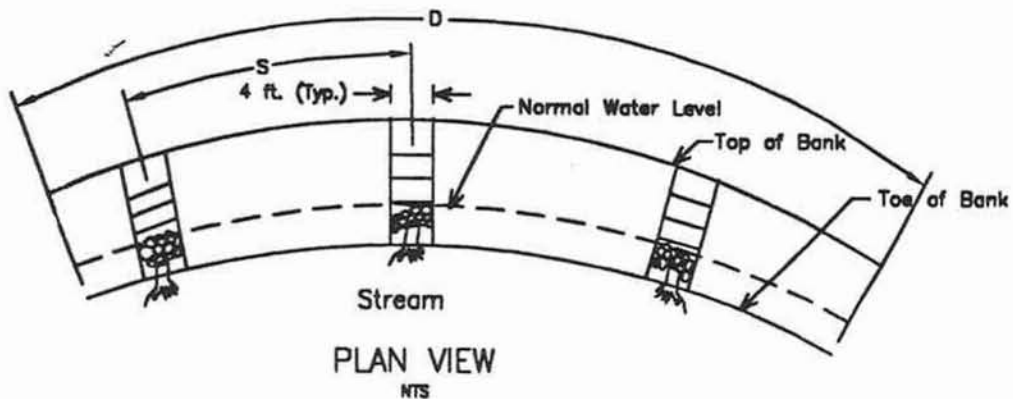
**ROCK TOE STREAMBANK PROTECTION  
(WITH TREE ROOT, FASCINE & LIVE STAKING)**

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

DESIGNED	ARS	DATE	6/94	APPROVED BY	_____
DRAWN	MH	DATE	9/94	TITLE	_____
TRACED	_____	DATE	_____	TITLE	_____
CHECKED	_____	DATE	_____	TITLE	_____

WA-3806D

2/3



Rock Gradation

Rock Riprap	Filter Material
D 100 = _____ Inches	D 100 = _____ Inches
D 50 = _____ Inches	D 50 = _____ Inches
D 25 = _____ Inches	D 25 = _____ Inches

Dimensions

Protected Bank:

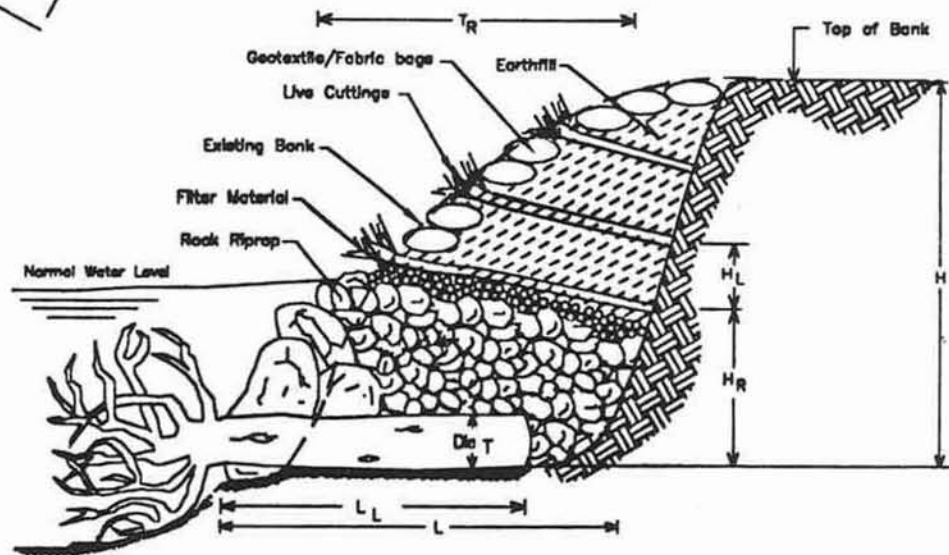
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 H = \_\_\_\_\_ ft.  
 H<sub>L</sub> = \_\_\_\_\_ ft.  
 L = \_\_\_\_\_ ft.  
 S = \_\_\_\_\_ ft.  
 Z = \_\_\_\_\_ ft.

Rock Riprap:

H<sub>R</sub> = \_\_\_\_\_ ft.  
 T<sub>R</sub> = \_\_\_\_\_ ft.

Tree Stump:

Dia<sub>T</sub> = \_\_\_\_\_ ft.  
 L<sub>L</sub> = \_\_\_\_\_ ft.



SECTION VIEW

NTS

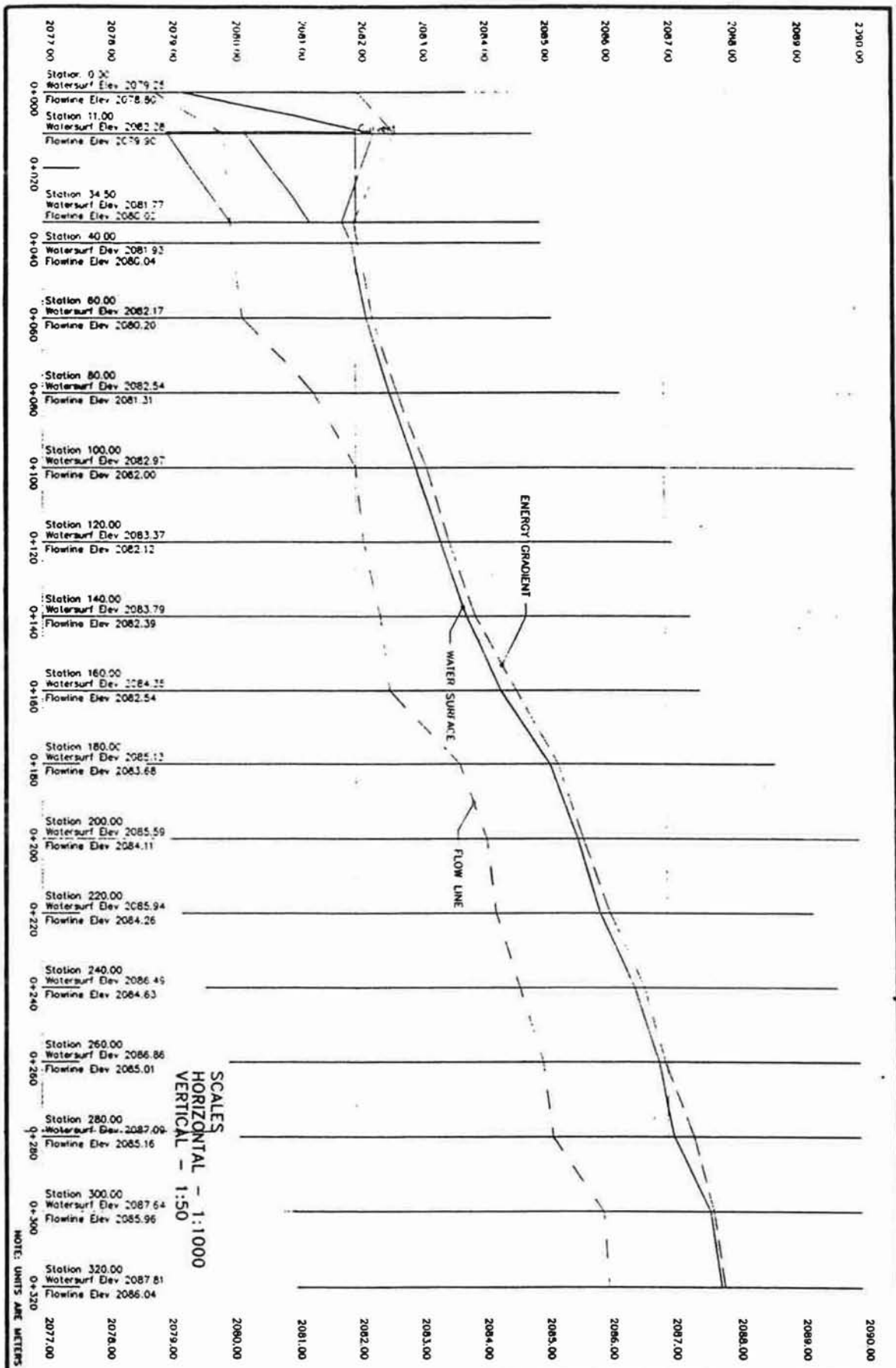
**ROCK & BRUSH TRENCH STREAMBANK PROTECTION  
 (WITH ROOT & ROCKTOE)**

U.S. SOIL CONSERVATION SERVICE NATURAL RESOURCES CONSERVATION SERVICE

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DRAWN <u>MDH</u>	DATE <u>8/94</u>	TITLE _____	
TRACED _____			
CHECKED _____		TITLE _____	

Exhibit 17  
 3/3

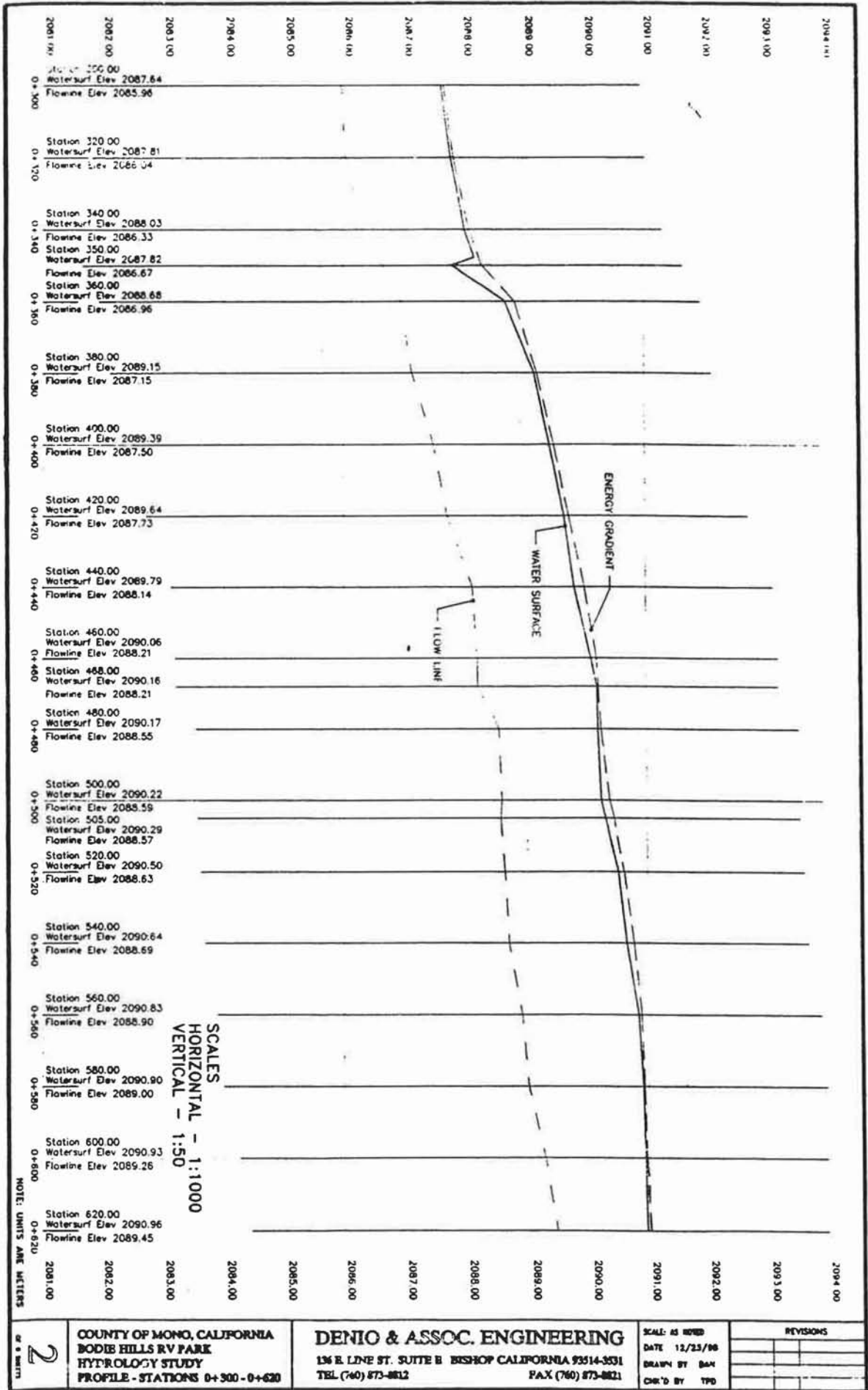
WA-3804A



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NOTE: UNITS ARE METERS

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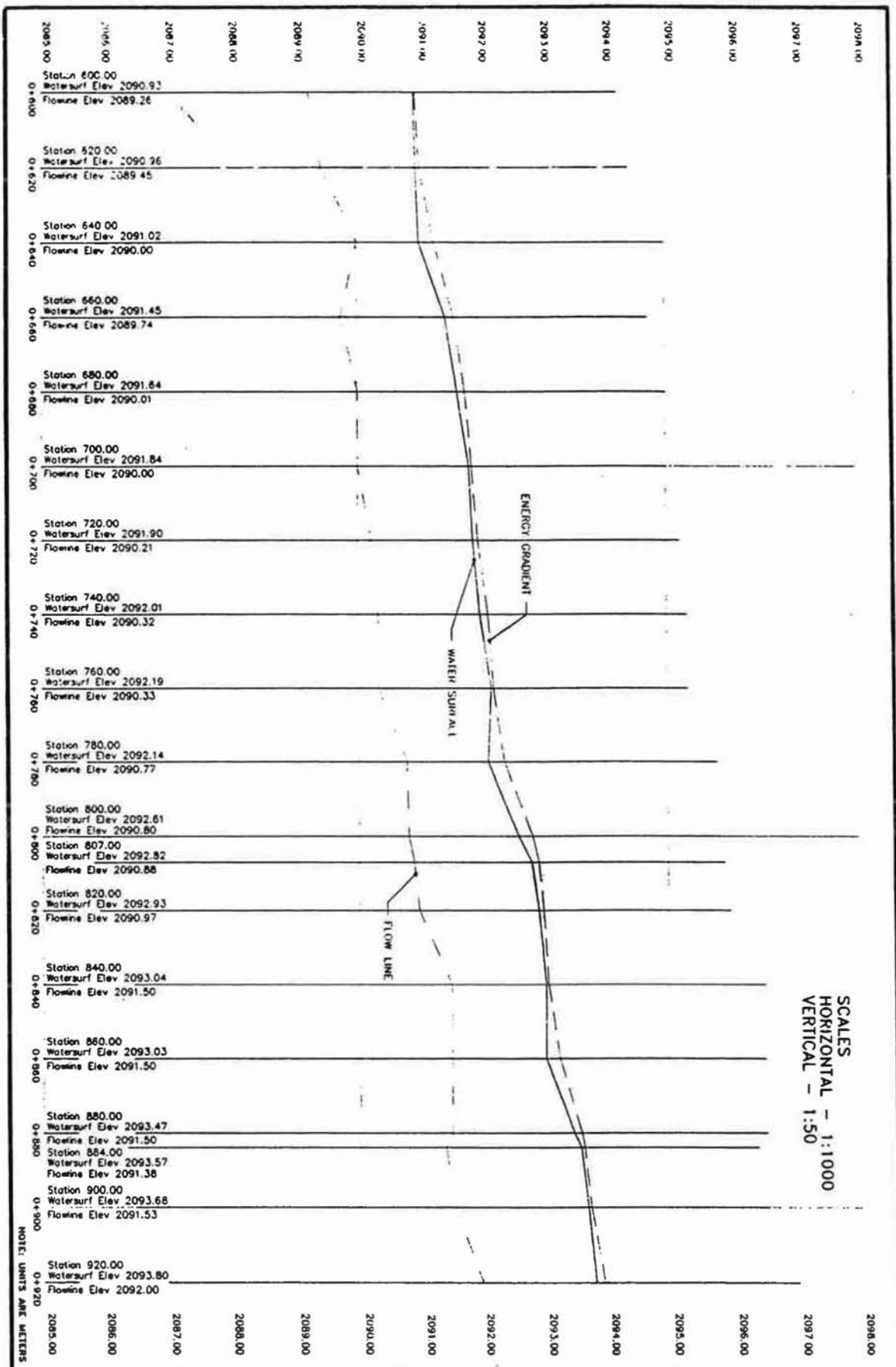
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 OF 8 SHEETS

COUNTY OF MONO, CALIFORNIA  
 BODIE HILLS RV PARK  
 HYDROLOGY STUDY  
 PROFILE - STATIONS 0+300 - 0+620

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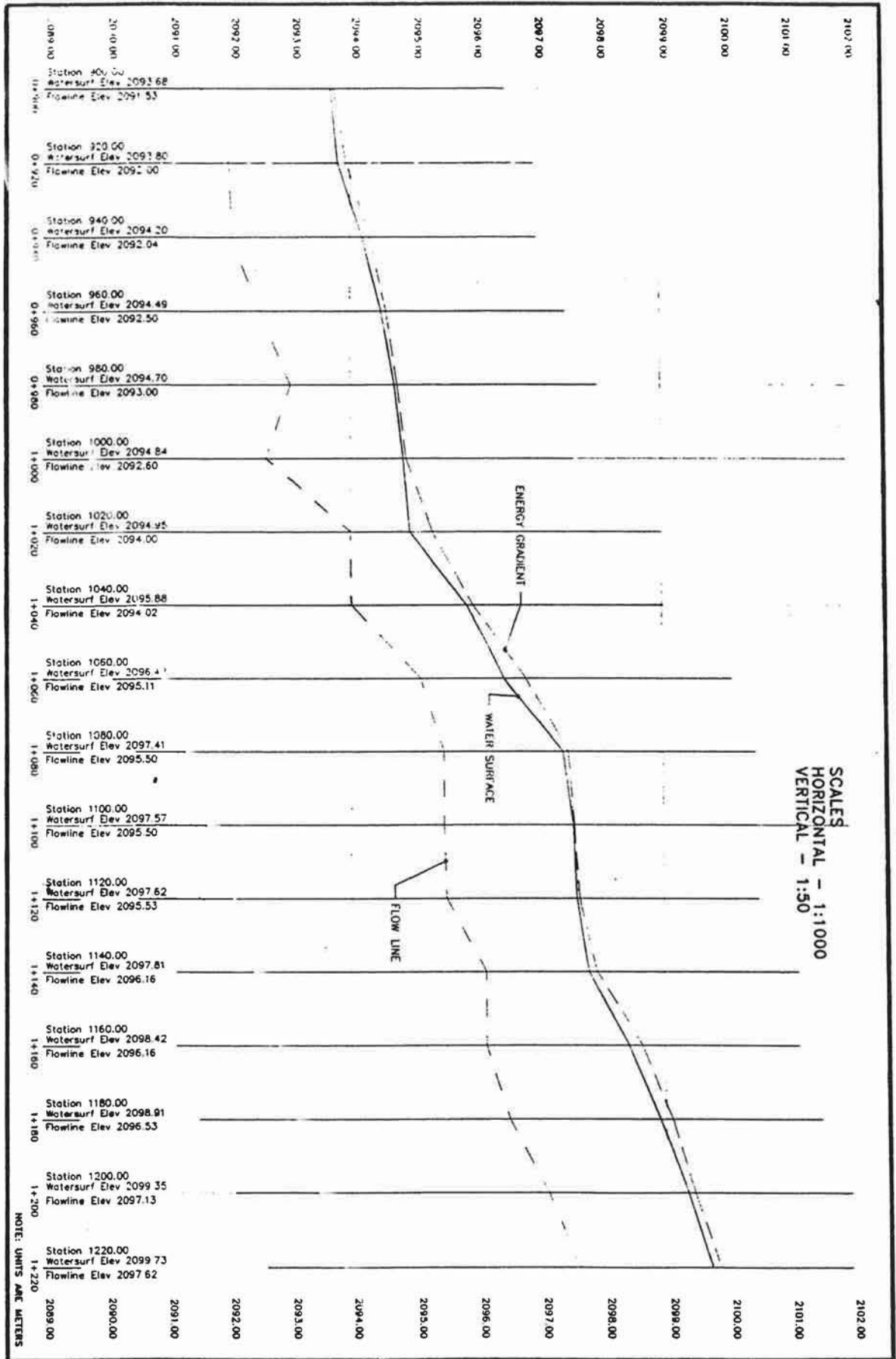
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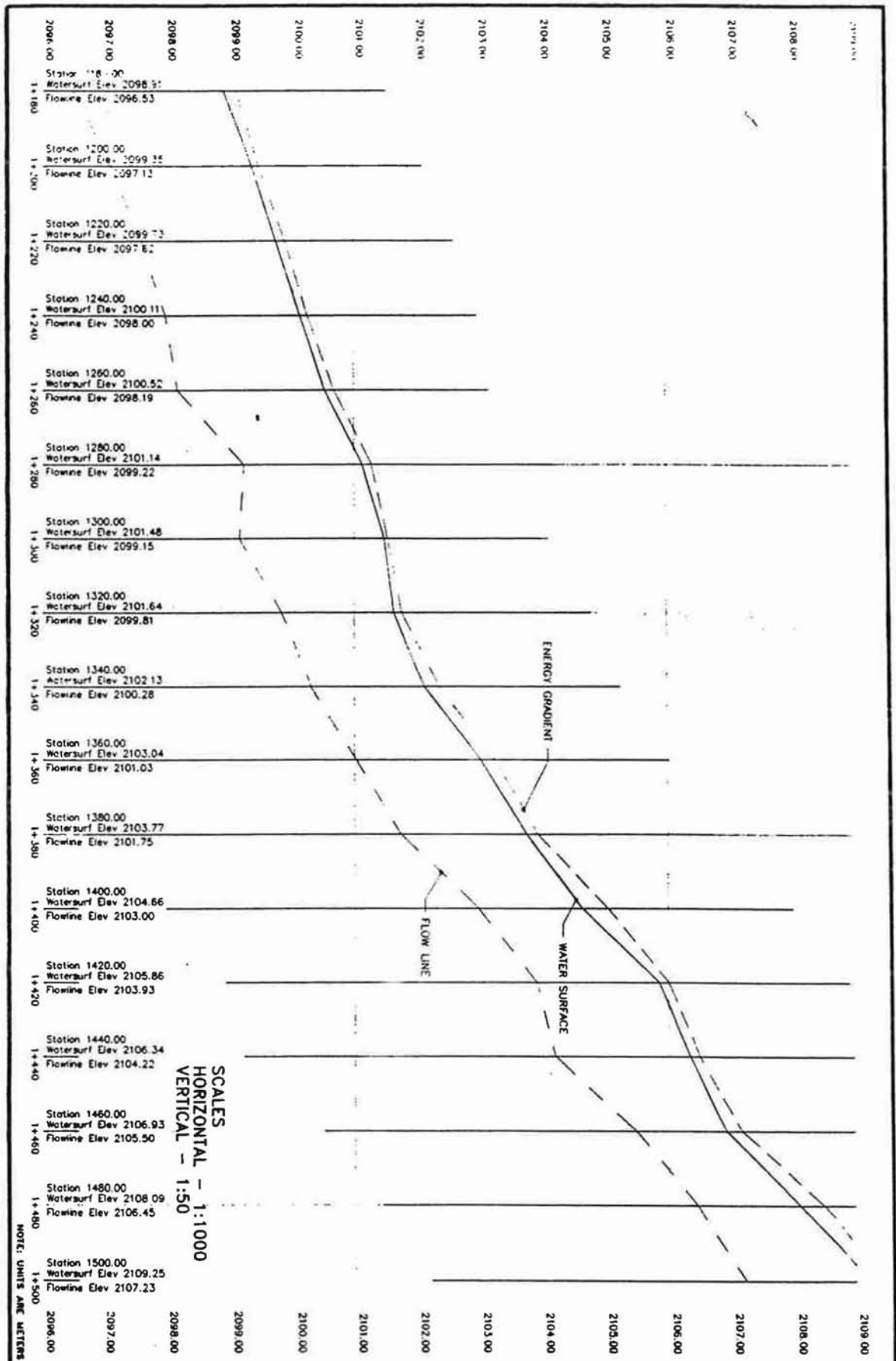
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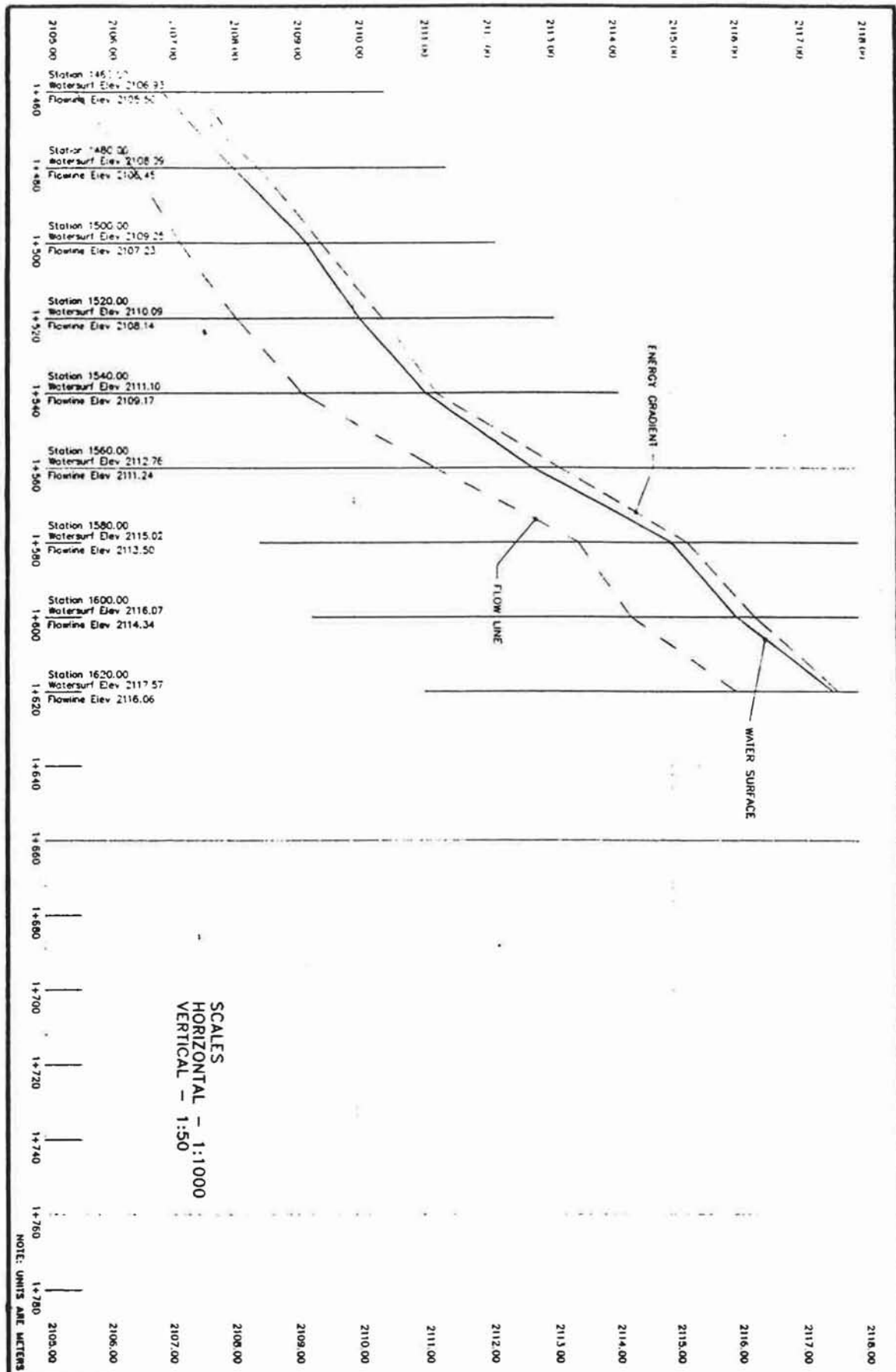




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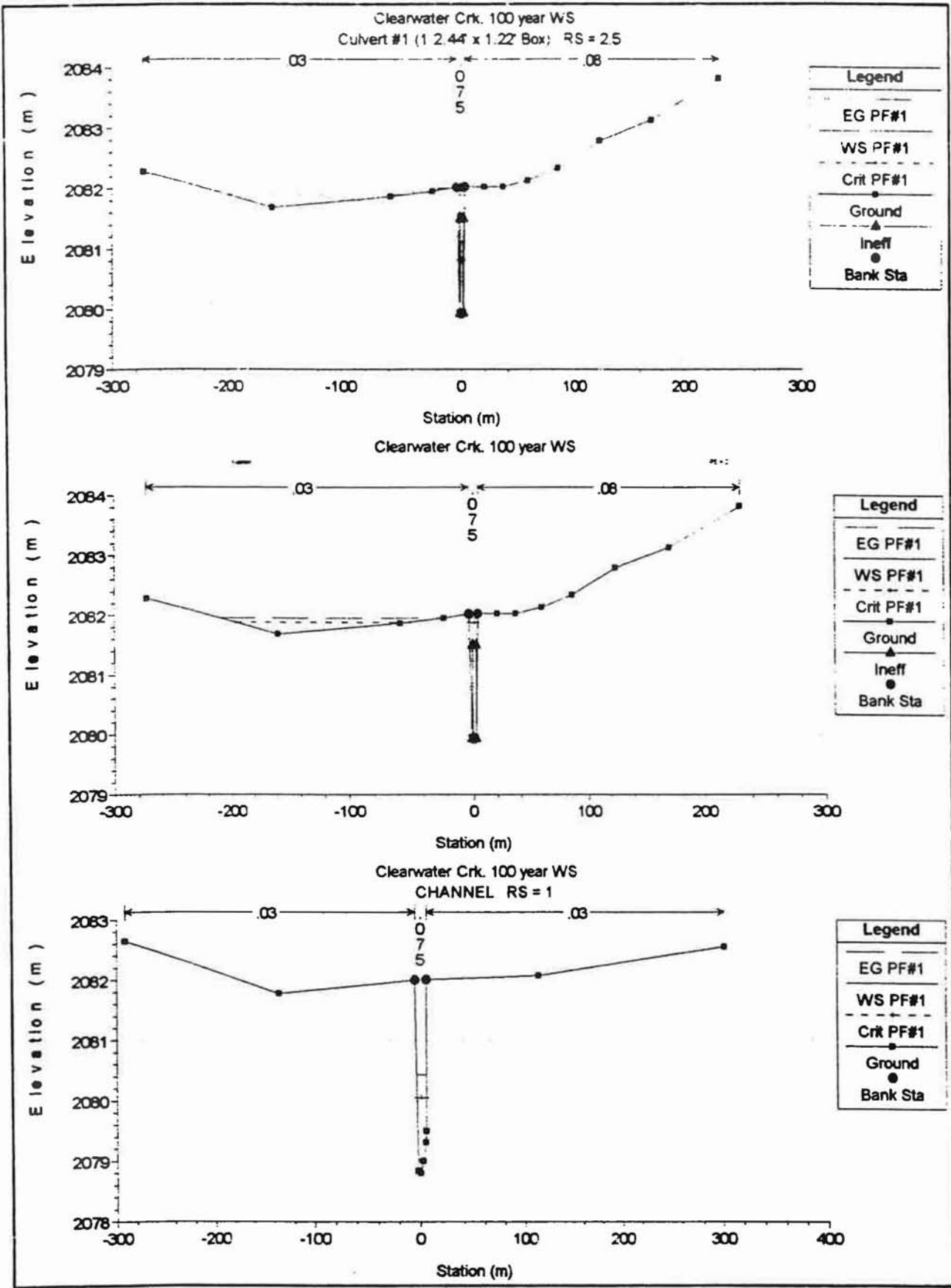
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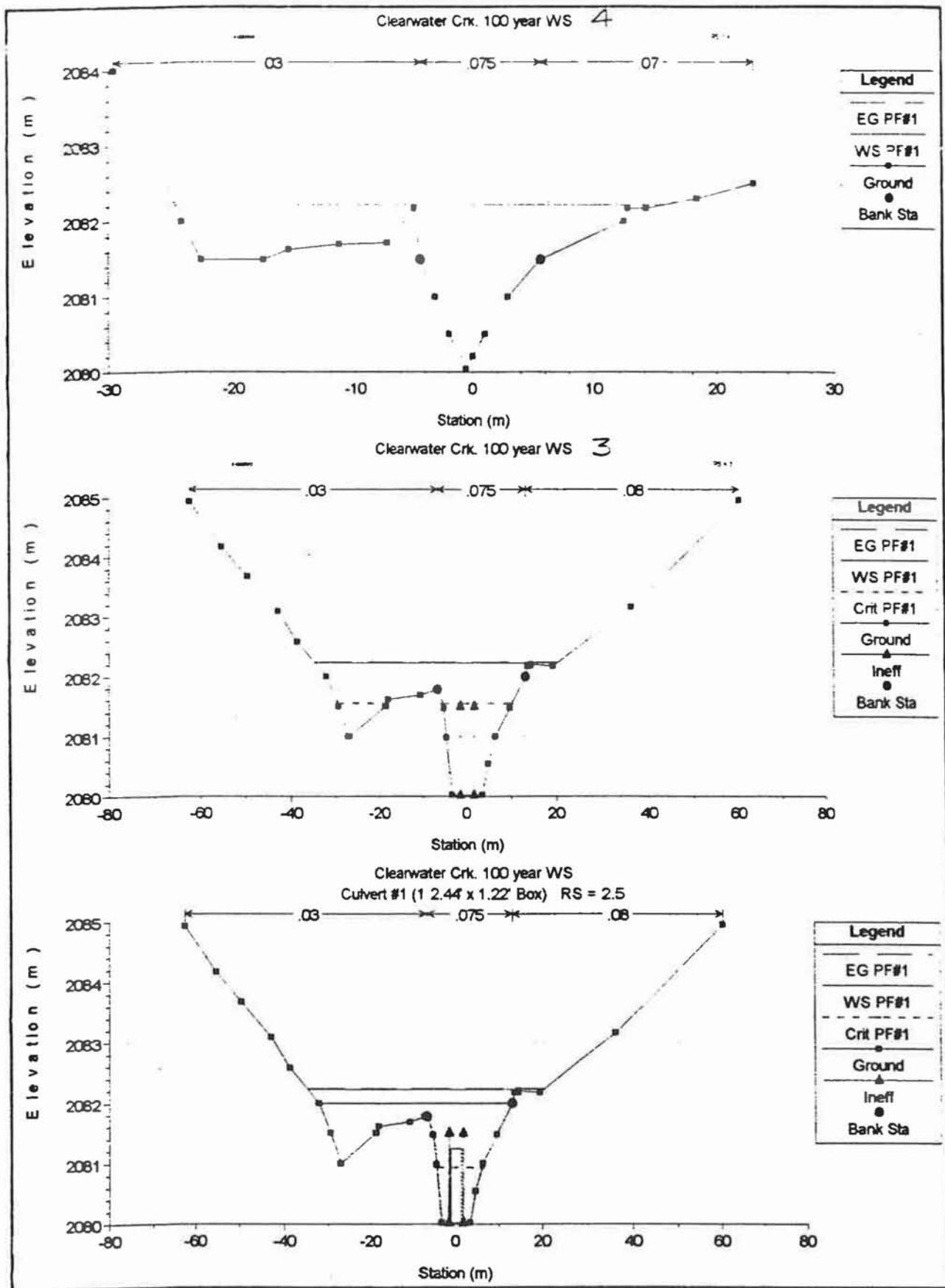


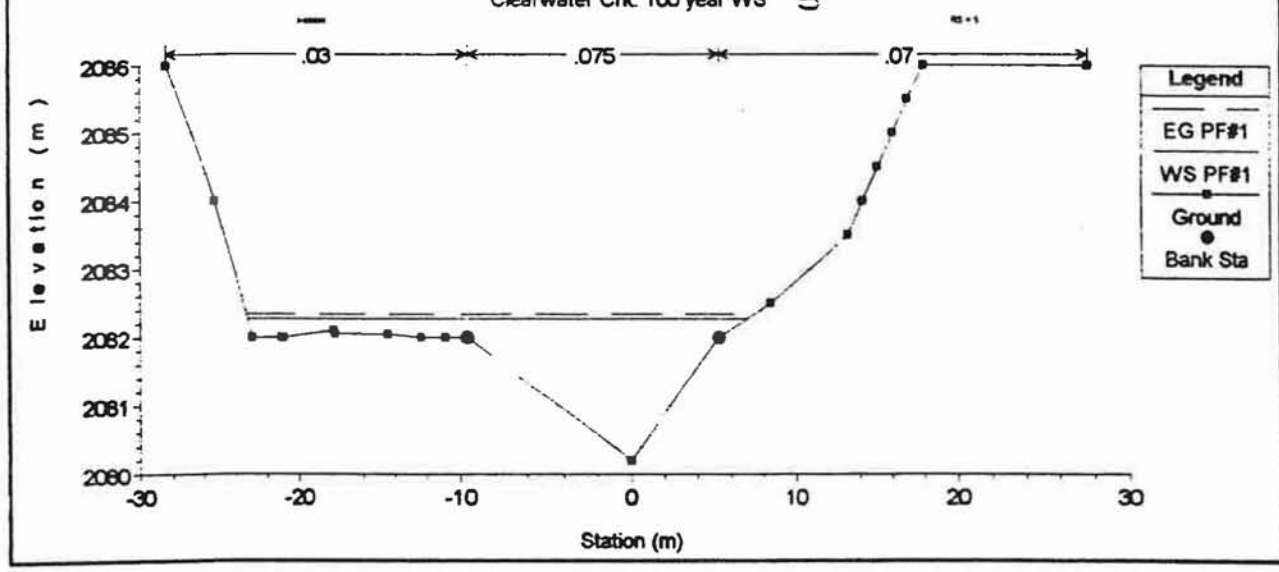
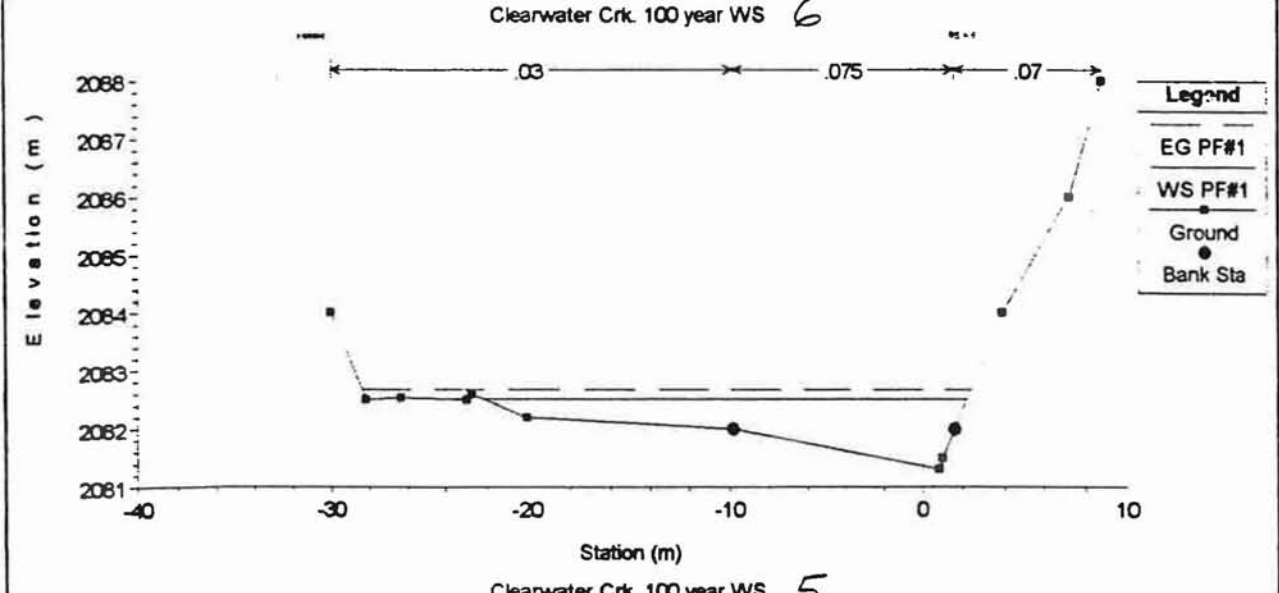
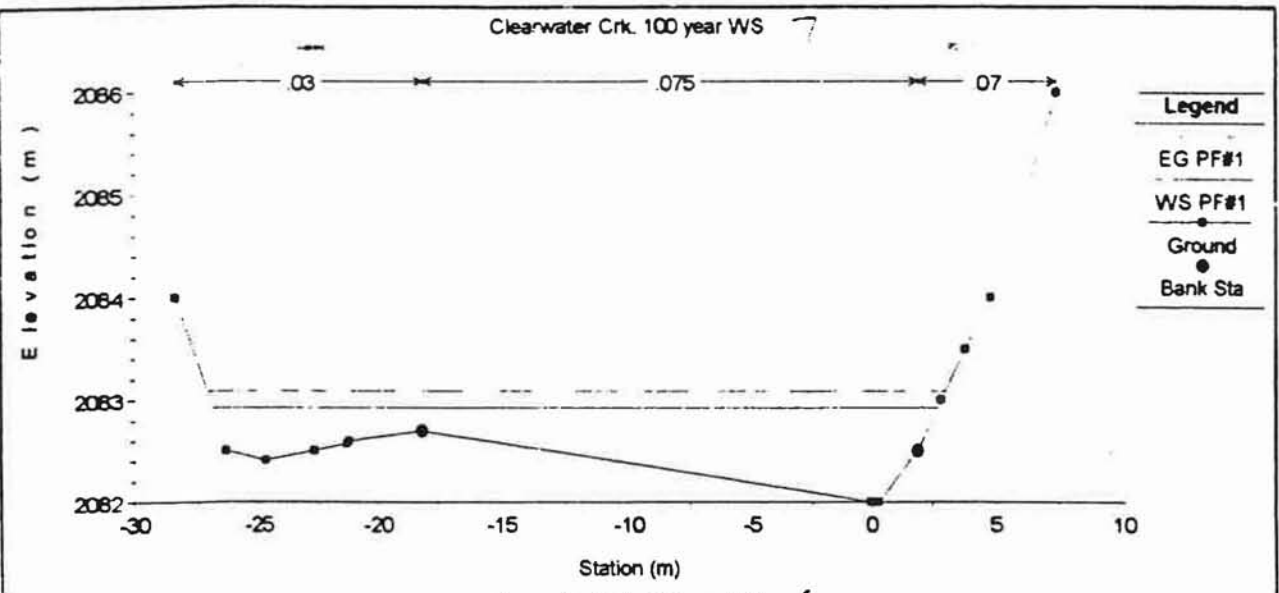
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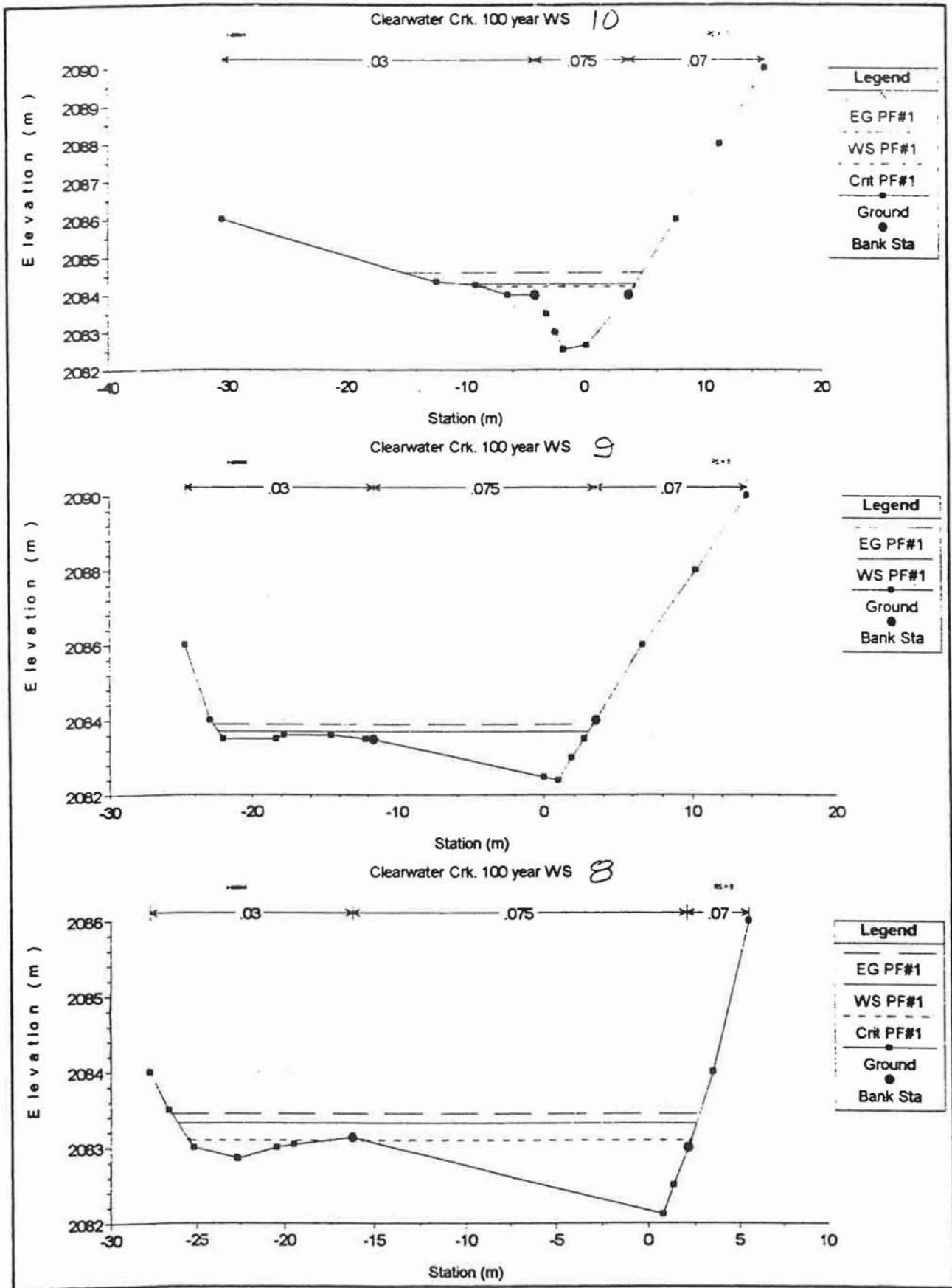
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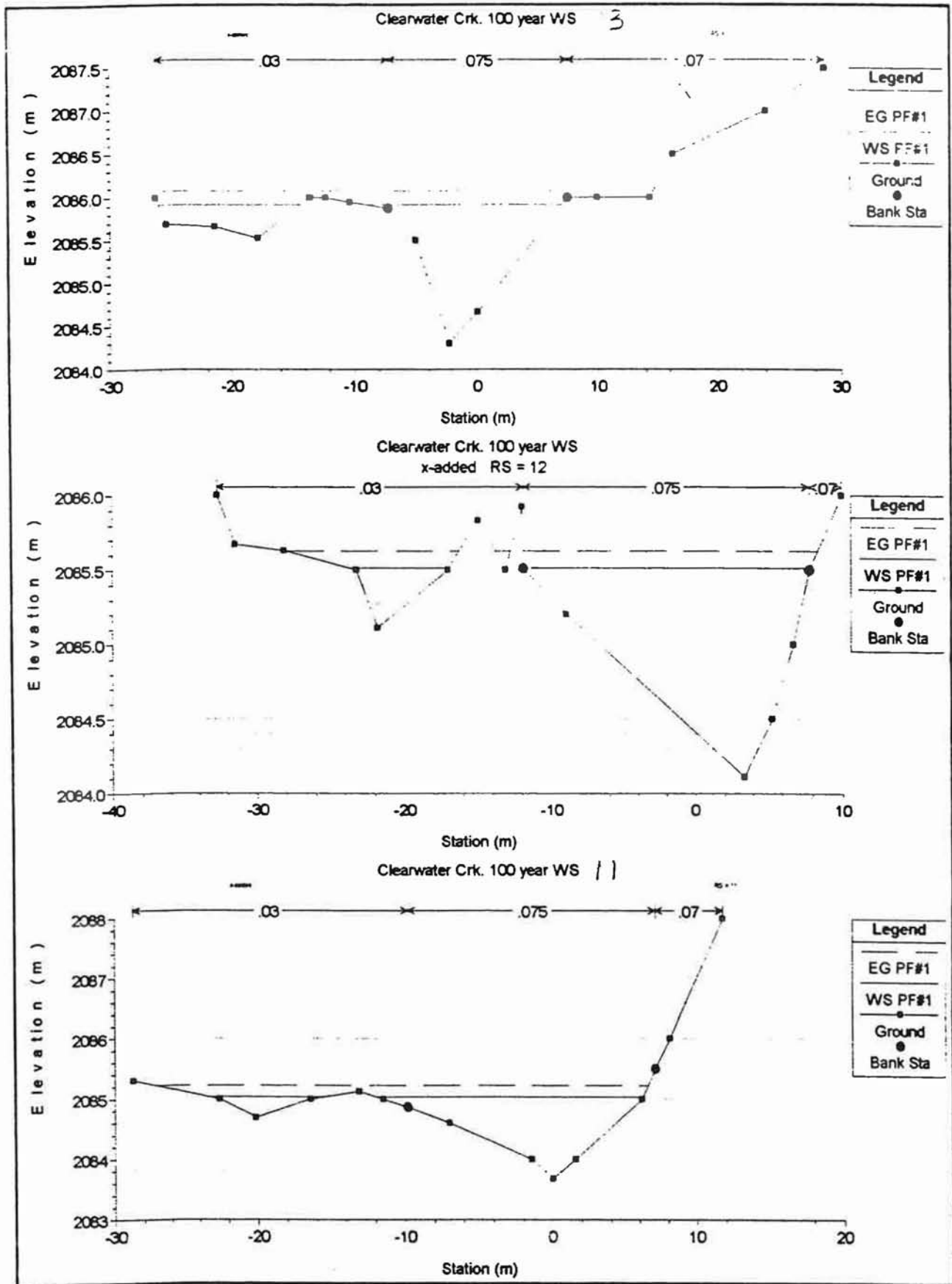
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6 <small>OF 8 SHEETS</small>										



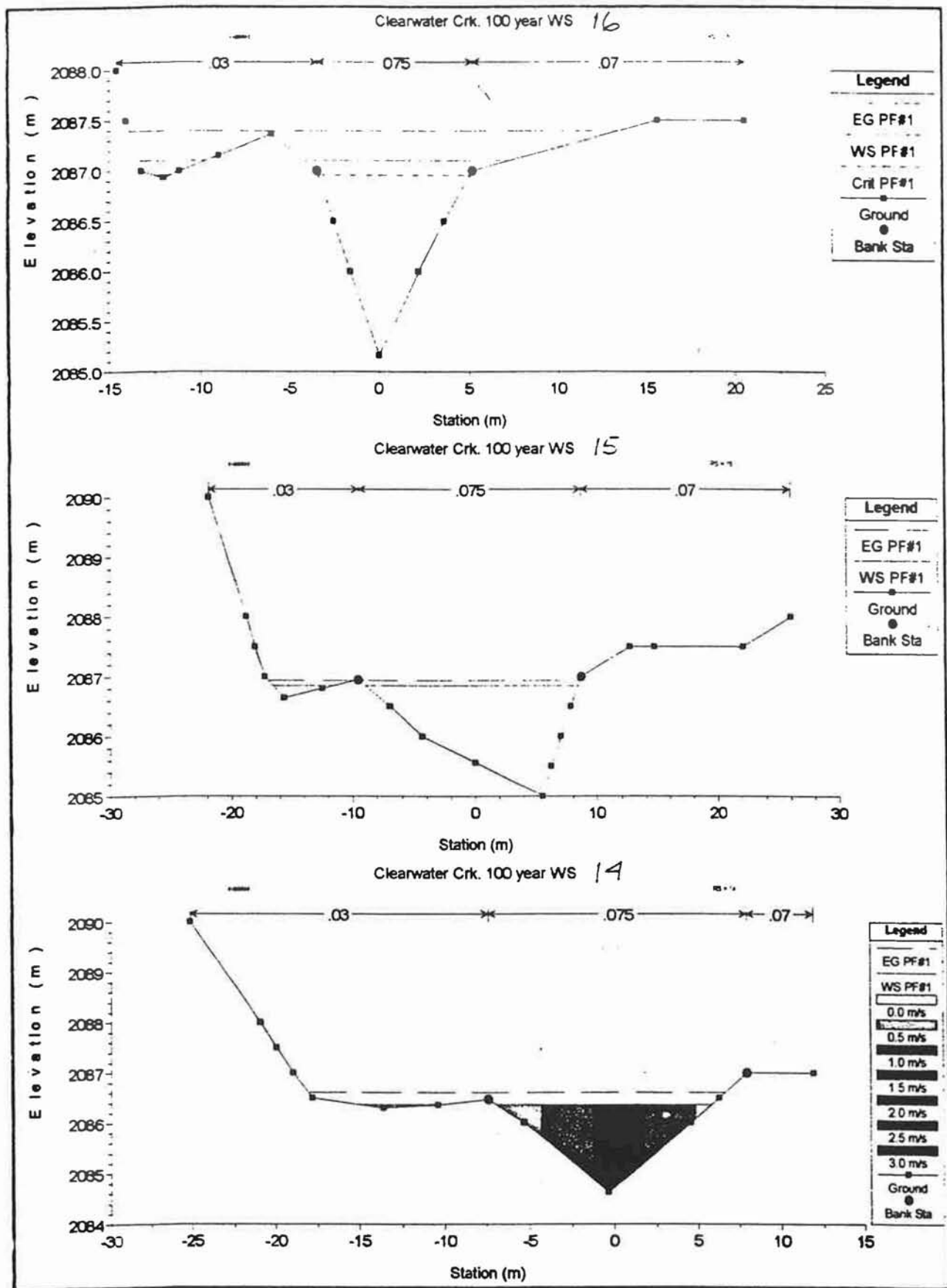


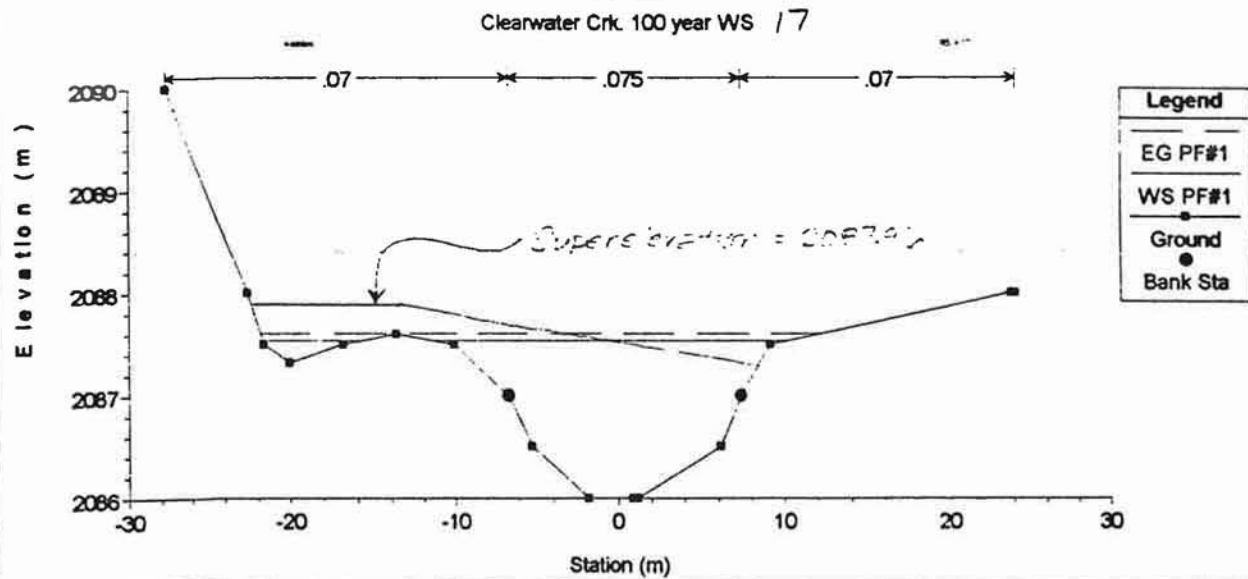
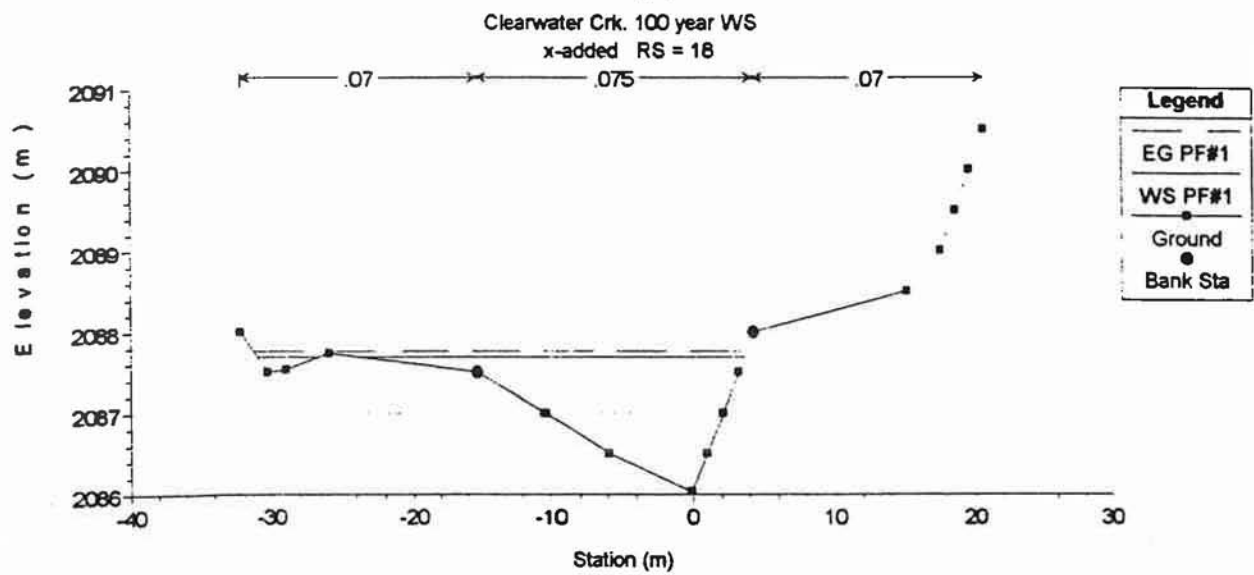
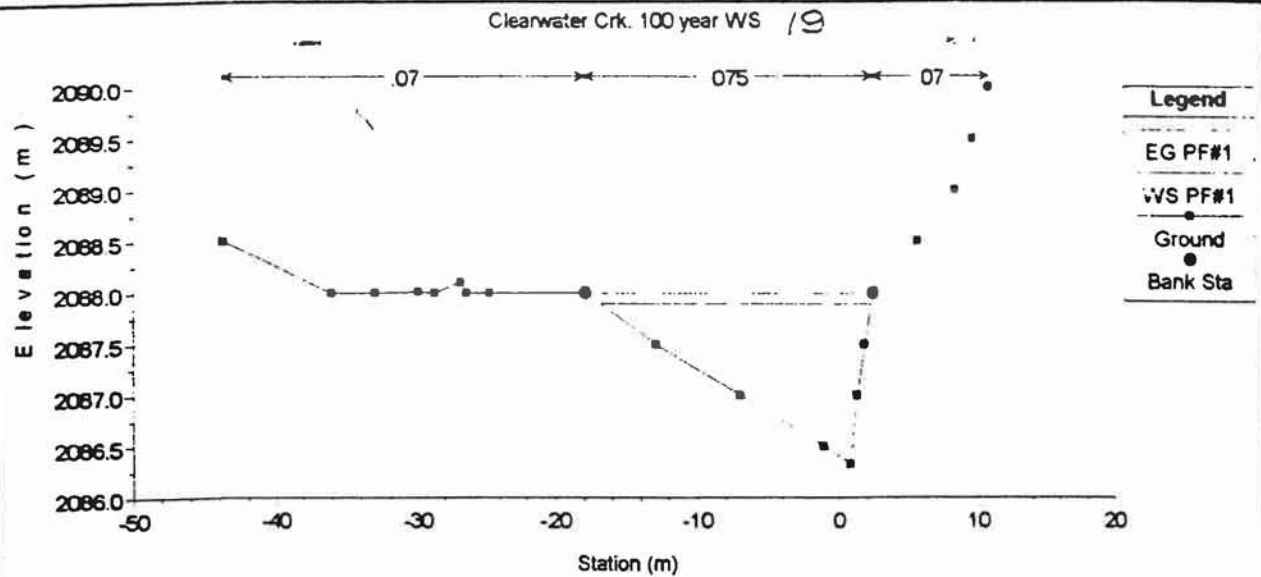


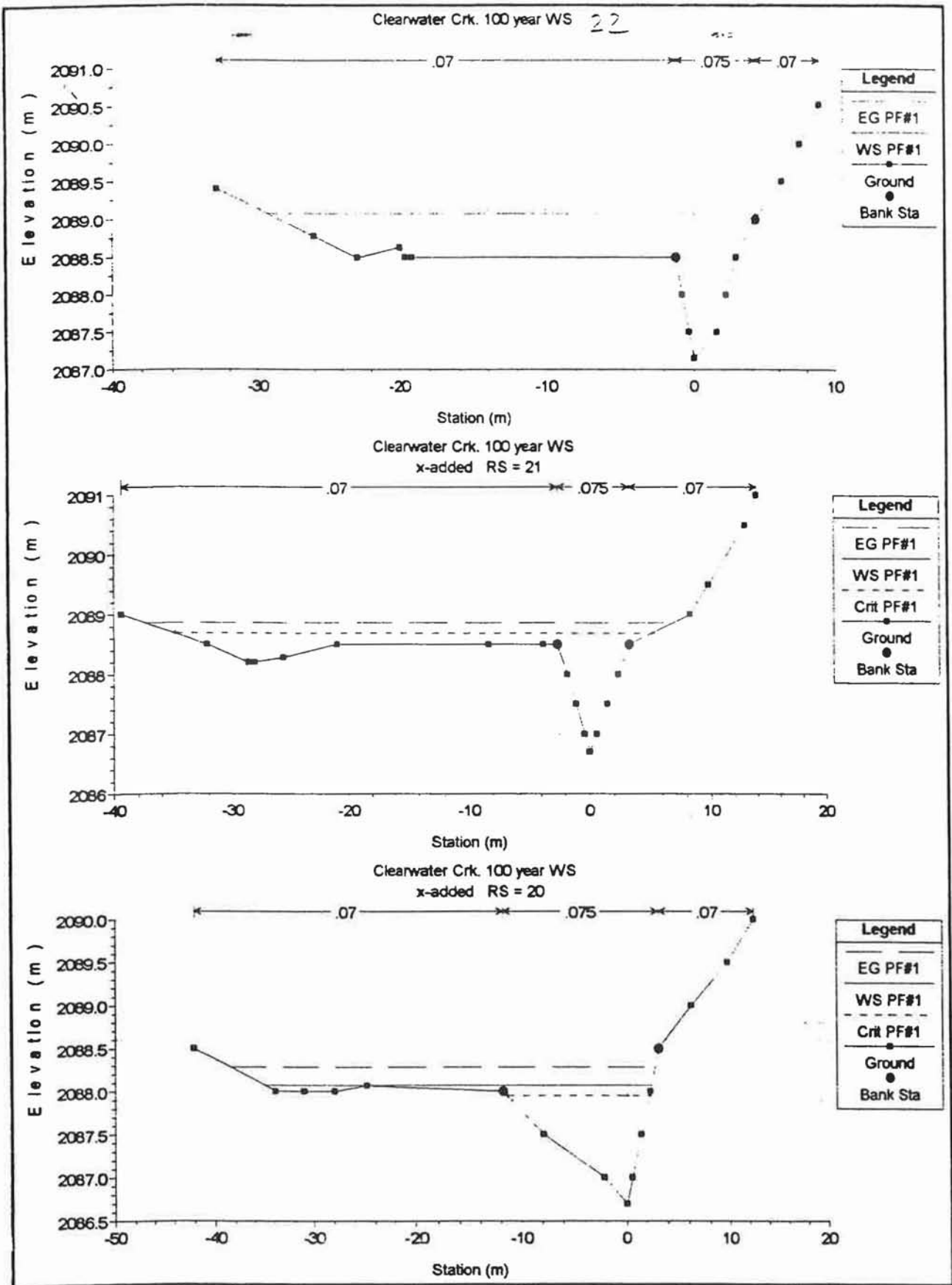




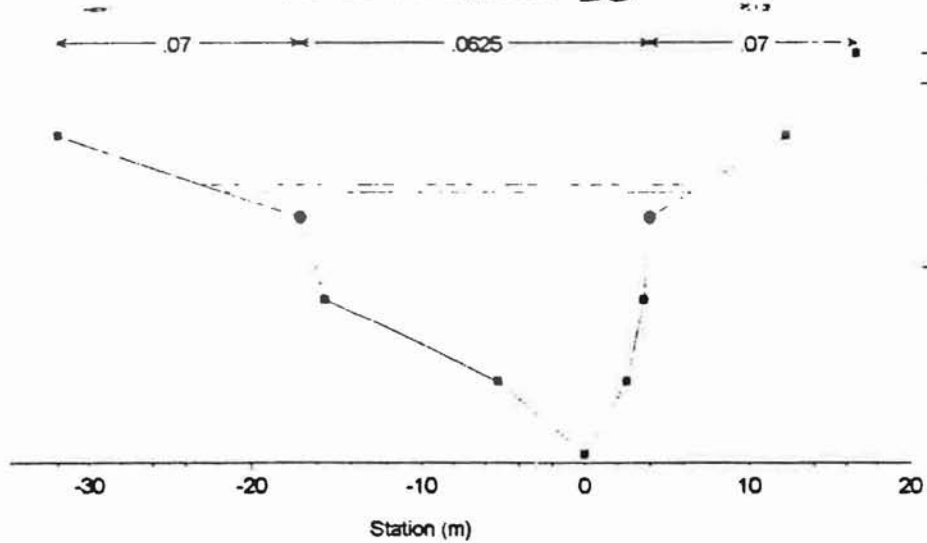






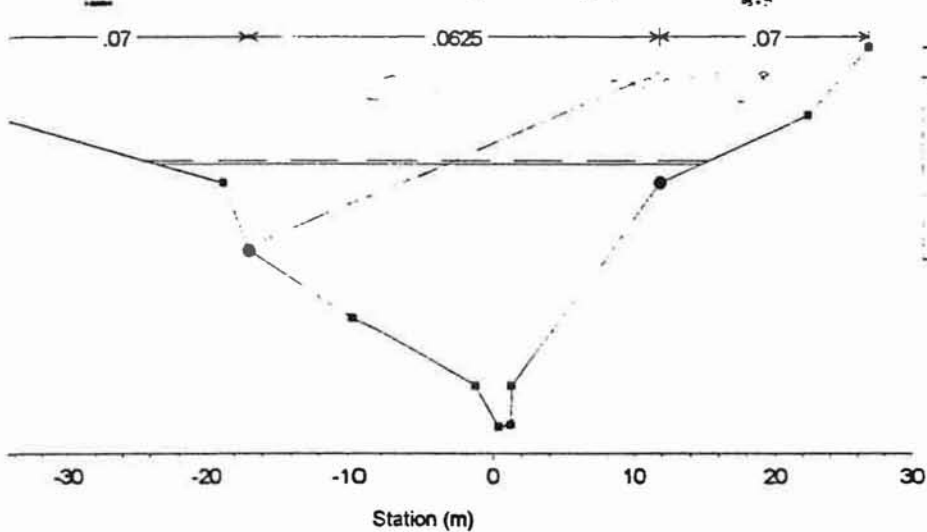


Clearwater Crk. 100 year WS 28



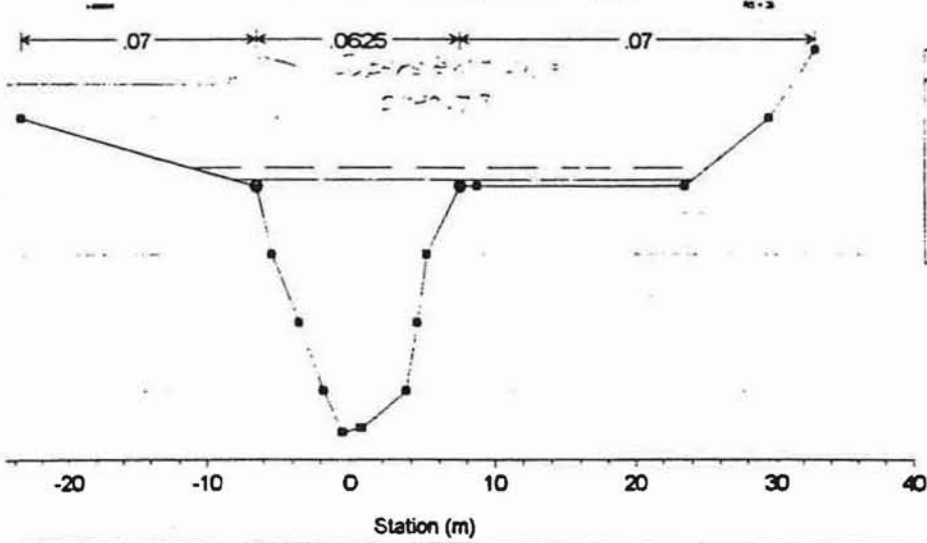
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  - Bank Sta

Clearwater Crk. 100 year WS 27

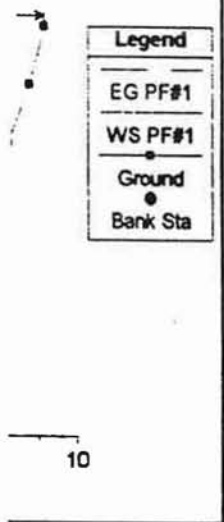
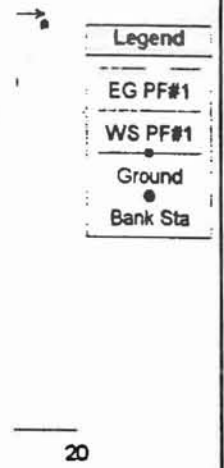
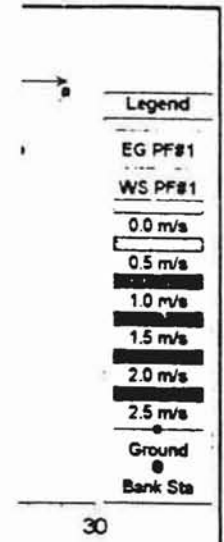


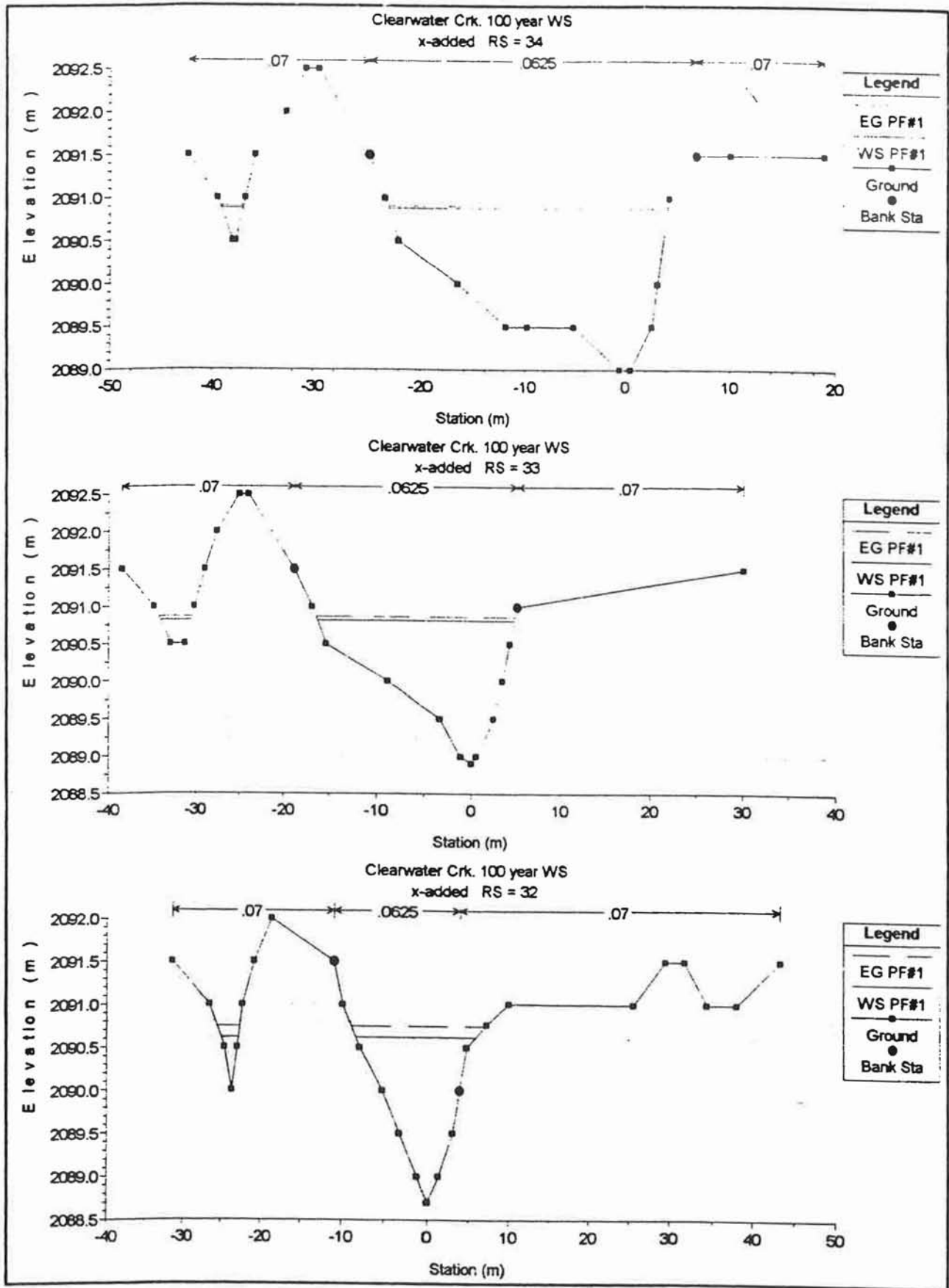
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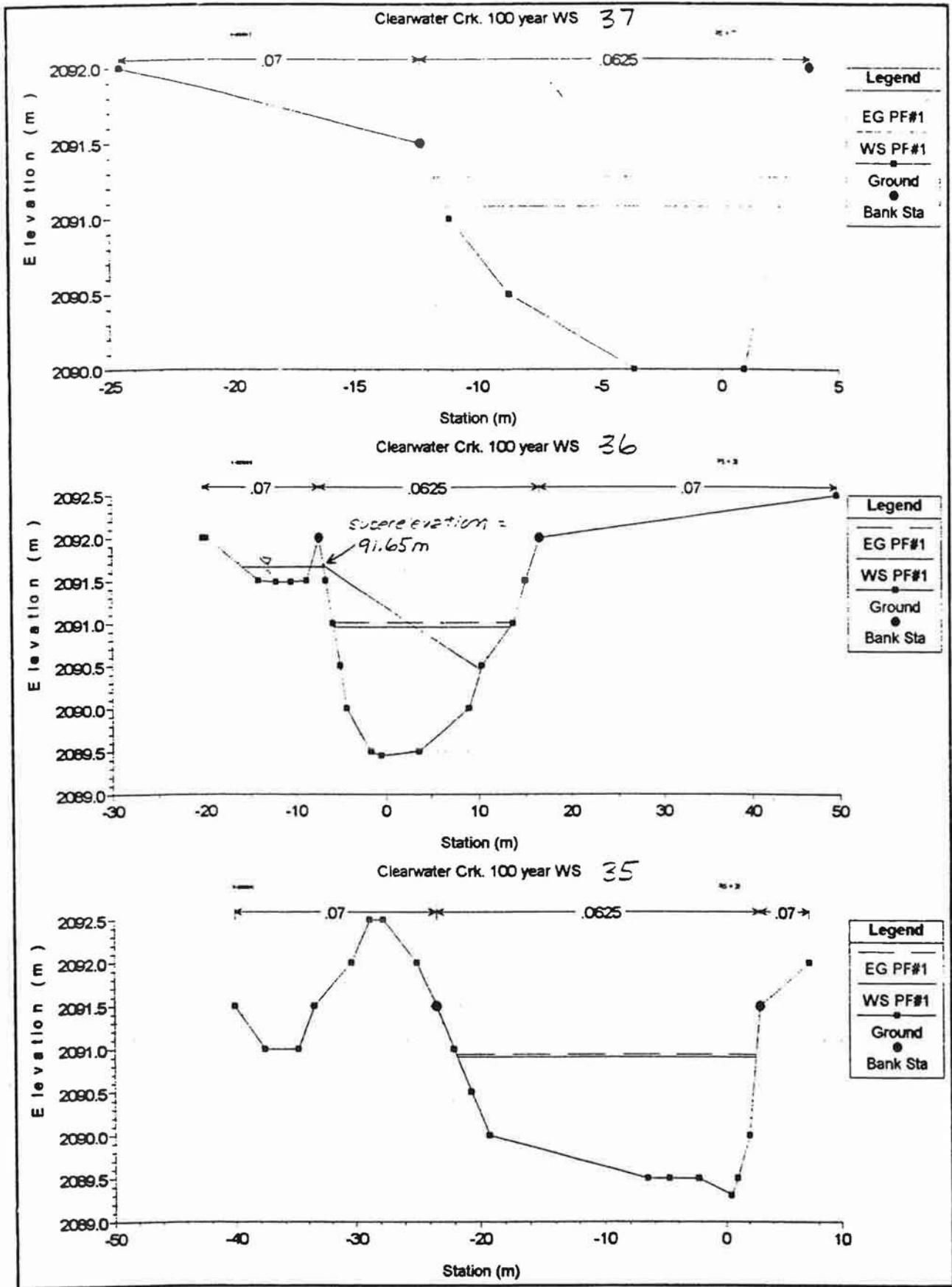
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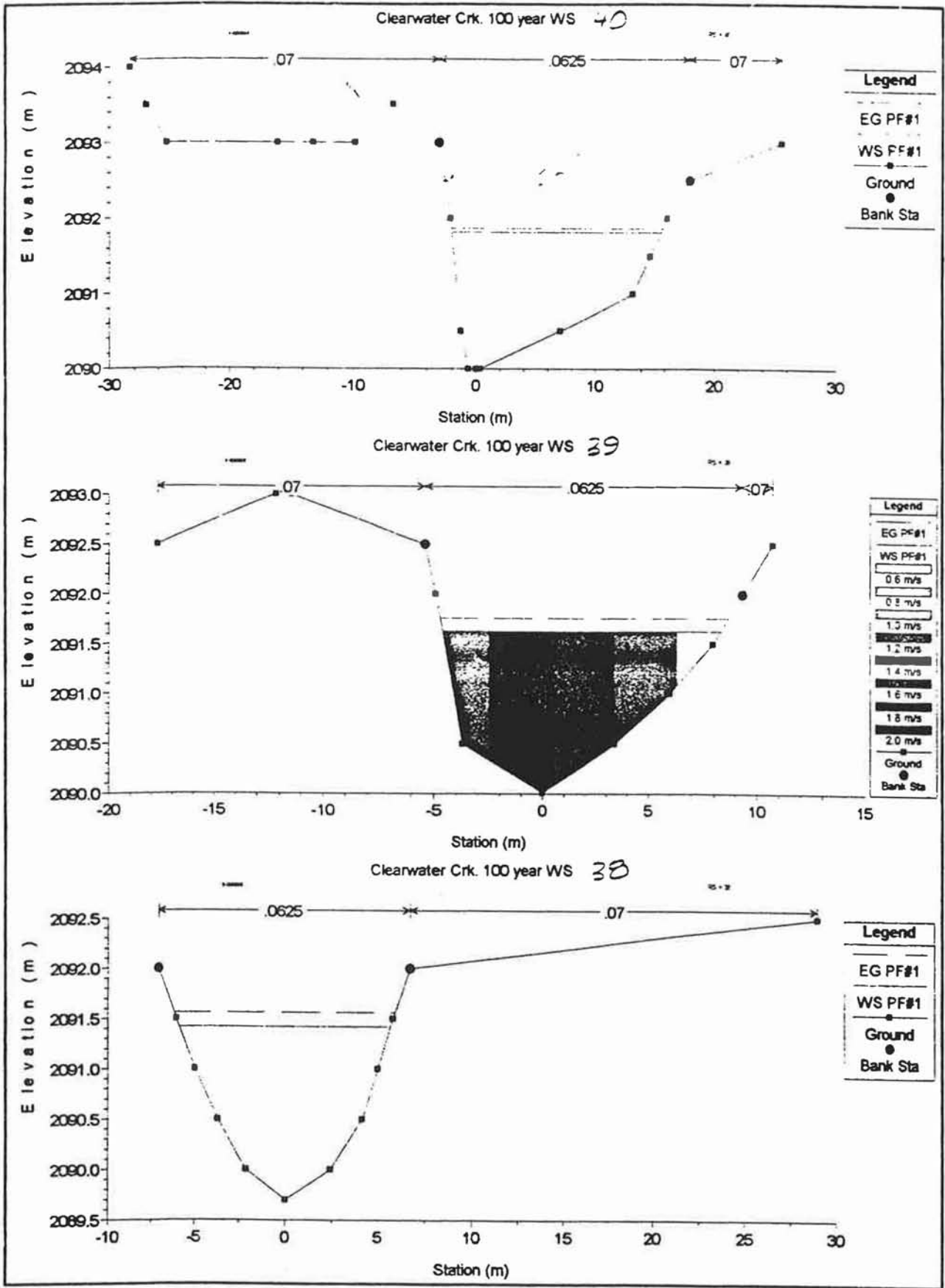


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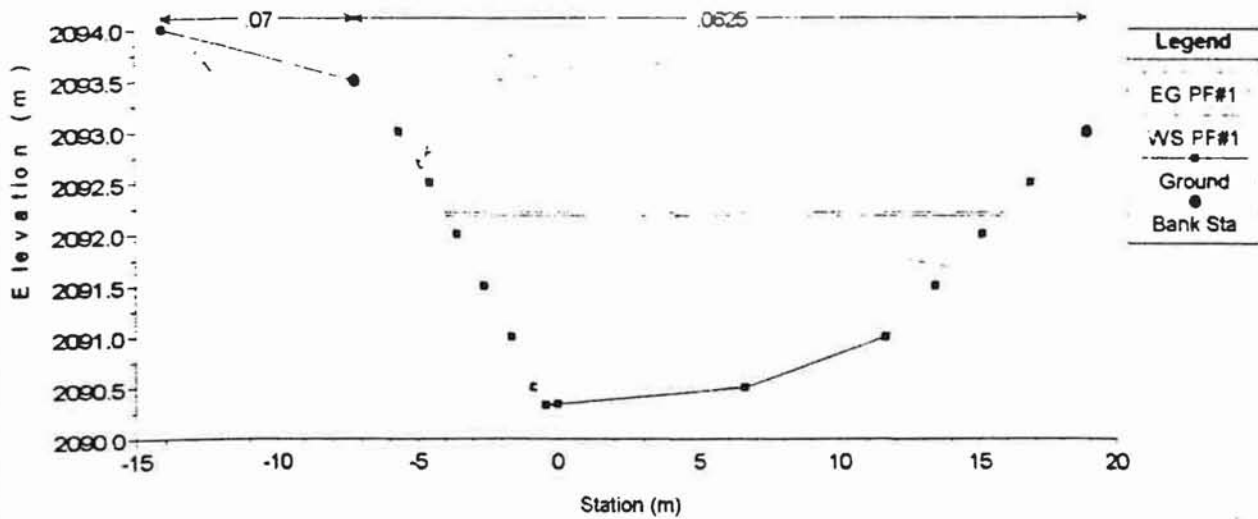




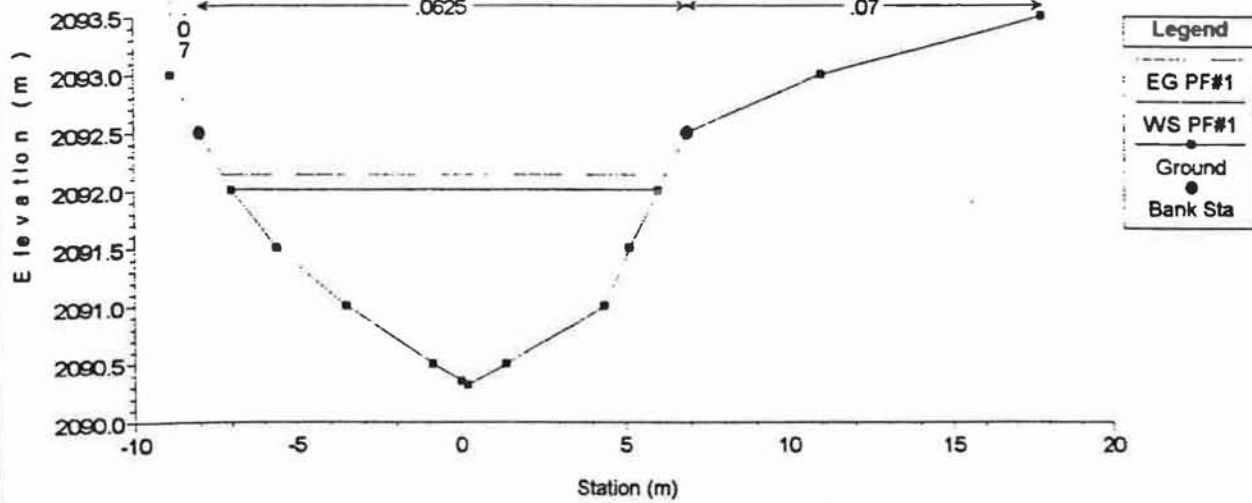




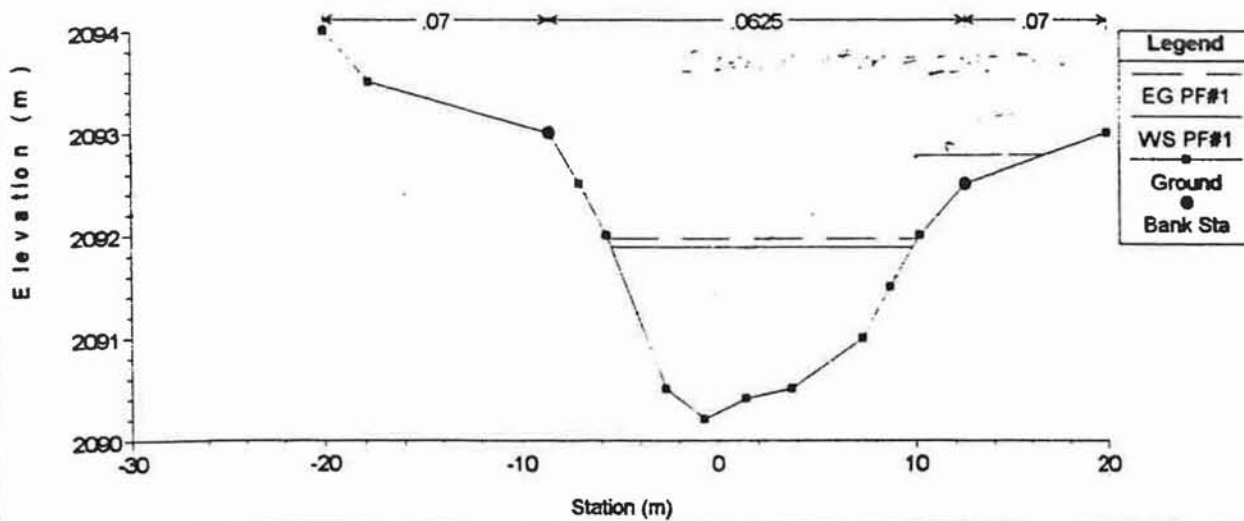
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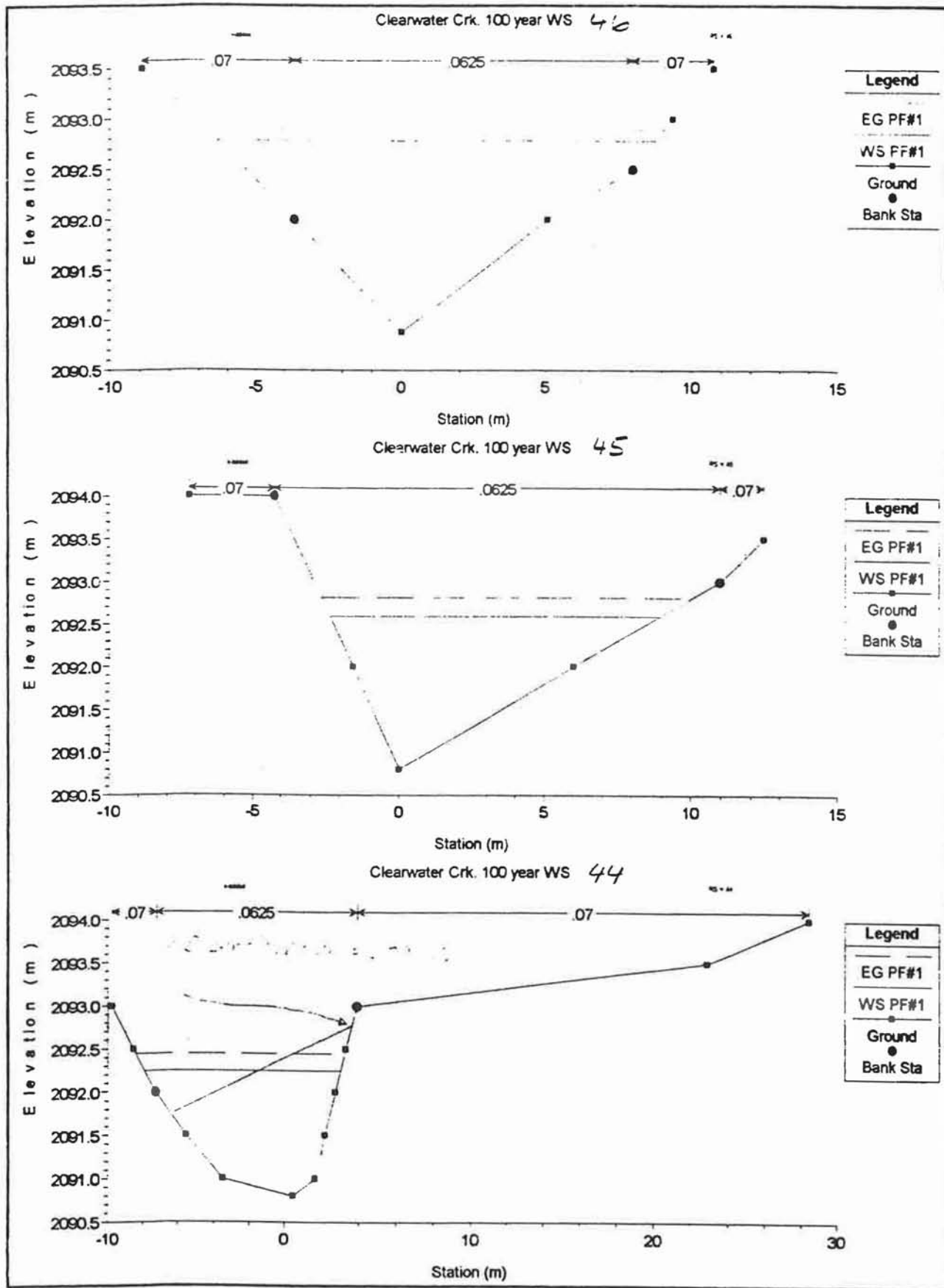


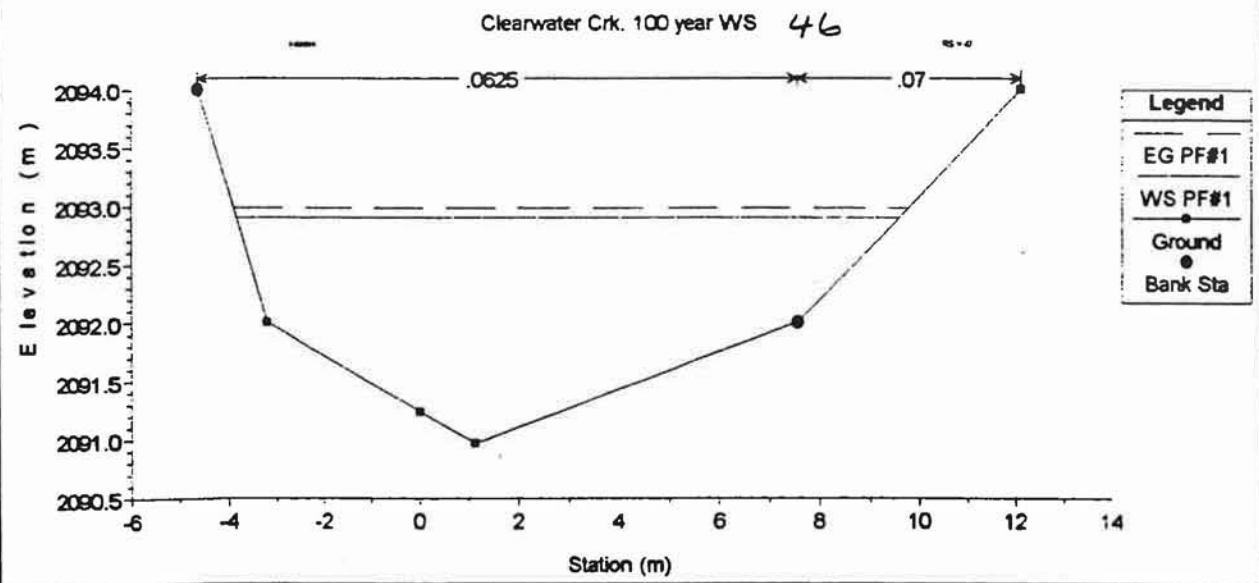
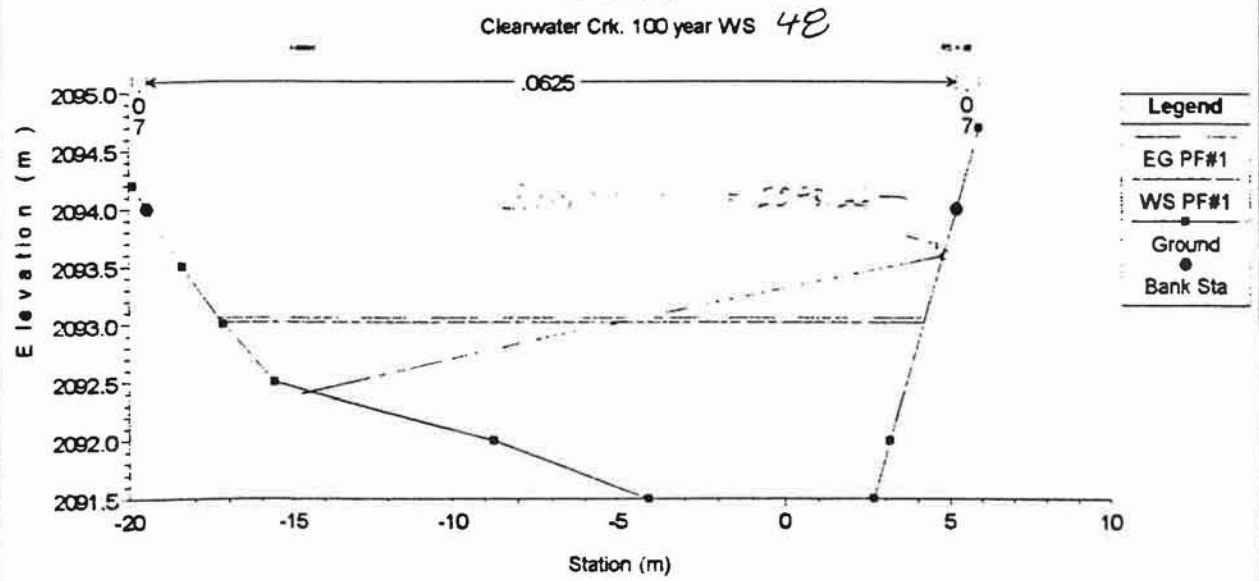
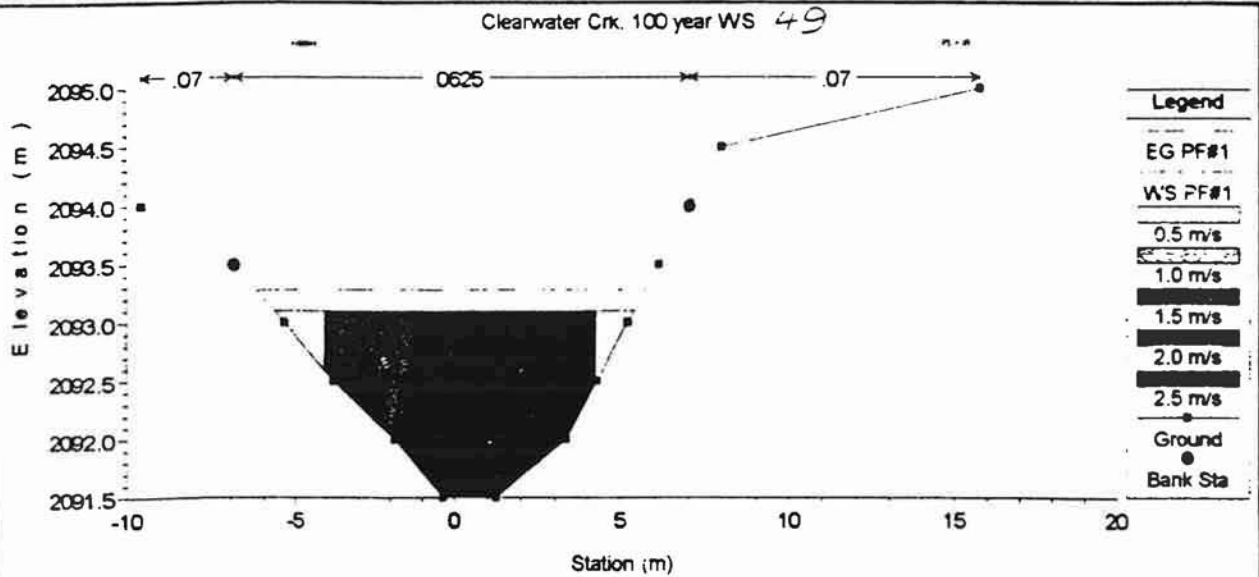
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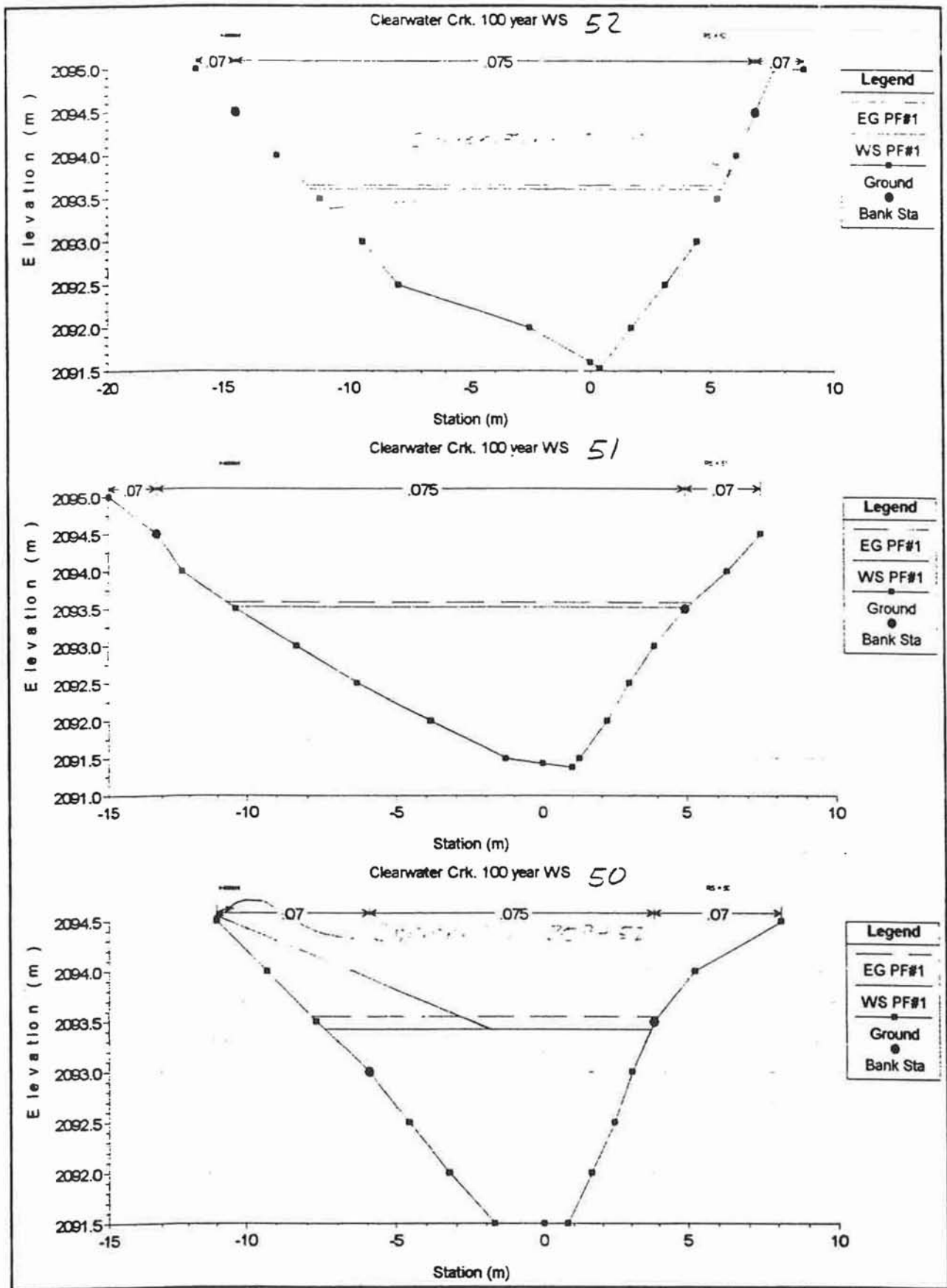


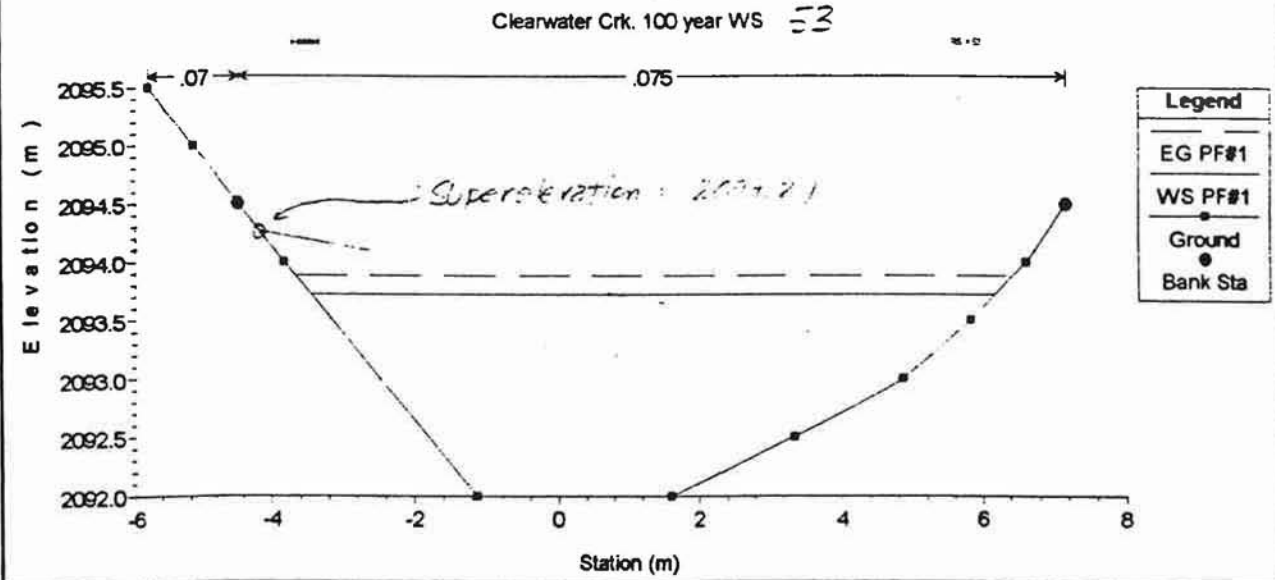
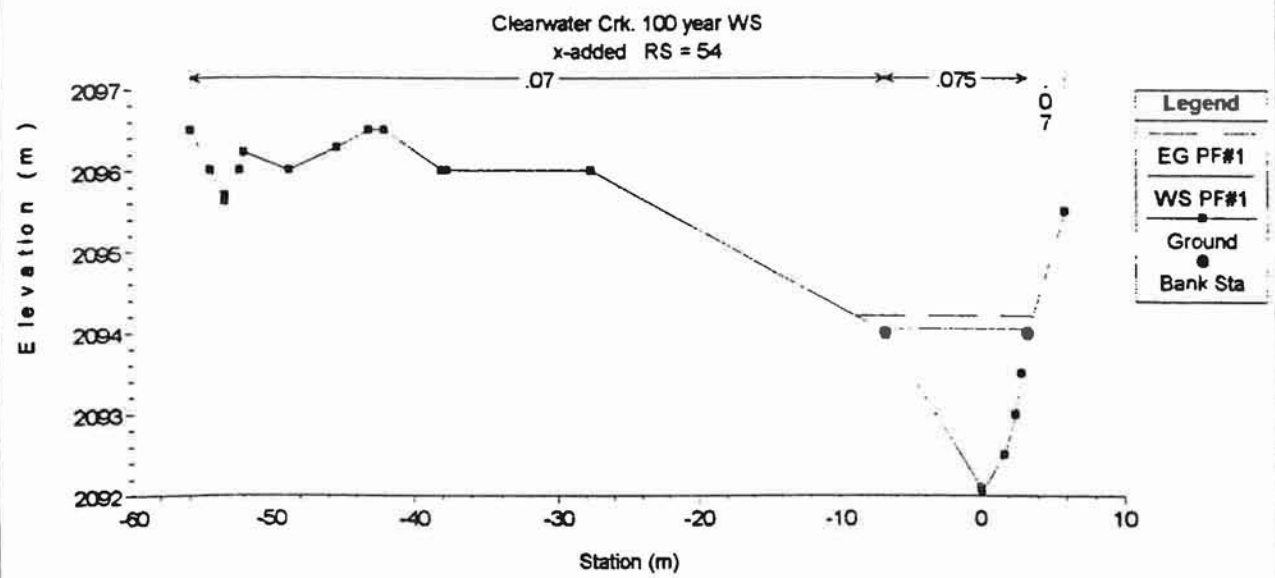
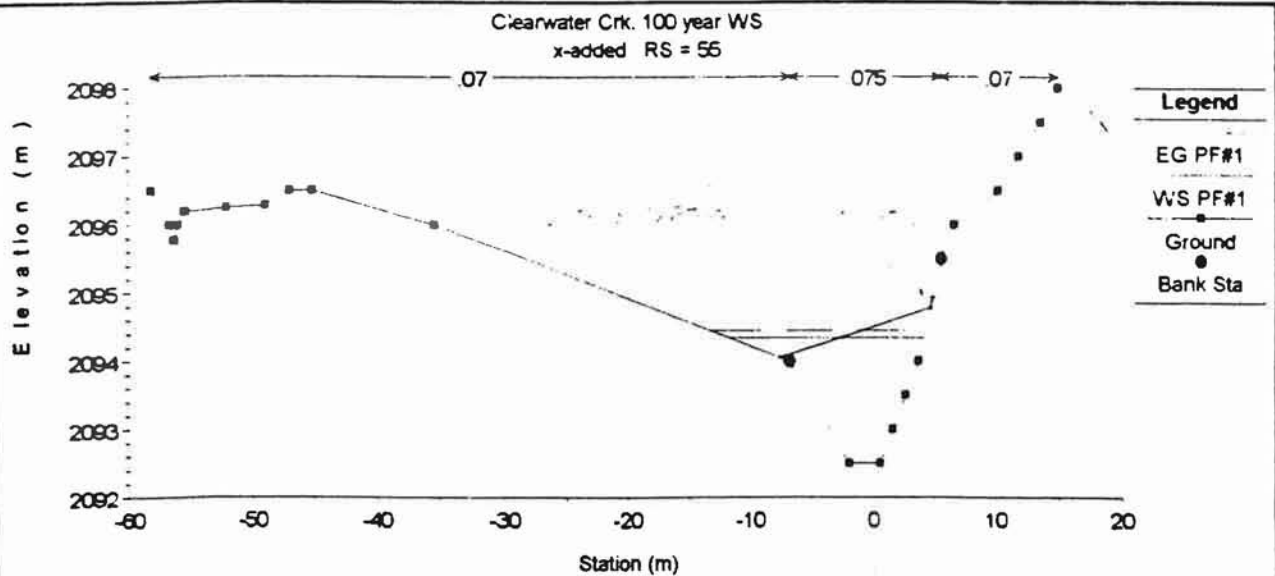
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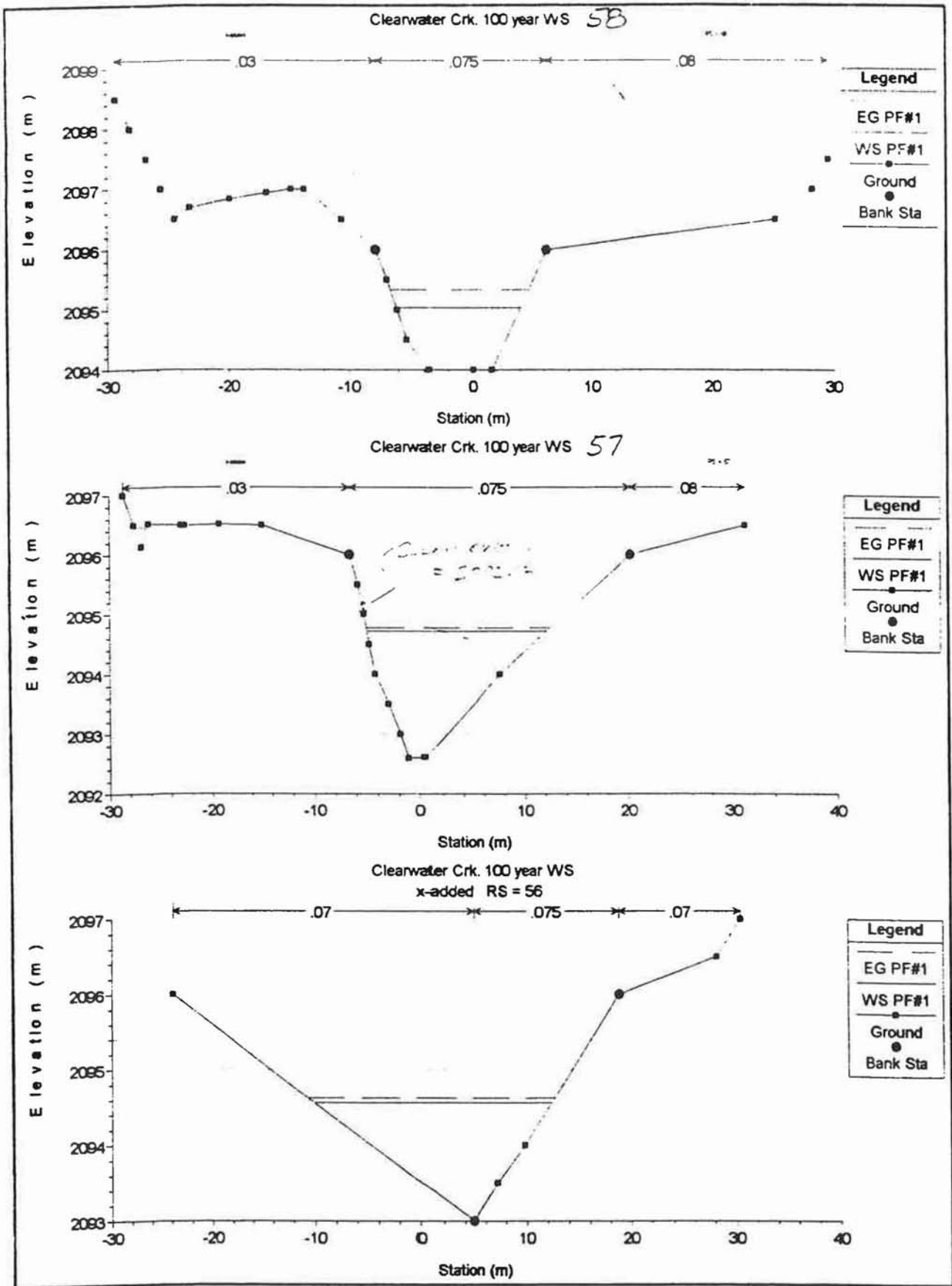


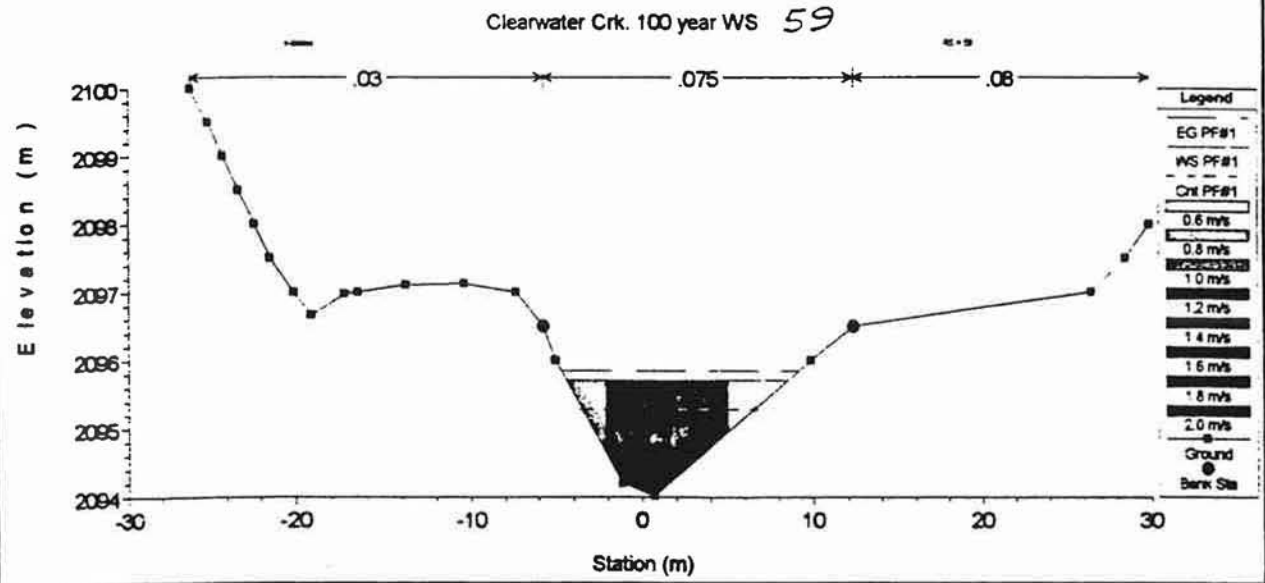
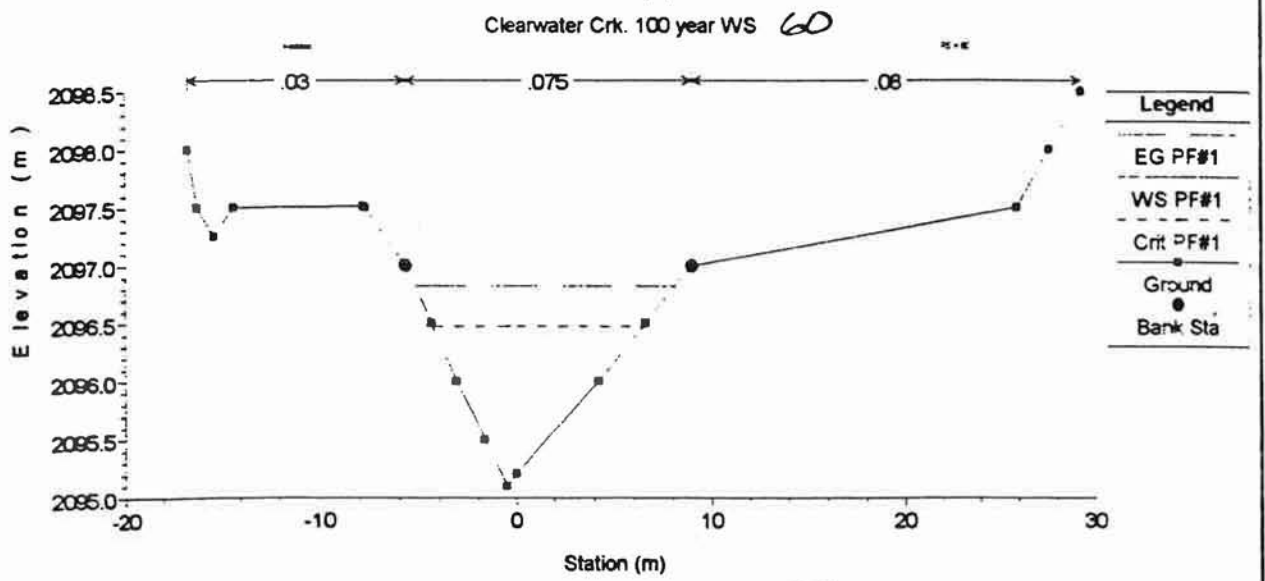
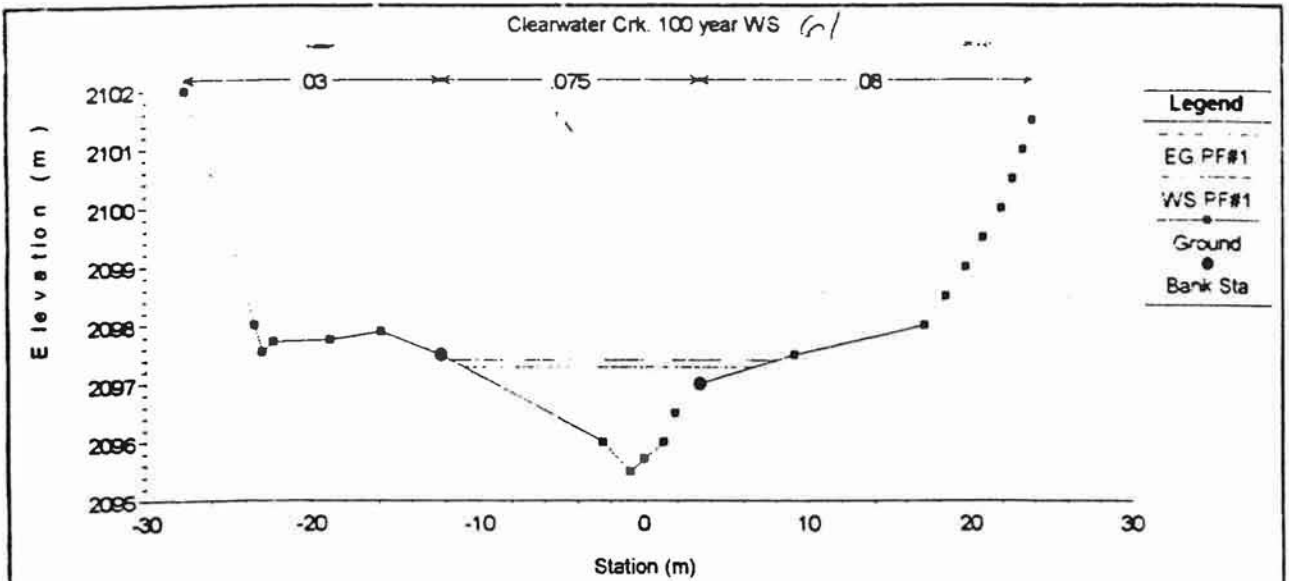




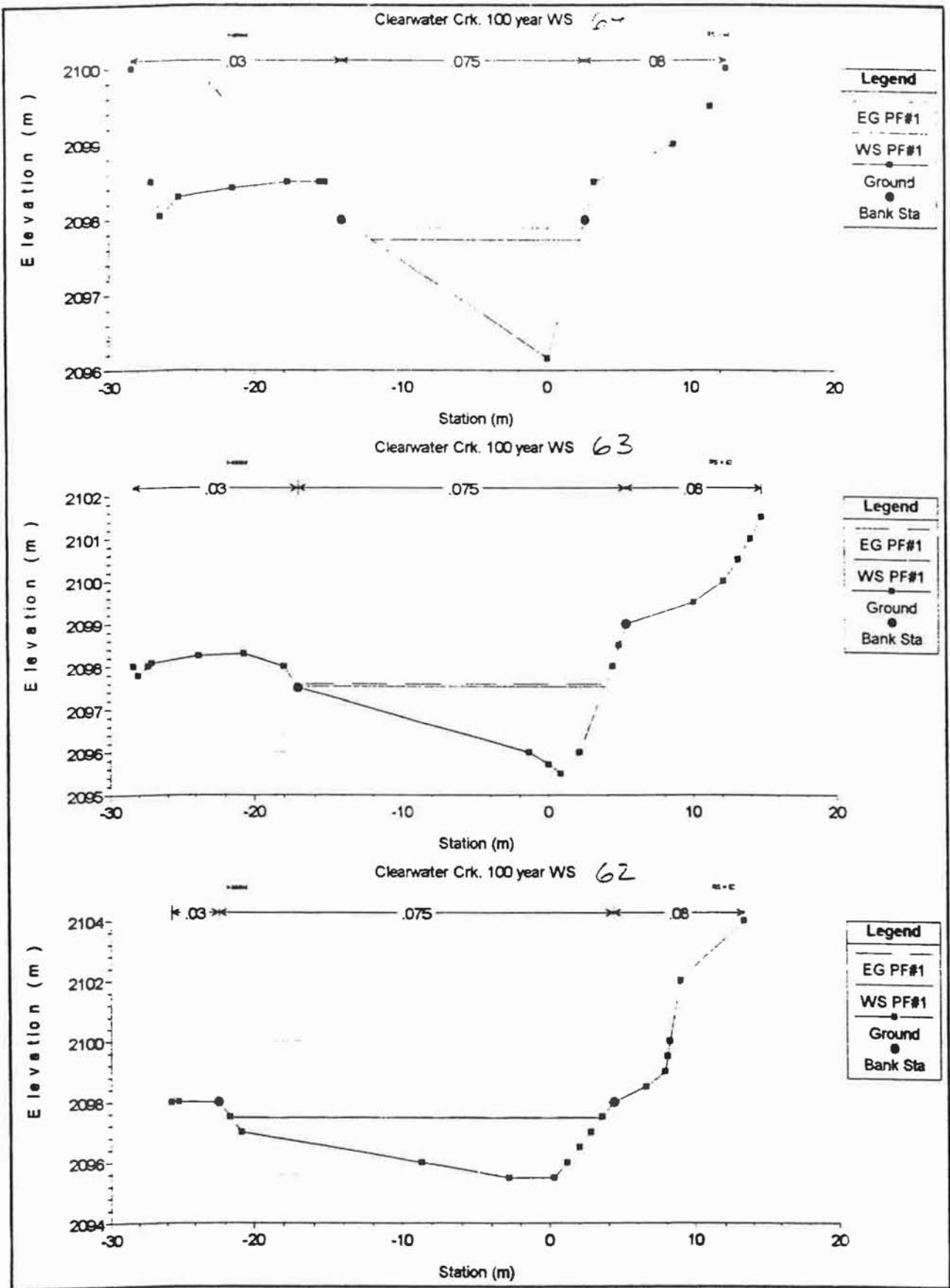




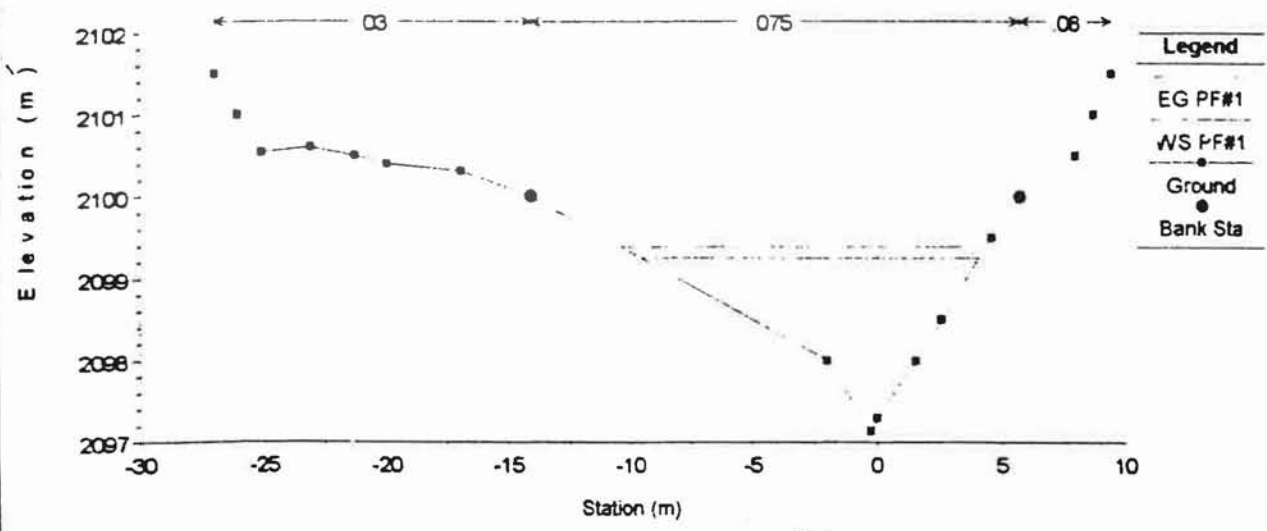




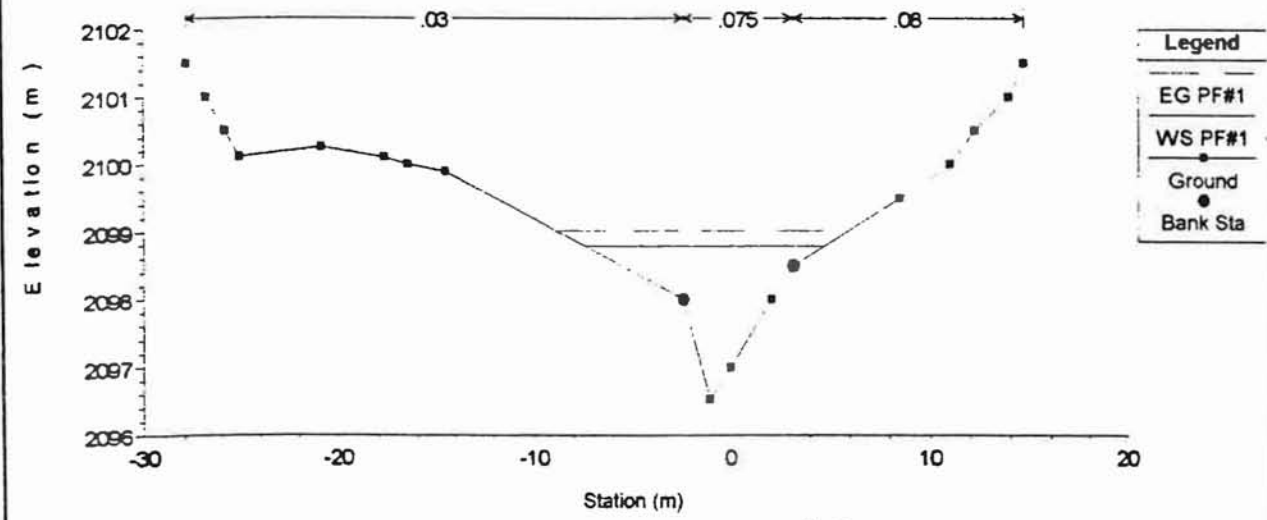




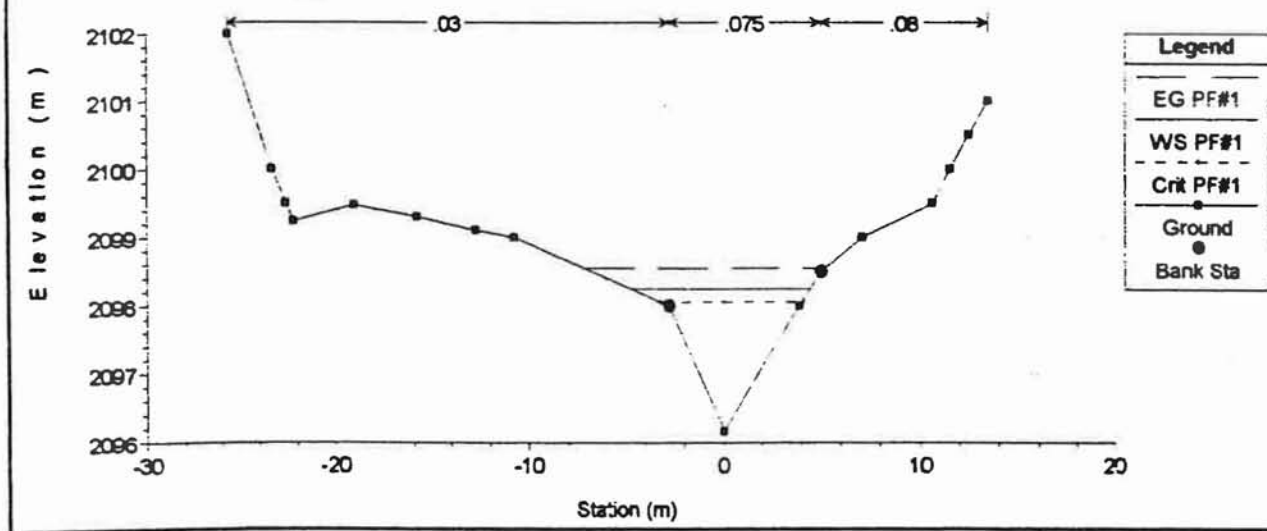
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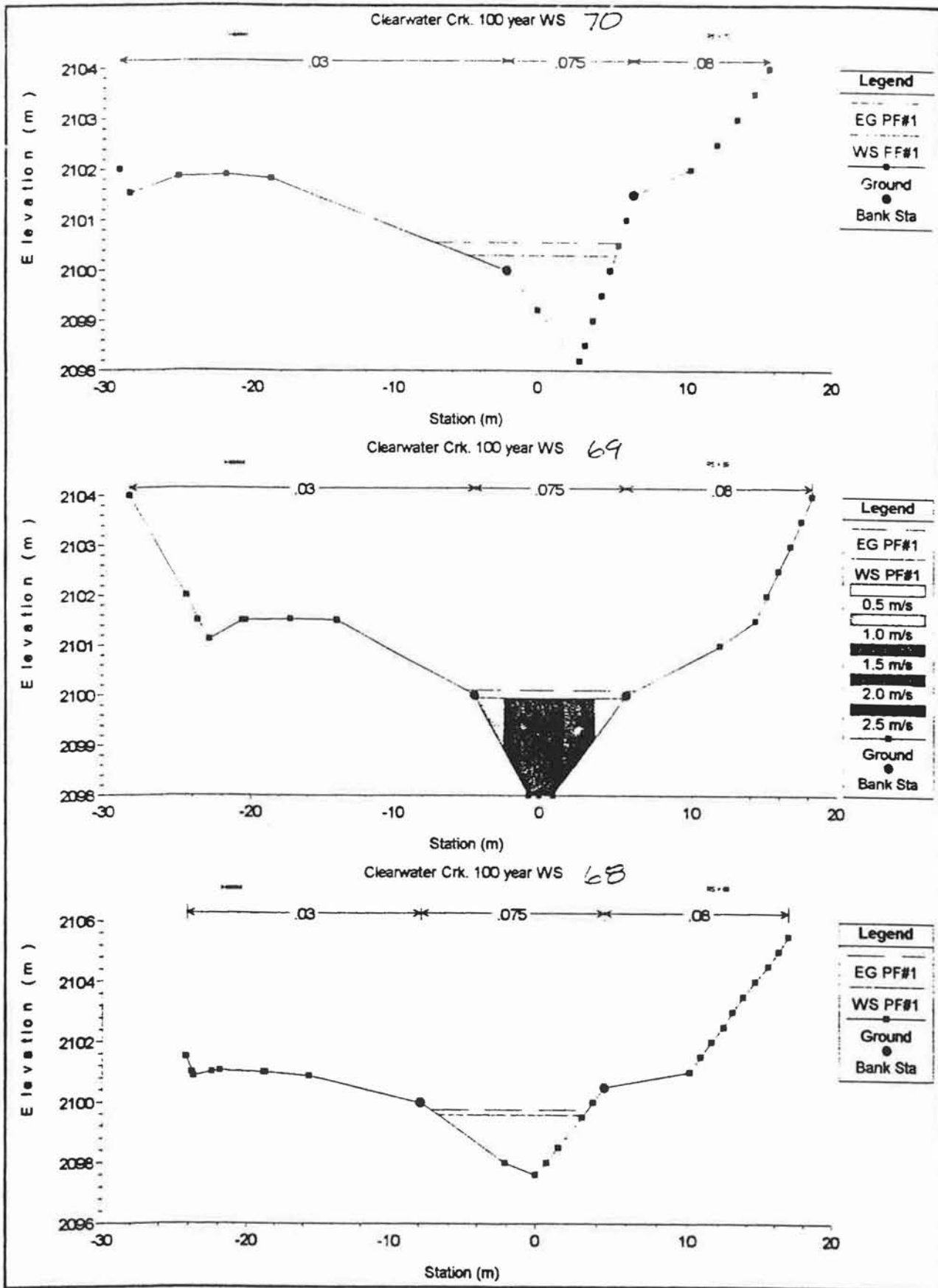


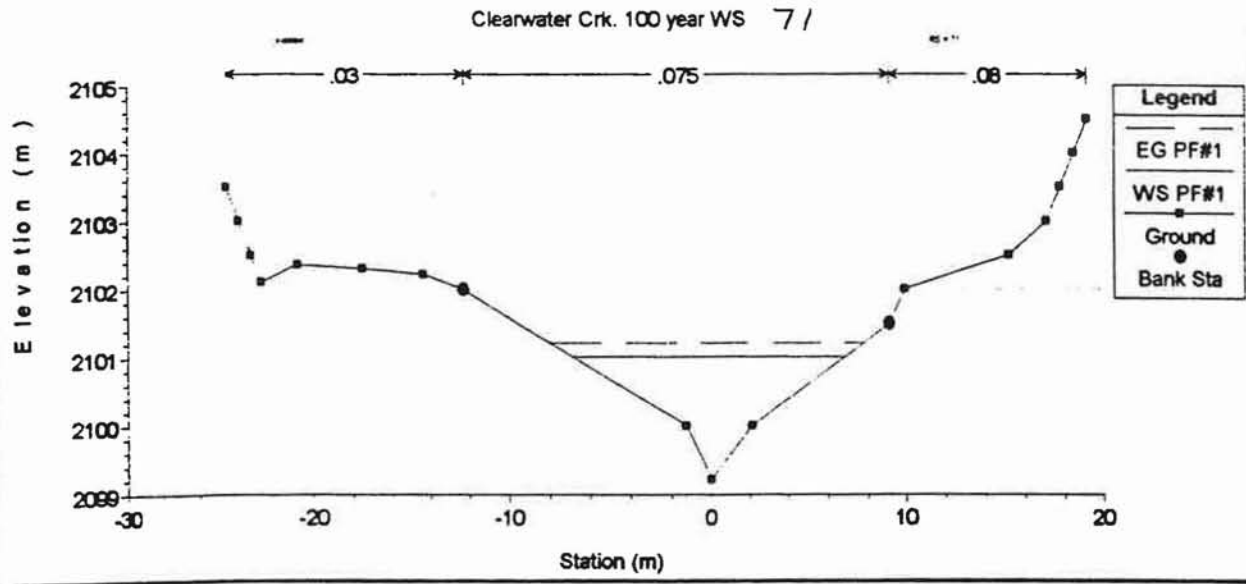
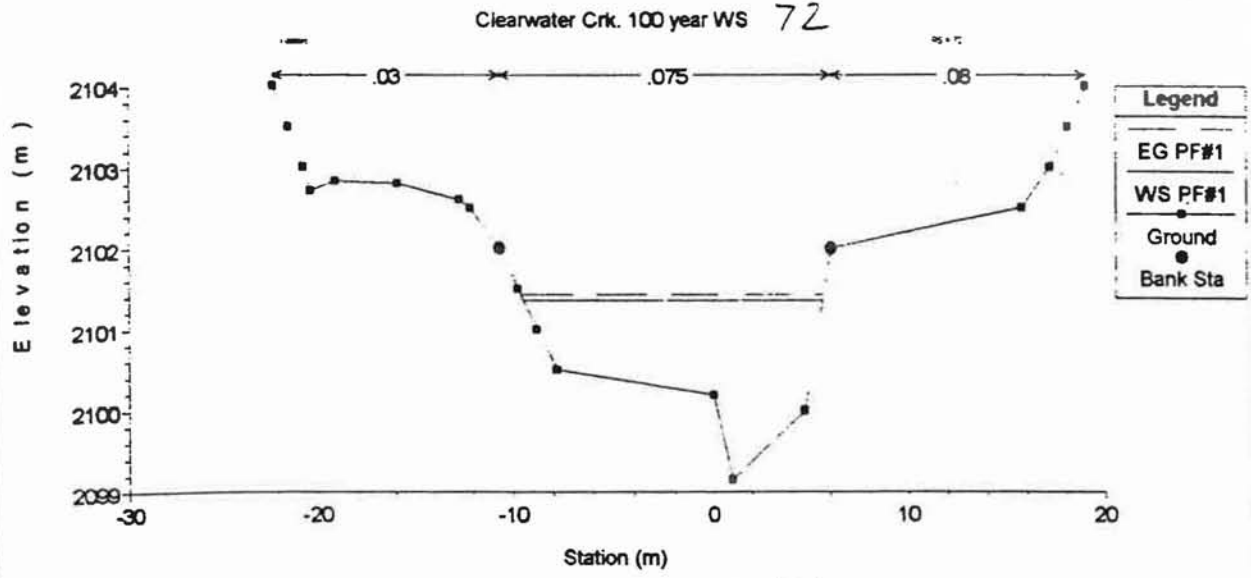
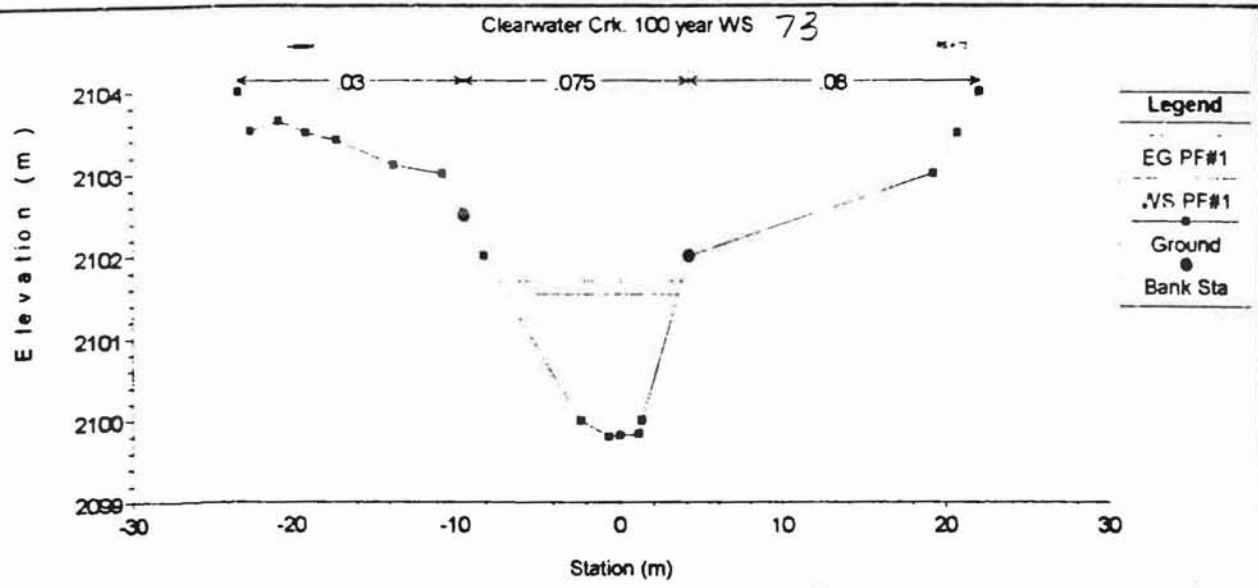
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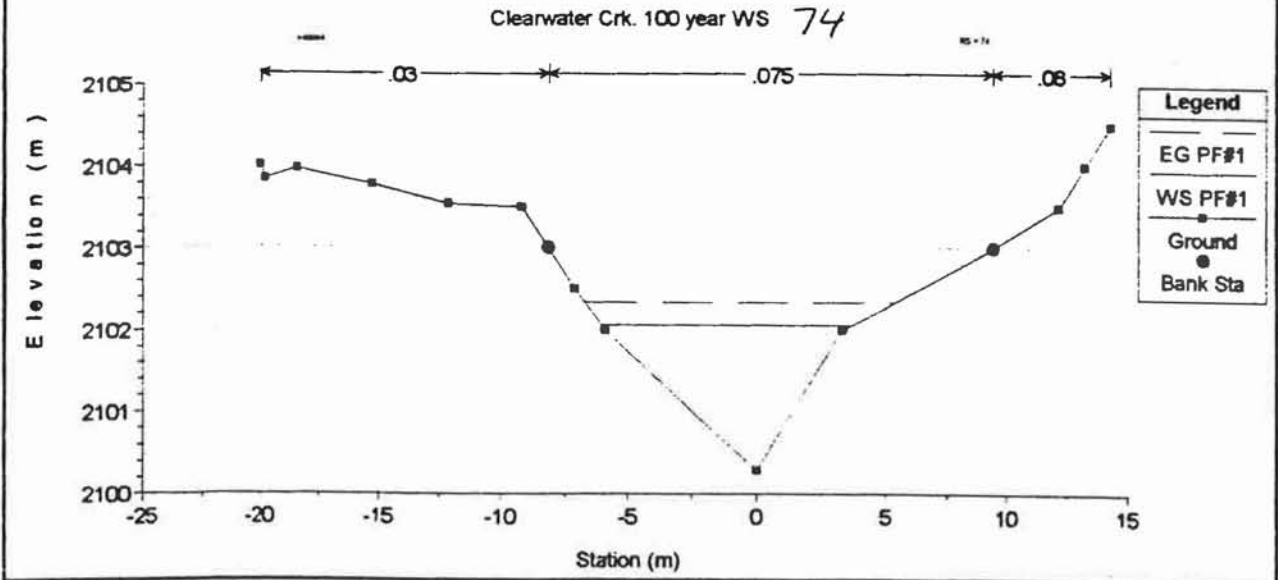
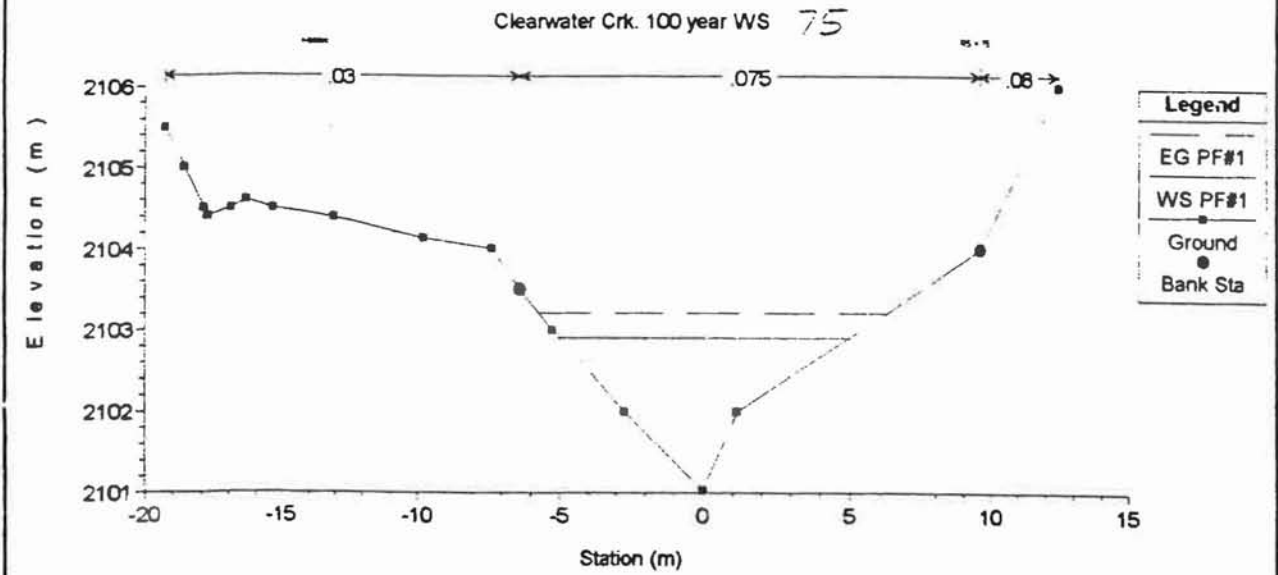
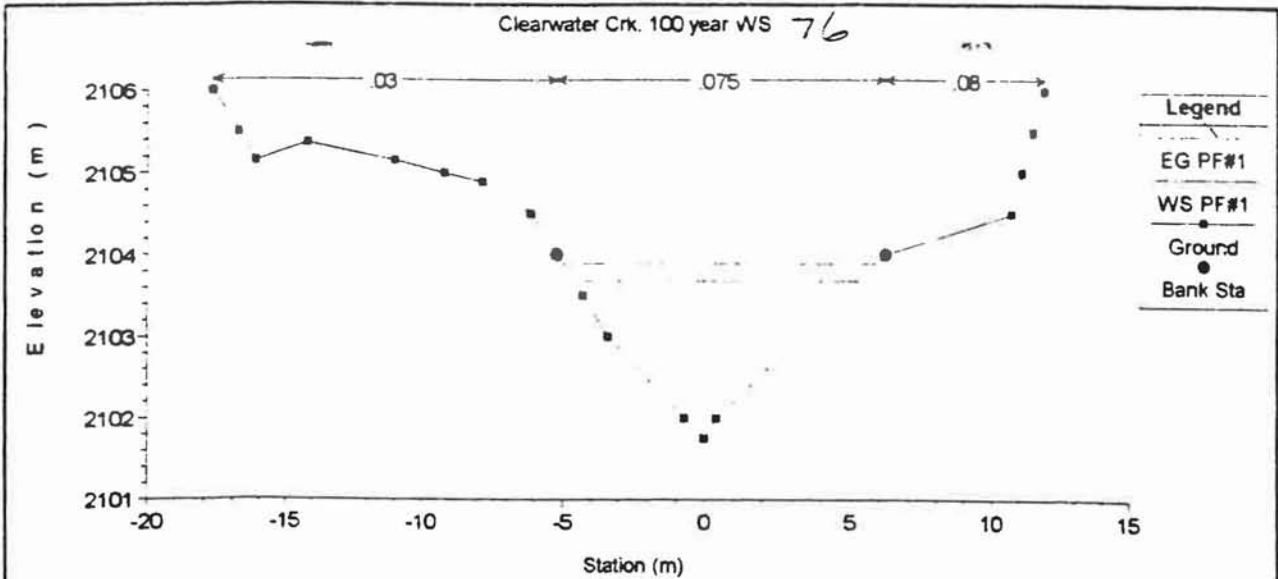


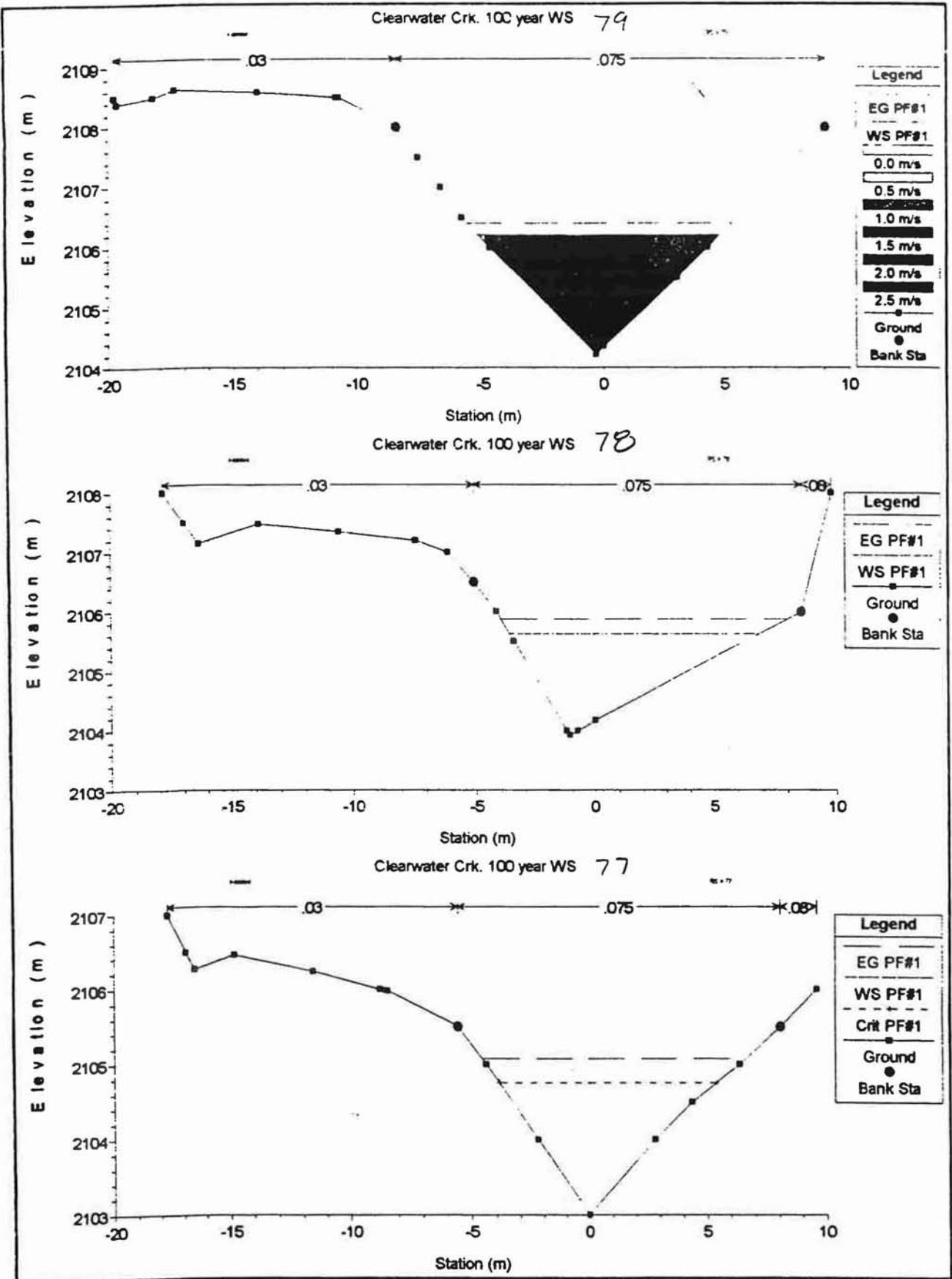
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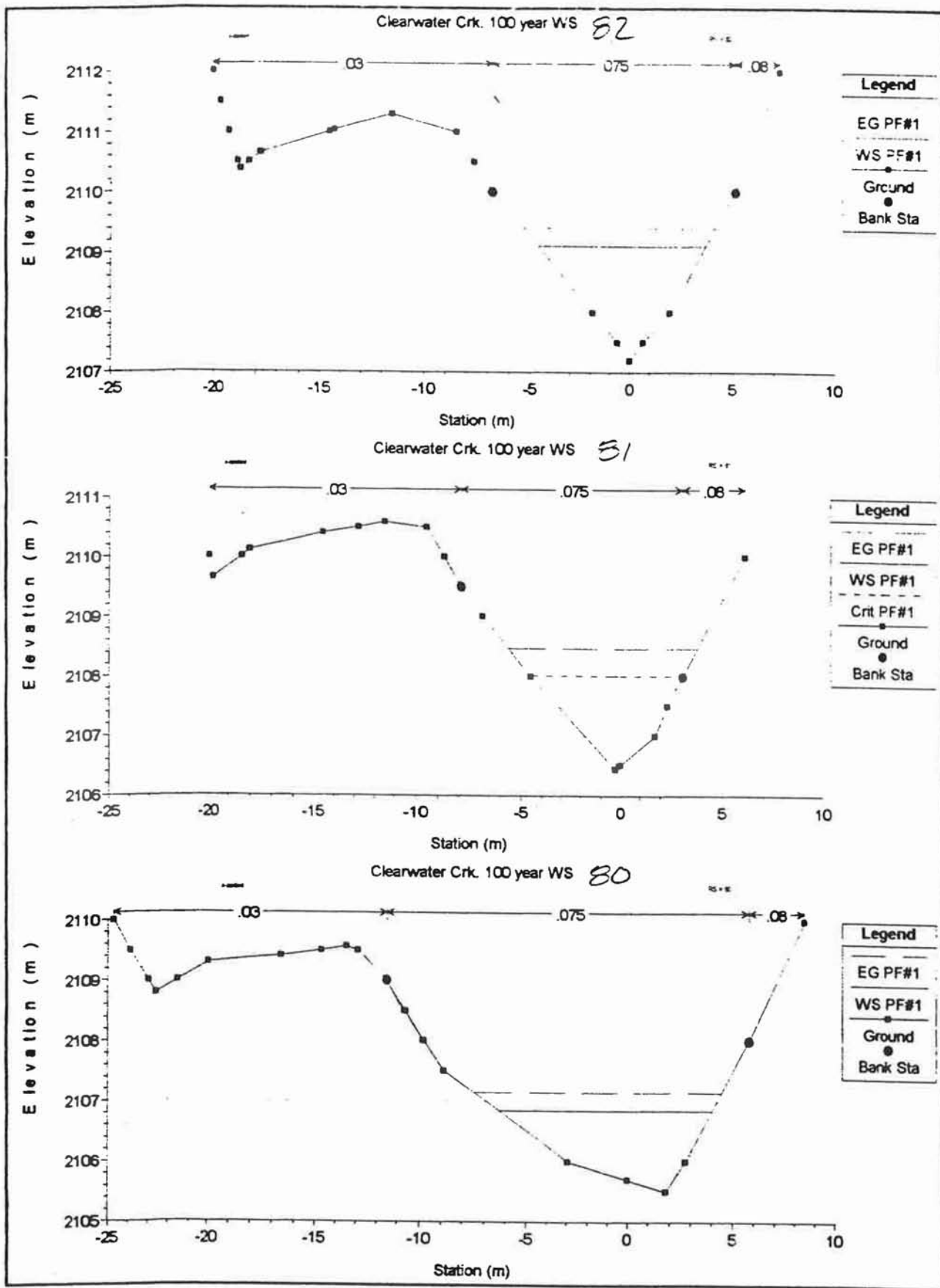


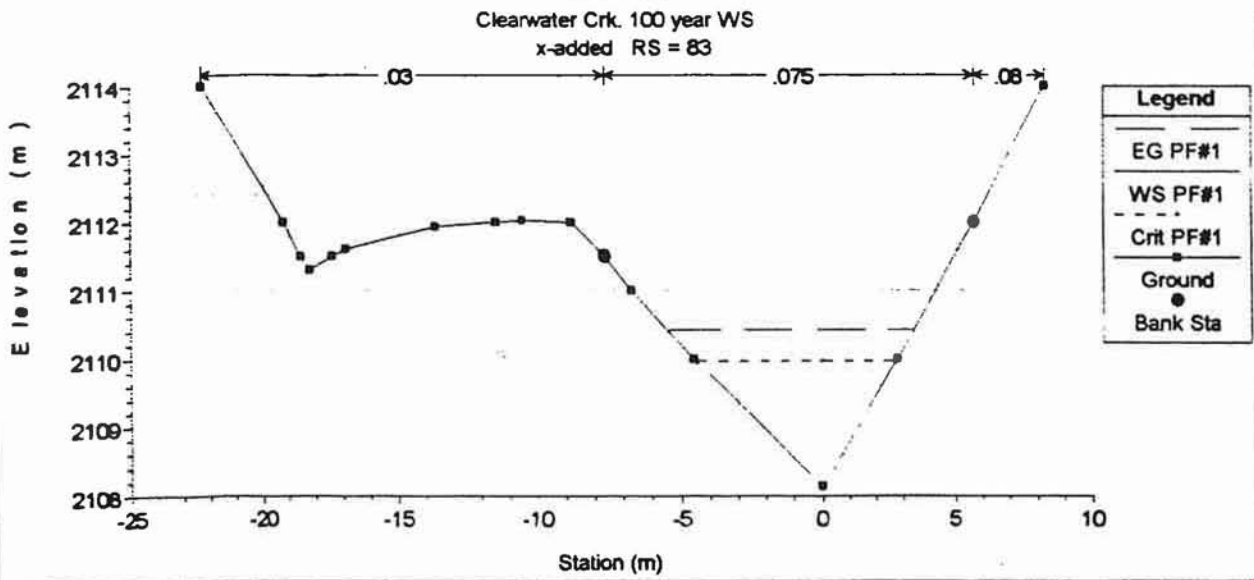
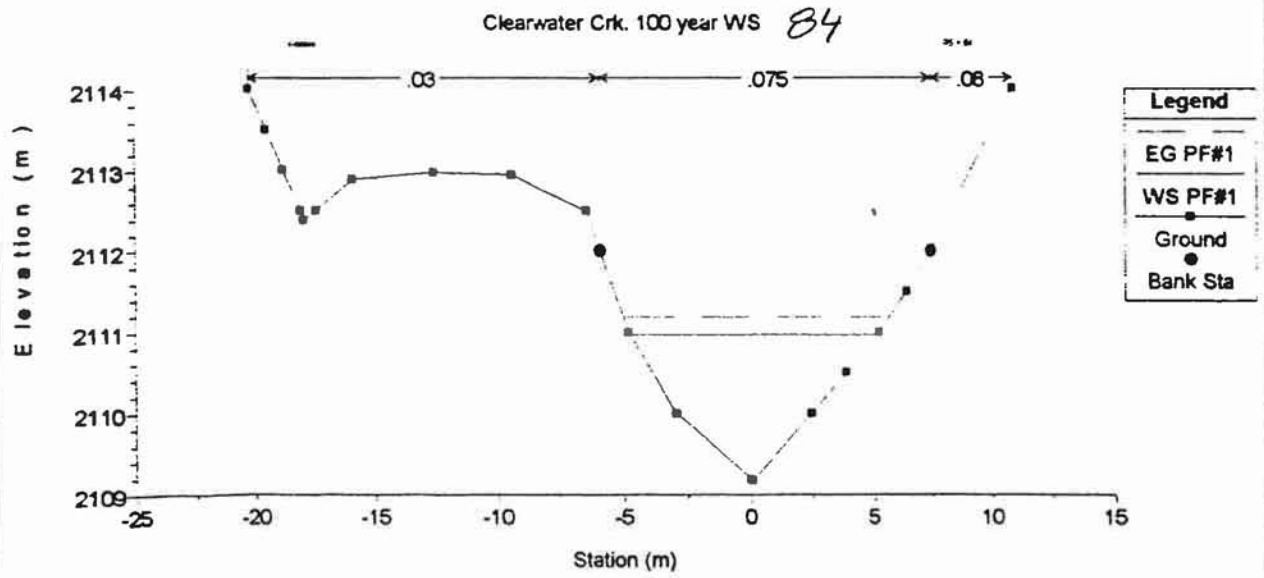
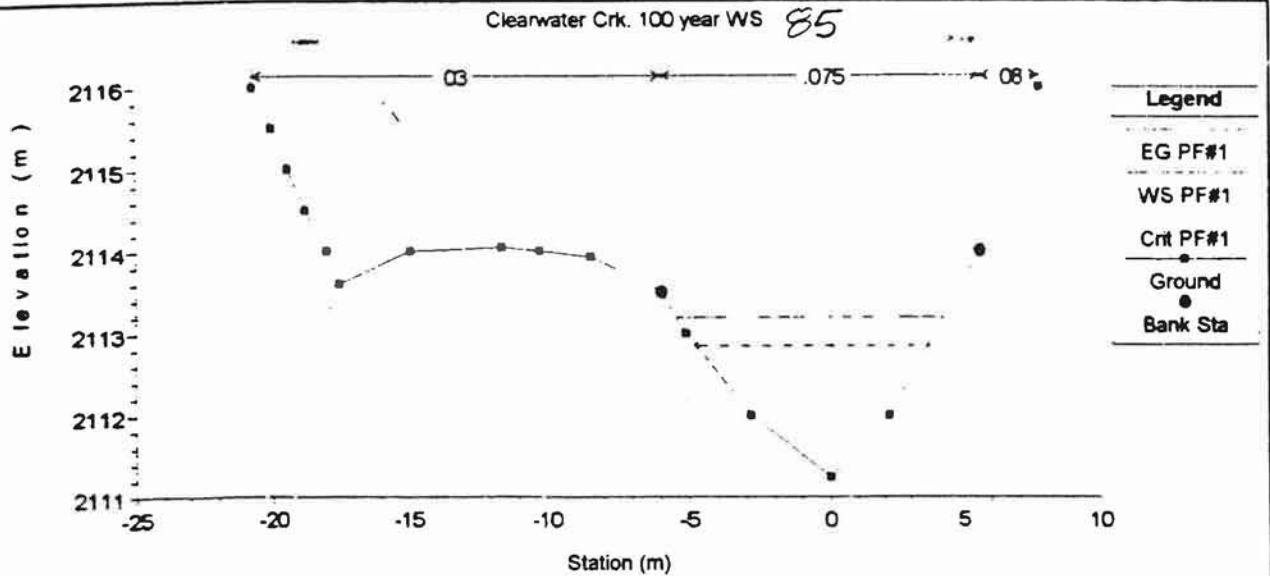




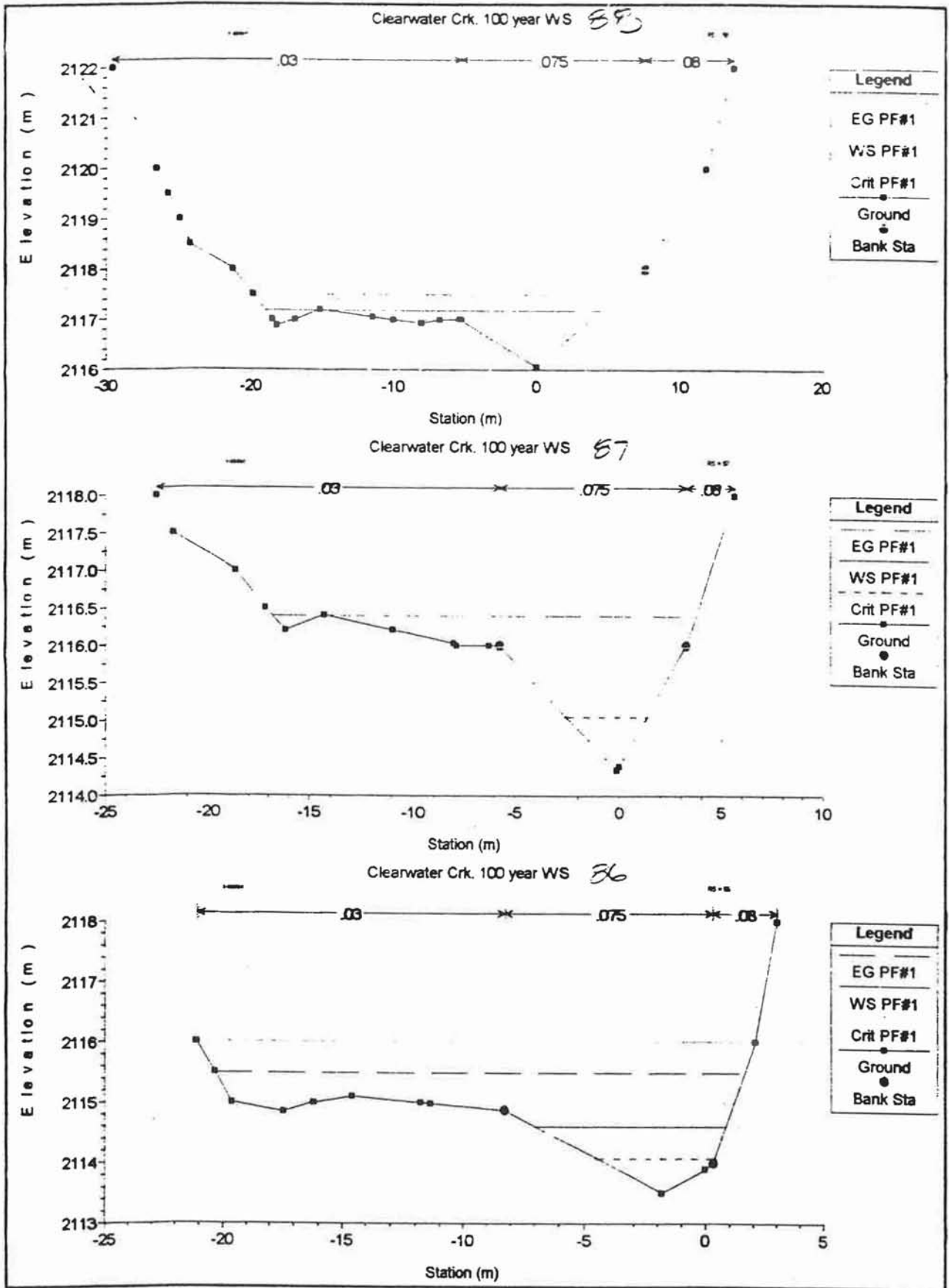












RECEIVED

JUN 29 1999

MONO COUNTY PLANNING DEPT.  
SOUTH COUNTY

***Denio & Associates Engineering***

136 E. Line Street - Suite E, Bishop, CA 93514-3531  
(760) 873-8812 (fax) (760) 873-8821 dnengineers@schat.com

June 25, 1999

**Review of Natural Resources Conservation Service Report**

**Dated: May 19, 1999**

**Proposed Bodie Hills RV Park, Bodie Road, Mono County**

***OVERVIEW***

A review of the NRCS report was requested by Mr. Rich Boardman, Public Works Director, Mono County. The review was to address recommendations for methods of stream bank erosion protection, and other elements of the NRCS report.

***REVIEW***

The NRCS report addresses erosion potential of the stream, and plant based erosion control methods for this project. The plant-based methods are valuable for the project in areas where such methods are appropriate. The detailed information provided regarding appropriate plant types, on-site availability, and techniques will be very useful for the engineer during design of the creek slope stabilization.

As stated in the NRCS report, rock type erosion control methods are vital at key areas. The potential erosion areas of major concern from the engineering perspective are protection of slopes immediately upstream and adjacent to the bridge abutments. Although plant based approaches may be appropriate for other areas of the stream, rock based erosion protection remains appropriate in areas immediately upstream and adjacent to the bridge abutments. Inclusion of plants as part of the rock based protection systems may be possible to achieve a better appearance and a reduction in flow velocity in these areas.

Deletion of rock type protection upstream and adjacent to the bridges may be achieved by one of two approaches: 1). Design the bridges to be supported by deep foundations, (piles or footings) extending below the potential scour elevation. This would allow bridges to stand regardless of erosion at the adjacent stream banks. This approach should be given careful consideration by the designer and Mono County, as such a system does have the potential of having vehicles isolated at the south side of the creek if erosion should make the bridge temporarily inaccessible at the road approaches. 2). Another option is to place the bridge footings a sufficient distance away from the stream banks so they would not be subject to damage from soil erosion. The increase in span may necessitate a midspan support designed for scour protection (deep foundation).

The NRCS report addresses protection at areas of active toe erosion by utilizing rock protection at the toe of stream banks. Such protection is recommended in our report dated February 1999

and remains appropriate in the areas identified in our report. The recommendation to avoid rock protection in the middle of the stream is also appropriate from an engineering standpoint.

Although the NRCS report states that no stream bank stabilization work is being considered by the developer at the north side of the stream, such work should be considered by the project designer, particularly in the areas immediately upstream and adjacent to any bridge abutments and where the stream is close to the highway.

### SUMMARY

The recommendations in the NRCS for soil erosion methods are complementary to the recommendations in our Hydrology study report. Particular consideration should be given to erosion protection immediately upstream and adjacent to the bridge abutments. Rock protection methods are appropriate for these areas, unless bridges are constructed with pile type footings or with abutments removed from the zone of potential erosion. The plant types, availability and placement techniques will be useful for the design of the slope stabilization systems. Our Hydrology report and the NRCS report combined provide valuable resources for creek bed design and slope stabilization.



Truman P. Denio, P.E.



United States  
Department of  
Agriculture

Natural Resources  
Conservation  
Service

1528 Highway 395, Suite 100A  
Gardnerville, Nevada 89410  
(775) 782-3661

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*Commitment to Quality\**

May 19, 1999

Mr. John R. Langford  
BEAR Engineering  
P.O. Box 657  
Bridgeport, CA 93517

Dear John:

On April 30, 1999, Dave Doughty, Civil Engineer, and Jane Schmidt, Resource Specialist with the Natural Resources Conservation Service, met with you and Mr. Bill Lapham on-site to evaluate resource concerns related to streambank erosion at the proposed Bodie RV Trailer Park, located approximately one-quarter mile east of Hwy. 395 on the Bodie Road (State Route 270) in Mono County, California.

You requested NRCS assistance to evaluate the stream channel conditions, gain an understanding of natural processes and human influences on the system, and obtain recommendations from us on how and where streambank stability could be improved on the proposed project site. We focused our review on the south side of Clearwater Creek, where Mr. Lapham's proposed improvements are concentrated. Unstable areas on the north side are influenced by the Bodie Road or lie within the CalTrans right-of-way and are not being considered by the developer for streambank stabilization work.

We reviewed portions of the "Hydrology and Flood Plain Study" by Denio & Associates Engineering (1999) to gain an understanding of watershed size and predicted flows; we did not review or evaluate their engineering recommendations.

The NRCS is not attempting to evaluate potential safety hazards to the public from flooding events through this review. We are providing you input which we would give to any other property owner with resource concerns about streambank erosion. We do feel that over-engineered solutions to streambank instability are, in the long-term, just as detrimental as under-engineered designs; in these type of stream systems vegetation is ultimately still the best protection during high flows. Any streambank treatment which would impede the flow of water in the bankfull flow zone (overhanging limbs, roots, rocks) should be avoided as they would trap sediment and then cause a shift in the deepest part of the channel (thalweg). This would re-route water flows into new pathways and the stream would respond with bank-cutting at new sites. Rock can be used judiciously in this stream system, but it should not be placed anywhere in the middle of the channel as it would divert water into the streambanks and cause more erosion. The

velocity of water increases as it moves along a rocked curve on a streambank, and vegetation does a better job of slowing the flow and dissipating energy. Therefore, while the use of rock at key areas to control erosional forces is vital, its use must be carefully planned, and vegetation should be included as a major component of any streambank stabilization work.

In regard to the issue of how quickly erosion might occur, and potential risk factors, we recommend you analyze the timeframe when the RV Park would be open for business each year. The Sierra Nevada winter "rain on snow" events produce floods of a different size, intensity, and duration than summer thunderstorm events, which typically only cover a small portion of a watershed at any given time. Possibly the U.S. Geologic Survey could provide you with some data which would assist you with this analysis.

The dynamic and changing nature of stream channels must be accommodated, and streambank stabilization measures may need to be modified over time to match changing conditions on the creek. As discussed later in this report, it is unreasonable to expect 100% streambank stability, 100% of the time on this type of stream system, as some erosional processes are natural and anticipated as the creek seeks to maintain an equilibrium between sediment build-up and transport through its system. Striving to completely stop all bank erosion is not only impractical, but it may also result in unpredicted results downstream in the system over the long-term.

#### SITE INFLUENCES

The highway is an encroachment on the Clearwater Creek stream channel. Due to the narrow confines of the canyon and the road paralleling the creek, the road is likely the strongest influence on the creek within this segment of the stream.

Livestock grazing (sheep) occurs upstream, but is not impacting this segment of stream, as evidenced by dense vegetation mats from last year's growth of plants. Old, decadent brush also indicates that neither livestock nor deer have made any substantial use of the vegetation over a long time-frame.

There were no signs of any beaver activity on this stream segment.

#### EXISTING CONDITIONS

Clearwater Creek has downcut from 4 feet deep to 10 feet deep from the original elevation of the valley bottom in this stream segment. This has likely occurred over a long time frame, as evidenced by the position of old willow clumps. Aged willows, possibly 200+ years old, are scattered along the top of the streambank in areas where the stream is now 4 to 10 feet below the top of the bank. (See Photo #2.) These willows established when the creek was close to the top of the bank, as they require a high water table for colonizing a site. The vegetation is "keeping up" with the downcutting process, i.e. willows and other herbaceous vegetation are found from the present stream elevation to the top of the banks, where



slopes have reached an angle of repose. This indicates the downcutting process is not advancing rapidly, but slowly.

As mentioned in the Hydrology Study by Denio & Associates Engineering, the stream is cutting down through deep alluvial soils easily eroded by water. Parent material is volcanic in origin. We estimated approximately 10% of the streambank in this segment was unstable; 90% streambank stability on this stream type with volcanic parent material is in the range of what would be expected to be found under natural conditions in the absence of major human disturbances. Studies in Idaho on similar stream systems showed that 60% of habitat types had 95% or better bank stability, and 80% of habitat types had 75% or better bank stability ratings. (See Overton, et al, 1995 in Appendix A). Therefore, Clearwater Creek in the project area exhibits a high degree of stability, certainly within the normal range expected for this stream type in these soils under natural conditions. On the short segments where active erosion is occurring, the erosional process common to all sites is toe erosion and bank cutting.

Vegetation is very dense and decadent in the eastern part of the project area; in some areas, dead mats of willows, roses and currants impede channel flow and contribute to heavy fuel loading. Dense vegetation within the bankfull flow zone contributes to erosion by collecting debris and re-routing the water into unstable banks during sediment-carrying high flows. There is an abundance of willows on the property, offering on-site material for use in any revegetation efforts. Sedges along the water's edge are also available for transplanting in plugs on any project work along the stream.

We estimated about 120 feet of streambank (at 5 sites) has active toe erosion and vertical banks which could threaten proposed developments located south of the creek. As noted above, this amount of erosion might be expected under natural conditions, so the reason to control these erosion points is to protect proposed developments which would be at risk in the future. Most of the active erosion is on the east half of the project area; the western half is farther along in the process of evolving into a stable system; a new floodplain has been developed within the gully area and the stream is meandering within this floodplain. Vegetation has already naturally re-stabilized most of the area and the banks are not threatened with toe erosion and undercutting.

This process of channel evolution, as seen on Clearwater Creek, is described in Appendix B to provide you with a better understanding of the natural processes at work in this area. The main point is that streams are dynamic in nature and this must be considered when planning streambank stabilization projects.

## **RECOMMENDATIONS:**

### **GENERAL:**

1. Vertical, eroding streambanks are a potential safety hazard to recreationists, as these banks are often undercut and someone standing on the edge could find themselves suddenly in the water, 10 feet below the bank. Besides controlling erosion, safety is another reason to reshape these

banks, unless public access in these areas is controlled by some other method.

2. Taking precautions to stabilize the small eroding areas on the south side of the creek is necessary to protect any proposed future improvements included with the RV Park. A secondary reason to reshape some of the banks on the western half of the project area is that vertical, eroding banks with no vegetative cover are not aesthetically pleasing to recreationists, who view all erosion as a problem in need of correction.

3. We advise developing a vegetation management plan for the area which addresses removing an appropriate amount of vegetation from the stream channel to reduce impediments to streamflows. Where willows and sod-forming sedges are well established at the edge of the stream, their root masses should be left in place, undisturbed. This applies to all areas which do not show signs of vertical banks and active toe erosion. Also, fuel-loading from large piles of decadent and dead brush should be considered to address fire safety concerns. There are several spots where there is a large build-up of dead material; treatment could reduce fuel-loading and provide woody plants the opportunity to regenerate. Recycling these decadent plants could improve wildlife habitat for birds and small animals in the area.

4. We advise considering where recreationists will want to access the creek while using the RV Park and prepare access sites to minimize future erosion problems from people using these areas. If recreationists cut their own trails to the creek, future corrective measures will be needed to fix erosion problems from trails. If access points are predetermined, you may have more success in controlling visitor use patterns and erosion.

5. We could provide you with some recommendations on a seed mix for the upper areas of the streambanks, based on your needs. Slender wheatgrass appeared to be the main grass colonizing upper bank areas at the time of the site visit. Other species could be incorporated, depending on your specific goals for these areas.

**SITE-SPECIFIC RECOMMENDATIONS:** See attached map for locations.

**SITE #1:** Vegetation clearing is needed within the stream channel to allow for bankfull runoff events to pass through, unimpeded. (Bankfull flows are the predicted 1.5 to 2 year runoff event, not to the top of the present streambank.)

**SITE #2:** Clearwater Creek makes a turn to the north, and there are vertical banks on the south side. See Photo #1. Only 30 feet of the streambank is actively eroding at the downstream end of the curve. The upstream part of this curve has stabilized with a cover of willows. Directly behind the eroding area, a tributary (ephemeral) channel feeds into Clearwater Creek from the south side. The developer plans to install a culvert in this tributary and cover the culvert with soil. The toe of the actively eroding area on the streambank should be excavated and rock should be keyed-in to the bankfull elevation, sized appropriately according to engineering standards, and angular in shape. The bank above the rock toe protection can then be shaped to a 2:1 slope angle. Willows should be planted (entire willows can be transplanted if equipment is available) into a trench above the rock toe;

willow roots need to be planted to a depth to assure water availability throughout the low flow period in late summer and fall. Willows could also be planted in a brush layer (see attached diagrams for examples of toe rock, bank reshaping, and vegetation treatments). Above the willows, a herbaceous seed mix can be planted on the rest of the bare area to encourage stabilization of the entire reshaped bank. Sod transplants at the water's edge may be used to tie the rock section into the areas immediately above and below the work area.

**SITE #3:** See Photo # 2. Clearwater Creek abruptly turns to the north at this spot. The lower 30 feet of streambank on the south side is actively eroding (toe erosion and bank undercutting mechanism) and requires stabilization in order to protect any developments planned for the area (Pad #10 and the gravel road connecting the RV pads would be located behind this site). Recommend same treatment as prescribed for Site #2, above. Rock toe protection to the bankfull elevation, bank reshaping to a 2:1 slope, and transplanting the existing large willow clumps at the top of the bank to a position above the new rock toe, to absorb and divert energy during high flows (or use brush layering). Seed remainder of bank with species adapted to the drier upper bank conditions.

**SITE #4:** This is a small portion of streambank with vertical banks, just downstream of the proposed footbridge. Approximately 20 feet of bank could be reshaped, with rock toe and vegetation treatment as described under Sites 2 and 3, above.

**SITE #5:** Another small section of streambank, about 20 feet long, with vertical banks and large willows overhanging into the water. Same treatment recommended as for Sites 2, 3, and 4, above, existing willows may be transplanted to be used as part of the stabilization of the slope.

**SITE #6:** This section of streambank, above the proposed western bridge, is an area which has evolved into a stable channel, except for the last 20 feet along the curve, which is still actively eroding. See Photo #3. The vertical banks seen on the left side of the photo (upstream end) are no longer actively eroding; the stream is now meandering through this segment, and willows provide protection to the toe of the slope. See Photo #4. The only work we would recommend on this upper portion is to reshape the upper vertical banks, to a 2:1 slope, if possible, and re-seed with the appropriate herbaceous seed mix. This will dramatically shorten the natural process of bank sloughing which will take many years for nature to complete, and provide a more aesthetic appearance to the area. Equipment should not disturb the existing vegetation along the stream. The bottom 20 feet of the curve should be laid back to a 2:1 slope and treated the same as for Sites 2-5, above with rock toe and vegetation planting.

**Site #7:** The final area of concern is located immediately downstream of the proposed western bridge site, and involves about 100 feet of streambank on the south side. Since there are no developments planned behind or below this segment of Clearwater Creek, any work done on this streambank would be for aesthetics, only. This segment of stream has also stabilized and reshaping the remaining vertical banks and replanting with a herbaceous seed mix would simply speed the natural process which is now occurring very slowly on site. See Photo #5. Again, the toe of the slope is already



protected by existing vegetation and should not be disturbed with equipment.

if we can provide further clarification on this report, please contact us at (775) 782-3661. We would be glad to continue to provide you with technical assistance on resource aspects of this project in the future.

Sincerely,

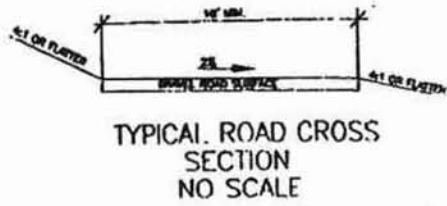


Jane Schmidt  
Resource Specialist

Dave Doughty  
Civil Engineer

cc: Mr. Bill Lapham

Enc: map, diagrams, photos, Appendices A & B

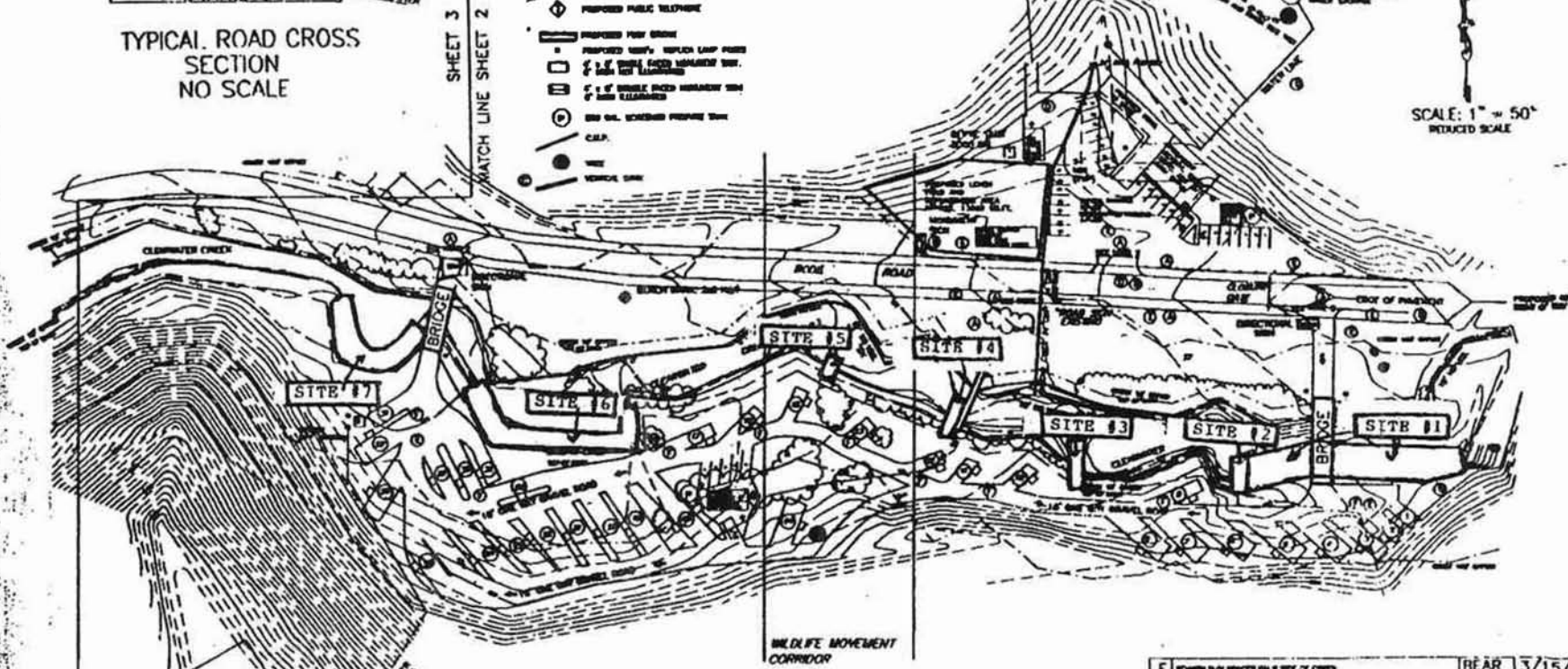


**LEGEND**

- PROPOSED WELL
- PROPOSED MOTORIST VEHICLE STOPPING SPACE
- CHANGED WILDLIFE
- PROPOSED SCIFIC TREE
- PROPOSED TREE CHAIRS
- PROPOSED SPAK FROM POINT P OF HIGH
- PROPOSED PUBLIC TELEPHONE
- PROPOSED FIRE DRIVE
- PROPOSED TRAIL, MATCH LINE CROSS
- 1/2" X 1/2" SQUARE LIGHT SIGNMENT SPACED AT 10' INTERVALS
- 1/2" X 1/2" SQUARE ROAD MARKING SIGN AT 10' INTERVALS
- ONE OR SEVERAL PROPOSED TRAIL
- C.A.P.
- WEL
- VEHICLE SIGN

APPROXIMATE LOCATION OF SHADOW  
TO INTERCEPT VEHICLE UNDERPASS  
ALONG BRIDGE, BRIDGE TO LEFT  
SIDE OR BRIDGE  
SEE PROPOSED PLAN SHEET "A"

SCALE: 1" = 50'  
RETRACTED SCALE



**MAP OF SITE NUMBERS  
REFERENCED IN NRCS REPORT  
DATED 5/19/99**

F	REVISED BY: [ ]	DATE: 3/15/99
E	BY: [ ]	DATE: 8/9/98
D	BY: [ ]	DATE: 12/2/97
C	BY: [ ]	DATE: 12/1/97
B	BY: [ ]	DATE: 7/23/97
A	BY: [ ]	DATE: 3/14/97
REV.:	DESCRIPTION:	BY:
FOR APPROVAL:	NO SIGN:	TO FIELD:
E & S APPROVAL:	AS NEEDED:	

<b>BEAR Engineering</b> Civil Engineering & Surveying		(616) 832-7077 P.O. Box 657 46 Sacher St., Ste. 3 Beverly Hills, CA 91517
JOB NAME: LOCATION: CONTRACTOR:	SCOPE HILLS RV PARK PORTION OF SECTION 24 T4N, R25E, U33N APN# 11-070-04	DRAWN BY: [ ] SCALE: DATE: 12/9/98 JOB NUMBER:
DESIGNER:	CHECKED BY:	SHEET 2 OF 5 DDPREVREV.DWG

PHOTOGRAPHS  
BODIE RV PARK PROPOSAL  
April 30, 1999



PHOTO #1. Site #2 on map. 30 foot long area of eroding, vertical banks on south side of Clearwater Creek. An ephemeral tributary enters into the creek at the right side of the photo, this side drainage runs directly behind the eroding bank! Developer proposes to install a culvert in the tributary and cover with soil. The toe of the eroding slope could be protected with rock, bank re-shaped to 2:1 slope and willows and other vegetation replanted to stabilize this spot.



PHOTO #2. Site #3 on map. Note position of willows on top of eroding bank. This indicates that Clearwater Creek once flowed at that higher elevation, in order for these willows to become established, and that the stream has downcut slowly over time to its present elevation. Note willows in foreground, stabilizing the channel configuration until the stream makes almost a 90 degree turn to the north. About 30 feet of vertical streambank could be stabilized with rock toe and vegetation planting.

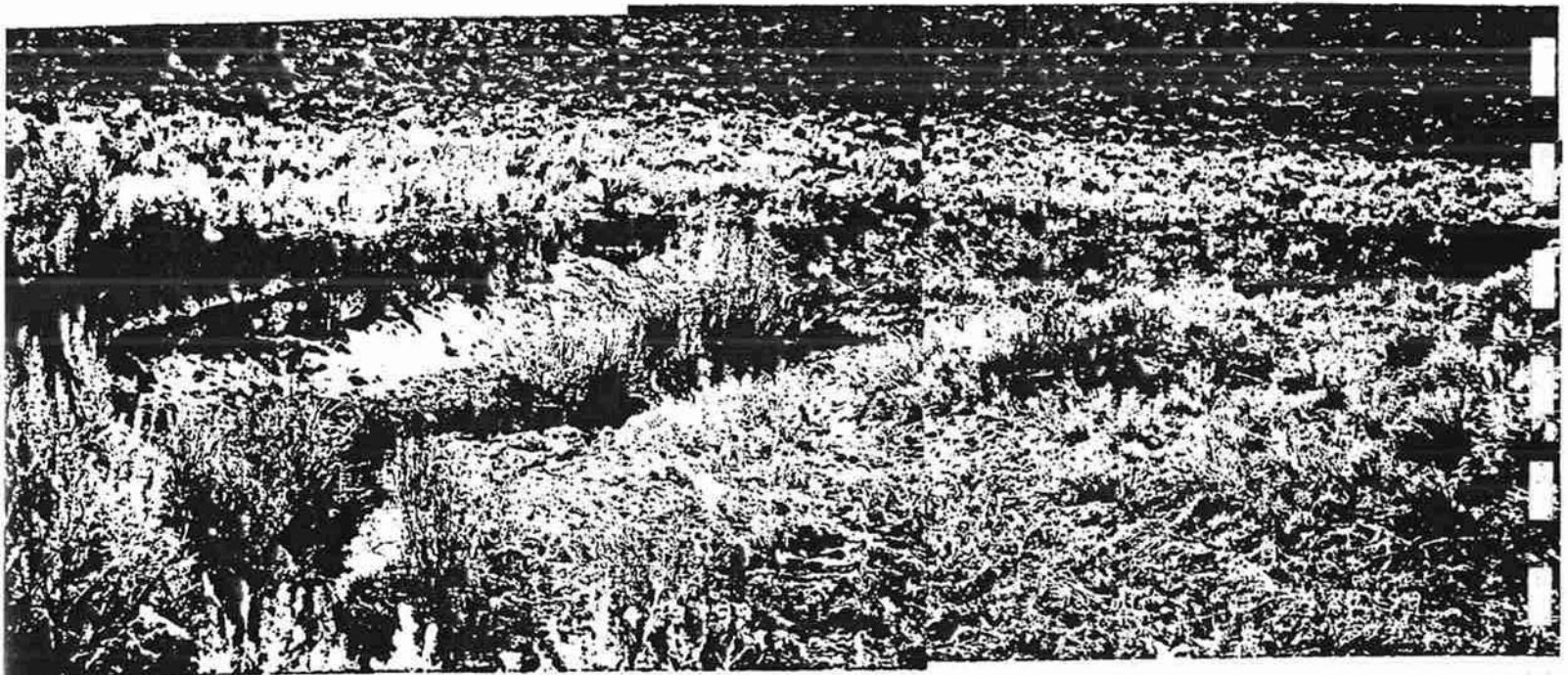


PHOTO #3: Site #6 on map. This section of the creek, just upstream of the proposed western bridge, has regained significant stability, after downcutting in the past. The vertical banks seen on the left are no longer



actively eroding at the toe of the slope; they are now sloughing off soil from the upper part of the vertical banks and slowly reshaping the banks into an angle of repose through natural processes. The creek itself has developed a new floodplain and is beginning to meander within it; willows at the edge of the creek stabilize the toe of the slope. Vertical banks on the left could be reshaped mechanically and replanted to speed along the natural process, but equipment should not disturb the lower bank or the vegetation growing there. At the far right, a short distance of streambank (20 feet) becomes vertical with active toe erosion, this should be stabilized with rock toe, reshaping and replanting.

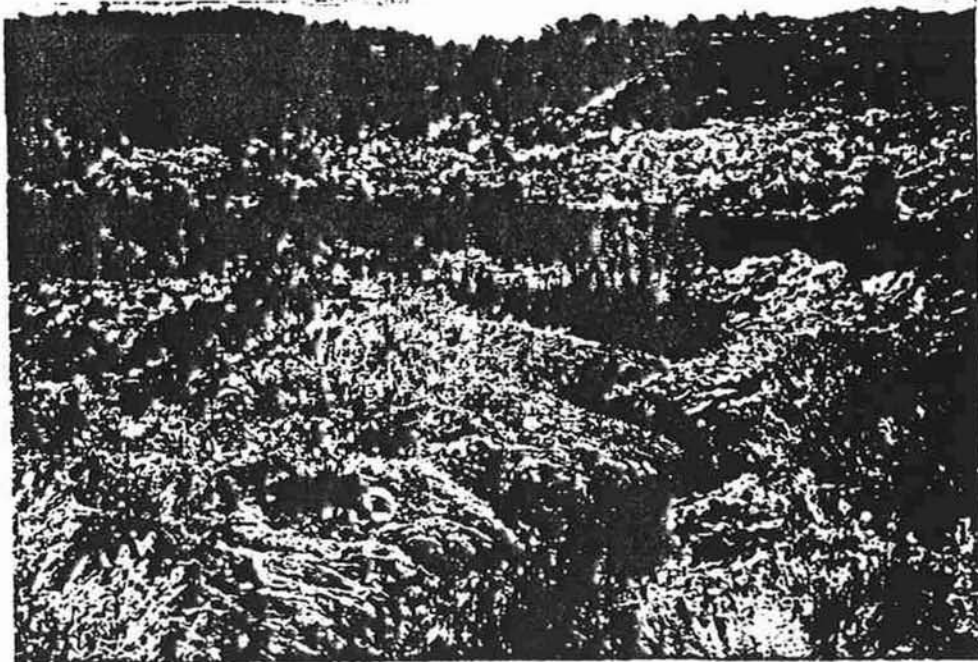
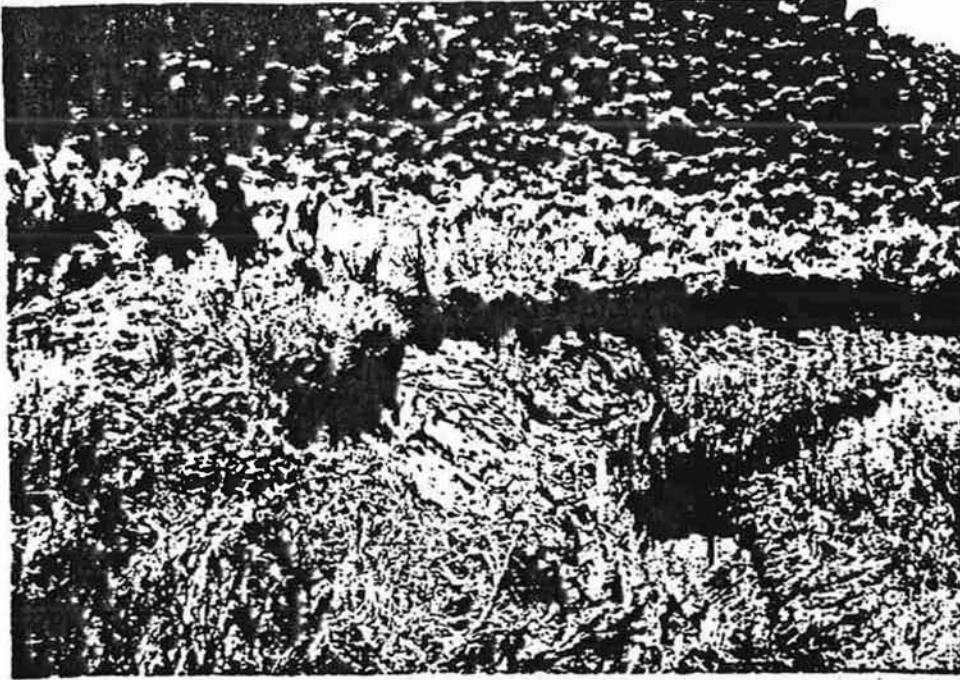


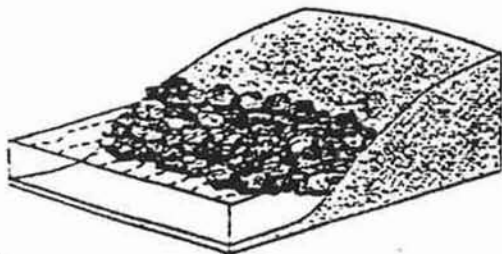
PHOTO #4. Also showing Site #6. Looking upstream at creek meandering through new floodplain, and banks on south side stabilized at the toe by willows.



**PHOTO #5. Site #7 on the map. Similiar situation to Site #6, where the remnants of the vertical banks are no longer actively eroding and the stream channel has stailized. There are no proposed developments behind or downstream of this area, but banks could be reshaped for aesthetics and to speed along the natural process already occuring on the site.**

## STREAMBANK TREATMENT

### Stone Toe Protection



A ridge of quarried rock or stream cobble placed at the toe of the streambank as an armor to deflect flow from the bank, stabilize the slope and promote sediment deposition.

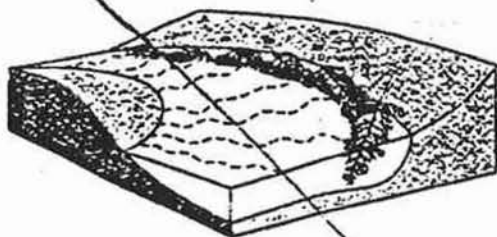
#### Applications and Effectiveness

- Should be used on streams where banks are being undermined by toe scour, and where vegetation cannot be used.
- Stone prevents removal of the failed streambank material that collects at the toe, allows revegetation and stabilizes the streambank.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerated source of streamside vegetation.
- Can be placed with minimal disturbance to existing slope, habitat, and vegetation.

#### For More Information

- Consult the following references: Nos. 10, 21, 56, 67, 77, 81.

### Tree Revetments



A row of interconnected trees attached to the toe of the streambank or to deadmen in the streambank to reduce flow velocities along eroding streambanks, trap sediment, and provide a substrate for plant establishment and erosion control.

#### Applications and Effectiveness

- Design of adequate anchoring systems is necessary.
- Wire anchoring systems can present safety hazards.
- Work best on streams with streambank heights under 12 feet and bankfull velocities under 6 feet per second.
- Use inexpensive, readily available materials.
- Capture sediment and enhances conditions for colonization of native species particularly on streams with high bed material loads.
- Limited life and must be replaced periodically.
- Might be severely damaged by ice flows.
- Not appropriate for installation directly upstream of bridges and other channel constrictions because of the potential for downstream damages should the revetment dislodge.
- Should not be used if they occupy more than 15 percent of the channel's cross sectional area at bankfull level.
- Not recommended if debris jams on downstream bridges might cause subsequent problems.
- Species that are resistant to decay are best because they extend the establishment period for planted or volunteer species that succeed them.
- Requires toe protection where toe scour is anticipated.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerated source of streamside vegetation.

#### For More Information

- Consult the following references: Nos. 11, 21, 34, 56, 60, 77, 79.



## STREAMBANK TREATMENT

### Bank Shaping and Planting



Regrading streambanks to a stable slope, placing topsoil and other materials needed for sustaining plant growth, and selecting, installing and establishing appropriate plant species.

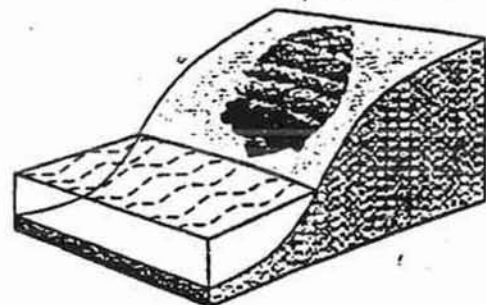
### Applications and Effectiveness

- Most successful on streambanks where moderate erosion and channel migration are anticipated.
- Reinforcement at the toe of the embankment is often needed.
- Enhances conditions for colonization of native species.
- Used in conjunction with other protective practices where flow velocities exceed the tolerance range for available plants, and where erosion occurs below base flows.
- Streambank soil materials, probable groundwater fluctuation, and bank loading conditions are factors for determining appropriate slope conditions.
- Slope stability analyses are recommended.

### For More Information

- Consult the following references: Nos. 11, 14, 56, 61, 65, 67, 68, 77, 79.

### Branch Packing (BRUSH LAYERING)



Alternate layers of live branches and compacted backfill which stabilize and revegetate slumps and holes in streambanks.

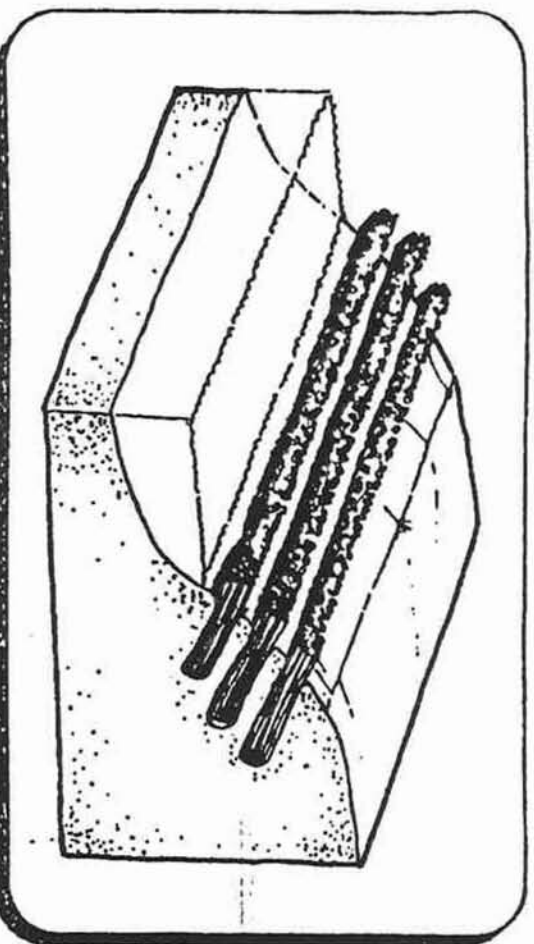
### Applications and Effectiveness

- Commonly used where patches of streambank have been scoured out or have slumped leaving a void.
- Appropriate after stresses causing the slump have been removed.
- Less commonly used on eroded slopes where excavation is required to install the branches.
- Produces a filter barrier that prevents erosion and scouring from streambank or overbank flows.
- Rapidly establishes a vegetated streambank.
- Enhances conditions for colonization of native species.
- Provides immediate soil reinforcement.
- Live branches serve as tensile inclusions for reinforcement once installed.
- Typically not effective in slump areas greater than four feet deep or four feet wide.

### For More Information

- Consult the following references: Nos. 14, 21, 34, 79, 81.

# Brush Layering



## Materials:

- o willow cuttings
- o clothesline cord or wire
- o chain saw or loppers (to harvest willows)
- o shovel
- o 1 person minimum

## Description and Use

This technique uses bundles of willow cuttings (*Salix* spp.) in buried trenches along the slope of an eroding streambank. This willow "terrace" is used to reduce the length of slope of the streambank. The willow cuttings will sprout and take root, thus stabilizing the streambank with a dense matrix of roots. Some toe protection such as a wattle, fiberchime, or rock may be necessary with this technique.

## How To Install

1. Harvest willow cuttings from a local, native stand that is in healthy condition taking no more than 2/3 of each plant. Cuttings should be at least a 1/2 inch diameter or larger to ensure an adequate supply of stored energy for rooting, but there should be a good mixture of various sizes. This is to ensure better entrapment of sediment which will promote better root growth.

Ideally, cuttings should be collected during the dormant season to ensure the highest success rate. Cuttings can be collected during the growing season if all the leaves are removed from the stem, although establishment success will be lower. Spring plantings are more successful than fall plantings.

2. The cuttings may be tied into bundles to facilitate transportation to the project site. The terminal bud should be removed so that stem energy will be re-routed to the lateral buds for more

efficient root and stem sprouting.

3. Soak the bundles for 4 to 5 days.

4. Toe protection if needed should be installed prior to excavation. Excavate a horizontal trench into the streambank along the length of the area to be treated. The trench should be located between the annual low and high water levels. The trench should be approximately 2 to 3 feet deep and the back portion must reach the permanent water table. The surface of the trench should be sloped 10 to 20 degrees such that the outside edge is higher than the inside.

5. Cut the twine on the bundles and place the cuttings in the trench. Make sure the basal cut ends reach the back of the trench. Spread the cuttings in the trench until desired thickness is achieved. In general, the thicker and denser the cuttings, the better the technique will work.

6. Slough the bank down on to the cuttings and pack the soil into the cuttings. To remove air pockets around the cuttings, water the soil when backfilling. The cuttings should extend no more than 12 to 18 inches from the bank to prevent them from being ripped out during high flows. Trim off the excess.

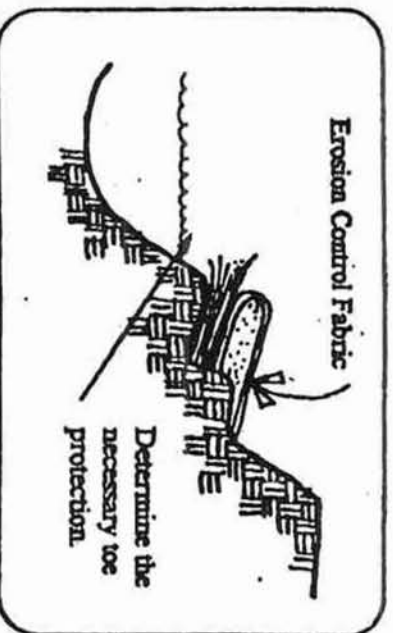
7. Create another terrace for cuttings behind the first layer as shown in the illustrations. Repeat the trenching and layering process until the streambank is sufficiently covered with brush layers. A brush trench can be installed at the top of the bank for overland flows (refer to Brush Trench Technique Sheet).

# Brush Layering

## Inventory & Planning Considerations

1. Corole willow (*Salix exigua*) is a particularly good species for this method because of its dense rooting system. This technique can also be used with a mixture of reddish dogwood (*Cornus sericea*) and willow but to encourage rooting in the dogwood, the stems will need to be manually nicked or cut and treated with rooting hormone.
2. A critical inventory step is to determine the availability of moisture for the cuttings. This technique is best applied to areas with bank seepage to supply enough moisture for the cuttings. In our semi-arid to arid region, the upper portion of the streambank may not have enough permanent moisture to establish the cuttings, and thus, other techniques may be required.

3. Another critical step with this technique is to determine if toe protection is necessary. Analysis and calculations will provide some guidance (see Chapter 3 Streambank Bioengineering Guide). In many cases rock will be necessary to provide adequate protection. In addition to toe protection, erosion control fabric can be used to protect the soil between the layers (See below illustration).



### Brush Layering with Erosion Control Fabric

4. Give careful attention to the upstream and downstream ends of the treatment area to prevent flows from getting behind the layers. Tying into existing features on site such as trees and rocks or the additional placement of brush and rocks are possible solutions.

## Management

To ensure the highest success for the treated area, determine the land management practices that created the eroded streambanks and modify those practices as necessary.

If the area is grazed, restrict livestock from treated areas to allow the eroded section of streambank to heal. Exclusion fences are the most efficient means to accomplish this goal. Managers should resist the temptation to put the exclusion fences at the high water line. The enclosure areas should include enough of the riparian zone to allow the stream to shift naturally over time.

If the area is farmed, a riparian buffer strip should be established and maintained. A buffer strip on both sides of the stream should be set aside to allow for natural riparian vegetation and stream function. A wider buffer strip is strongly encouraged and will yield greater benefits.

Check with your local NRCS district conservationist for cost-share programs and volunteers for fencing, planting, and other restoration activities.

Finally, a stream is an interconnected system and land use practices both upstream and downstream will affect the success of your bioengineering work. Talk with your neighbors and work together to create a healthier riparian and stream system that can benefit everyone.

## Monitoring & Maintenance

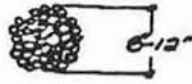
Do not ignore the project after it has been installed. Periodic monitoring of the project will provide valuable insight into the stabilization process and may offer important information for future projects.

Periodic maintenance includes making sure the streambank is not eroding close to the side of the trench. It may be determined that some additional protection is necessary to allow more time for the cuttings to take root and stabilize the streambank.

# Procedure for Brush Layer



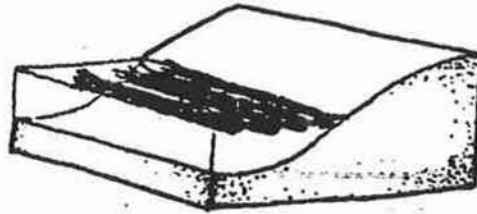
Harvest the willows and remove terminal bud.



Tie cuttings into bundles using 2 pieces of twine to facilitate transportation.

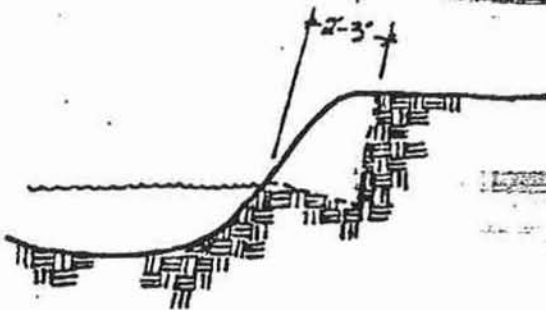
**Step One: Acquire Willow**

Soak the bundles for 5 to 7 days before planting. Remove from water before roots emerge.



**Step Two: Soak Willow Bundles**

Install the selected toe protection. Excavate the trench and make sure the trench slopes back.



**Step Three: Excavate trench**

Lay out the cuttings along the trench and slough the bank onto the cuttings. Work the soils into the cuttings.



**Step Four: Layer Placement**

Create another terrace as shown and place the cuttings. Slough the bank on to the cuttings.



**Step Five: 2nd Layer Placement**

Repeat the process until the final layer is placed.



**Step Six: 3rd Layer Placement**

## APPENDIX A

### BODIE RV PARK PROPOSAL

The attached excerpt from Overton, et al (1995) is intended to provide the resource manager a description of stream characteristics that represent natural conditions in the absence of major human disturbances for key stream types as classified by Rosgen (see also Appendix B). The intent of the Overton, et al report is to help managers predict the effects and risks of prescribed management actions, determine the design and location of restoration efforts, and extrapolate results from sampled areas (summarized in their report) to unsampled areas.

The attached excerpt references a "C" type stream, as defined by the Rosgen classification system as a low gradient, meandering channel, found in many meadows. It is further classified by parent material, in this case, volcanic in origin. While the data presented is not from the eastern California area, it offers a general representation of how these stream types behave under natural conditions in these soil types. The data indicates that, under natural conditions, these stream systems will display relatively high streambank stability.





United States  
Department  
of Agriculture

Forest Service

Intermountain  
Research Station

General Technical  
Report INT-GTR-322

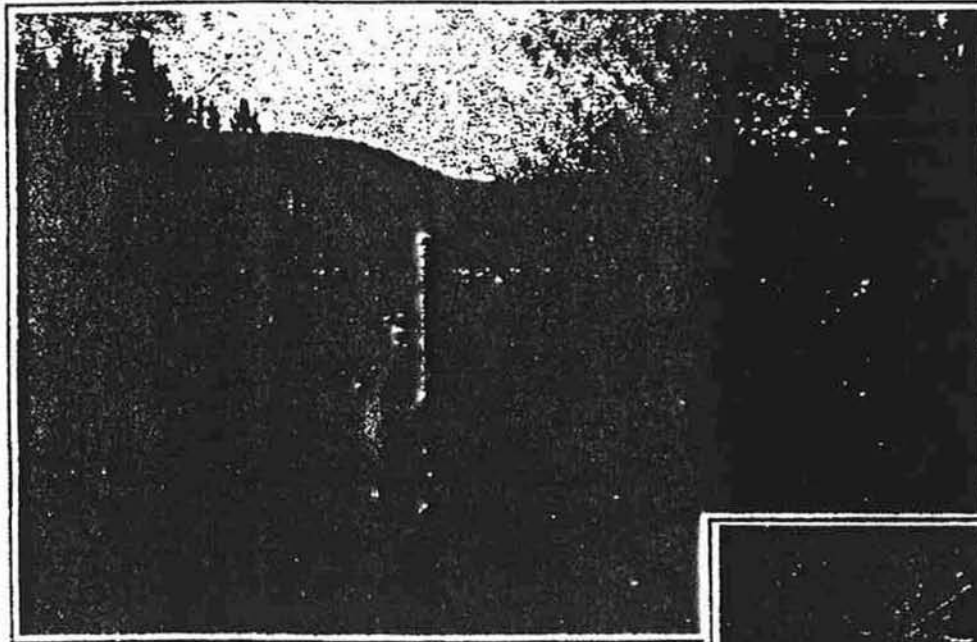
August 1995



*Jan 5*

# User's Guide to Fish Habitat: Descriptions that Represent Natural Conditions in the Salmon River Basin, Idaho

C. Kerry Overton  
John D. McIntyre  
Robyn Armstrong  
Shari L. Whitwell  
Kelly A. Duncan



## Frequency Distributions

The frequency distribution is a count of how frequently a value occurs among the set of observations. Because we have a large data set, the data must be condensed and summarized into a more compact and interpretable form. The frequency distribution allows us to quickly view the data set's range from low to high, and at what values we see clustering.

The data have been converted to relative frequencies (fig. 12) and cumulative relative frequencies (fig. 13). Relative frequencies (fig. 12) are helpful in determining the percent occurrence of that observation in relation to the other observations. For example, total stable banks (100 percent stable) made up 52 percent of the observations (fig. 12). This frequency distribution also displays how the data are skewed. For example, figure 12 data are skewed to the left. Because of this skewed distribution, the mean (84) has little value in regard to identifying the central tendency for bank stability. The most logical measure of central tendency is the mode, the value that occurs most frequently.

The cumulative relative frequency example (fig. 13) lets us quickly determine how many observations are above or below a particular value. For example, figure 13 indicates that approximately 15 percent of the habitat types had 50 percent or less bank stability, approximately 70 percent of the habitat types had better than 80 percent bank stability, and 60 percent of the habitat types had 90 percent or better bank stability. Figures 12 and 13 quickly characterize bank stability for low gradient (less than 1.5 percent), unconfined, plutonic geology channel reach types.

The following section describes stream channel attributes that represent natural condition variables. Detailed field measurement and recording procedures will be found in the R1/R4 Fish and Fish Habitat Standard Inventory Procedures (Overton and others, in preparation). Appendix C provides a general description of the electronic data base queries used to generate the frequency distributions.

## Bank Instability

Bank instability can be initiated by natural events (extreme floods, wildfires, mass wasting) or human disturbances (grazing, logging, roads, urban developments, gravel operations) that change discharge, sediment load, and channel stability (MacDonald and others 1991). Bank material and vegetation type and density also affect the stability of banks (Platts 1984). Eroding streambanks support little or no riparian vegetation, resulting in a loss of stream shading, bank undercut, nutrient loading, and terrestrial insect drop into the stream. This can affect salmonids by increasing summertime stream temperatures, reducing wintertime temperatures resulting in the formation of anchor ice, reducing cover through a lack of bank undercut or overhead vegetation cover, and depositing sediment. All this will reduce depths, interstitial gravel spaces, and pool volumes; and decrease terrestrial and aquatic fish food items (Meehan 1991).

A stable streambank, as viewed at the steepest sloped portion of the channel between the bankfull and existing water level, shows no evidence of active erosion, breakdown, tension cracking, or shearing. An unstable streambank shows evidence of active erosion and/or slumping; undercut banks are considered stable until tension fractures show on the ground surface at the back of the undercut. Left and right bank lengths are estimated separately, as bank lengths may not be equal. Every portion of each bank is accounted for. Stable banks are expressed as a percentage of the total estimated bank length (includes left and right bank) for each habitat type. Figures 14 through 39 are the statistical summaries for percent bank stability grouped by all surveyed stream reaches, by channel reach types, and by channel reach types and geology.



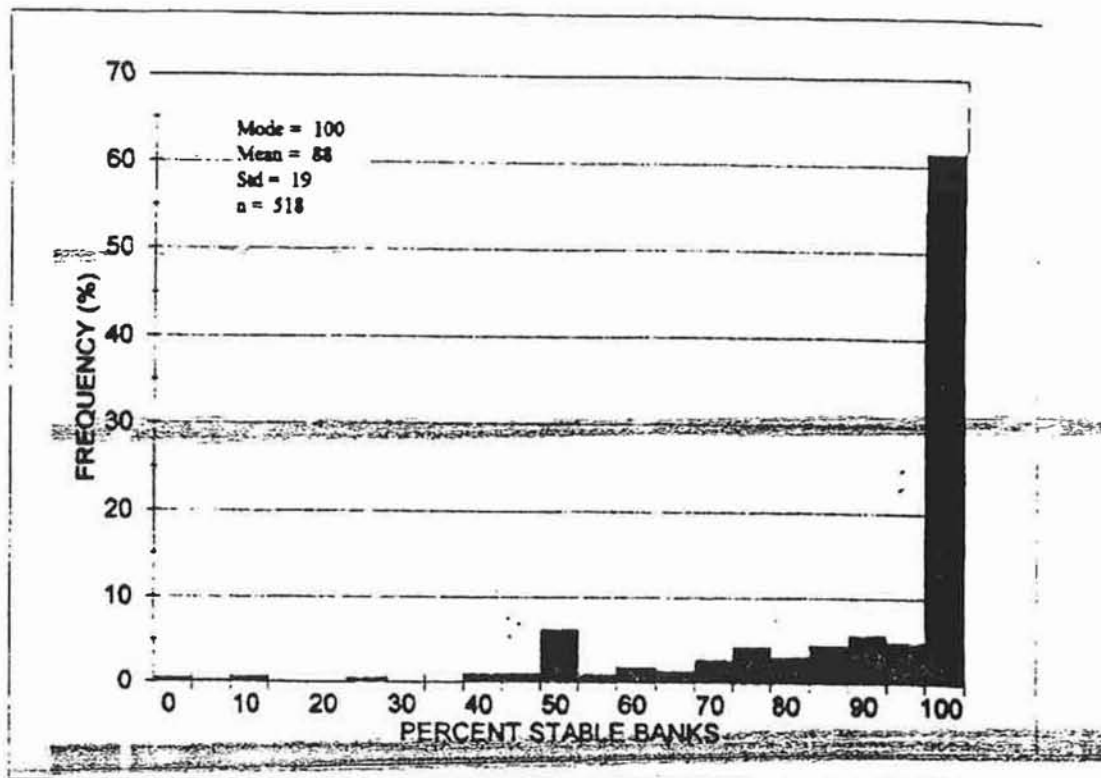


Figure 36—Frequency distribution displaying the range of percent bank stability for "C" channel volcanic stream reaches.

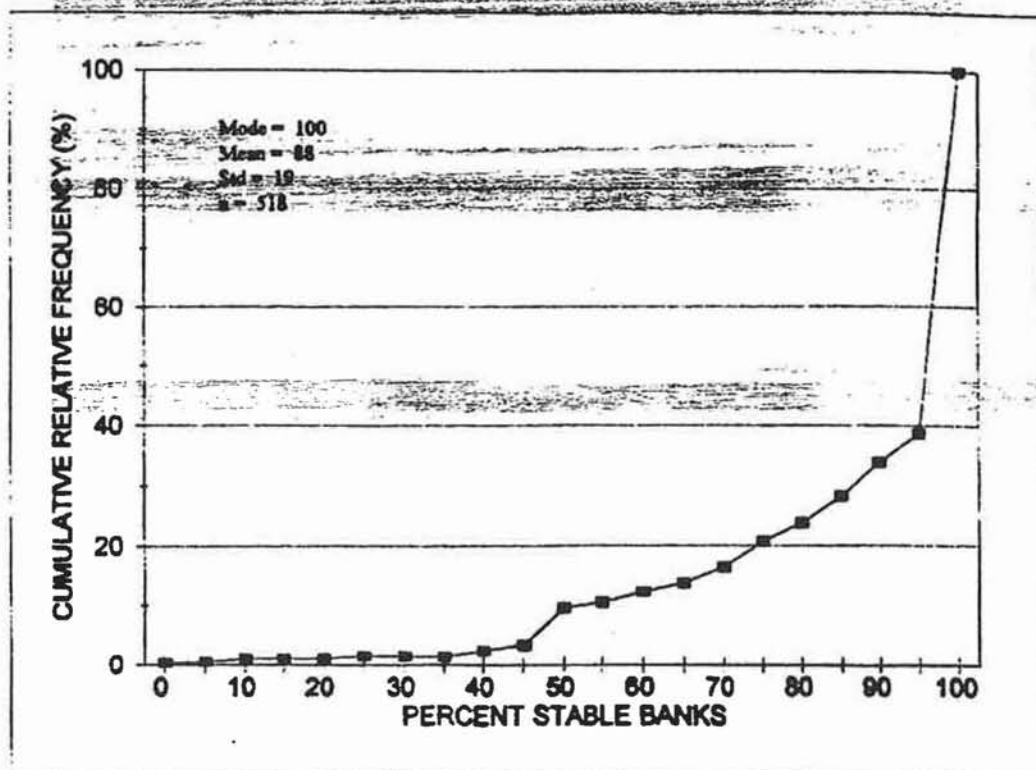


Figure 37—Cumulative relative frequency distribution displaying the range of percent bank stability for "C" channel volcanic stream reaches.

## APPENDIX B

### BODIE RV PARK PROPOSAL

The attached excerpt from Dave Rosgen's "Applied River Morphology" provides some background on the evolutionary and dynamic nature of stream systems. The examples discussed in Figures 6-5 and 6-6 most closely relate to Clearwater Creek and the Bodie RV Park proposal area. These examples are for a streamtype with more of a gravel substrate (hence the "4" included in each stream type, e.g. E4, G4, etc.). Clearwater Creek appears to be more of a "6" substrate, consisting of depositional soils (alluvium).

Figures 6-5 and 6-6 show the progression of changes in a channel from one stream type to another, due to some major influence on the system which caused changes streamflow magnitude and/or timing, sediment supply and/or size, direct channel disturbance, or riparian vegetation changes. Any number of factors could have initiated these channel changes along Clearwater Creek, as the area has been under significant human influence since the mining boom in the late 1800's. What is pertinent today is understanding that the segment of stream through the proposed RV Park is in various stages of evolution. The western half of the segment has moved from the "G" (gully) stage to a stream which has created a new floodplain, and has developed sinuosity and stable banks within that floodplain. The upper portion, or eastern half of the project area, has a few areas of active erosion (still a gully), but most of this area is starting to develop a new floodplain.

As Rosgen points out, labelling different evolutionary stages as "good" or "bad" does not acknowledge the role of the interim steps a stream channel must evolve through in order to regain equilibrium and stability following a natural or human caused disturbance. Monitoring the creek's response to development and stabilization work will show if the creek continues on its present pathway to establishing a new, more stable channel within a new floodplain over time.

# APPLIED RIVER MORPHOLOGY

A high-contrast, black and white photograph of a river channel. The foreground is dominated by a large, dark rock on the left side. The river flows from the background towards the foreground, with a bridge visible in the distance. The water is bright white, contrasting sharply with the dark rocks and banks. The overall image has a grainy, high-contrast aesthetic.

**Dave Rosgen**

*Illustrated by Hilton Lee Silvey*



## EVOLUTIONARY STAGES OF CHANNEL ADJUSTMENT

To understand the evolutionary tendencies of rivers, following either a natural or an imposed change is to improve one's ability to "read the river" in its current state. A proper interpretation for the current condition of a river reach in comparison to its potential can provide a valuable guide for management direction and/or restoration. A given classification of a river reach does not indicate that the stream is necessarily in a stable pattern or is functioning close to its "potential." Rather, the stream type classification developed with a Level II analysis describes only the existing morphologic conditions. The desire to make a stream into what is conceived to be "good," has to be balanced with an individual's understanding of the morphological features of the natural stable stream system. The self-stabilization tendencies of a stream system and the natural tendency to evolve into a particular morphological form needs to be understood to provide an individual with a "blueprint" for the river's future. Watershed management and stream restoration can be effective when such activities and practices are designed to be compatible with the "most probable stable form" of rivers. The most probable state of rivers is best described in the book, "A View of the River" by L.B. Leopold (1994). The intricacies of the multiple interacting variables which form and maintain the river are well described by Leopold (1994), where the concept of entropy (energy distribution), longitudinal profiles, and principles of minimum variance are used to describe the progression toward the most probable form. These fluvial process tendencies toward a uniformity of energy expenditure in open, steady state systems are complex, which often makes communication of the related principles difficult in terms of description and understanding. Field evidence collected over time can help provide insight into observed changes in river morphology, in the presence of changing flow and sediment regimes that may be influenced by changes in watershed condition.

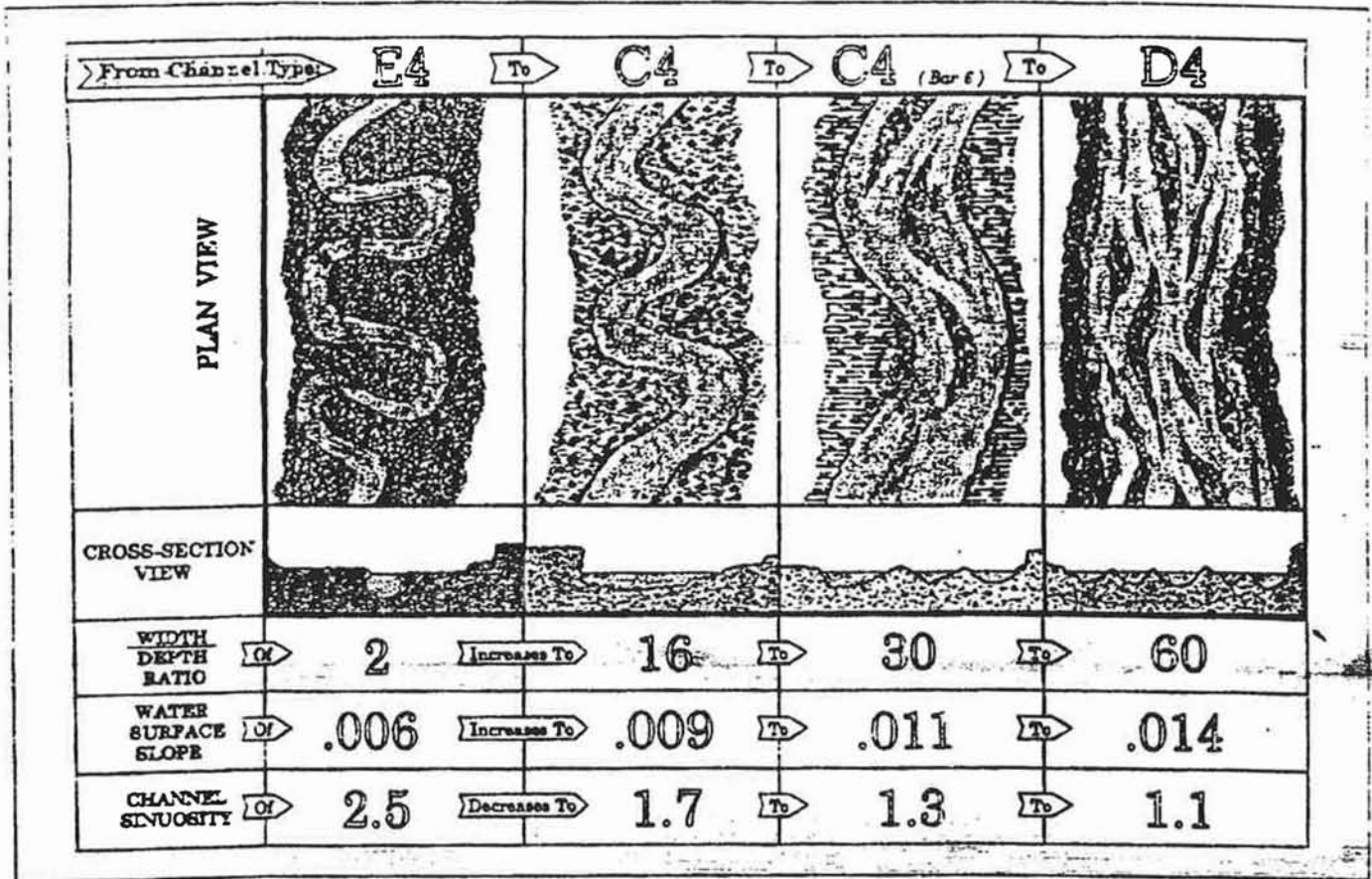
### Adjustment Examples

Rivers generally do not change instantaneously, under a geomorphic exceedance or "threshold". Rather, they undergo a more consistent series of channel adjustments over time to accommodate changes or alterations in the "driving" variables. Many of the individual adjustments can occur quite rapidly, however. The dimensions, pattern, and profile of the river reflect the combined processes of adjustment which are presently responsible for the form and function of the river. The rate and direction of channel adjustment is a function of the nature and magnitude of perhaps the change in climate or land use and the stream type involved. Some stream types can change or evolve rapidly, while others are comparatively slow in their response.

In reviewing historical aerial photos, observations can be made of progressive stages in channel adjustment. Adjustments occur partially as a result of a change in the streamflow magnitude and/or timing, sediment supply and/or size, direct channel disturbance, and riparian vegetation changes. Observed changes in channel morphology over time can be quantified and communicated in terms of stream type changes. For example, within a given stream reach and perhaps due to streambank instability, with a resultant increase in bank erosion rate, field observations would normally indicate: an increasing width/depth ratio; decreased sinuosity; increased slope; establishment of a bi-modal particle size distribution; increased bar deposition; accelerated bank erosion; increased sediment supply; decreased sediment transport capacity; a decreased meander width ratio; and channel aggradation. The extended changes in process and condition can be described more simply as a series of progressive physical responses or channel adjustments resulting in the evolution of a stream type from an E4 to C4 to C4 (bar-braided) to D4 (Figure 6-4), (Rosgen, 1994).

Corresponding changes in channel dimension, pattern, and profile that would progressively evolve from an E4 to C4 to G4 to F4 to E4 stream type is shown in Figure 6-5 (Rosgen 1994). As the local reach slope steepens in conjunction with a higher

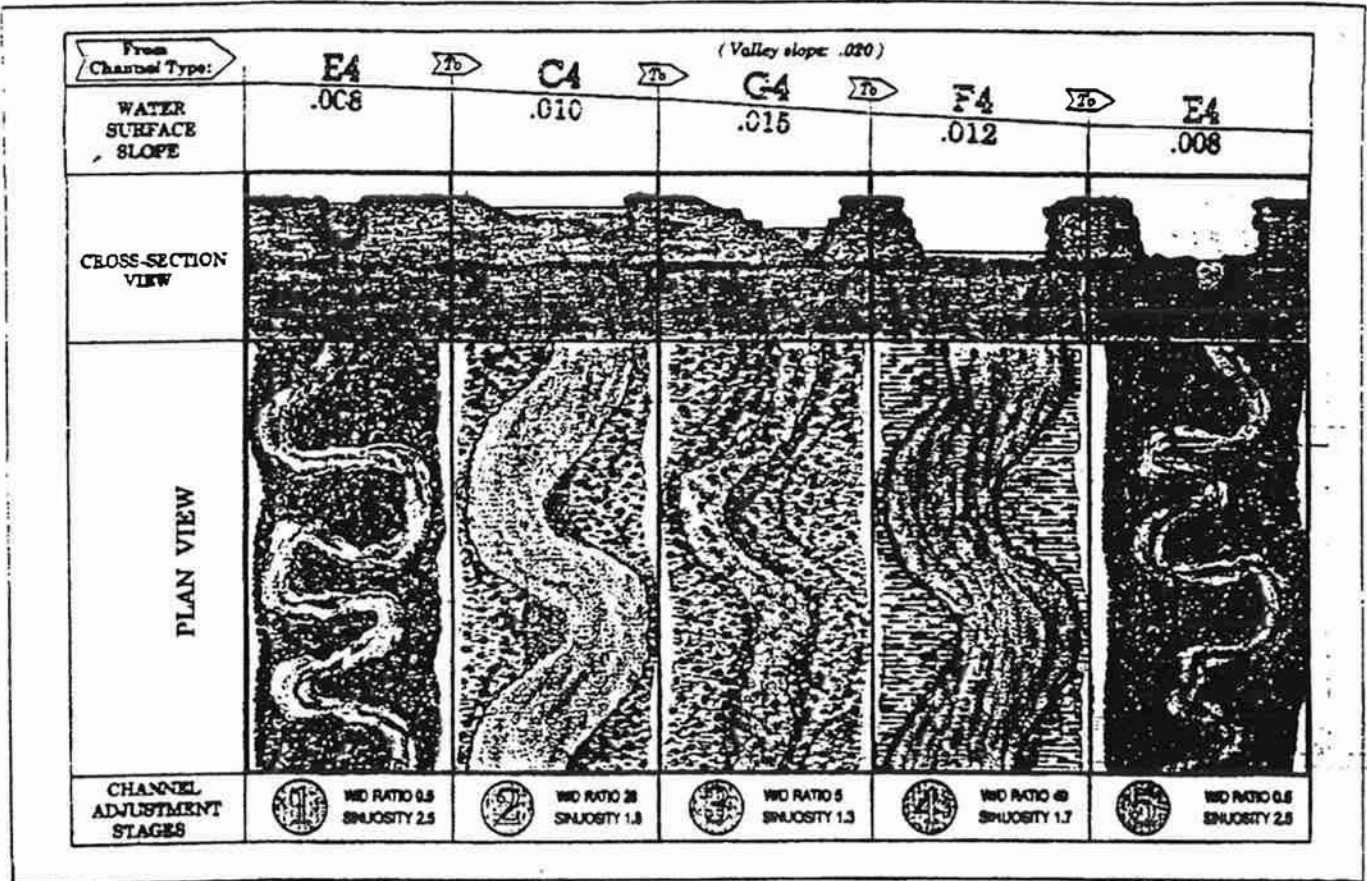
# LEVEL III: ASSESSMENT OF STREAM CONDITION AND DEPARTURE



width/depth ratio (conversion of E4 to C4 stream type), chute cutoffs develop across large point bars that begin down cutting, eventually into a steeper, entrenched gully (G4 stream type). The stream then abandons its floodplain, followed by a decrease in width/depth ratio. The degradation process that is initiated results in a lowering of the base level, thereby rejuvenating (over-steepening) all the tributaries to the main-stem river. The resultant headward advancement of the drainage network adds an accelerated excess sediment supply originating from both channel degradation and bank erosion processes. As the banks continue to erode, the belt width and width/depth ratio increase, which eventually leads to an F4 stream type. The natural tendency for a river is to balance its slope with that of its valley and rebuild a new floodplain. In order to decrease the stream slope and rebuild a new floodplain, the stream must progressively increase sinuosity and belt width. An increase in the dimensions of belt width and sinuosity can only happen through a process of lateral extension. The tenden-

FIGURE 6-4. Example of progressive stages of channel adjustment due to an imposed change in stream bank stability.

cy for lateral extension of natural channels is predictable and the accelerated rate of bank erosion can be readily observed in the F4 stream type. The next series of progressive adjustments lead to a C4 stream type which eventually evolves back to the original E4 stream type. The resulting E4 morphology is a lower width/depth ratio, a reduction in channel slope, and an increase in sinuosity and meander width ratio. The previously over-widened bed of the F4 stream type is now the elevation of the new floodplain for the new C4 stream type, which gradually incises, reducing the width/depth ratio and increasing the entrenchment ratio. These channel adjustments as described above, signal the start of a new E4 stream type. The stream can eventually evolve, under a changed sediment and flow regime, into a sinuous, low gradient, low width/depth ratio channel with a well developed floodplain which matched the original, or pre-distur-



bance stream type morphology. The original morphology can be self-replicated; however, the new local base level will now exist at a lower elevation in the valley, which will continue to advance the drainage network of the tributaries. The recurring evolutionary sequence takes place in the presence of "good" riparian conditions, where vegetation provides the necessary resistance to flow forces, illustrating the stream's ability to reach a condition or state described as natural stability. As you will recall from the previous definition of stability, the stream has to be able to properly distribute the flow and sediment produced by its watershed in order to maintain the dimension, pattern and profile without either aggrading or degrading. The evolution from a high width/depth ratio (F4) to the lower width/depth ratio stream types (C4 and E4) improves the sediment transport capacity. The increase in sediment transport capacity is due to the change in boundary stress distribution and an increase in stream power (due to increased velocity and depth). Even though the C4 and E4 stream

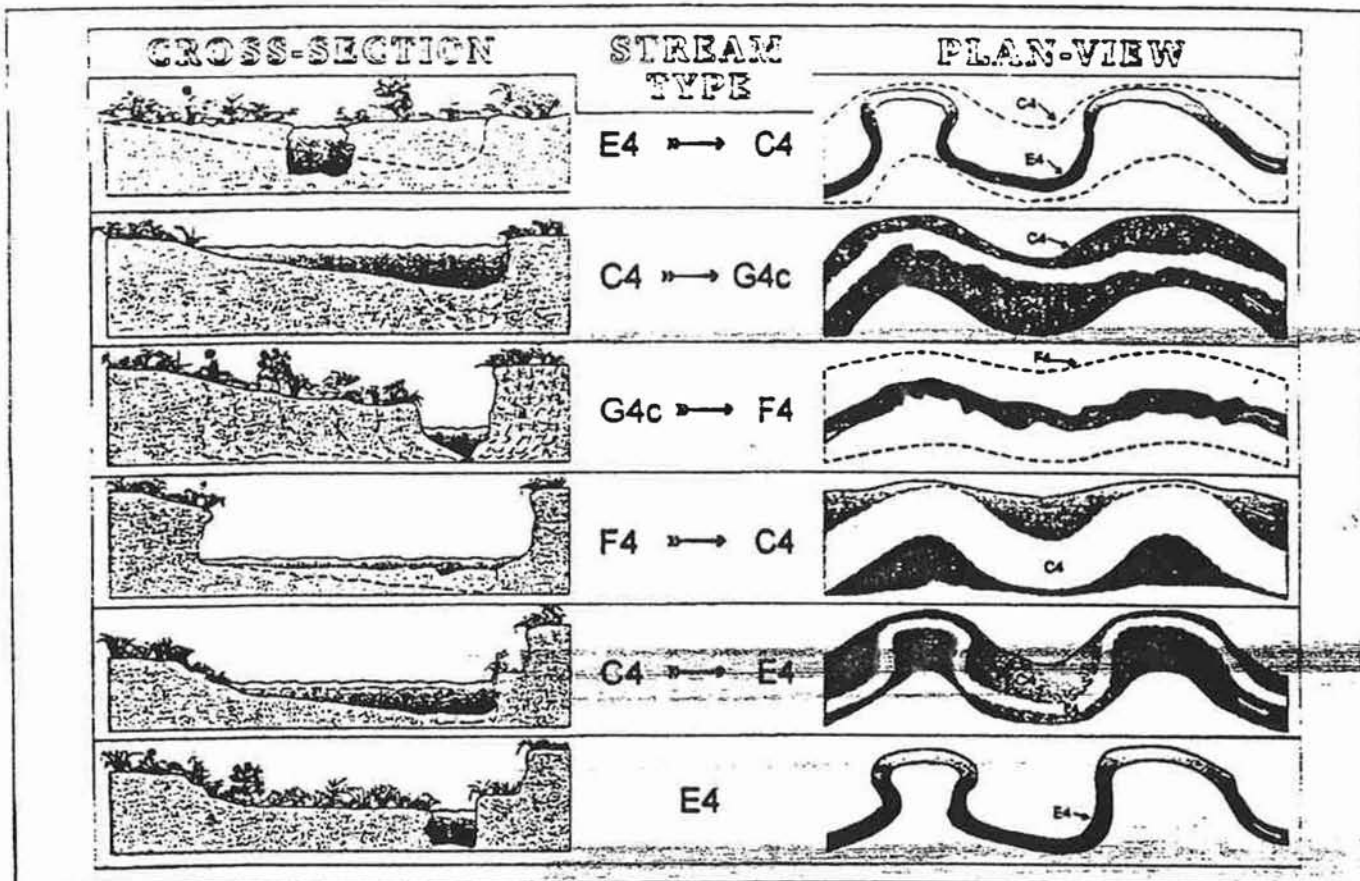
FIGURE 6-5: Adjustment of stream types in five progressive stages.

types have a more gentle slope than the F4, these stream types are more efficient at moving larger sizes and volumes of sediment since they require less cross-sectional area for the same discharge resulting in a higher mean velocity.

The above process of stream type development can be more simply described as an adjustment from stream type E4 to C4 to G4 to F4 and eventually back to E4 (Figure 6-5). Another series of illustrations, depicting changes in cross-section and plan-view corresponding to the adjustments shown in Figure 6-5 are shown in Figure 6-6. Commonly such land-use activities as livestock grazing under saturated soil conditions that can lead to streambank trampling, along with heavy utilization of riparian vegetation will result in a corresponding decrease in streambank stability sufficient to initiate a shift in stream type. The stream type or stability shift brought on by a natural or imposed change



## LEVEL III: ASSESSMENT OF STREAM CONDITION AND DEPARTURE



exceedance of a "geomorphic threshold" leads to changes in the morphological variables of width/depth ratio, slope, sinuosity, and meander width ratio. Examples of some typical stream type evolution sequences depicting a wide range of channel adjustments are shown in the photographs of *Figures 6-7a to 6-7f* and *Figures 6-8a to 6-8f*.

The evolutionary sequences shown in *Figures 6-4 through 6-6* and the photographic examples in *Figure 6-7* and *Figure 6-8* are only a few of many potential scenarios of stream type shifts. Often "B" stream types evolve from "G" stream types located on alluvial fans when erosional sequences create a moderate entrenchment, an increase in width/depth ratio, and emerging riparian vegetation gradually stabilizing the stream banks.

Stream channel adjustments resulting from the influence of various physiographic processes, including climate change, adverse watershed impacts, vegetative composition changes, reservoir construction, and direct channel disturbances have been well documented throughout western North

FIGURE 6-6. Adjustments of channel cross-section and plan-view patterns, as stream types change or shift through an evolutionary cycle.

America. The knowledge provided by observing and documenting historical adjustments, studying time trends from relict photographs, and understanding the natural tendency of rivers to regain a condition or state of stability can assist in managing and restoring disturbed river systems. Additional information concerning channel shifts can be obtained from data related to long-term U.S. Geological Survey streamflow stations. Since most stream systems are always seeking a stable condition, by the time all the research and development for restoration plans and permits are obtained, we often cannot get there fast enough to "fix" streams before they have already fixed themselves. An important challenge for us all is to learn how to recognize the tendency for stream systems to develop a natural stability and to understand the time-trends involved. Often the directions of management that are designed to "restore" streams into a state or con-



dition that does not match the dimension, pattern and slope of the original natural, stable form only serve to provide a trial and error method of learning. If one is assigned to "restore" a river, it is not only important to know the current state of the river, but what will be the eventual stable morphological form. With consistent documented, objective observations, stream types can relate much more than what may be initially assumed from a casual inspection.

### Equilibrium Interpretations

Some researchers have developed a visual "image" of the equilibrium channel, where the morphologic variables have mutually adjusted to a "stable" condition. For example, Bull, 1978 in describing "stream power" as the power expenditure per unit bed area ( $\omega = \gamma Qs/w$ ), found such values to be high in a narrow channel, so the channel may be unstable and subject to widening until a smaller value of  $\omega$  is reached and the channel stabilized. (Where:  $\omega$  = stream power;  $\gamma$  = water density;  $g$  = gravitational acceleration;  $Q$  = stream discharge in cms;  $s$  = slope; and  $w$  = stream width). This statement about a channel naturally widening to balance available stream power is appropriate for some stream types such as the A3-A6, B1-B6, and G3-G6 stream types. However, a stable "E" stream type has a comparatively low width/depth ratio (narrow and deep) and accommodates a high unit stream power by naturally developing an increased form resistance, as observed in the high values of meander width ratio (belt width/bankfull width) of 20-40, and a high sinuosity. In the case of the E stream-type, a widening of the channel to decrease stream power in order to "stabilize" the stream would in actuality initiate de-stabilization. The classification of rivers helps to stratify the morphological types so that interpretations of adjustment processes from generalized statements can be directed appropriately to stream types where these conditions apply. The channel widening in an "E" stream type would lead to: (1) an increase in width/depth ratio; (2) an increase in channel slope; (3) a shift to a higher boundary shear stress in the near-bank region; (4) an increase in sediment supply due to increasing

bank erosion; (5) an increase in bar deposition which adds to the boundary shear stress imposed on the banks; (6) an increase in belt width, and (7) and an increase in width/depth ratio that would lead to a decrease in meander width ratio. These imposed changes acting in combination tend to accelerate lateral channel extension with a continuing increase in width/depth ratio and a corresponding shift in stream type. The systematic channel adjustments would, in effect, increase the sediment supply but decrease sediment transport capacity which would then lead to instability.

## LEVEL III FIELD PARAMETERS: THE STREAM CHANNEL INFLUENCE VARIABLES

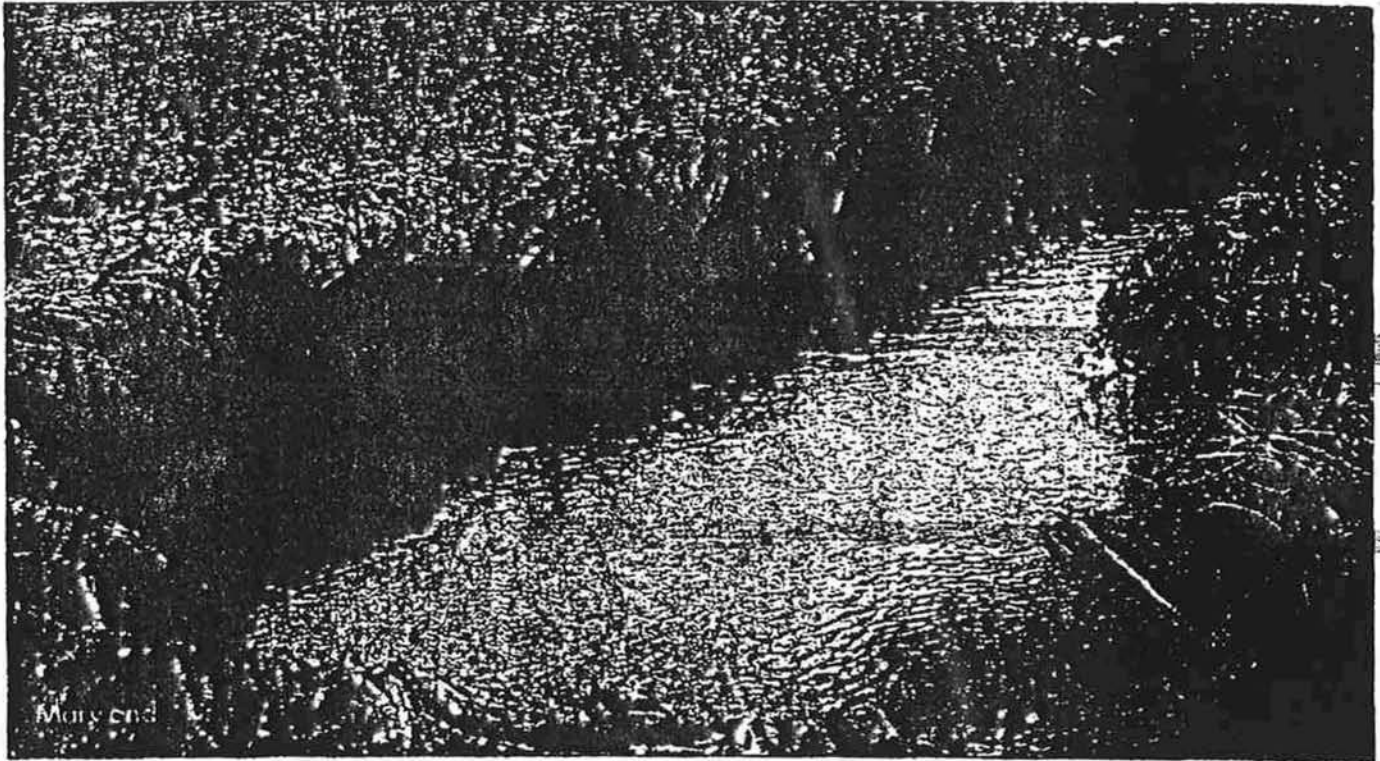
### Introduction

The Level III field inventory uses ten additional parameters to more fully describe stream condition beyond the fundamental Level II morphological template. The additional parameters are: (1) riparian vegetation, (2) streamflow regime, (3) stream size and stream order, (4) organic debris and/or channel blockage, (5) depositional patterns, (6) meander patterns, (7) streambank erosion potential, (8) aggradation/degradation potential, (9) channel stability rating, and (10) altered channel materials and dimensions. Parameter items 7-10 are additions to an earlier classification system (Rosgen, 1985).

Each of the listed parameters exerts a strong influence on existing stream condition and future operational potential. The parameters are not incorporated into the stream typing process until Level III to limit the sheer number of potential combinations of variables that would otherwise lead to an unworkable number of stream types. For example, incorporating flow regime directly as a classification parameter would increase the number of stream types from 41 to 492. The attributes of the flow regime are clearly important for interpreting both physical and biological stream characteristics, but can be more directly evaluated through a series of simple descriptors that provide additional informa-

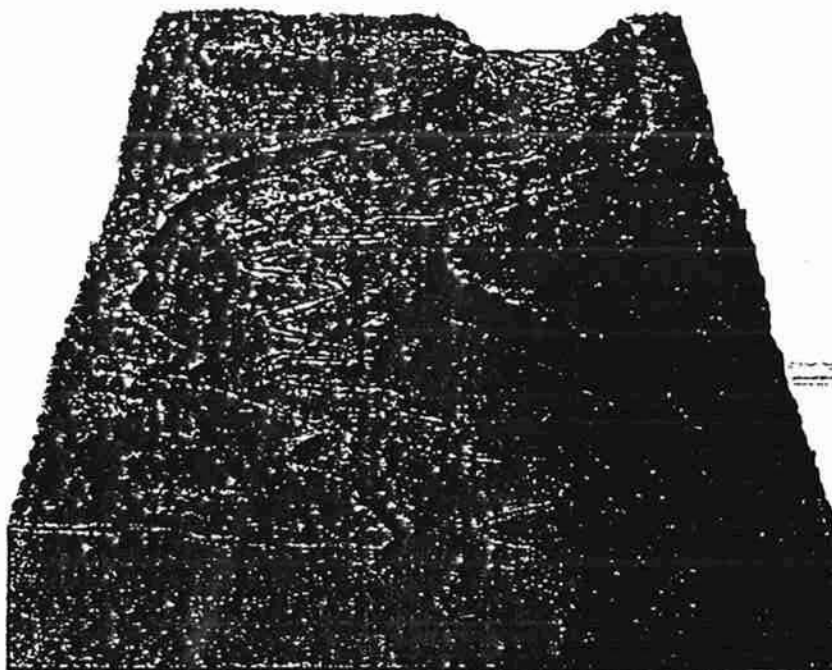
## MORPHOLOGICAL DESCRIPTION AND EXAMPLES OF STREAM TYPES

### E6 Stream Type



The E6 stream types are channel systems with low to moderately sinuosity, gentle to moderately steep channel gradients, and very low channel width/depth ratios. The E6 stream types are found in a variety of land forms including high mountain meadows, alpine tundra, deltas, lacustrine valleys, and broad alluvial valleys with well developed floodplains. The E6 stream channels are found in valley types VIII, X, and XI. The E5 stream type is typically seen as a riffle/pool system with the dominant channel materials composed of silt-clay, interspersed with organic materials. Channel slopes are less than 2%, with a high number having slopes of less than .01%. Due to the inherently stable nature of the bed and banks, this stream type can exist on a wide range of slopes. Sinuosities and meander width ratios decrease, however, with an increase in

slope. Streambanks are composed of materials similar to those of the dominant bed materials and are typically stabilized with riparian or wetland vegetation that forms densely rooted sod mats from grasses and grass like plants as well as woody species. Typically the E6 stream channel has high meander width ratios, high sinuosities, and low width/depth ratios. The E6 stream types are hydraulically efficient forms as they require the least cross-sectional area per unit of discharge. The narrow and relatively deep channels maintain a high resistance to plan form adjustment which results in channel stability without significant downcutting. The E6 stream channels are very stable unless the streambanks are disturbed and significant changes in sediment supply and/or streamflow occur.



**DELINEATIVE CRITERIA (E6)**

**Landform/soils:** Gentle slopes in broad riverine or lacustrine valleys and river deltas. Can be laterally contained in entrenched valley, evolving to a channel inside a previous channel.

**Channel materials:** Silt/clay dominated cohesive channel materials with accumulations of organic material including peat. Dense root mat on streambanks.

**Slope Range:** < .02 (often < .0001)

**Entrenchment Ratio:** > 2.2

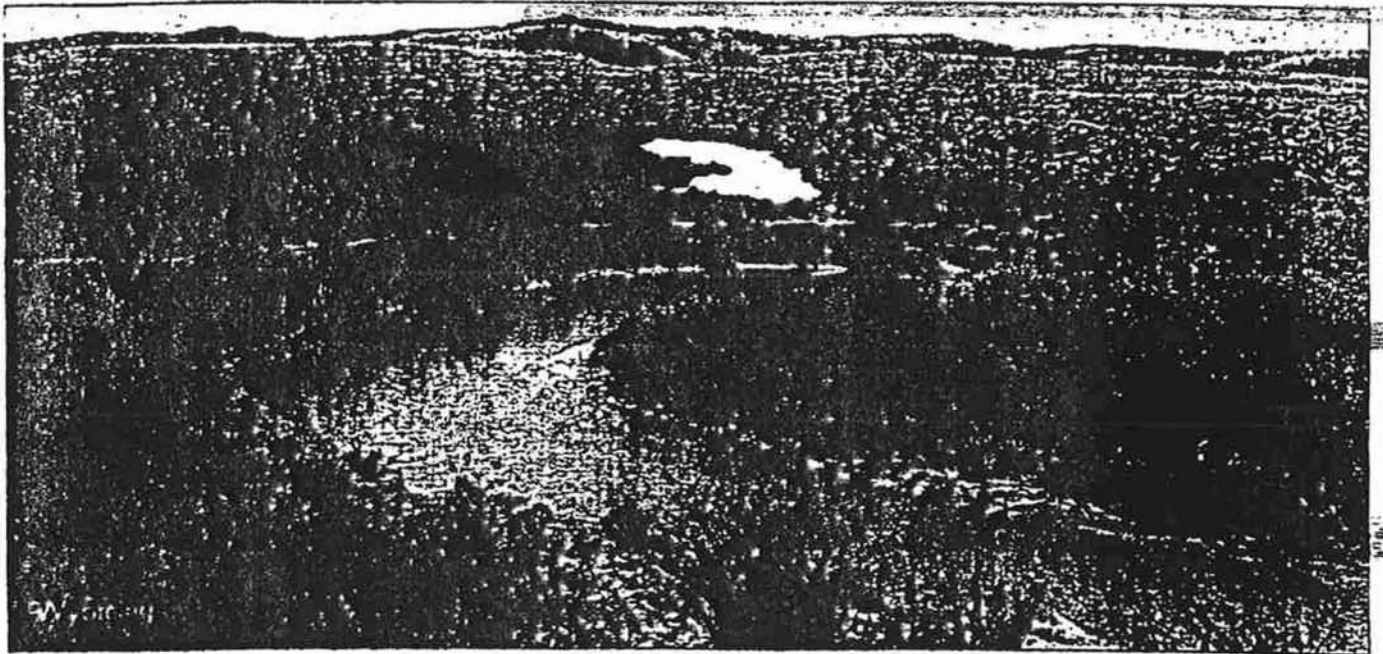
**Width/depth Ratio:** < 12

**Sinuosity:** > 1.5



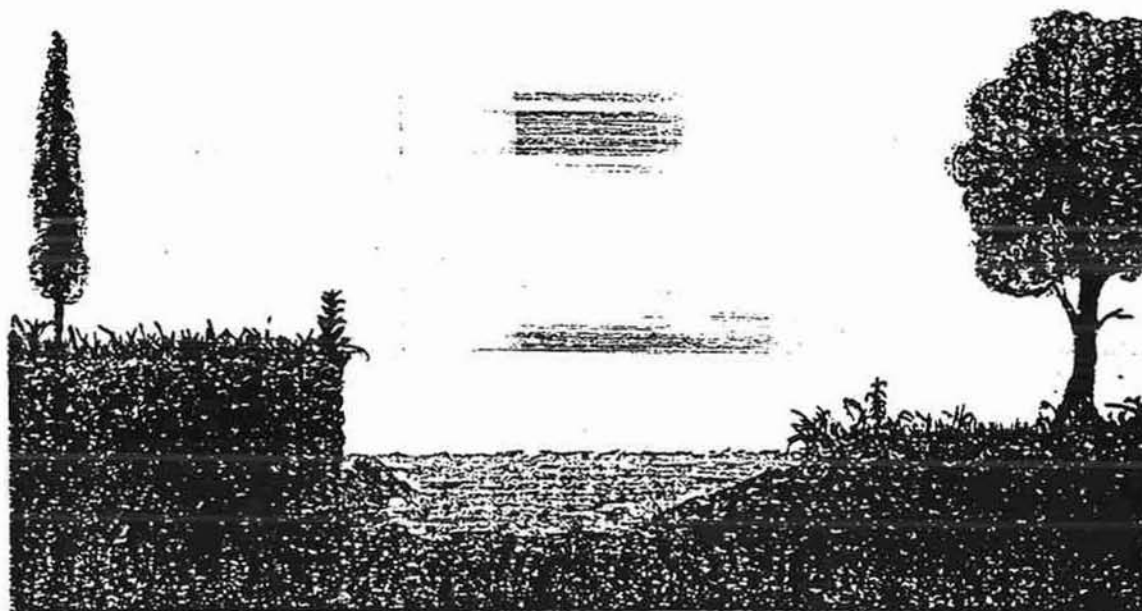
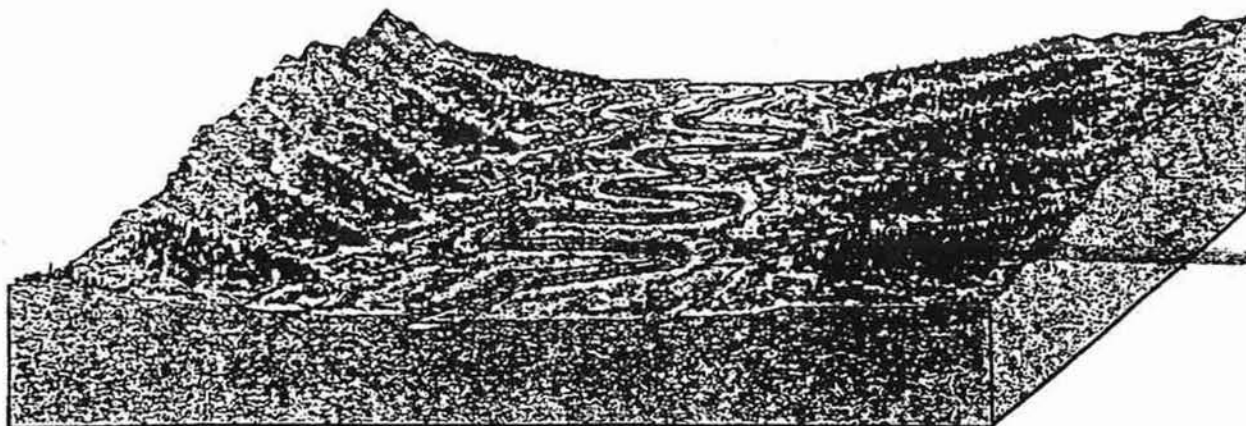
# MORPHOLOGICAL DESCRIPTION AND EXAMPLES OF STREAM TYPES

## C6 Stream Type



The C6 stream type is a slightly entrenched, meandering, silt-clay dominated, riffle-pool channel with a well developed floodplain. The C6 stream type occurs in broad valleys and plains areas with a history of riverine, lacustrine, and eolian deposition (loess). The C6 stream type can be found in very low relief basins typical of the interior lowlands, great plains, coastal plains, and in river deltas. The lower extremities of glacial outwash areas can also develop C6 stream types. The C6 stream channels are associated with Valley Types IV, V, VI, VIII, IX, X, and XI. It is obvious that the C6 stream type is widely distributed throughout a wide range of physiographic provinces. Generally, C6 stream channels have gentle gradients of less than 2%. Gradients less than 0.001 are denoted as a C6c- to indicate the very low gradients of many C6 stream types. The C6 stream channel displays a lower width/depth ratio than all of the other C stream types due to the cohesive nature of stream bank materials. The riffle/pool

sequence for the C6 stream type is, on average, 5-7 bankfull channel widths in length. The streambanks are generally composed of silt-clay and organic materials, with the stream beds exhibiting little difference in pavement and sub-pavement material composition. Rates of lateral adjustment are influenced by the presence and condition of riparian vegetation. Sediment supply is moderate to high, unless streambanks are in a very high erodibility condition. Bedload sediment yields for the stream types are typically low, reflecting the presence of fine bed and bank materials and gentle channel slopes. The C6 stream type is very susceptible to shifts in both lateral and vertical stability caused by direct channel disturbance and changes in the flow and sediment regimes of the contributing watershed. Meander and depositional patterns which modify the condition of this stream type are described in Chapter 6.



### DELINEATIVE CRITERIA (C6)

- Landform/soils:** Broad gentle valleys, plains, and deltas. Depositional soils (alluvium), associated with cohesive materials from riverine and lacustrine process. Often associated with tidal influence deltas, marshes and other wetland complexes.
- Channel materials:** Silt-clay predominates, however many of these C6 stream types are associated with a high organic component including peat.
- Slope Range:**  $< .02$  (C6c- .001) (.0001 more common)      **Entrenchment Ratio:**  $> 2.2$
- Width/depth Ratio:**  $> 12$  (generally lowest of C's)      **Sinuosity:**  $> 1.4$

## MORPHOLOGICAL DESCRIPTION AND EXAMPLES OF STREAM TYPES

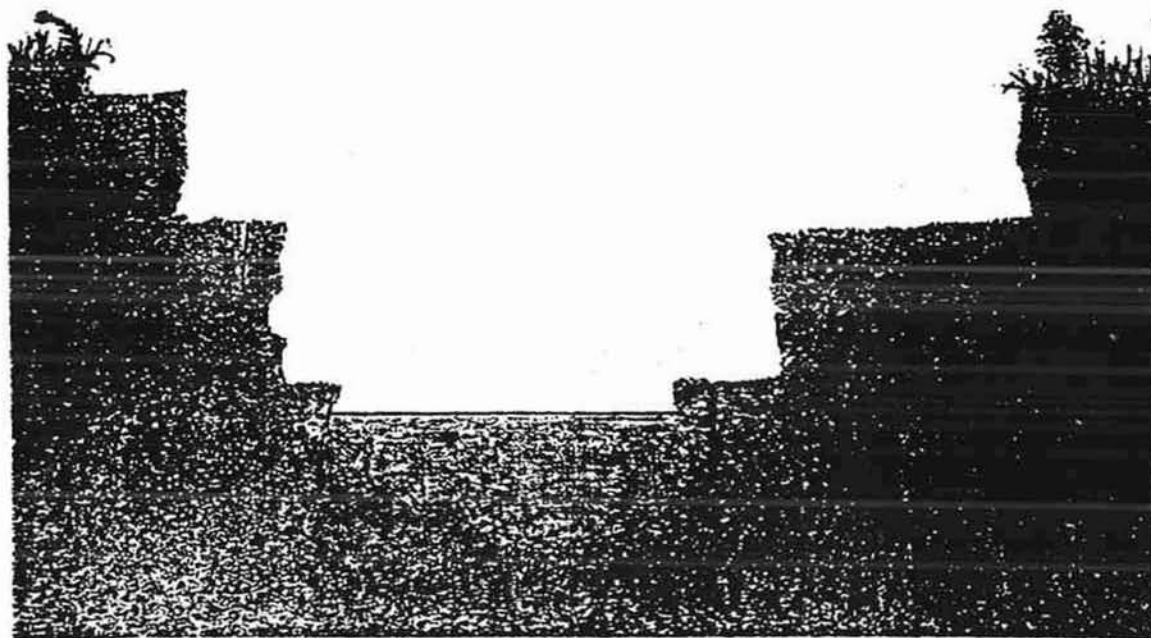
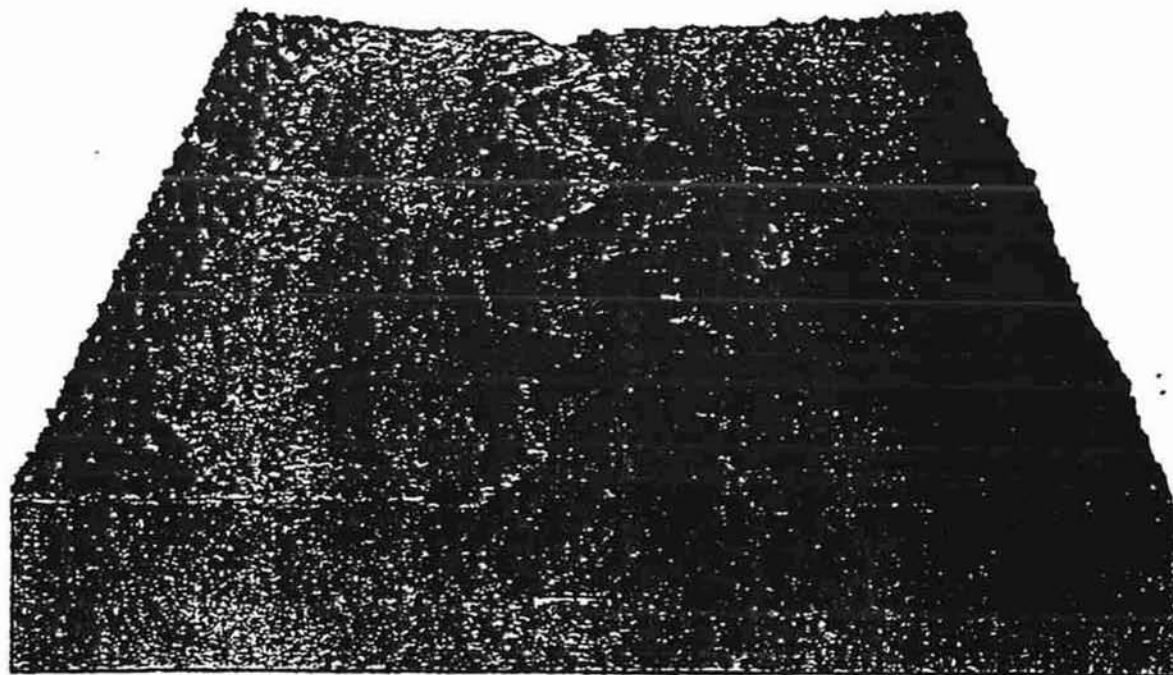
### G6 Stream Type



The G6 stream type is an entrenched gully system with gentle to moderately steep channel gradients; that is deeply incised in cohesive materials of silts and clays. Bedload sediment transport rates are relatively low, and replaced by high washload and suspended sediment yields that commonly occur within the stream type. The bed features are generally observed as an unstable, degrading step/pool morphology. The dominate lithology for the G6 types include shales and depositional environments such as fans, deltas, lacustrine landforms, and other features that have cohesive, silt/clay deposits. Streambank erosion processes acting on the typical-

ly steep banks produce very high amounts of erodible material, especially within delta and lacustrine landforms. Woody riparian vegetation can have a bank stabilizing tendency if the vegetation densities are very high. The G6 stream types are very sensitive to disturbance and tend to make significant adverse channel adjustments to changes in flow regime and sediment supply from the watershed. The G6 stream type is generally considered to be experiencing near continuous degradational processes. It is not unusual to observe channel gradients of less than 2% (G5c), or even channel slopes less than .1% (G5c-).





### DELINEATIVE CRITERIA (G6)

**Landform/soils:** The G6 stream type is associated with moderately steep, fluvial dissected landforms, alluvial fans or down cut in alluvial or colluvial valleys. Soils are cohesive materials generally in alluvium, colluvium, eolian deposits (loess), and residual soils such as those derived from shales.

**Channel materials:** Silt/clay dominated channel with mixtures of gravel and some silt/clay.

**Slope Range:** < .04

**Entrenchment Ratio:** < 1.4

**Width/depth Ratio:** < 12

**Sinuosity:** > 1.2





United States  
Department of  
Agriculture

Natural  
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*"Commitment to Quality"*

DATE: June 18, 1999

TO: Rich Boardman  
Director of Public Works  
P. O. Box 457  
Bridgeport, CA 93517

SUBJECT: Bodie Hills RV Park

I have reviewed the report and recommendations prepared by Jane Schmidt and Dave Doughty of our office in Gardnerville. Their report dated May 19, 1999 was prepared in response to a request from Ed Inwood, Supervisor, for technical assistance. The May 19 response is a partial inventory of resources and some recommendations. This information was provided to the landowner and his project designer for their information and consideration. This is not a design report and NRCS is not providing a design review. The elements of the report are provided for the use by the project development team. It is their responsibility to incorporate any of the recommendations.

Mark B. Twyeffort  
Civil Engineer

cc: Chuck Houston, SCE, NRCS, Reno, NV  
Nick Pearson, STC, NRCS, Reno, NV  
Jane Schmidt, Resource Conservationist, Gardnerville, NV  
Dave Doughty, Civil Engineer, Gardnerville, NV

OPTIONAL FORM NO 7-88

FAX TRANSMITTAL

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U.S. DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE  
GENERAL SERVICES ADMINISTRATION

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The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

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