



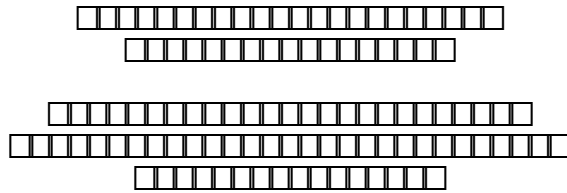
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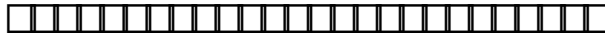


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WEBER.MTG





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This report is the result of a Value Engineering (VE)/Value Analysis (VA) Study, performed by a Study Team comprised of members who have the expertise necessary to address the project, process and individual features, and who have not been notably involved in the project previously. The Study Team applied value study methodology to the available project data to develop ideas that would improve project value and fulfill the client's needs. This organized study process contains all the required elements of a quality decision support process.

The VE/VA methodology is a problem solving technique that examines the features or process of a project to determine their pertinent functions, governing criteria, and associated costs. Alternate ideas, developed through creativity techniques, are analyzed for functionality, value, and implementation requirements. The best ideas, which fully meet the stated requirements at a lower cost or with an increase in long term value, are developed and proposed for adoption. This technique has proven extremely successful in private and Government applications, and is mandated by the Federal Government (OMB) in all Government activities exceeding a specified level of expenditure.

This report contains the elements required by applicable regulations and complies with the generally accepted guidelines and standards of the Value Engineering profession.

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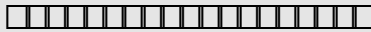


The VE Study Team wishes to express thanks and appreciation to the Principal Designer, [REDACTED] [REDACTED], and the members of the design team, who fully and cordially provided all requested information and consultation on the conceptual design. The success of the VE effort could not have been possible without the full cooperation shown by the design team members.

The VE Study Team wishes also to express thanks and appreciation to those listed on the Consultation Record of this report. The cooperation and helpfulness of those consulted contributed greatly to the technical foundation and support of the VE Study Team's deliberations and proposals.

The aim of VE is to achieve the best value for the user of the projects designed. It is only with the full team effort, as shown by all involved, that this goal can be achieved. This study represents the product of such an effort.

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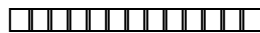
The following VE proposals are independent of all other proposals, i.e., they are not affected by the acceptance of any other proposals:

Upstream Embankment Relocation: The estimated potential savings of this proposal are based on a reduction of construction cost (after deducting costs for the Value Engineering study at \$15,000 and implementation at \$50,000).

Downstream Embankment Relocation: The estimated increased cost of this proposal are based on higher construction cost (after adding costs for the Value Engineering study at \$15,000 and implementation at \$50,000).

Add Mechanical Control: The estimated increased cost of this proposal is based on a higher construction cost (after adding the costs for the Value Engineering study at \$15,000).

Auxiliary Fuseplug Channel: The estimated increased cost of this proposal is based on a higher construction cost (after adding costs for the Value Engineering study at \$15,000).



The minimum potential savings of the above proposals is would be an increase of \$2,265,000. The maximum potential savings of the above proposals is estimated to be \$135,000. If proposals are combined, additional savings would be realized since the cost of the Value Engineering study (\$15,000) would be deducted only once.



The VE Study Team identified 5 additional ideas for further study with the potential for cost improvement that were not fully developed due to time constraints and during the oral presentation 2 additional ideas were identified. The following ideas, presented by the team, have the potential for further improving the project's value and are submitted to the design team for further consideration:

- Narrower filter/drain sections.
- Steeper slopes.
- Exchange upstream and downstream slopes.



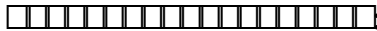
Discussion in the Study Team Oral Presentation:

During the Study Team's oral presentation, two additional ideas were identified for further consideration by the design team as follows:

Allan Jumper, the Design Team leader, indicated it might be possible to use the value engineering study proposal 2, to build the embankment at the downstream location, however, make the connection at the right abutment near the outlet works, retain the existing outlet works, and include a stability berm downstream of the embankment, as proposed in the original concept. This could increase the outlet works stability and preclude seepage along the fault from an earthquake.

Ken Clouser, BIA Phoenix Office, indicated there may be potential to use the value engineering study proposal 4, to construct an auxiliary channel at the fuseplug, but substitute a concrete OGEE crest instead of a flap gate with shear pin. This would provide a safer solution that would still allow initial reservoir releases that would not require a complete rebuild of the the fuseplug for typical releases that did not cause fuseplug erosion.

VESUM.DES



Weber Dam and Reservoir are located on the Walker River within the Walker River Paiute Indian Reservation in west-central Nevada. The dam is located in Mineral County about 132 miles southeast of Carson City and 8 miles upstream from Schurz. It was constructed in 1934-1935. The reservoir contains approximately 10,700 acre-feet at the normal water surface elevation of 4208.0 feet. The reservoir also has an authorized surcharge capacity of about 2 feet and contains approximately 14,900 acre-feet at the surcharge water surface elevation of 4210.0 feet. The primary use for the reservoir is irrigation, and no other congressionally authorized uses are listed within the National Dam Directory. The drainage basin upstream from the dam is about 2,650 square miles and extends into the California Sierra Nevada Range.

The dam is an earthfill embankment composed of homogeneous silty sand with a downstream gravel fill shell. A minimum key trench was provided under the upstream portion of the embankment. Drawings indicate that a steel sheet piling, capped by a concrete core wall, was driven into the conglomerate and cemented gravel foundation.

The dam structural height is 50 feet, the dam height is about 45 feet, and the normal hydraulic height is about 36 feet. The crest length is about 1,950 feet at elevation 4217 and the crest width is 16 feet. The downstream slope is 2:1 (H:V). The upstream slope is 2:1 (H:V) from the crest of the dam to elevation 4184, and then 10:1 (H:V) below elevation 4184. The upstream slope of the dam is covered by hand-placed riprap and the downstream face is covered with loose rock and vegetation (bushes, grasses, and weeds).



The outlet works is located to the right of the maximum section of the dam (station 11+73). It consists of an intake with a trashrack; an 6-foot-diameter reinforced concrete horseshoe conduit and tunnel; a gate tower containing a control house with four 4-foot by 4-foot slide gates (two acting as guard gates and two as operations gates); and a two-span access bridge. No outlet works stilling basin is provided. The inlet invert elevation is at about 4175 feet. The outlet works has a capacity of about 820 ft³/s at maximum normal water surface elevation of 4208.

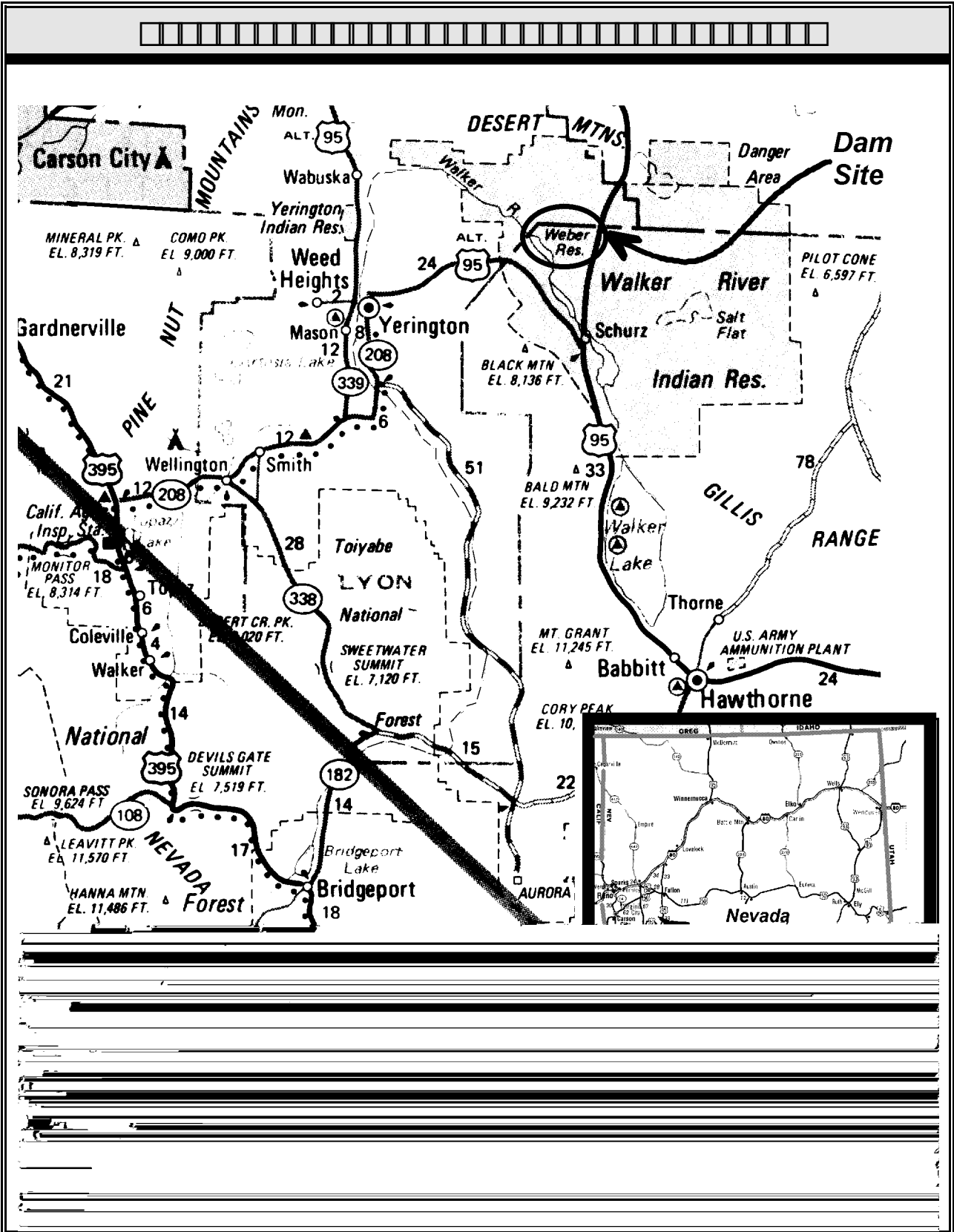
The dam has two spillway facilities. An emergency fuseplug structure is located on a natural draw about 1,200 feet southeast of the dam embankment (southeast of the right abutment). The fuseplug is a small earth dike with a crest length of 200 feet and a crest elevation of 4215.0 feet and base elevation of 4211.5 feet. No erosion sill is provided. The fuseplug maximum discharge capacity is 7,000 feet at elevation 4217 (the same elevation as the dam crest). The fuseplug's current function is to augment the spillway flow enough to avoid overtopping of the dam during a major flood event. The service spillway is a reinforced concrete structure located on the right side of the dam embankment controlled by two 20-foot by 14-foot manually operated radial gates. The spillway crest is about elevation 4196 and the top of the gates is about elevation 4210. The spillway capacity is about 5,200 ft³/s. A flip bucket with a plunge pool is used for energy dissipation.



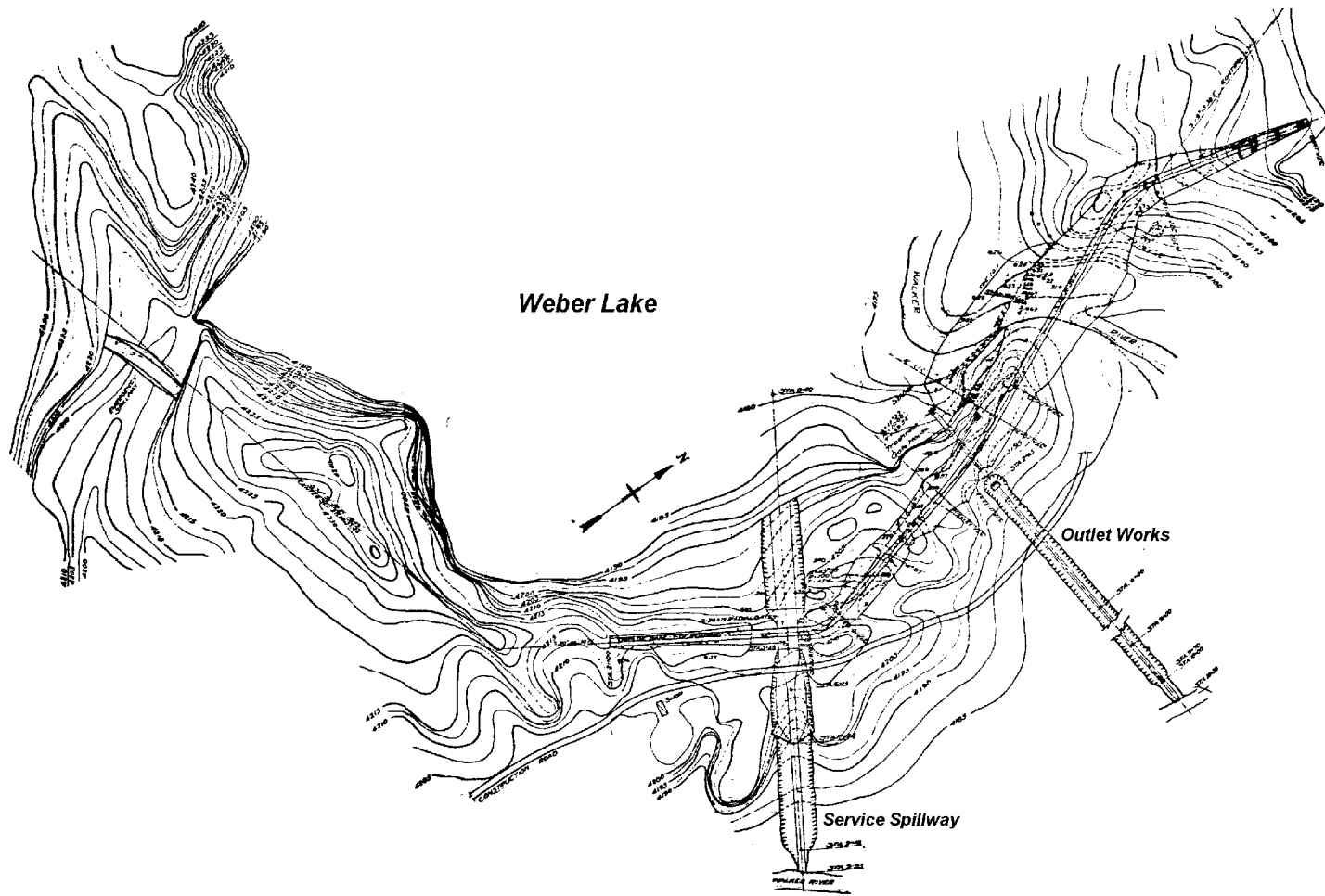
The downstream hazard classification for the dam is □□□□ (Failure could potentially cause the loss of more than six lives.) About 25 percent of the town of Schurz, Nevada, would be inundated in the unlikely event of dam failure.

The overall safety classification of the dam is □□□□. The Deficiency Verification Analysis (DVA), shows this is due to the potential for overtopping caused by inadequate spillway capacity to pass flood events greater than 7 percent of the Probable Maximum Flood (PMF); embankment erosion during spillway discharges; static stability of the downstream slope; dynamic stability of the embankment and foundation; uncontrolled seepage; and deteriorated spillway gates and operators. Floods greater than 25 percent of the PMF are not considered to be a dam safety issue since the incremental damage and persons at risk (PAR) for inundation is equal to the same conditions as a

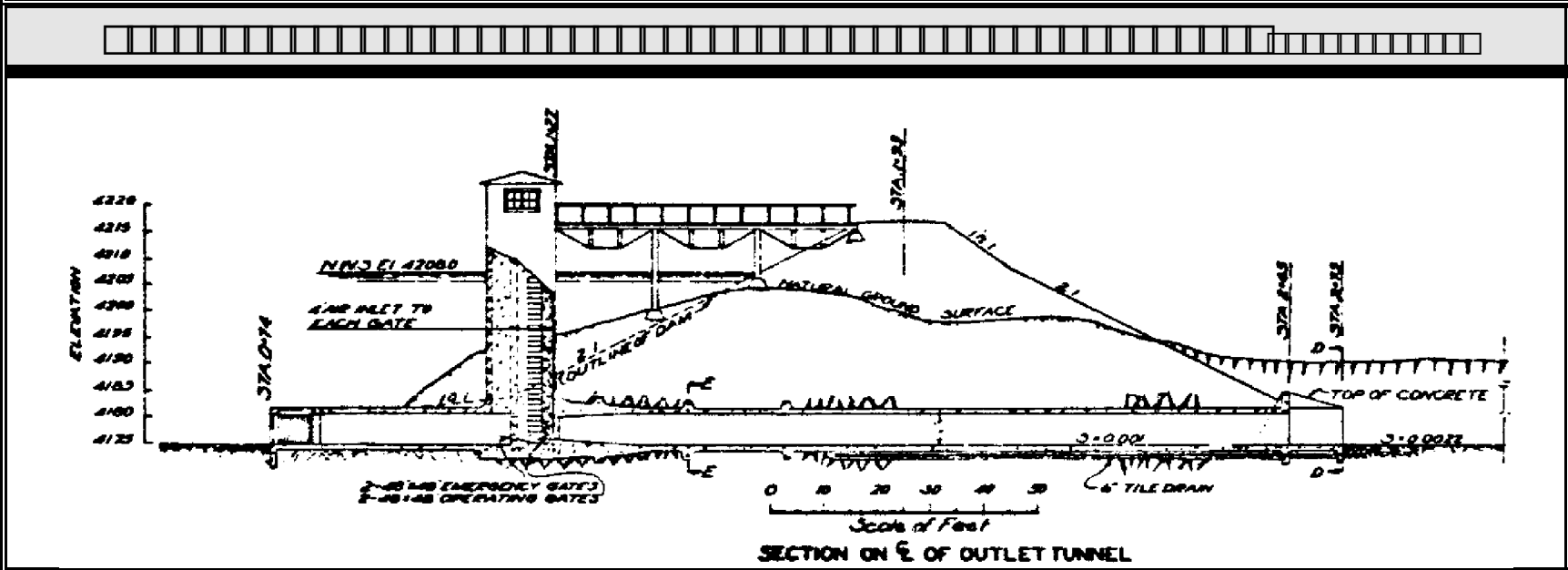
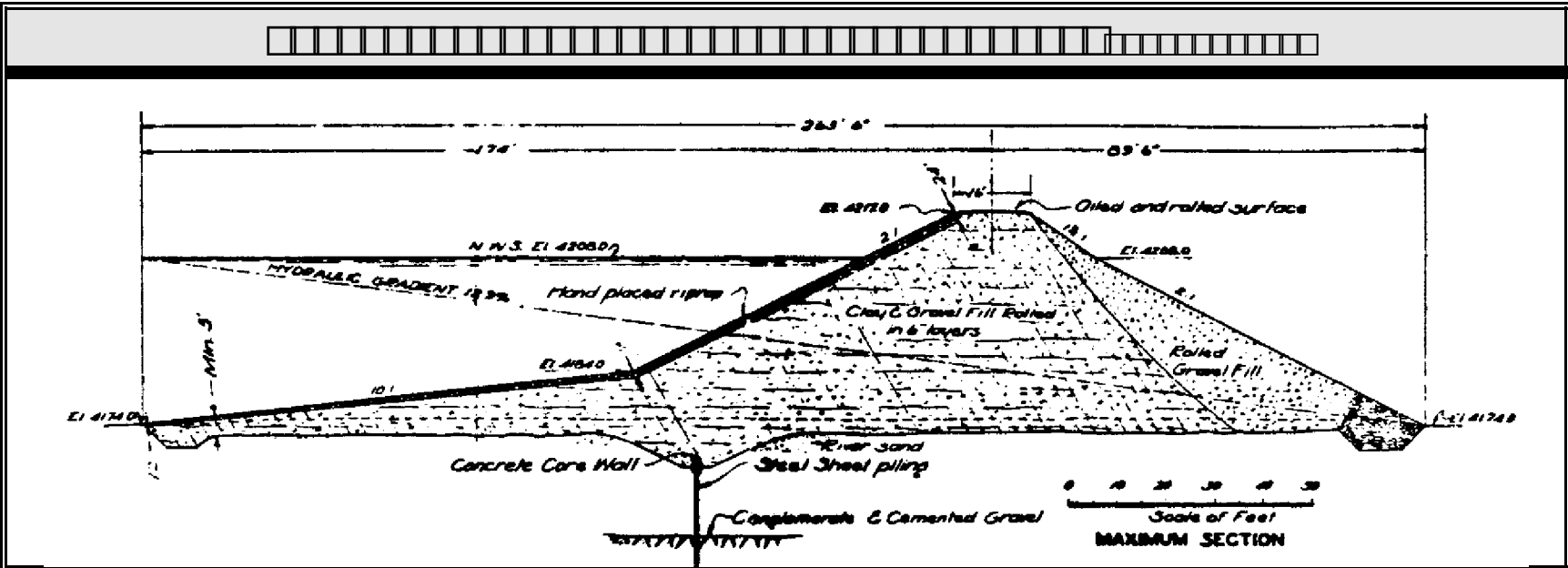
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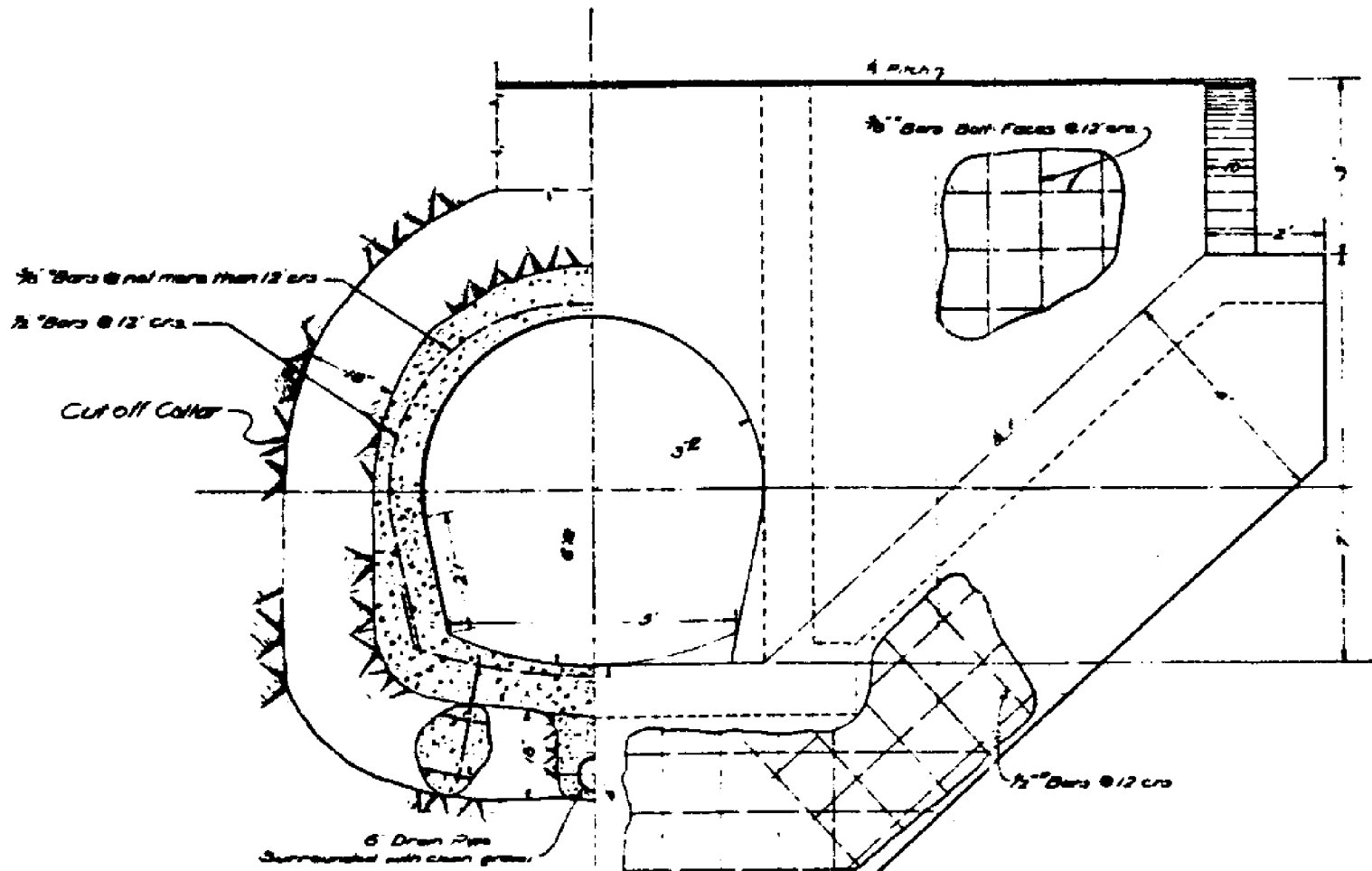
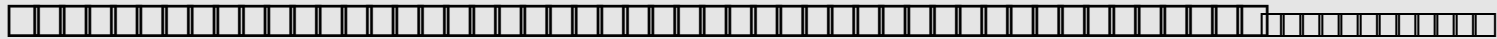
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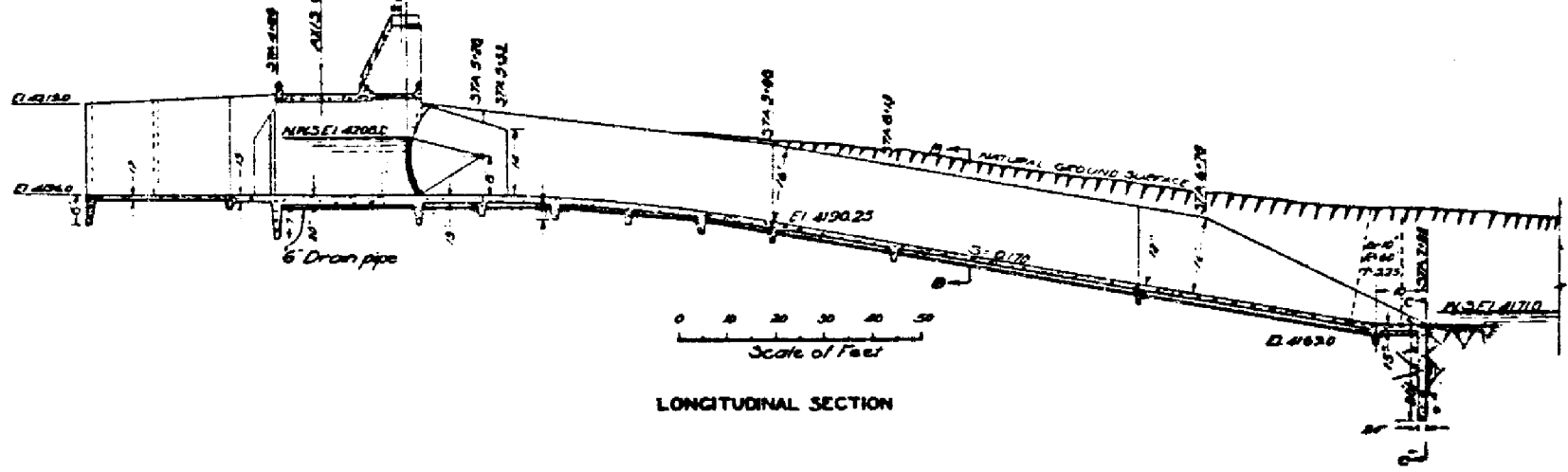
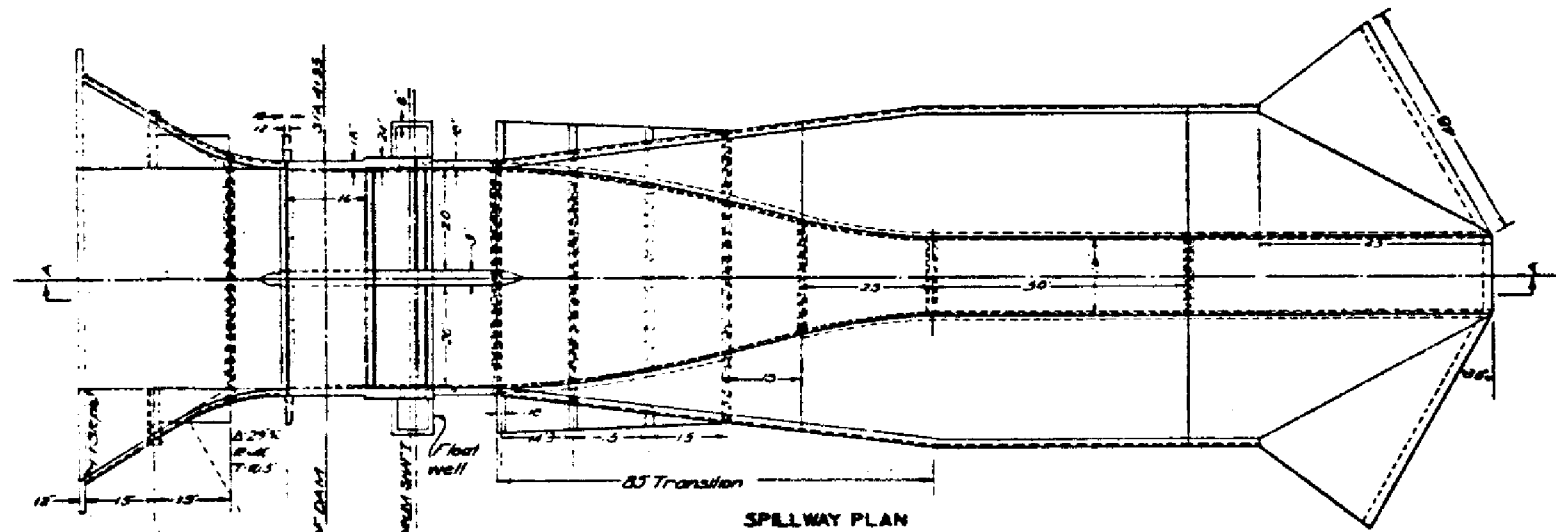
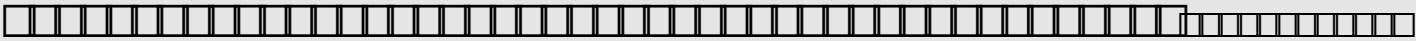


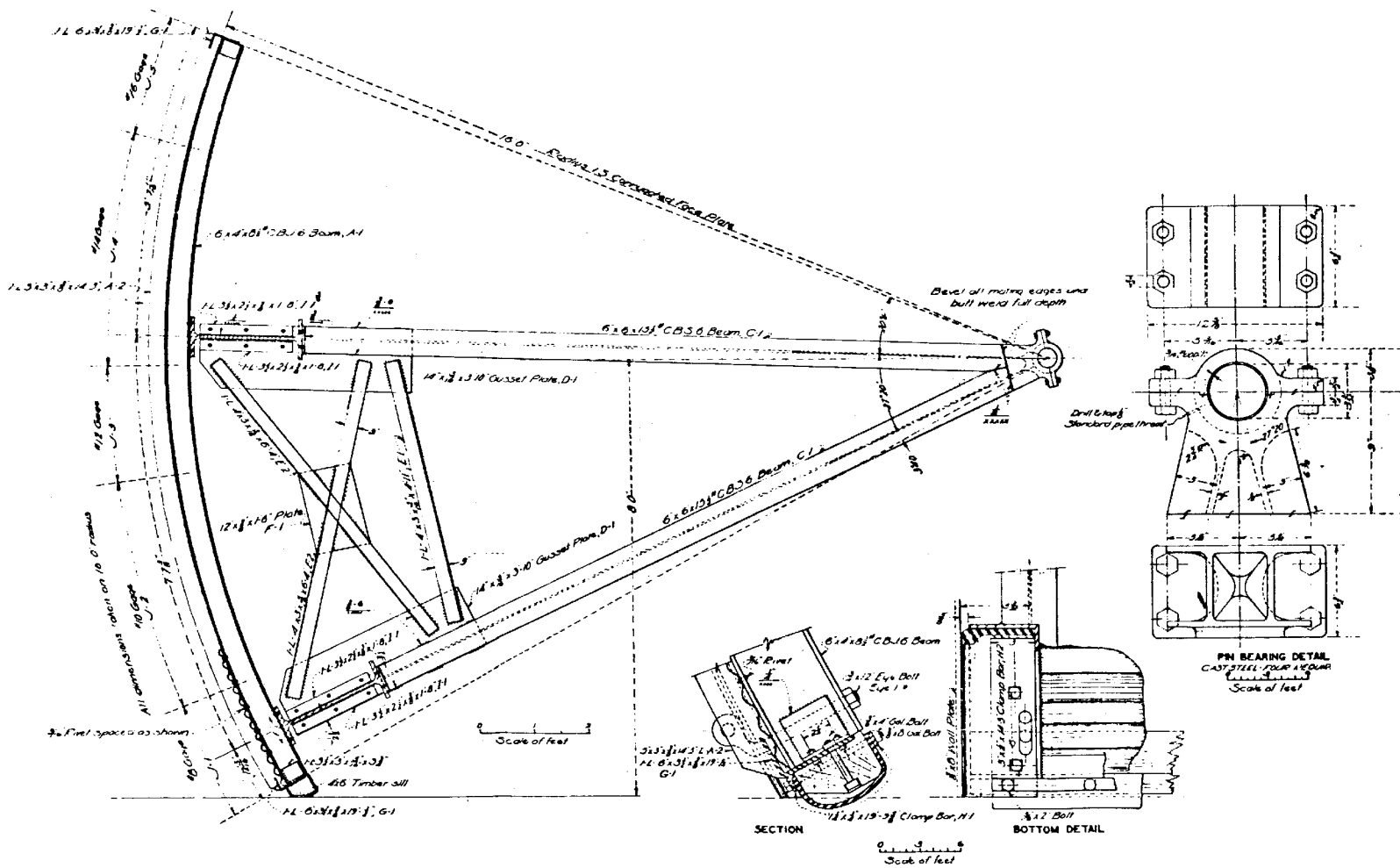
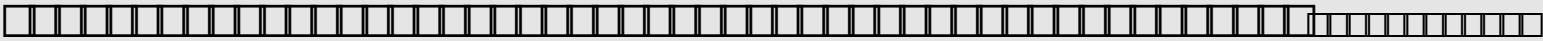
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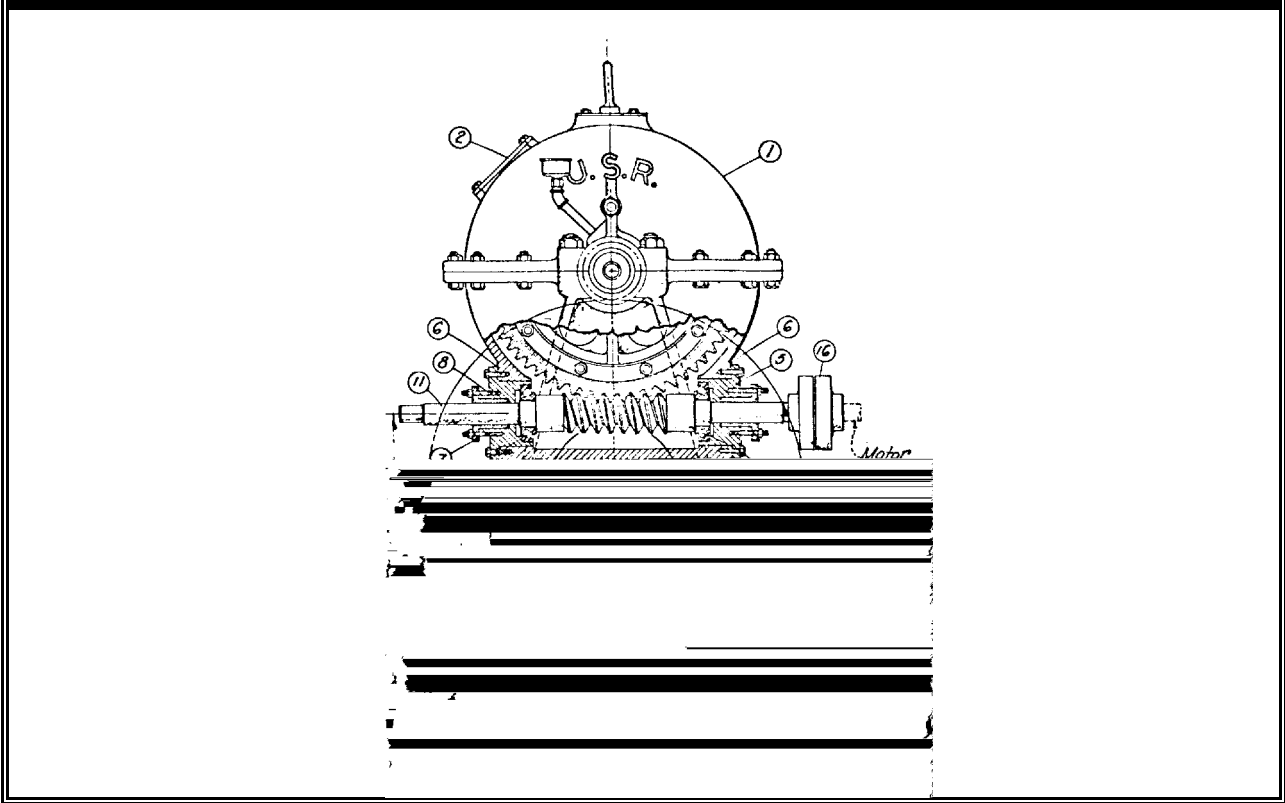
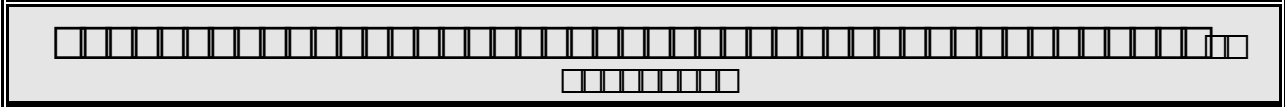
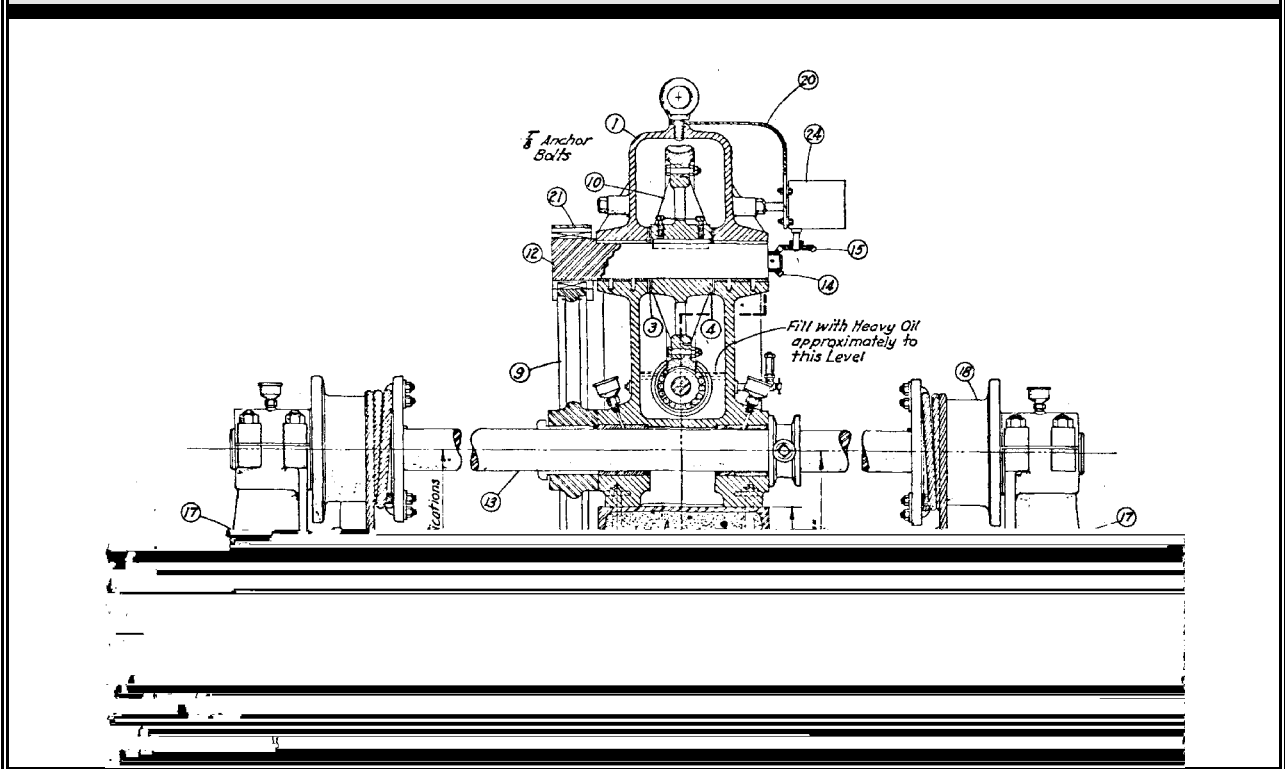
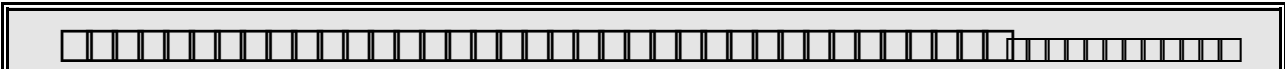
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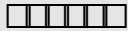


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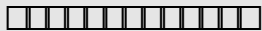




The dam and reservoir are owned and operated by the Bureau of Indian Affairs (BIA), Walker River Agency, Walker River Irrigation Project.



Safety of Dams modifications must conform to BIA safety criteria (which are almost identical to the Bureau of Reclamation's safety criteria).



Pursuant to Department of the Interior (DOI) guidance, the design features being funded by dam safety funds should address dam safety issues. Other issues are examined if they fall within the general guidelines of correcting dam safety identified issues which could affect public safety.

The construction activities should be completed as soon as practicable to reduce the effect on the irrigation season. Recreation at the site is extensive and should remain as uninhibited as possible.

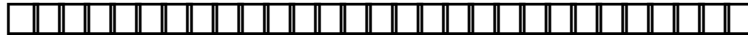


Construction of the dam began in 1934 and was completed in 1935. During construction, it was recognized that seepage was a problem, and that the steel cutoff wall was not functioning as expected. A "supplementary cutoff wall" was constructed upstream. The spillway radial gates were installed in 1937. The fuseplug emergency spillway design is unlikely to be typical as it is unlikely that its original purpose was to function as a fuseplug.

The Bureau of Reclamation (Reclamation) has conducted SEED examinations of the structure for BIA and tribes since 1982. Several intermediate and special inspections (mainly to monitor the seepage situation) have been conducted since the first inspection. The most recent intermediate examination was conducted in September 1992. The current DVA is dated February 1992.

The dam has had a long history of seepage problems beginning during the first filling. Surficial slides were noted on the upstream face in 1982. The spillway was repaired in 1978, and the gate seals were replaced in 1987. The condition of the spillway gates is poor. The spillway flip-bucket foundation is in good condition. The condition of the gates in the outlet-works gate and control house is poor.

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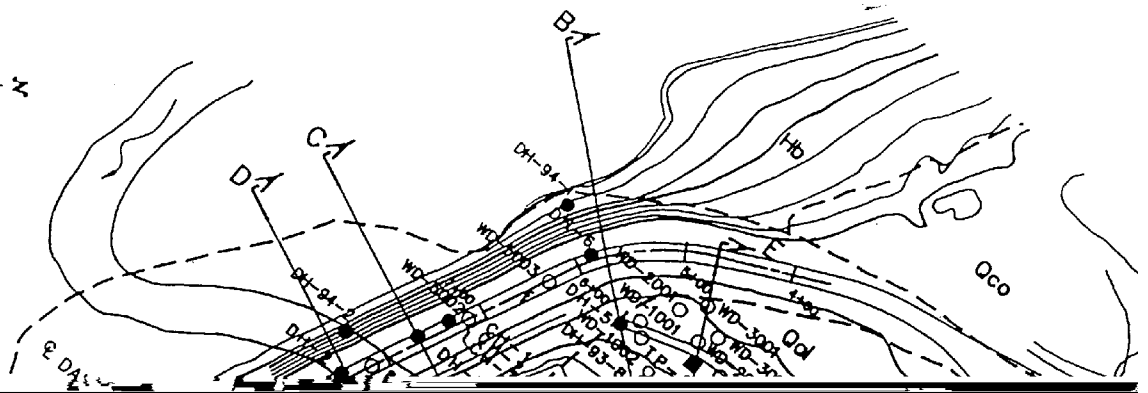


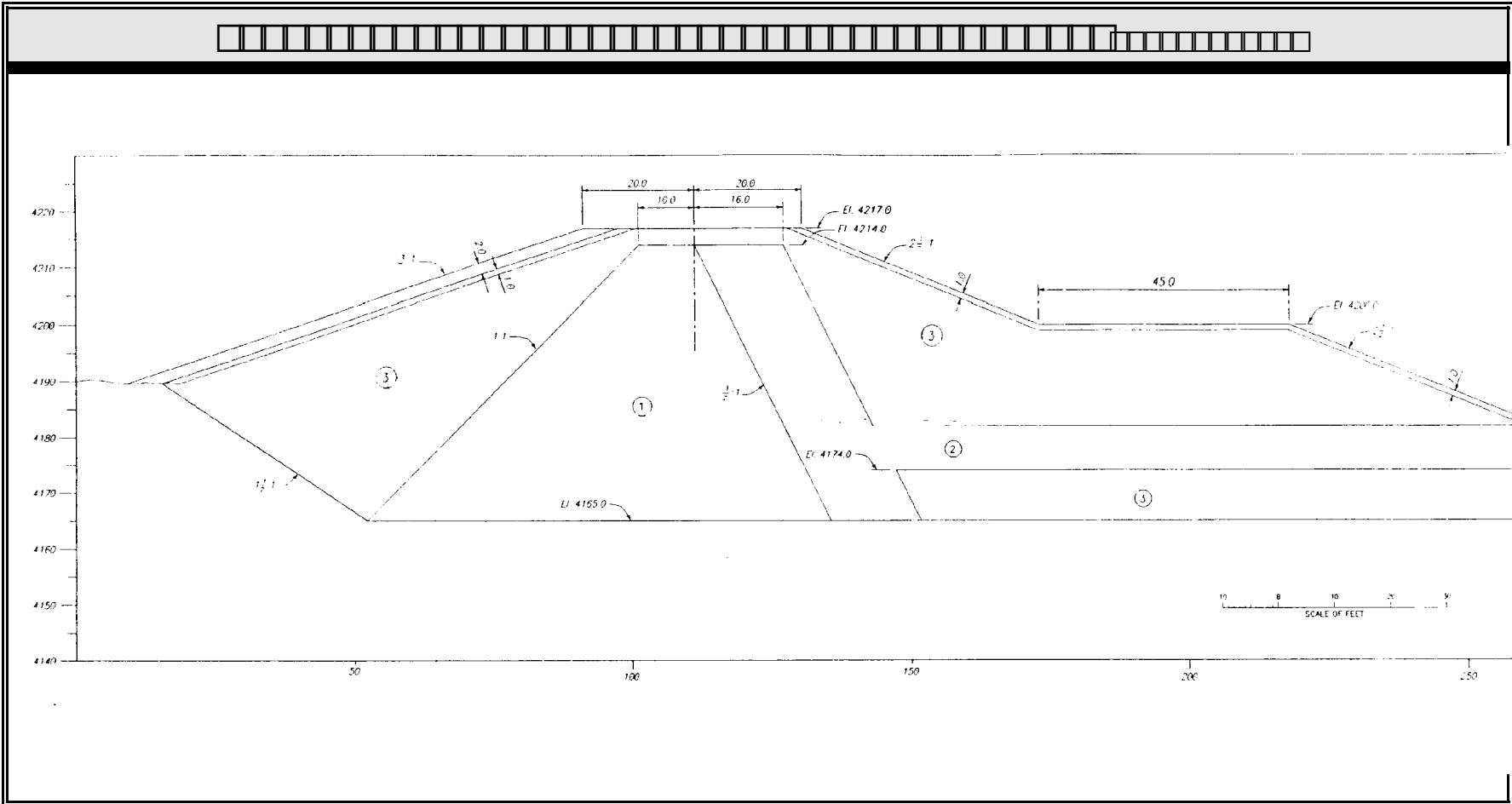
This project addresses dam safety deficiencies of (1) the embankment and foundation, (2) the deteriorated condition of the service spillway radial gates and operators, and (3) the inability of the spillways to pass floods greater than 7 percent of the PMF. The deteriorated outlet works slide gates and operators and the cracked and spalled condition of the spillway and outlet works concrete are O&M conditions which will be corrected as a part of this project.

The conceptual designs include the following:

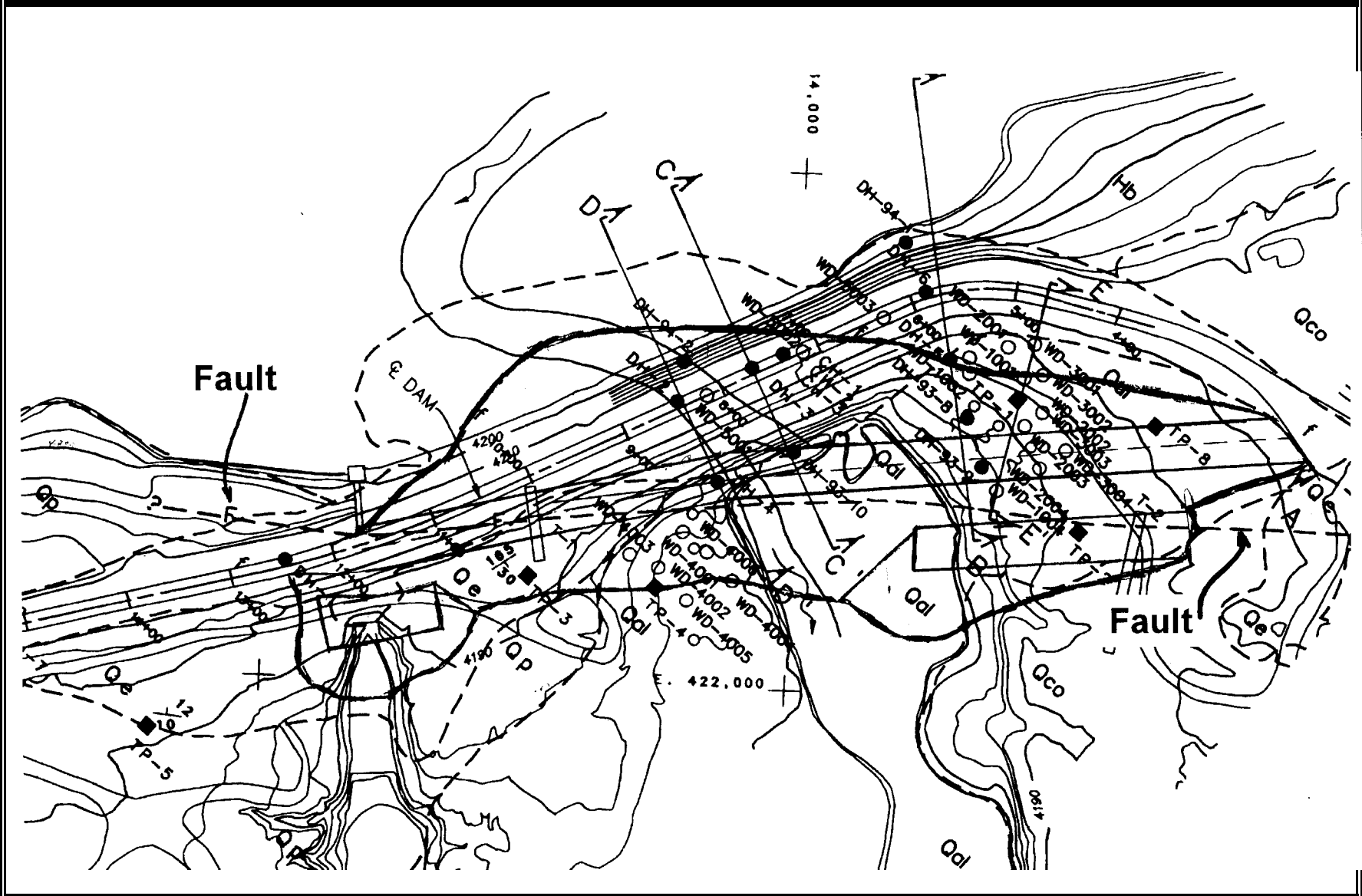
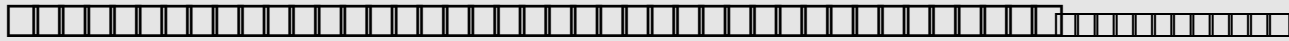
1. Removal and replacement of approximately 900 feet of embankment with flattened slopes and internal filter/drains
2. Construction of a downstream stability berm
3. Widening of the emergency spillway
4. Construction of an extension to the outlet works conduit and widening of the embankment at the outlet works
5. Construction of a fuseplug embankment with a soil cement erosion sill across the emergency spillway
6. Rehabilitation of the service spillway radial gates and replacement of the operators
7. Rehabilitation of the outlet works slide gates and operators
8. Replacement of the outlet works intake trash rack
9. Repair of the outlet works concrete
10. Replacement of the outlet works gate control house
11. Repair of the service spillway concrete.

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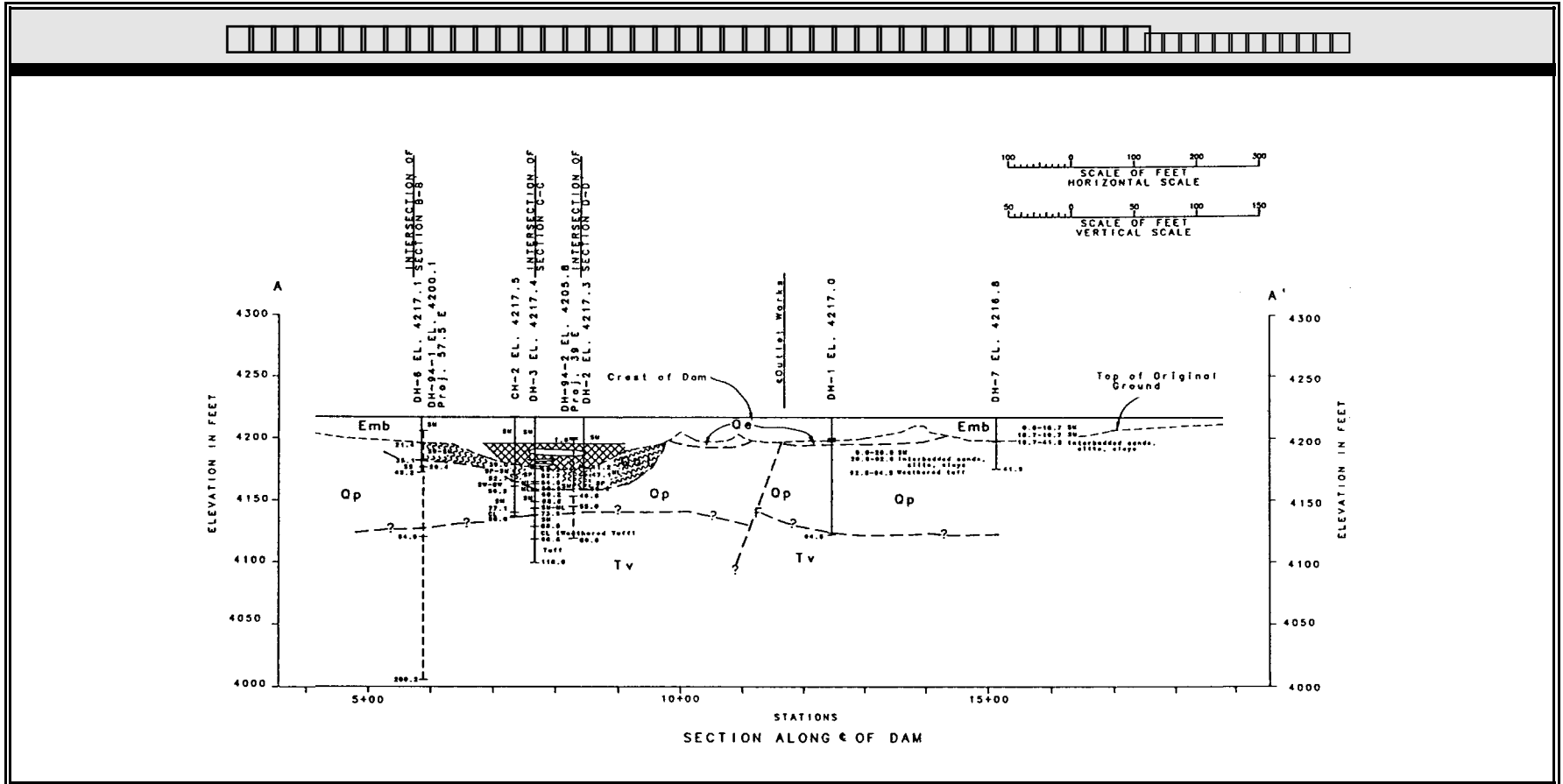




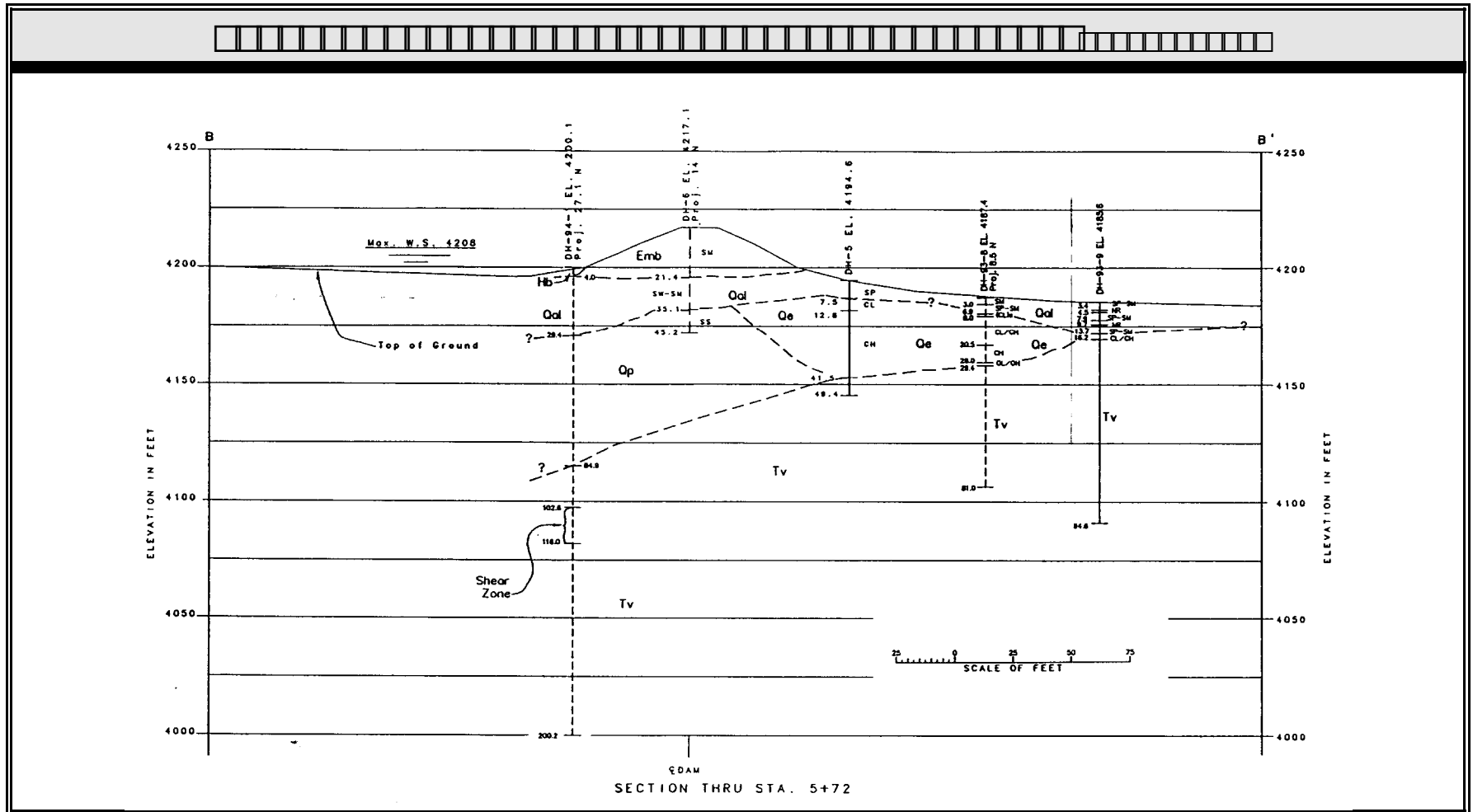
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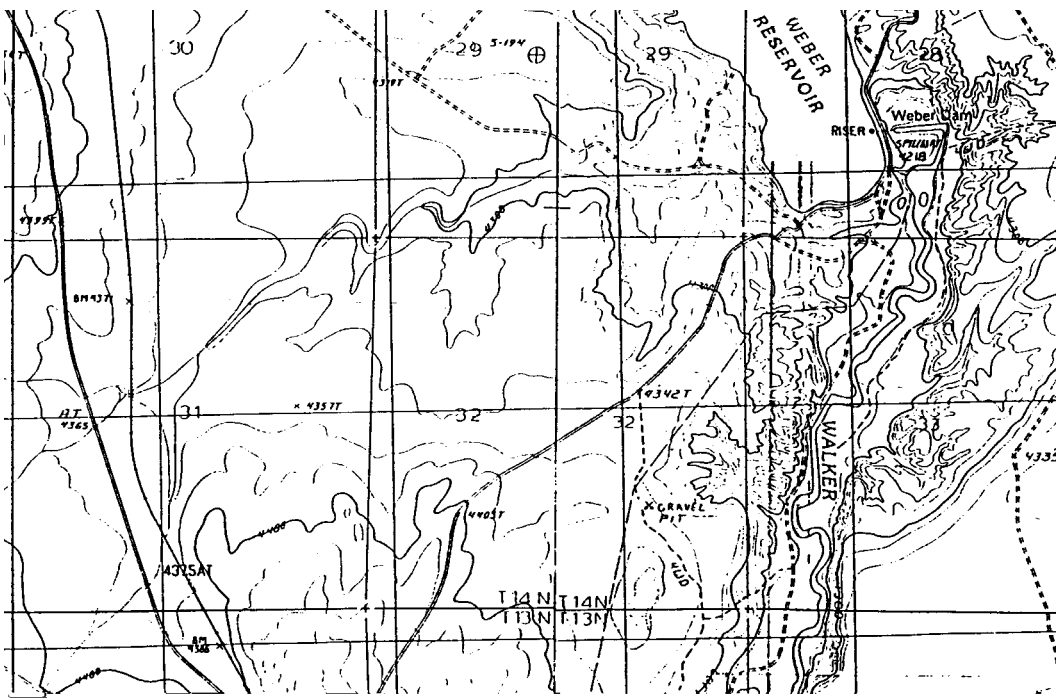


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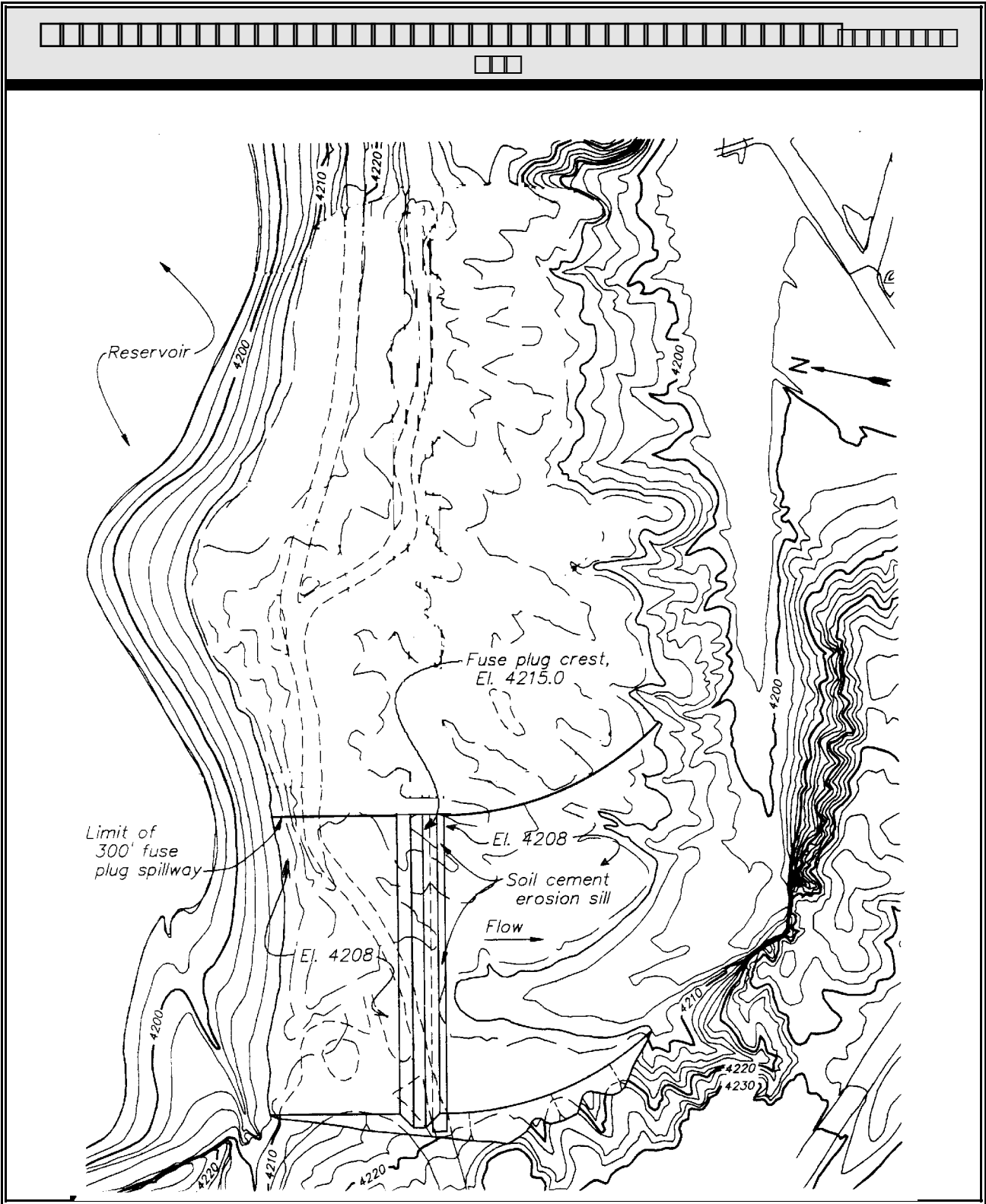


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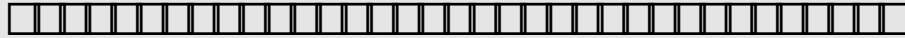
Weber Dam Modification

VALUE ENGINEERING STUDY

COST MODEL

COMPONENT/PERCENT PROJECT COST	PROJECT COST PROPORTION
Erosion Protection (RipRap) (4.9%)	
Cofferdam/Dewater (5.6%)	

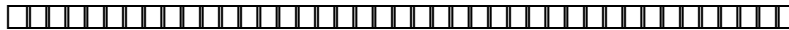
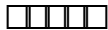
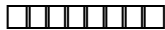







The VE Study Team (VEST) cost model is based on the conceptual design estimates provided by the design team for the preferred project conceptual. This cost model is developed by the VEST and is used to focus on features with the greatest potential for savings and to highlight areas of value mismatch.



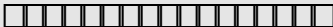
Unit prices are reviewed by the Estimating and Technical Services Section, D-3521, to ensure reliability and applicability.

Cost savings and the original design concept estimates are of the same general level of development. It is recognized that these costs may vary as final designs are pursued.



		
Emergency Spillway/Fuseplug	Control Delay Redirect Control	Failure Failure Flood Release
Outlet Works Rehabilitation	Control Prevent Regulate Deliver	Flow Debris Level Flows
Service Spillway Gates (Radial)	Prevent Regulate	Overtopping Level
Erosion Protection (Riprap and Bedding)	Prevent	Erosion
Filter/Drain	Control Direct Distribute Eliminate Prevent	Seepage Water Water Piping Failure



		
Downstream Berm	Stabilize Backup Control Reuse	Slope Dam Seepage Excavation
Access Road	Access Access Access	Dam Facilities Recreation Grazing
Cofferdam/Dewater	Protect	Construction
Power	Power Motorize Simplify	Telemetry Gates Construction
Foundation Treatment	Prevent Increase	Liquefaction Stability
Design Objectives	Support Provide	Irrigation Access
All the Time	Protect	Construction

FUNCANAL.TAB



WEBER DAM MODIFICATION - CONCEPTUAL DESIGN

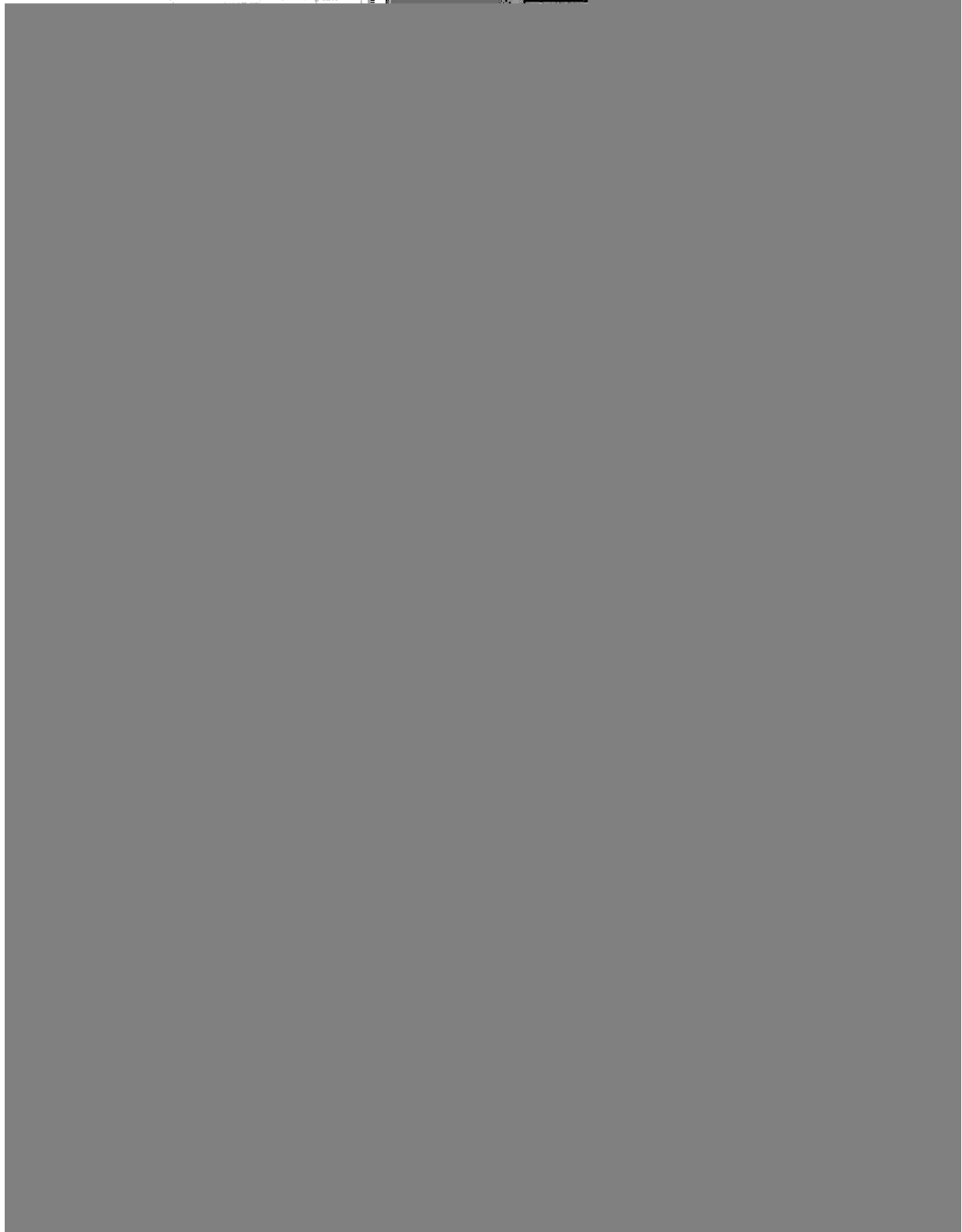
FUNCTION - QUALITY - SYSTEM TECHNIQUE (PART) DIAGRAM

HOW?
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DESIGN OBJECTIVE

ALTERNATIVE

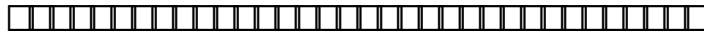
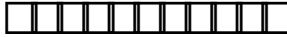
WHY?
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- DISPOSITION OF IDEAS
 PROJECT:

	
	
<p>Relocate/Rebuild Outlet Works</p> <p>Incorporate New Outlet Works in the new embankment.</p> <p>Convert outlet works conduit channel to wetlands, if the outlet works are relocated.</p> <p>Relocate dam UPSTREAM away from the fault.</p> <p>Relocate dam DOWNSTREAM away from the fault.</p> <p>Narrow the filter/drain.</p> <p>Localize protection of the conduit in the area of the fault only.</p> <p>Construct a deeper vice wider fuseplug section.</p> <p>Use a toe drain vice filter section.</p> <p>Steepen slopes to reduce the embankment section.</p> <p>Exchange upstream/downstream slopes; use 3:1 for downstream slope and 2½:1 for the upstream slope.</p> <p>Steepen slope at the top of the embankment to 1½:1.</p> <p>Drain down further to avoid the need for cofferdam.</p> <p>Rehabilitate the mechanical controls at the spillway.</p> <p>Include motor-generators to permit motorized gates in the absence of commercial power.</p> <p>Install flashboards for part of the fuseplug for more control of the reservoir releases and reduce cost of the fuseplug operation.</p> <p>Construct an auxiliary channel in the fuseplug with the same fill but starting at a lower elevation (say 4212) that would erode first.</p>	<p>Rejected due to cost.</p> <p>Although not costed, would need to be developed as an additional cost in Proposal 2.</p> <p>Although not costed, this idea could be incorporated in Proposal 2.</p> <p>Developed as Proposal 1.</p> <p>Developed as Proposal 2.</p> <p>Submitted as another idea.</p> <p>Rejected as infeasible.</p> <p>Rejected due to a fault at that location and the potential need for material.</p> <p>Not technically viable due to the fault.</p> <p>Submitted as another idea, if feasible based on deformation calculations.</p> <p>Submitted as another idea, if feasible based on deformation calculations.</p> <p>Submitted as another idea, if feasible based on deformation calculations.</p> <p>Rejected as infeasible.</p> <p>Developed as Proposal 3.</p> <p>Included in Proposal 3.</p> <p>Developed as Proposal 4.</p> <p>Submitted as another idea.</p>

IDEASDIS.TAB



(A LISTING OF ITEMS WITH POTENTIAL VALUE IMPROVEMENT)

Narrow the filter/drain section	-	May be possible to reduce the filter and drain sections based on refined information available later in design.
Steepen the current concept embankment slopes to reduce the material quantities.	-	May be possible to reduce the sections based on refined information available later in design and deformation calculations.
In the current concept, exchange the upstream and downstream slopes; use 3:1 for downstream and 2½:1 for the upstream slope.	-	May be possible to reduce the sections based on refined information available later in design and deformation calculations.
In the current concept, steepen the slopes at the embankment crest to 1½:1 to reduce material quantity.	-	May be possible to reduce the sections based on refined information available later in design and deformation calculations.
Construct an auxiliary channel at the center of the fuseplug with the same fill but starting at a lower elevation (4215) that would erode first.	-	Reduced cost over Proposal 4, but with potential for similar savings in reconstruction after a flood event.
<u>Ken Clouser, BIA Phoenix Office,</u> indicated it may be possible to use the value engineering study proposal 4, to build an auxiliary channel at the fuseplug, but substitute a concrete OGEE crest instead of a flap gate with shear pin.	-	This would provide a safer solution that would still allow initial reservoir releases that would not require a complete rebuild of the the fuseplug for typical releases that did not cause fuseplug erosion.

██████████	██████████ ████████ ████████	██████████
Allan Jumper, the Design Team leader, indicated there may be potential to use the study proposal 2, to build the embankment downstream of the fault, but make the connection at the right abutment near the outlet works, retain the existing outlet works, and include the stability berm downstream of the embankment, proposed in the original concept.	-	This could increase the outlet works stability and preclude seepage along the fault from an earthquake.

VEOTHER.STY



██████████ Weber Dam Modification
██████████ RELOCATE THE DAM EMBANKMENT UPSTREAM OF THE FAULT.
██████████ The concept design centers the dam embankment on the fault and adds a stability berm to the downstream slope to earthquake prevent failure. The outlet works conduit would be extended downstream.
██████████ The dam embankment would be located upstream of the fault and the outlet works conduit would be extended upstream through the dam.

VEALDES.TAB

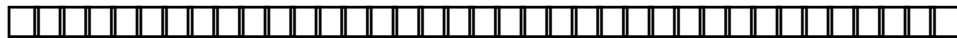


██████████ Weber Dam Modification	
██████████ ██████████	██████████ Prevent MCE Failure
██	
The dam embankment would be located upstream of the fault and the outlet works conduit would be extended upstream through the dam.	
██████████	██████████████████
Reduce the volume of fill material, including filter material, partially due to the narrower crest.	Requires extension of the outlet works about 100 feet upstream of the existing inlet. The existing outlet works tunnel will have to be evaluated for bearing capacity to ensure it can withstand the new embankment.



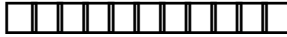
<input type="checkbox"/> Weber Dam Modification
<input type="checkbox"/> RELOCATE THE DAM EMBANKMENT DOWNSTREAM OF THE FAULT.
<input type="checkbox"/> The concept design centers the dam embankment on the fault and adds a stability berm to the downstream slope to earthquake prevent failure. The outlet works conduit would be extended downstream.
<input type="checkbox"/> The dam embankment would be located downstream of the fault and the outlet works and walkway would be rebuilt in its entirety and the conduit would be extended downstream through the dam. This proposal was estimated based on percentages of the quantities used in the original concept and its alignment.

VEALDES.TAB



<input type="checkbox"/> Weber Dam Modification	
<input type="checkbox"/>	<input type="checkbox"/> Prevent MCE Failure
<input type="checkbox"/>	
<p>The dam embankment would be located downstream of the fault and the outlet works would be rebuilt in its entirety or the conduit would be extended downstream through the dam.</p>	
<input type="checkbox"/>	<input type="checkbox"/>
<p>Moves the alignment entirely off the fault.</p> <p>Reduce the volume of fill material, including filter material, partially due to the narrower crest.</p> <p>Eliminate construction of the downstream berms at the left abutment and the outlet works.</p> <p>Out of the Q_e formation material.</p> <p>May eliminate the need to rehabilitate the outlet works tunnel.</p> <p>Outlet works tower could be relocated within the center section of the embankment, thus increasing its resistance to earthquake loading.</p>	<p>Requires additional exploration, ie. cone penetrometer tests.</p> <p>Destroys additional wetland that will have to be replaced as mitigation.</p> <p>Requires relocation of the outlet works tower. Can possibly use the existing outlet works tunnel. Will have to evaluate the bearing capacity of the tunnel to ensure it can withstand the new embankment.</p>

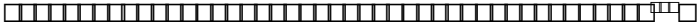






















VEALTEVL.ALT

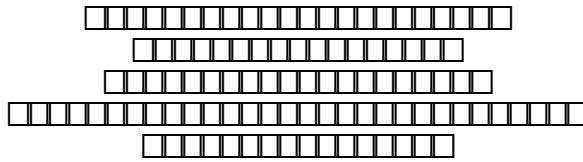


<input type="checkbox"/> Weber Dam Modification	
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> Control Release
<input type="checkbox"/>	
<p>Provide an auxiliary channel through the fuseplug to allow preemptive controlled releases, either manually or automatically with a shear pin flap gate. This will allow supplementary reservoir releases in conjunction with the existing spillway. This alternative would not require the fuseplug to be completely rebuilt after each flood event, thereby saving maintenance. Manual operation of the flapgate would allow the operator to initiate additional releases without having to breach the plug or wait for the plug to erode.</p>	
<input type="checkbox"/>	<input type="checkbox"/>
<p>Additional controlled release capacity.</p> <p>Eliminate rebuild of fuseplug from lower flow flood events.</p> <p>Initiate reservoir releases without waiting for the fuseplug to erode which allows the operator to respond to flood events.</p> <p>Initiate releases as necessary in advance of the flood event without destroying (breaching) the fuseplug and having to rebuild the breached portion.</p> <p>Initiate higher level of protection of reservoir facilities, ie. greater release rate to prevent dam crest overtopping.</p> <p>Preempt any slug releases through the emergency spillway if the fuseplug is lost rapidly.</p>	<p>Additional construction item.</p> <p>Higher cost of spillway.</p>

VEALTEVL.ALT

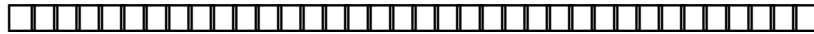
AUXILIARY FUSEPLUG CHANNEL SIZING TABLE

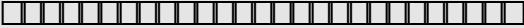

								
								
								
	27	53	66	80	106	133	199	265
	75	150	187	225	300	375	562	750
	138	275	344	413	551	688	1033	1377
	212	424	530	636	848	1060	1590	2120
	296	593	741	889	1185	1481	2222	2963
	389	779	974					
								



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Russ	Geotechnical Engineering	(303) 236-3900 Extension 270

WEBER.MTG



	
Specifications/Solicitation No.1425-3-SI-60-06140, USBR, Great Plains Region, Toe Drain and Outlet Works Repair, Bonny Dam, Pick-Sloan Missouri Basin Program, 1993	Data on subsurface drainpipe trench laying machine used in VE Alternative 3B and 3C.
SEED Data Book, Weber Dam Volumes 1 and 2, USBR, Dam Safety Inspection Section, Denver, Colorado	Design and construction data related to Weber Dam used for all alternative proposed by VE Team.
"Designing with Geosynthetics," Robert M. Koerner, 1990, Second Edition.	Referenced for identifying geomembrane to be used in Design Team concepts and applications for use in VE Proposals.
"Seepage, Drainage, and Flow Nets," Harry R. Cedergren, 1977, Second Edition.	General use for design of filters/drains for new dam options proposed by VE team.