Methow Valley Irrigation District Project

FINAL Environmental Assessment

East and West Diversion Screening Proposal

BPA Project # 1996-034-01

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Prepared by:

Bonneville Power Administration

March 12, 2004

Final Environmental Assessment
Methow Valley Irrigation District Project
East and West Diversion Screening Proposal

Administrative Summary

Funding Agency: U.S. Department of Energy, Bonneville Power Administration
Proponent: Methow Valley Irrigation District

Name of Proposed Project: MVID East and West Diversion Screening Proposal

Abstract: Bonneville Power Administration proposes to assist the Methow Valley Irrigation District by funding the replacement of existing fish screens located along their East and West irrigation diversion canals. The East and West diversions are along the Methow River and Twisp Rivers, respectively, in Okanogan County, Washington. The existing screens, which were constructed decades ago, are deteriorating and do not meet current Federal and state standards and criteria for safe and effective fish passage. Both diversion sites are used by anadromous salmonids including Chinook, sockeye, and coho salmon, and steelhead. Non-migratory resident fish in the Methow and Twisp systems include rainbow, brown, brook, cutthroat/rainbow hybrid, and bull trout, and mountain whitefish.

The proposed fish screen replacements would meet accepted current standards and criteria for fish protection. Because this action has, in part, been addressed in an environmental assessment (EA) previously prepared by BPA in 1997, we make reference to that document. In addition to the proposed (preferred) action, BPA has been asked to consider an action alternative (Alternative 1) that is essentially the same as Alternative A in the original 1997 EA. This alternative includes the conversion of the MVID irrigation system from surface water withdrawals to a pressurized pipe groundwater system. The no action alternative (Alternative 2) is also examined.

The proposed action would result in some short-term, localized and minor construction-related impacts such as soil and vegetation surface disturbance, temporary displacement of wildlife, and localized noise. The long-term benefits include fish protection and conservation, improved fish movements around the new fish screen facility, prevention of fish entrapment and entrainment, compliance with standards and criteria for screening and passage promulgated by NOAA Fisheries and the state of Washington, and improved fish returns. Cumulative effects of reasonably foreseeable MVID irrigation system actions are also addressed. This Final EA reflects input from the public and any new information gathered since the preliminary EA was issued in early December 2003.

For additional information, contact:
Carl J. Keller or Nancy Weintraub
Bonneville Power Administration
P.O. Box 3621 – KEC-4
Portland, Oregon 97208-3297
Telephone: (503) 230-7692 or (503) 230-5373
Email: cjkeller@bpa.gov;
nhweintraub@bpa.gov

DEPARTMENT OF ENERGY
Bonneville Power Administration

Methow Valley Irrigation District Project
East and West Diversion Screening Project

Finding of No Significant Impact (FONSI)

SUMMARY: Bonneville Power Administration (BPA) has proposed to fund fish screen replacements at the Methow Valley Irrigation District's (MVID's) East and West Diversion canals, both located near Twisp, Washington, in Okanogan County. BPA prepared a Preliminary Environmental Assessment (EA) (DOE/EA-1486) in December 2003 that evaluated the proposed action and alternatives. Public input to the preliminary assessment was requested, and we have subsequently prepared a final EA. Based on this environmental review process for this project analysis, including public input, BPA has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment, in accordance with the National Environmental Policy Act. Therefore, preparation of an Environmental Impact Statement (EIS) is not required and BPA is issuing this FONSI for the proposed action.

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FOR FURTHER INFORMATION, CONTACT: Carl J. Keller, Biologist, Bonneville Power Administration – KEC-4, P.O. Box 3621, Portland, Oregon, 97208-3621. His phone number is (503) 230-7692; FAX number is (503) 230-5699; and e-mail is cjkeller@bpa.gov.

SUPPLEMENTARY INFORMATION: BPA has decided to fund the replacement of the existing fish screens at the East and West Diversion canals. The existing screens, which were constructed decades ago, are deteriorating and do not meet current Federal and State standards and criteria for safe and effective fish passage. The National Marine Fisheries Service (NOAA Fisheries) has documented that listed fish are making their way behind the MVID fish screens and being diverted into the canals and dying. Both diversion sites are used by anadromous salmonids including Chinook, sockeye, and coho salmon, and steelhead. Non-migratory resident fish in the Methow and Twisp systems include rainbow, brown, brook, cutthroat/rainbow hybrid, and bull trout, and mountain whitefish.

BPA and the MVID have selected the option to install fish screens by the spring of 2004. Implementation of the proposed action in this EA would, in part, help expedite MVID to meet the consent decree responsibility and halt the unlawful take of ESA-listed fish. The new screens would comply with current standards and criteria for fish passage and screens as documented in the National Marine Fisheries Service's Juvenile Fish Screen Criteria and Anadromous Salmonid Passage Facility Guidelines and Criteria.

Table 9 in the final EA summarizes the impacts of the proposed action and alternatives. BPA has determined, based on the context and intensity of these impacts, that the impacts of the proposed action are not significant, using the definition of this concept in section 1508.27 of the

Council on Environmental Quality Regulations for implementing the National Environmental Policy Act. This determination is based on the following discussion of the factors for evaluating intensity that are listed in section 1508.27, with relevant aspects of context and intensity identified.

1. **Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.**

Implementing the proposed action is expected to offer long-term fish protection and conservation, improve fish movements around the new fish screen facility, prevent entrapment and entrainment, help satisfy a court-ordered consent decree requiring MVID to avoid a "take" violation under section 9 of the ESA, meet the standards and criteria for fish screening and passage by NOAA Fisheries and the State of Washington, and improve fish returns. The following impacts would likely result from construction-related activities that are categorized as short-term, localized, and minor: soil and vegetation surface disturbance on a total of about 1.3 acres that have already been impacted from previous human-caused disturbances at both sites, temporary displacement of wildlife, sediment and turbidity discharges from the construction and removal of cofferdams in the Methow River, possible disturbance of ESA-listed fish from in-water work, tree removal, and localized noise. These impacts would be mitigated by the implementation of a number of measures intended to offset, compensate, or mitigate the possible adverse effects caused by project construction. These measures include such activities as an operations and maintenance plan, pollution and erosion control plan, site rehabilitation plan, revegetation/seeding procedures, and noxious weed control, which are listed in the Mitigation Plan (Appendix B) of the Final EA.

2. **The degree to which the proposed action affects public health or safety.**

The project is not expected to affect public health or safety. Security fences to be constructed around each screen facility (each about 1/3 acre in size) would be locked to prevent unauthorized entry, to protect the newly constructed screens and appurtenances, and promote human safety. The Final EA provides that, during construction of the new fish screens, certain measures would be made to avoid/minimize unnecessary pollution or contaminant discharges into the environment. This includes preparation and implementation of a Pollution and Erosion Control Plan, and monitoring any leakage of equipment fluids. These are identified in Appendix B of the Final EA.

3. **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.**

a. The MVID canal system was recommended as eligible for inclusion on the National Register of Historic Places (National Register) because the properties associated with the proposed fish screen replacements have made a significant contribution to the broad patterns of history in the Methow Valley. The irrigation system has been the most prominent irrigation feature in the valley. Although neglect and considerable changes in the structural materials of

the MVID, over time, have caused substantial deterioration, both the east and west canals still remain located in the original rights-of-way.

The current fish screens were constructed after the canal systems were built, and were replaced in the 1960s and 1970s. Therefore, because the screens are less than 50 years of age, they are considered non-contributing elements of the National Register eligibility. A cultural resources survey of the east and west screen sites was last conducted in November 2003 by a BPA archaeologist and no cultural materials were found. A follow-up letter from the Deputy State Historic Preservation Officer concurred with BPA's findings that the fish screens would have no adverse effects on the National Register-eligible MVID canal system.

b. There are no parklands or public recreational facilities in the immediate vicinities of either screen site.

c. The Natural Resource Conservation Service (NRCS) has designated most of the soils on the valley bottoms as farmland of statewide importance. The location and extent of prime and other important farmlands designated by the NRCS were obtained from NRCS soil survey information. There are no prime farmlands in the immediate location of the screen sites on the Methow and Twisp rivers, so the proposed action would not affect these farmlands.

d. Naturally occurring wetland environments that could be affected by the proposed action are found only at the west canal screen site, and are associated with the Twisp River. The National Wetland Inventory classification system identifies Palustrine and Riverine wetlands in the project vicinity; however, the project would not cause long-term adverse or beneficial effects on wetlands. The fish screen replacement would occur in an artificially created canal (ditch) system that was previously excavated from a wetland in the 1930s, but no additional filling or permanent impacts to the wetland will occur. The U.S. Army Corps of Engineers does not claim jurisdiction under the Clean Water Act because the canal is not considered a navigable waterway and less than 30 cubic yards of fill would be deposited. The artificial canal (ditch) to be disturbed by replacement of the drum screen will be rehabilitated (graded and revegetated) in accordance with the rehabilitation plan (Appendix B of the Final EA).

Because the exact locations and designs of the MVID screens were not finalized at the time of the announcement of the environmental process for this project, BPA included a notice of floodplain and wetlands involvement. However, through the floodplain/wetlands assessment process (see section 5.5 of the final EA) we have subsequently determined that the screen replacement project will occur outside of the 100-year floodplains of the Methow and Twisp rivers. Therefore, no floodplain findings are required.

e. The Methow River system, including the entire Twisp River and over half of its tributaries, has been recommended for inclusion in the Washington State Scenic Rivers Program. The Twisp River is also considered a River of Statewide Significance. Implementation of the proposed action would have no bearing on potential inclusion of the Twisp River as a State scenic river because the proposed action would replace the existing screens essentially in the same footprint, which is located approximately 300 feet off the main channel. The actual project footprint is very small on the landscape, the general character of the project areas will not

change, and there will be no change to water flows or hydrology in the immediate area of the screens, compared to existing circumstances.

f. There are no ecologically critical areas in the immediate vicinities of both project sites. The new screen would be positioned in an artificial water conduit system. Although critical habitat for bull trout has been proposed, there is no designated critical habitat for bull trout in the project area. Until adequate information is presented to warrant formal critical habitat designation, there is no need for formal management steps or measures to be taken. Conservation measures, terms, and conditions spelled out in the USFWS Biological Opinion will adequately address the concerns for bull trout proposed critical habitat. Therefore, construction and maintenance of the proposed fish screen replacement would not affect habitats, landscapes, or ecological settings known to be particularly important, unusual, unique, or critical.

4. **The degree to which the effects on the quality of the human environment are likely to be highly controversial**.

The environmental effects of the proposed action are not considered to be highly controversial. Only one public comment letter was received on the preliminary EA and this letter did not raise any controversy over environmental effects of the proposed action.

5. **The degree to which the possible effects on the human environment is highly uncertain or involves unique or unknown risks.**

Implementation of the project is not likely to cause effects on the human environment that are uncertain, unique, or unknown. Fish screen replacements are fairly routine and the effects are well documented. The anticipated effects from this specific screen replacement project are straightforward, documented in the Final EA, and do not present any degree of uncertainty.

6. **The degree to which the action may establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration.**

Fish screen replacement is an ongoing practice throughout the Pacific Northwest that is being employed in an effort to facilitate easy and safe fish passage, particularly for the early life stages of anadromous fish species. The MVID fish screen replacement is a stand-alone project and will not establish a precedent for future actions. BPA's decision to fund the screen replacements also does not represent a decision in principle about a future consideration. Additional modifications to the MVID irrigation system may be proposed in the future, but the replacement of the screens has independent utility, corrects an immediate problem, and is designed to accommodate a range of flows that includes both the current operation and the flows required under the new Washington Department of Ecology Order. This new order is described in section 1.3.2 of the final EA.

7. **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.**

The 1997 EA prepared for the MVID irrigation system improvement project evaluated a variety of possible actions that could be undertaken to address the broader need and purpose. The fish screen replacement currently proposed is not intended to correct or offset irrigation system problems or deficiencies; instead, this project is designed to complement the current and reasonably foreseeable future improvements.

The MVID may need to take additional actions, such as repairing or replacing portions of the remaining canals to slow or stop the issue of leaking of water from them, to be able to meet the new Washington Department of Ecology (WDOE) order while still providing an adequate supply of water to its members. Also, the BOR is currently drafting plans that would upgrade the MVID diversions to address fish passage problems and replace the annual push-up dam on the Twisp River (west canal diversion) with a more permanent, reliable and fish-friendly structure. No funding has yet been identified for implementing these additional actions but, to the extent possible, they have been addressed in the EA. See section 4.8 of the EA for a more detailed discussion of cumulative effects. The proposed fish screen replacement project at the east and west diversion diversion canals is independent of other actions that have, or are expected to have, individually insignificant but cumulatively significant impacts.

8. **The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historic resources.**

See the discussion under 3(a) above.

9. **The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.**

The primary intent of this project is to provide long-term benefits to all fish species, including anadromous and resident species that are protected under the ESA (see discussion under item 1 above). Fish entrapment and stranding in the canals resulting from holes in the existing screens has, in part, necessitated corrective actions to prevent fish from entering the irrigation canals. The proposed fish screen designs at the east and west diversion canals are also intended to correct other fish screen problems/constraints such as velocity flows and angles, effective routing of fish to the bypass, and avoiding impingement during high flows. The proposed screens are intended to meet current Federal and State fish screening technologies and standards and correct existing fish screening and passage problems. The potential benefits are substantial to the local and possibly regional population of resident and anadromous salmonid species that are listed under the ESA.

While project implementation is expected to provide substantive long-term benefits, there will be some adverse effects from project construction. These have been discussed in response to item 1 above. As stated, these impacts will likely be short-term, very localized, and of a small magnitude, without foreseeable secondary adverse effects. Appendix B of the final EA

documents the terms and conditions and other mitigation measures that would be implemented to offset, compensate, avoid, and/or minimize potential adverse effects on listed species and critical habitat from project construction.

10. **Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment**.

The proposed action does not threaten or affect an existing Federal, State, or local violation or requirements for the protection of the environment. As part of the environmental process for this project, BPA has consulted on and complied with the applicable laws and requirements. This consultation has resulted in the commitment by BPA to a number of environmental conservation and mitigation measures (see Appendix B of the Final EA).

On December 16, 2003, the WDOE issued its Administrative Order (No. DE 03WRCR-5904) which was the result of a court-ordered review of the MVID's irrigation system. The new fish screens are designed to accommodate the short- and long-term requirements of this Order, so no conflicts are envisioned.

Determination: Based on the information in the EA, as summarized here, BPA determines that the proposed action is not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act, 42 U.S.C. 4321 et seq. Therefore, preparation of an EIS is not required and BPA is issuing this FONSI. for the proposed action.

Issued in Portland, Oregon, on 3/15/04.

*/s/ Therese B. Lamb*_____

Therese B. Lamb, Vice President
Environment, Fish and Wildlife

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CHAPTER 1 NEED FOR AND PURPOSE OF ACTION

Bonneville Power Administration (BPA) has received a request from the Methow Valley Irrigation District (MVID) to fund the replacement of two fish screens along their East and West irrigation diversion canals. On August 19, 2003, the Northwest Power and Conservation Council recommended that BPA provide funding for replacement screens at the MVID diversions (Marker, 2003). Because BPA is the primary potential source of funding for the proposed project, it is acting as the lead agency under the National Environmental Policy Act (NEPA). BPA prepared and sent out for public review and comment a preliminary environmental assessment (EA) in early December 2003.

This final EA is intended to supplement a 1997 BPA environmental assessment that examined a broader scope of actions and alternatives for the MVID (BPA, 1997b). The fish screening action currently proposed for BPA funding is a smaller component of, and has a smaller scope than an overall larger rehabilitation plan for the MVID, and has considerable overlap with the alternatives of the 1997 document. Therefore, we rely on information contained in that 1997 EA and reference various chapters from that document.

1.1 Underlying Need for Action

The MVID currently operates two diversions to feed water to their irrigation system: one on the Methow River and one on the Twisp River, both located in North Central Washington. Although fish screens have been in place on each of the two diversions since the 1930s, fish screens constructed in the state of Washington in the 1930s through 1970s do not comply with currently accepted biological protection standards and criteria for juvenile salmonid fish. Old screens typically provide fair protection from injury/mortality for large yearling smolts (4-6-inch long), but inadequate protection for fry and fingerling life stages. Improperly screened irrigation canals, or screens that are in disrepair or outdated, may cause injury and mortality of fry and fingerlings and may hamper efforts to increase depressed salmon and steelhead populations.

The National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NOAA Fisheries) has documented that juvenile Chinook salmon and steelhead (among other fish species) are making their way behind the MVID fish screens and being diverted into the canals and dying, due to stranding either in the canals or in the irrigators' fields. NOAA Fisheries investigations concluded that the MVID water diversions and screens were causing "take" as defined under the Endangered Species Act (ESA) (Nordlund, 2002; Nordlund, 2000; Carlson, 2002). The studies further identified that mortality and injury of juvenile salmonids would likely occur due to inadequate fish screens in both canals. These fish species are listed as endangered under the ESA. The underlying need for action is to help prevent this loss of endangered juvenile fish. BPA is responsible for protecting and conserving listed threatened and endangered species under the ESA. Funding a project to protect and mitigate these endangered species would assist BPA in fulfilling its ESA responsibilities, particularly under the Reasonable and Prudent Alternative action #149 of NOAA Fisheries' 2000 Biological Opinion on the Federal Columbia River Power System (FCRPS) operations.

The current MVID screen designs are deteriorating, outdated, and ineffective, and do not meet current regional fish screen biological protection criteria adopted by the Columbia Basin Fish and Wildlife Authority Fish Screening Oversight Committee of 1995; nor do they meet the fish screen design standards and criteria of the NOAA Fisheries and state of Washington. The

screens at the East diversion canal are noncompliant with the screen angle orientation criteria, and thus may exceed approach velocity criteria. These screens were temporarily re-meshed with 3/32-inch mesh to conform with NOAA Fisheries criteria in 2000 at MVID's expense. The new mesh was simply wrapped over the ¼ inch mesh of the old screens as a temporary measure. Since that time, the mesh has deteriorated to the point where breaks and gaps are appearing. This re-meshing also decreases the screen's ability to pass water by decreasing its effective area. As a result, MVID has been unable to divert sufficient water to supply their users through these screens without exceeding approach velocity limits. A similar situation exists at the West canal screens. These screens are perpendicular to the stream flow; do not provide any sweeping velocity along the screens; the screen size is insufficient to pass 30 cubic feet per second (cfs) at an approach velocity of 0.4 feet per second; the trash rack is located upstream of the drum screen face; and the drum screen provides insufficient water control over the water surface at the screens. These deteriorating and outdated fish screens contribute to reduced movement, passage, and survival for ESA-listed fish in the Twisp and Methow rivers and require corrective action to maximize opportunities to restore depressed runs of ESA listed species.

The MVID must comply with a consent decree with NOAA Fisheries that requires the district to take certain steps to avoid violating the ESA (see chapter 1.3.2 regarding the consent decree). In order to do this, the MVID needs to either replace the noncompliant fish screens, discontinue the current irrigation system, or select another viable alternative. The MVID agreed to comply with fish screen criteria by the spring of 2004, in a consent decree negotiated in Federal court. Implementation of the proposed action in this EA would, in part, meet the consent decree responsibility and halt the unlawful take of ESA-listed fish.

The proposed action is also needed to help BPA to meet its obligations under the Pacific Northwest Electric Power Planning and Conservation Act (Act). Development of the hydropower system in the Columbia River Basin has had far-reaching effects on many species of fish and wildlife. According to this Act, BPA is responsible for protecting, mitigating and enhancing fish and wildlife affected by the development, operation, and management of the FCRPS hydroelectric facilities on the Columbia River and its tributaries (see Pacific Northwest Electric Power Planning and Conservation Act, 16 U.S.C. 839 et seq., Section 4(h)(10)(A)). To accomplish this goal, the Act requires the Northwest Power Planning Council (recently renamed the Northwest Power and Conservation Council; hereinafter Council) to develop a program for fish mitigation and enhancement, and requires BPA to fulfill its mitigation duties in a manner consistent with the program. As mentioned earlier, one of the projects recommended by the Council is the MVID East and West diversion screening project. Providing funding for the proposed action would assist BPA in fulfilling its obligations as mandated under the Act, and would expedite protection of the listed Methow and Twisp River fish.

1.2 Purpose of Action

BPA has identified the following purposes for participating in this project and BPA would base its choice among the alternatives on these purposes:

- Prevent losses of anadromous and resident fish to the MVID irrigation system;
- Improve fish passage;
- Help MVID assure its members continued access to water supplies;
- Achieve cost and administrative efficiency; and
- Comply with all applicable laws, regulations, and Executive Orders.

1.3 Background

Figure 1 provides a map overview of the MVID, including the locations of the diversions and their juxtaposition to the Methow and Twisp Rivers. Lands irrigated by the MVID are also shown.

The proposed fish screen replacement project is part of a larger, more complex set of actions to rehabilitate the MVID irrigation system. These actions were examined in the Methow Valley Irrigation District Project-Final Environmental Assessment and Finding of No Significant Impact (DOE/EA-1181) that was prepared by BPA in 1997 (BPA, 1997b). The broad goals of the larger rehabilitation effort are to increase the efficiency of the irrigation system, improve instream flows for fish and water delivery throughout the system, correct fish passage problems that have been identified in several studies of fish and water issues in the Methow Basin, and institute water conservation in the MVID through on-farm irrigation equipment replacement and educational programs.

1.3.1 Historical Perspective

This chapter provides a brief overview of the history behind the Methow Valley Irrigation District and the project. More detail and historical references may be found in BPA (1997b), Montgomery Water Group (1996), Okanogan County (1994), Washington Pollution Control Hearing Board (2003), and a variety of other reports.

The MVID canal system has been part of the Methow Valley's primarily fruit-growing agricultural production during its years of operation from the early 1900s to the present. The first efforts at irrigation were in the 1880s, but after 1900 there were larger scale and more organized irrigation attempts in the valley. In 1919, farmers and orchardists created the MVID. In providing water to the irrigators, the district has experienced various challenges and conflicts including fish passage problems around the diversions, critically low stream flows downstream of the diversions that have been harmful to anadromous and resident fish, high conveyance losses, and the maintenance of an economically viable irrigation water supply for its members.

Fish population declines were reported in both the Methow and Twisp Rivers shortly after construction of the MVID system, and much of the loss was attributed to downstream-migrating juvenile fish being drawn out of the rivers and into the irrigation system where they often died. The original fish screens built on the East and West canals were installed in 1937 to prevent entry of fish into the irrigation system. In 1967, the East canal screen's concrete structures were demolished and rebuilt, and the screens were also remeshed (pers. com. Eric Egbers, WDFW Oct. 10, 2003). The West canal screens were replaced in 1976 (Archaeological and Historical Services 1996).

The overall water conveyance efficiency of the MVID system (i.e., current demand for irrigation water divided by the total amount of water diverted) has been estimated to be as low as 20 percent (Montgomery Water Group, 1996), although seepage evaluations conducted by the Bureau of Reclamation (BOR) in 2003 indicate that efficiencies may presently be somewhat higher. Water conveyance losses in the canals occur due to evaporation and canal leakage. The need to increase the efficiency of the irrigation system, improve instream flows for fish in the Methow and Twisp rivers, and correct fish passage problems has been identified in a variety of legal documents and studies in the Methow Basin since the 1980s. There has been much

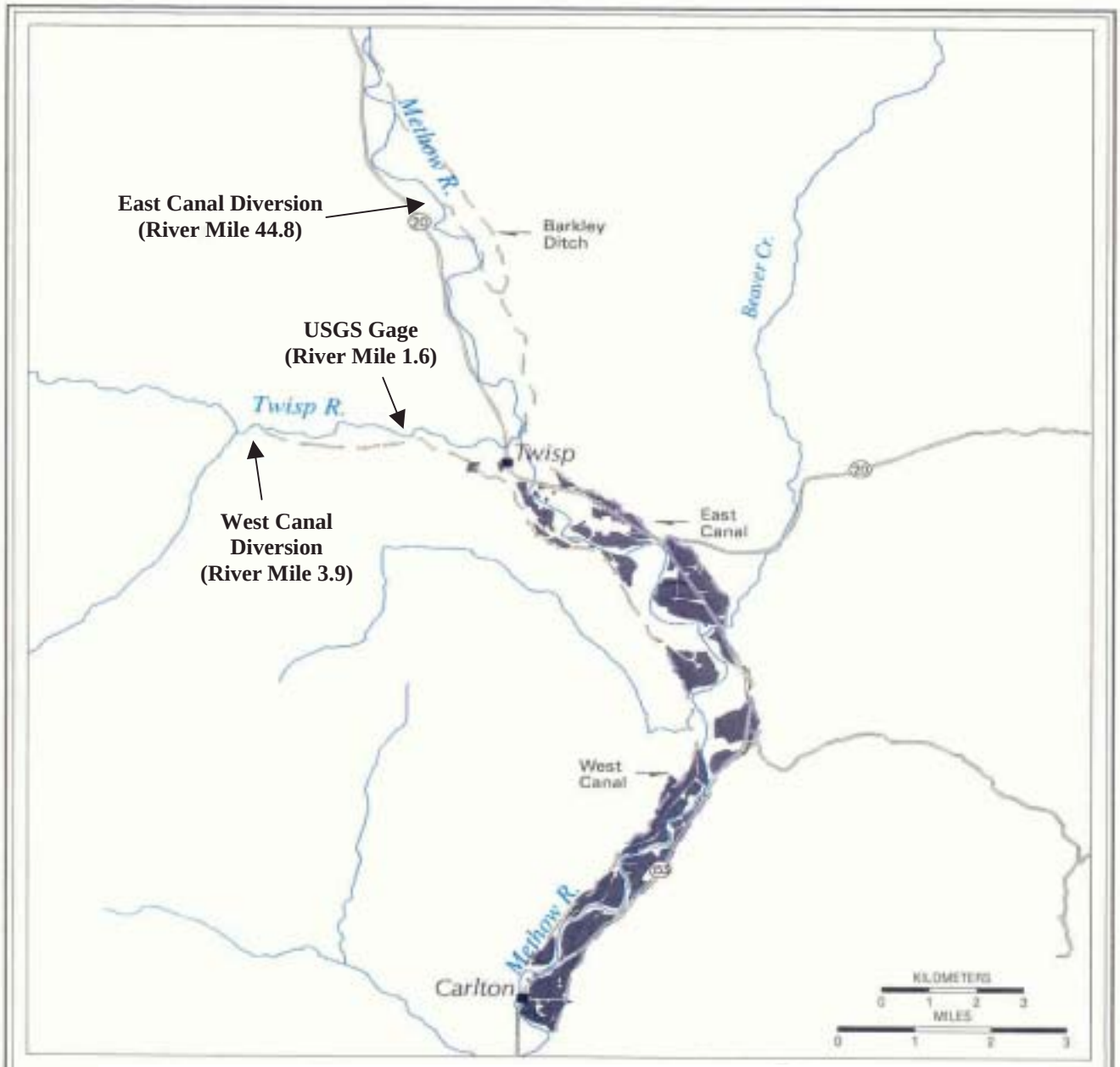

Figure 1. Location of Irrigation Diversions for the West Canal and East Canal Methow Valley Irrigation District near Twisp, Washington.

Modified from Methow Valley Irrigation District Project. Final Environmental Assessment and Finding of No Significant Impact DOE EA - 1181

dialogue and debate between the MVID, various state and Federal agencies, and tribes over the best practical rehabilitation and management strategies for the irrigation district:

- 1988 - The Washington Department of Ecology (WDOE) issued an order (DE 88-C386) requiring the MVID to rehabilitate its system or curtail water use.
- 1990 - The Washington Department of Wildlife et al. (1990) published a Methow and Okanogan River Subbasin Salmon and Steelhead Production Plan that identified problems with the MVID irrigation system.
- 1990 - The Klohn Leonoff study, commissioned and completed by WDOE and MVID, addressed significant issues such as poor maintenance and inefficient water use of the canal system (Klohn Leonoff Consulting Engineers, 1990).
- 1991 - The Yakama Nation filed suit against the WDOE and MVID for failing to implement the measures recommended in the Klohn Leonoff report and sought to enjoin the MVID's wasteful water practices.
- 1994 - The Methow Valley Water Pilot Planning Project prepared a Draft Methow Basin Plan that addressed irrigation issues in the Methow Basin.
- 1996 - The Montgomery Water Group completed a Water Supply Facility Plan for WDOE and the MVID, which assessed the overall state of the system and quantified the amount of water being used at that time. The plan suggested alternative water conservation strategies to benefit fish, improve system efficiency, and continue water provisions for irrigation. The plan included a recommendation for a pressurized closed-pipe system to convey water to the users.

1.3.2 BPA's Involvement and Subsequent Events

BPA became involved with the MVID project in 1996, after the Council recommended that BPA provide funding at that time. WDOE and the Washington Department of Fish and Wildlife (WDFW) were also to contribute funds for the MVID Rehabilitation Project based on a proposal by the Yakama Nation and the MVID. The proposed action at the time was to implement the recommendation from the Water Supply Facility Plan, which included conversion to groundwater wells and a pressurized closed-pipe system. BPA participated in extensive scoping and discussions on the project at that time, and in 1997 completed a Final Environmental Assessment (DOE/EA-1181) that evaluated a range of alternatives to rehabilitate MVID's irrigation program (BPA, 1997b). A Finding of No Significant Impact (FONSI) was issued in 1997 for two of the alternatives: 1) The proposed action (Alternative A), which included removal of the instream diversions and fish screens and replacing them with groundwater wells and pressurized pipe placed in the existing canals; and 2) Dissolution of the MVID (Alternative C).

Shortly before the EA and FONSI were completed, a group of MVID members opposed to the improvements filed suit against the MVID directors, but progress in implementing the proposed action continued. However, in 2000, the MVID Board voted for the exclusion of lands in the district as contemplated under the proposed action in the 1997 EA (Jolley et al., 2000). After the exclusion, the directorship changed and the new Board withdrew from the proposed plan. Several years of negotiations between the MVID, BPA, WDOE, the Yakama Nation, NOAA Fisheries, and others ensued. Also in 2000, the MVID voted not to accept the pressurized pipe system (alternative A in the 1997 EA) because of the following reasons (Jolley et al. 2000):

- high O&M costs;
- no assurance that legal rights-of-way for a pipeline system were secured;

- no final plan provided for evaluation and peer review;
- pump tests appeared inadequate to supply water to meet user's needs;
- no guarantee for funding;
- concerns about insufficient water rights from DOE; and
- concern for impacts to habitat fed by leaking canals.

On July 19, 2000, NOAA Fisheries sued the MVID claiming that the MVID's water diversion activities on the Methow and Twisp rivers constituted a "taking" of endangered Upper Columbia spring Chinook salmon and endangered Upper Columbia steelhead, which violated Section 9 of the ESA. NOAA Fisheries also sought to permanently enjoin MVID from operating its diversions until measures were implemented to avoid the repeated incidental taking of these species or until the MVID obtained a Section 10 permit allowing such takings.

The parties ultimately entered into a court-approved consent decree that provided that if the MVID did not eliminate surface water diversions, then the drum screens would have to be re-meshed to comply with the National Marine Fisheries Service' Juvenile Fish Screen Criteria to protect juvenile salmonids (NMFS, 1995 and 1996). In 2000, MVID rejected the first option (elimination of surface water diversions) in favor of an enclosed pressurized pipe system, which was BPA's original preferred alternative adopted in its 1997 FONSI and elected to pursue the replacement screen option.

At various points after 1997, BPA funded interim actions, including on-farm efficiencies and lateral pipe replacement. The irrigators excluded from the district were promised compensation by BPA as outlined in the 1997 EA, and received groundwater permits from the WDOE. To date, BPA and WDOE have spent about $900,000 for various on-farm efficiencies and irrigation improvements for the MVID, including lateral pipe replacement, pre-engineering studies, facilitation, and environmental analysis.

During the spring of 2001, BPA funded a series of facilitated discussions to revisit a proposal for MVID improvements. The participants invited to these discussions included representatives of the MVID, BPA, WDOE, WDFW, Yakama Nation, and NOAA Fisheries. The group settled on a proposal to line the East and West canals with concrete and convert the flood irrigation diversions to pump houses. Ultimately, the MVID rejected this alternative because of the anticipated high future power costs for pumping.

In April 2002, the WDOE issued an Administrative Order (No. 02WRCR-3950) requiring MVID to limit its diversion of water from the Twisp and Methow Rivers to a combined maximum instantaneous rate of 53 cfs, a substantial reduction from MVID's claimed diversion rights of 102.4 cfs. In August 2003, the State of Washington Pollution Control Hearings Board (PCHB) found that WDOE's Order reducing MVID's diversions to 53 cfs did not "meaningfully address the significant inefficiencies of MVID's water conveyance system," and ordered WDOE to re-examine the MVID irrigation system with the goal of issuing a supplemental order to adequately address conveyance losses (WPCHB, 2003) if funding continues to be available. On December 16, 2003, the WDOE issued its Administrative Order (No. DE 03WRCR-5904) which was the result of the court-ordered review of the MVID's irrigation system. This review again revealed a wasteful irrigation system, that improvements to the system are possible, and that funding is available for improvements in order to achieve reasonable system efficiencies (Barwin, 2003). A summary of this Administrative Order is provided in Table 1 and the proposed fish screen project is designed to accommodate a range of flows that could result from this Order.

Table 1. Summary of Washington Dept. of Ecology's Administrative Order 03WRCR-5904

	By April 1, 2004	**April 1, 2004 – September 15, 2006**	**After Sept. 15, 2006**
Twisp River at river mile 4.3	No comment made	Limit instantaneous and annual diversion to 21 cfs max. and 5,162 acre-feet of water annually	Limit instantaneous and annual diversion to 11 cfs max. and 2,716 acre-feet of water annually
Methow River at river mile 44.8	Install/maintain measuring device to determine amount of water entering MVID East canal	Limit instantaneous and annual diversion to 20 cfs max. and 4,909 acre-feet of water annually	Limit instantaneous and annual diversion to 20 cfs max. and 4,909 acre-feet of water annually

In April 2003, the MVID requested the Council to consider a proposal for BPA to fund fish screen replacement that would address screening and passage problems. On August 4, 2003, the Council recommended construction of a traveling belt fish screen on the MVID East side canal and a rotating drum fish screen for the MVID West side canal (Fritsch, 2003). On August 19, 2003, the Council recommended that BPA provide funding for the replacement of the MVID East and West diversion screens (Marker, 2003). The Council did not consider or recommend any other alternatives, so alternatives other than the proposed action would have to go through the Council's process before BPA would consider these for funding.

The fish screen replacement proposal has been cooperatively developed by the following entities who are willing to provide the support listed, subject to limitations of available funding and staff:

- WDFW - Providing the engineering/biological expertise to evaluate appropriate fish screens at the East and West diversion sites; would ensure fabrication of fish screens to meet current standards and criteria for fish screening and passage; would install the screens at its own expense: about $275,000.
- WDOE - Responsible for management of water rights in the state of Washington; Conducted an evaluation to determine appropriate canal flow and conveyance efficiency for the MVID; also processing the exclusions with no administrative costs.
- BOR - Providing engineering expertise and technical support for the current fish screen proposal.
- NOAA Fisheries - Providing consultation expertise in accordance with requirements of the Endangered Species Act in support of the design of the proposal so that it appropriately protects/conserves listed anadromous fish.
- U.S. Fish and Wildlife Service - Providing consultation expertise in accordance with requirements of the Endangered Species Act (ESA) in support of the design of the proposal so that it appropriately protect /conserves listed wildlife and resident fish.
- MVID - Providing a commitment to allow its facilities to be upgraded, and providing the long-term operation and maintenance of the screens.
- BPA - Would provide the majority funding for this project = about $958,000 for fish screen replacement that would include all infrastructure construction and preparation for fish screen installation; also paying for exclusion of members on the lower Twisp to convert to wells; has prepared relevant environmental evaluation.

1.4 Approach BPA Has Taken In This Document

As previously mentioned, BPA prepared an EA in 1997 to examine rehabilitation and improved water conservation strategies for the MVID (BPA, 1997b). The 1997 EA addressed a range of alternatives that were being considered at the time for a broader project scope than the proposed fish screen action. The fish screening currently proposed by the MVID for BPA funding has considerable overlap with the alternatives examined in the 1997 EA. For example, fish screen upgrades were considered as components of alternatives B and D in that document; however, the 1997 FONSI did not cover these alternatives.

The Federal action currently proposed would be the issuance of funds by BPA to replace the fish screens for the MVID. This final EA provides the environmental analysis of this proposed action and two alternatives: developing a groundwater/piped irrigation system and a no action alternative. Because the current proposal was part of the larger project that BPA addressed in its 1997 EA, we make reference to, and incorporate that 1997 EA, where applicable, so as to eliminate redundancy and streamline the current EA document. The cumulative impacts chapter (chapter 4.8) of this final EA addresses future possible actions that are reasonably foreseeable concerning rehabilitation of the MVID irrigation system. These actions are speculative, conceptual, or not yet agreed upon by the parties at this time.

1.4.1 Timeline

The timeline for this project has shifted slightly from that identified in the preliminary EA. Table 2 now reflects the current target timeframe:

The construction period proposed in the preliminary EA was identified as March - June 2004. However, Table 2 now reflects the current realistic target timeframe where most project construction would now occur between May 15 and July 31. The reason for this minor change of construction timing would be to allow ample time for preconstruction staging by the contractor, enable the necessary mitigation plans and conditions to be prepared in advance of construction, allow ESA consultation to conclude, and to ensure all appropriate and necessary contracting processes are engaged before, during, and after project construction. However, it is important to note that the temporary water bypasses are proposed to be constructed in April, 2004 to enable the MVID to receive irrigation water by the start of the 2004 irrigation season (May 1, 2004). These bypasses are described in chapters 2.1.1, 2.1.2, and 2.1.3.

Table 2. NEPA Timeline

Timeframe	Action
Early December 2003	Issue preliminary EA; solicit public comments on the preliminary EA
March 15, 2004	Complete the final EA (including identification of terms, conditions, plans, and other stipulations), based on comments received on the preliminary EA and during the environmental process, and from subsequent information gathered, and issue FONSI
March 15 to May 15, 2004	Project contracting and preconstruction (staging) work
May 15 – July 31, 2004	Start/complete construction

1.5 Public Involvement

After the Council recommended that BPA fund the MVID project in the summer of 1996, extensive public involvement was conducted during preparation of the 1997 EA, including meetings, scoping, open house public gatherings and workshops (BPA, 1997).

In response to the most recent fish screen replacement proposal by the MVID in 2003, BPA sent notification to 773 points of contact on October 7, 2003 to inform them that the Council had recommended that BPA provide funding assistance to the MVID for fish screen replacement (BPA, 2003). The 773 contacts included appropriate tribes, landowners in the Methow Valley, MVID members, agencies, local news media, and others interested in the project. The notification also stated that BPA would prepare an environmental analysis for the proposed action and alternatives. The notification invited interested parties to request a copy of the EA for review and comment, when that document becomes available. BPA contacts were also provided.

On October 15, 2003, BPA published a similar notice in the Methow Valley News (Twisp, Washington) and The Chronicle (Omak, Washington). These publications contained the same information as the notification described above.

In early December 2003, in response to their requests, BPA sent hard copies of the preliminary EA to 56 individuals and electronic copies of the document were sent to 11 individuals. Only one comment response was officially received by BPA. The Okanogan County Noxious Weed Control Board (OCNWCB) expressed concerns regarding noxious weeds along the MVID irrigation system and at each project site. Their recommendations included: removing and treating noxious weed infestations, developing a long-term weed control plan, revegetating with a suitable competitive grass mixture that would outcompete noxious weeds, using an integrated weed management plan, and initiating a weed identification education program prior to ground disturbance. Appendix A summarizes their comments, which BPA believes are reasonable, valid, and relevant to the project. We have therefore required that the MVID consult with the OCNWCB to ensure their concerns are appropriately incorporated into the Site Rehabilitation Plan, which will be referenced later.

Appendix A also refers to a September 10, 2003 letter that BPA received from Earthjustice, on behalf of the Okanogan Wilderness League. A summary of their comments, along with our responses to the comments, is also included.

CHAPTER 2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter of the EA describes the proposed action and alternatives. Chapter 2.1 outlines the proposed action, including the planned work and timeframes. Chapter 2.1.4 lists the mitigation measures that are proposed to minimize or mitigate the potential adverse environmental impacts during project construction. Chapter 2.2 presents an alternative that would involve the reconfiguration of the irrigation system from surface water diversions to groundwater wells and pressurized pipe. Chapter 2.3 describes the no action alternative, and Chapter 2.4 discusses the alternatives considered and reasons they were not evaluated in detail in this EA. Lastly, chapter 2.5 compares the predicted performance of the proposed action with the no action alternative and describes how well each meets those project purposes.

During the NEPA process for this project, BPA has committed to a number of mitigation measures including those associated with the ESA. As the lead Federal agency, BPA is responsible for implementing these conditions if the proposed project is funded, to ensure appropriate conservation and protection of the resources and demonstrate environmental compliance. Appendix B contains the Mitigation Plan, which lists those mitigations, cites the sources that explain the conditions, and identifies when they would be implemented.

2.1 Proposed Action (Fish Screen Replacement)

2.1.1 Overview

The principle components of the fish screen replacement project are listed in Table 3, and the actions are further described and explained in detail in the Pre Design Memoranda for both sites (B0R, 2003a and BOR, 2003b). Appendices C and D-provide site plans, layouts, and other associated details on the proposed East and West diversion fish screen replacements, respectively. Appendices E and F describe the temporary water delivery for the East and West diversions that would be constructed prior to the start of the irrigation season (May 1, 2004).

Designs of the proposed fish screens are consistent with the NOAA Fisheries' Juvenile Screen Criteria (NMFS, 1995 and 1996). Passage would be designed in accordance with the NOAA Fisheries Anadromous Salmonid Passage Facility Guidelines and Criteria (NOAA Fisheries, 2003a). As stated earlier, the primary design criteria address appropriate screen location and orientation; approach velocity; minimum screen area; sweeping velocity; flow distribution; mesh size, shape and type of material; and cleaning features. We have secured the concurrence from NOAA Fisheries in regard to the engineering design of the proposed screens and appurtenant facilities (pers. com. w/ B. Nordlund, February 19, 2004 and March 1, 2004).

The proposed work at both sites would generally include staging of equipment and materials, installing the temporary water bypasses, removing the existing concrete and metalwork from each existing screen structure, constructing the concrete infrastructures to accept the new screens, and installing the new fish screens fabricated by the Washington Department of Fish and Wildlife (WDFW). The entire project would be constructed and operating within an eight- to ten- week period. Selection and use of the equipment would have the least adverse effect on the environment, including vehicle staging, vehicle operation, inspection, and containment of potential equipment contaminants. Specific provisions on equipment and pollution prevention would be contained in a Pollution and Erosion Control Plan (see item 23 in Appendix B).

Table 3. Principle Components of the Proposed Action

MVID EAST FISH SCREEN - Replace existing drum screens with traveling belt screen	**MVID WEST FISH SCREEN** - Replace existing drum screens with upgraded drum screens
Clearing and grubbing	Clearing and grubbing
Demolition, removal and disposal of the existing screen structure	Demolition, removal and disposal of the existing screen structure
Diversion and care of the canal	Diversion and care of the canal and bypass flows
Installation of coffer dams	Installation of coffer dams
Earthwork for concrete structure for four traveling belt fish screens and a fish return pipe outlet	Earthwork for concrete fish screen structure and reinforced concrete fish ladder/spillway
Placing reinforced concrete and metal work for fish screens	Placing reinforced concrete and misc. material for fish screens and fish ladder/spillway
Installing slide gates	Installing three slide gates
Installing complete electrical system	Installing complete electrical system
Installing fish return pipe	Installing fish return pipe
	Canal reshaping
Site grading	Site grading
Placing gravel surfacing	Placing gravel surfacing
Placing riprap	Placing riprap
	Construction of log control weirs
Installing chain link fencing	Installing chain link fencing
Coordinating screen installation and other miscellaneous metalwork with WDFW	Coordinating screen installation and other miscellaneous metalwork with WDFW
Site rehabilitation with native vegetation	Site rehabilitation with native vegetation

At the start of demolition and construction, the work sites would be isolated from normal river flows by the construction of cofferdam structures to:

- enable dry working conditions for the removal and replacement of the fish screens,
- prevent adverse affects on surface waters and water quality, and
- prevent construction impacts directly on fish that might be in the project area during the construction phase.

Construction of the new fish screens at both locations would occur during the 2004 irrigation season (May 1 - October 1, 2004) and would be isolated from the Methow and Twisp rivers. Accordingly, water would not be allowed to normally pass through the diversions during the time of new screen construction. The MVID needs a continuous supply of irrigation water throughout the 2004 irrigation season to continue their irrigation practices, while the new screens are being constructed. Therefore, a temporary bypass would be established prior to the start of the MVID irrigation season (May 1, 2004) to ensure irrigation water is provided to the irrigators until the new screens at each site are constructed and fully operational. Appropriate fish bypass has also been incorporated into the screen designs at each site and is described below.

The estimated BPA funding to complete the infrastructure construction in preparation for the screens is about $958,000. This includes all site preparation, engineering design, coffer dam construction, moving and backfilling of earthen materials, establishing the electrical service to each site, construction of new permanent fish bypasses, construction of temporary water bypasses, and so on. The fish screens are being fabricated by the WDFW at the estimated cost

of $275,000. No additional funding sources for project construction are currently offered or available to meet the project purpose and need.

2.1.2 East Diversion Site (Methow River)

Replacement Screens – The replacement screens would be located approximately 60 feet downgradient in the canal from the existing headworks. No changes are planned to be made to the headworks structure, although the supporting concrete walls would likely be reinforced. The new screen facility would consist of four 6-foot wide by 7.5-foot high rotating belt type screens that would be angled 20 degrees from the canal flow to maintain the required sweeping velocity along the screens. The operational limit of the diversion is 24 cfs, based on WDOE Order DE 02WRCR-3950, but the screens can operate at flows ranging from 1 to 30 cfs and remain within the required maximum approach velocity of 0.4 feet per second. Three 36-inch wide metal check gates would be located 10 feet downstream from the screens to control the water surface elevation on the screens. The unlined section of canal between the headworks and the screens would be replaced with a concrete channel to provide a more efficient water conduit to the fish bypass. A metal trash rack and walkway would be installed upstream of the replacement screens.

Fish Return Bypass - The new fish return bypass flow would be controlled by an adjustable overflow weir and ramp. The fish return water would flow over the adjustable weir into a concrete box and then into a 24-inch diameter, 210-foot-long buried fish return pipe. The pipe exits into the Methow River approximately 270 feet downstream from the existing diversion dam crest. The elevation of the outlet end of the pipe would be submerged at all river levels except the very lowest flows. A small concrete structure would be constructed at the outlet end of the pipe to protect and stabilize the outfall.

Cofferdams - All demolition work and construction of permanent facilities would be performed in the dry (see items 25 and 43 in Appendix B) by the use of three temporary cofferdams in the construction area. One cofferdam, approximately 2 cubic yards in size, would be placed just downstream of the existing headgate to control any leakage and prevent water from entering the screen replacement construction site. A second cofferdam, estimated at 7 feet high by 25 feet wide and about 800 cubic yards, would be required to dewater the fish return outlet structure area in the Methow River. A third small coffer structure would be needed to install the temporary water bypass (see below). Any fish stranded in the dewatered areas would be rescued at the time of dewatering and returned back to the river by a qualified biologist (see items 26 and 34 in Appendix B). Each cofferdam would be constructed with either clean native cobble fill, sand bags, ecology blocks or other measures that would deploy “clean” material into the water (see items 22 and 44 in Appendix B), and would be removed after construction is completed and the new screens are operating.

Electrical Service - Electrical service to the screen site would be installed by Okanogan County Electric Co-op. The Co-op would provide and install approximately 600 feet of cable, set a padmount transformer adjacent to or just inside the fenced yard of the screen site, and install a 100 amp meter just inside the fenced yard. For electrical service to the screen site the contractor would excavate a 3 foot deep, 600 foot-long trench along or adjacent to the canal road, install electrical conduit, and backfill the trench. The contractor would also furnish and install the meter base and the secondary electrical system at the fish screens.

Access - Access to the East screen site is from the Twisp-Winthrop Road approximately 5 miles north of Twisp, Washington via an existing gravel access road. The primary staging area for the contractor would be from the west side of the canal to the top of the east bank of the river, and from the headworks downstream for approximately 200 feet. All appropriate landowner access approvals would be secured prior to project staging and construction.

Demolition Work – As stated earlier, all demolition work would be performed in the dry. The existing concrete and other structures would be removed and disposed of by the contractor. After demolition is completed, the foundation for the new structure would be excavated and suitable material stockpiled for backfill. Material unsuitable for backfill would be disposed off-site in an approved upland location by the contractor.

Concrete for the structure including reinforcing steel and embeds would then be formed and placed. When the concrete has been cured to design strength, backfill from a commercial source or suitable backfill from excavation would be placed and compacted around the screen structure. Appropriate insulating, tenting, heating concrete and earthwork would be required during subfreezing weather.

Fencing – A permanent 6 feet-high chain link fence would be constructed around the main portion of the new fish screen and associated structures following site construction for security purposes. The fence would enclose an area about 1/3 acre.

Screen Installation - The screens and miscellaneous metalwork would be fabricated by the WDFW Screen Shop in Yakima, Washington, and installed by them immediately following the completion of concrete and infrastructure work. The construction contractor would coordinate the installation of electrical service and other work associated with completing the fish screen installation. The existing diversion dam, fish ladder, and headgate structures would be left in place.

Temporary Irrigation Water Bypass - A temporary gravity bypass pipeline would be installed to convey water from the concrete headwall next to the headgate, around the construction site, and back into the canal below the new screen site. This construction activity would be accomplished by May 1, the start of the irrigation season, thus water would be provided to the irrigators during the time that the new screens are being constructed. The 36-inch-diameter, 200 foot-long pipeline, along with a 42-inch control gate at the headwall, would be buried to allow gravity flow to enter the bypass pipe, route around the construction site, and enter the irrigation canal without interfering with the screen replacement activities. A cofferdam would be constructed to allow the temporary pipe to be constructed in the dry. Installation of the small cofferdam should only take about a day or so and the structure would remain in place about a week, after which the structure would be removed and water would then be allowed to enter the newly constructed temporary conduit. When the new fish screen becomes operational, the temporary water bypass would be shut off, and the head gates would be opened to allow water to enter the diversion as it does normally. Appendix E provides a more detailed explanation of this temporary water pipeline.

Site Restoration - The Contractor would perform grading and gravel surfacing, and install the fencing when earthwork is complete and weather permits. When contract site work is finished the contractor would clean up disturbed areas and demobilize. The site would be revegetated with native vegetation. All construction activities are planned to be completed by August 1,

2004. Items 19, 20, 28, 47, and 50 in Appendix B contain provisions associated with restoring the project sites that would be applied, such as implementing pollution and erosion control measures, photo documentation, post construction monitoring, revegetation, and operations and maintenance.

2.1.3 West Diversion Site (Twisp River)

Replacement Screens - The replacement screens would be located about 30 feet downgradient in the canal from the existing screen. The new screen facility would consist of three 4-foot diameter, 10-foot long rotating drum screens that would be angled 22.5 degrees from the canal centerline to maintain adequate sweeping velocity along the screens. The operational limit of the diversion is 29 cfs, based on WDOE Order DE 02WRCR-3950, but the design flows for the replacement screens would range from 15 cfs to 30 cfs at an approach velocity of 0.4 feet per second.

A canal overflow (spillway) weir crest would also be provided adjacent to the bypass weir. The spillway would have a 24-foot long overflow crest and would limit canal water surface to 0.85-inch screen diameter. An inclined trash rack would be placed upstream of the screens. Three new sluice gates would be placed downstream of the screens to control canal flow and maintain normal screen submergence of the 0.75-inch screen diameter.

Fish Return Bypass - The fish bypass flow would be controlled by an adjustable ramp weir. The bypass flow would plunge into a series of constructed concrete pools with 1 foot drops to allow for upstream adult passage. The flow exits from the last plunge pool into the natural bypass channel that empties back into the Twisp River about 1/4 mile downstream. During construction, a cofferdam would be constructed around the existing weir to allow upgrades to be made to the entrance of the natural fish bypass channel.

Cofferdams – Three temporary cofferdams would be constructed to isolate the construction area from river water. Cofferdams would be constructed both upstream and downstream of the existing fish screen, and the third cofferdam would be positioned in the natural bypass channel just below the last concrete pool. Approximately 13 cubic yards of fill material would form each cofferdam, for a total of about 40 cubic yards. Any fish stranded in the dewatered area would be rescued and placed back in the river by a qualified biologist (see items 26, 34, and 37 in Appendix B). The cofferdams would be constructed with clean native fill cobble, sand bags, ecology blocks or other measures that would deploy clean material into the water (see items 22 and 44 in Appendix B). Any fish stranded in the dewatered area would be rescued at the time of dewatering and placed back in the stream. The cofferdams would be removed after construction is completed and the new screens are operating.

Temporary Fish Bypass – During construction, off-season canal and bypass fish flows would be diverted around the construction work site by a temporary pipeline and temporary cofferdams. A 24-inch-diameter, 95-foot long fish bypass pipe would be buried across the canal embankment to discharge into the existing fish channel. This activity would be located about 300 feet from the Twisp River. When the cofferdam, bypass pipe and dewatering systems are constructed and functioning, screen demolition and replacement work would proceed. No sediment would be added to the Twisp River.

Electrical Service – The Okanogan Public Utility District (PUD) would install electrical service. The PUD would install about 1,480 feet of cable, set a padmount transformer, vault and poly pad, and install a 200 amp meter. The contractor would install about 1,480 feet of conduit for the cable into a 3 feet deep trench and backfill.

Access - Access to the screen site is from Poorman Creek Road near Twisp, Washington on an existing gravel access road. The staging area for the contractor would be 100 feet downstream of the canal from the screen site in a parking area along the access road. Because of the topography and juxtaposition, it is improbable that staging, site preparation, and access would have direct physical impacts on the aquatic resources. All appropriate landowner access approvals would be secured prior to project staging and construction.

Demolition Work - All demolition work and construction of permanent facilities would be performed in the dry. Existing concrete structure and features would be removed and disposed by the contractor. After demolition is completed the new structure would be excavated and suitable material stockpiled for backfill. Cobbles unsuitable for backfill would need to be disposed off site.

The concrete slab, walls, and fish screen piers would then be formed and placed. When the concrete has been cured to design strength, backfill from a commercial source or suitable backfill from excavation would be placed and compacted around screen structure. Appropriate insulating, tenting, heating concrete and earthwork would be required during subfreezing weather.

Fencing – A permanent 6 feet-high chain link fence would be constructed around the main portion of the new fish screen and appurtenances following site construction for security purposes. The fence would enclose an area less than 1/3 acre.

Screen Installation - The new screens and miscellaneous metalwork (ramp weir, sluice gates, walkways, handrails, etc.) would be fabricated by the WDFW Screen Shop in Yakima, Washington, and installed by them immediately after completion of the concrete and infrastructure work. The construction contractor would coordinate the installation of electrical service and work associated with completing the fish screen installation.

Temporary Irrigation Water Bypass - A temporary gravity bypass pipeline would be installed to convey water from the canal, around the construction site, and back into the canal below the location of the new screen. This construction activity would be accomplished by May 1, the start of the irrigation season, thus, water would be provided to the irrigators during the time that the new screens are being constructed. The 36-inch-diameter, 200 foot-long pipeline, along with a stoplog flow control structure, would be buried to allow gravity flow to enter the bypass pipe, route around the construction site, and enter the canal without interfering with the screen replacement activities. When the new fish screens become operational, the temporary water bypass would be shut off, the cofferdam removed, and the water allowed to pass normally into the diversion. Appendix F provides a more detailed explanation of this temporary water pipeline.

Site Restoration - The Contractor would perform grading and gravel surfacing, and install the fencing when earthwork is complete and weather permits in summer 2004. When contract site work is finished the contractor would clean up disturbed areas and demobilize. The site would

be revegetated with native vegetation. All construction activities are planned to be completed by August 1, 2004. Appendix B contains provisions associated with restoring the project that would be applied, such as implementing pollution and erosion control measures, photo documentation, post construction monitoring, revegetation, and operations and maintenance.

2.1.4 Mitigation Measures

The following measures would be incorporated into the proposed project to eliminate or reduce potential adverse environmental effects associated with construction of the new fish screens. Appendix B also identifies these provisions.

- The screens themselves would be mitigation for the ongoing impacts of the old screens. They are designed to protect and conserve fish by adhering to current Federal and state fish protection standards and criteria for screening and passage.

- The project would be constructed in the dry to: 1. prevent direct construction impacts to fish that could cause injury or mortality, 2. enable dry working conditions during removal of existing screens and construction of new screens, and 3. prevent adverse affects to surface waters and water quality.

- Clean cobble fill would be used to construct the cofferdams.

- Fish salvage efforts would be employed as needed during the dewatering (coffering) of the screen sites in preparation of screen replacement.

- Turbid water from dewatering would be discharged into settling and infiltration basins or the canal downstream of the screens before it is allowed to re-enter the river. No sediment would be added to the Methow or Twisp rivers.

- A Pollution and Erosion Control Plan that incorporates best management practices for erosion control and a hazardous spill response plan would be prepared and implemented to prevent pollution from construction activities.

- Equipment would be stored away from the river and monitored for any leakage of hydraulic fluids, gasoline, and oil during construction.

- Care would be exercised to restrict the number of trees that would need to be removed or disturbed at the project sites. The bypass pipes would be routed to disturb as little established vegetation as possible during construction.

- Following construction, the sites would be graded and planted with native vegetation to help stabilize the soil and mitigate for the removal of vegetation.

2.2 Alternative 1 - Groundwater Well/Pressurized Pipe Irrigation

The Okanogan Wilderness League (OWL) has suggested that this EA address an alternative that includes the “elimination of the canals in favor of a pressurized pipe system and full conversion from surface water diversions to groundwater withdrawals” (Earthjustice, 2003) (Appendix 1). This initiative is also supported in OWL’s letters going back to the late 1980s

(OWL, 2003; OWL, 1993; OWL, 1991; OWL, 1989; Bernheisel, 2003). The OWL alternative would be very similar to BPA's preferred alternative (Alternative A) in the 1997 EA, where it was addressed in detail. The environmental impacts of this alternative were found not to be significant in BPA's FONSI. As stated in chapter 1.3.2., the MVID rejected this alternative in 2000.

Based on the plans developed for the 1997 EA, this alternative would entail the following:

- A new irrigation system would be built. It would use 18-inch groundwater wells in three separate well fields, one for the East canal and two for the west canal. About 13 miles of new low-pressure pipe would be placed in existing canal rights-of-way.

- Three small concrete tanks would be built above ground to act as reservoirs for the new system. Each tank would be about 20 feet tall by 20 feet in diameter.

- Several existing canal reaches would be abandoned: East canal reaches 1, 2, lower 4, 5, and 6; West canal reach 1 and middle of reach 3. (West reach 5 had already been abandoned prior to the 1997 EA.) Irrigated lands served by these canal reaches were removed from the MVID under the April 2000 MVID Board resolution (00-07), and are now served by existing or new, privately owned groundwater irrigation wells. Figure 2-2 of the 1997 EA delineates location of the reaches.

- A portion of reach 2 on the East canal has been shared under an agreement with the Barkley Ditch users for many years. In order not to adversely affect the Barkley Ditch users, this portion of the reach would be replaced with a pipeline to provide them with the same amount of water they are currently using, and turned over to them.

- The total estimated construction cost for implementing this alternative was estimated to be $3.3 million in 1997 (currently $3.76 million), however this does not include the excluded member's costs. The total construction funding sources have not been identified for this alternative. If BPA funding recommended for the proposed fish screening alternative were applied to this alternative, there would still be a substantial funding gap, estimated at between $2.7 million and $3.0 million. Cost estimates developed in 1997 have been projected into current year dollars based on a calculated average Consumer Price Index.

- An estimated 2 year period of time could be required to complete all phases of planning and construction for this alternative, providing that funding sources were secured.

- MVID members who were excluded from the District under the 2000 MVID Board resolution were to keep their benefits under MVID water rights and claims, by having MVID rights changed to independent wells. WDOE is in the process of granting the former MVID members authorization to transfer their portions of the existing MVID surface water points-of-diversion to points-of-withdrawal for existing or new groundwater wells. WDOE would also need to grant the remaining MVID members a similar change in water rights from surface to groundwater.

If this alternative is selected, the original Mitigation Action Plan (Appendix I in the 1997 EA) would still apply. Such measures would be implemented to eliminated and/or minimize potential environmental adverse effects.

2.3 Alternative 2 - No Action

Under the no action alternative for the MVID diversion screen replacement project, BPA would not fund the replacement of the fish screens at the East and West irrigation diversions. Under the NOAA Fisheries consent decree, the MVID would either need to find alternative financing for replacing the screens or not operate the irrigation system. This could result in either increased costs to the irrigators for alternative financing, and/or at least temporarily ceasing the delivery of irrigation water to the irrigators' fields. Construction and installation of the new fish screens would most likely be delayed or not occur.

2.4 Alternatives Considered But Not Examined in Detail

Two other alternatives that could attain the broader project purposes of the MVID rehabilitation project were considered in the 1997 EA (see BPA (1997b) for a more detailed narrative description of those alternatives). These alternatives included Alternative B, Partial upgrade to the existing irrigation system, and Alternative C, Dissolution of the MVID. Alternative B included upgrading the fish screens, along with rebuilding the remaining open canal sections. Alternative C contemplated a total dissolution of the MVID, with members changing to individual wells (or small local irrigation districts in a few cases) to serve their irrigation needs.

Alternative B was estimated at $11.9 million to implement in 1997 (currently $13.57 million) along with an estimated annual O&M cost of $127,000 (currently $144, 907), and individual well drilling costs by the members who would leave the MVID. Alternative C was estimated at a cost of $2.7 million (currently $3.08 million) to implement with no annual O&M costs to the MVID. All costs would be shifted to the individuals.

These alternatives were not brought forward for detailed consideration in this Final EA. Alternative B addresses a broader scope of action than the need and purposes identified in this final EA, goes far beyond the recommended funding authorization by the Council, and would be considerably more expensive to implement. Alternative C was rejected by the MVID Board.

Another alternative considered but rejected for further study was one discussed by the Independent Economic Analysis Board (IEAB) working on behalf of the Northwest Power and Conservation Council. The IEAB suggested consideration of a market-based solution, such as the purchase or lease of water rights facilitated by the development of local or regional water markets. At the same time, the IEAB recognized a number of problems with such an approach: (1) difficulty implementing such an alternative under the current legal, social, and hydrologic situation in the region, (2) MVID's water rights are still in litigation, and (3) the current MVID Board would likely not approve any water transfers for in-stream use. For these and other reasons identified by the IEAB, BPA has not considered this alternative (IEAB, 2002).

2.5 Comparison of Alternatives Relative to Predicted Performance

Table 4 presents a comparison of the alternatives. Each is evaluated as it meets the purposes for the project, which are listed in chapter 1.2.

Table 4. Predicted Performance Summary of the Proposed Action and Alternatives

	Proposed Action – Fish Screen Replacement	**Alternative 1 - Conversion to groundwater wells and pressurized pipe**	**Alternative 2 - No action alternative**
Prevent losses of anadromous and resident fish to the MVID irrigation system	Screens would be designed to meet current NOAA Fisheries criteria to prevent losses of all life stages of fish.	Would eliminate losses entirely by replacing diversions and screens with groundwater wells.	Current documented fish losses would continue unless diversion is halted.
Improve fish passage	Fish bypass improvements would provide safe passage of fish through the system; Fish passage problems with diversions would remain.	Would eliminate need for diversions on Twisp and Methow Rivers that are obstacles to fish passage; would eliminate need to upgrade existing fish screens and eliminate current fish screen and diversion passage problems.	Diversions and fish screen bypasses would remain as fish passage obstacles.
Help MVID assure its members continued access to adequate water supplies	No change from the current access; screens would be designed to operate within a wide range of flows. Possible need for diversion or canal repairs to meet WDOE order limiting diversions due to wasteful water practices. MVID proposes and supports this alternative.	Would provide access to adequate water supplies for all MVID members in accordance with WDOE order. MVID has already rejected this alternative.	Could result in at least temporary disruption of water supplies for MVID members due to enforcement of consent decree and WDOE order. Not supported by MVID.
Achieve cost and administrative efficiency [1]	Estimated implementation and material cost of about $958,000 for infrastructure (Federal funds) and $275,000 for the actual screens (state funds). Est. annual O&M costs: $129,000 [2] Additional costs may be incurred to comply with WDOE order.	Estimated implementation cost of $3.76 million. Most likely no additional funding would be needed to comply with WDOE order. Est. annual O&M costs: $119,000 This alt. would have to go through Council's project prioritization process and be	Costs unknown. Alternative funding would be needed to comply with consent decree and WDOE order or irrigation would be halted. Could result in loss of crops, including orchards. Estimated annual 0&M costs: $118,000, but likely to rise due to increased repairs and maintenance.

	Takes advantage of cost shares and in-kind work available now for this alt.	process and be recommended before BPA would consider funding it.	
Compliance with Laws, Regulations, and Executive Orders	Would comply with current fish screening and passage standards; would also comply with ESA, NHPA, CWA, etc.; Ability of existing canals to function in compliance with WDOE order unknown. Expedites resolution of unmet fish needs that have been identified, but not addressed in a sustainable manner for over 20 years.	Would be in compliance once implemented, but in violation of consent decree until funding secured and construction completed, which could take several more years; Most likely would be in compliance with WDOE order.	Would result in MVID violation of consent decree/Endangered Species Act and WDOE order unless irrigation is halted.

[1] Cost estimates, originally developed in the 1997 EA, have been projected into current year dollars based on a calculated average Consumer Price Index (CPI) from 1997 to the present. These estimates are relatively conservative when compared to other methodologies.

[2] Cost estimate = $117,000 normal MVID O&M, plus $12,000 for MVID subcontract with WDFW for screen reviews and maintenance.

CHAPTER 3 AFFECTED ENVIRONMENT

3.1. General Overview

As part of the 2000 amendments to the Fish and Wildlife Program of the Northwest Power Planning Council, the revised Program adopted an ecosystem-based subbasin approach for fish and wildlife management. This approach addresses biological objectives and action strategies for each province and subbasin within the Columbia River basin. Accordingly, a Methow Subbasin Summary was prepared to identify and catalogue existing information and activities to help make informed choices on fish and wildlife mitigation and restoration (WDFW, 2001). We make reference to this document and the 1997 EA for the resource baseline in this final EA. However, we summarize only the key and relevant points in this chapter.

The MVID is located in the Methow Subbasin of the Okanogan Highland physiographic province in north central Washington State. The subbasin is entirely within Okanogan County and includes the towns of Twisp, Winthrop, Methow, Pateros, and Carlton. The Methow River Valley drains approximately 1,772 square miles of the eastern slopes of the Cascade Range and joins with the Columbia River at Pateros, Washington. The Twisp River is a primary tributary to the Methow River; their confluence is at the town of Twisp.

The MVID irrigation system and associated lands are shown in Figure 1. The legal descriptions of the East and West screen sites are as follows:

Project Location	River	Legal Description
East Diversion screen site	Methow River	T.34N, R.22E, Sec. 30, SW1/4, NW1/4
West Diversion screen site	Twisp River	T.33N, R.21E, Sec. 10, SW1/4, SE1/4

The current total irrigated acreage within the borders of the irrigation district is estimated at about 880 acres, after the 2000 exclusion. Most of the current irrigation is for hay, alfalfa, lawn watering, and limited apple orchards. The water is applied by sprinkler systems pumping directly from the canals, ditches and/or lateral pipes supplied from turnout structures.

The MVID canal system is comprised of two main gravity-fed, open unlined canals. The East diversion canal is a 15-mile long canal that diverts water from the Methow River. Water diverted from the Methow River supplies the east side of the valley between the towns of Twisp and Carlton. Flow is diverted at the East diversion site by the use of a timber flashboard dam that extends across the width of the river. The dam creates about 3 feet of head when all boards are in place. Water passes two 48-inch by 22.8-inch headgates through about 45 feet of diversion canal, which is constructed from an earthen slope on the left side and a concrete retaining wall on the right. There are two existing 4.6-feet-diameter drum screens oriented perpendicular to the canal flow. The drums rotate by means of 10-feet-long paddle wheels. The U.S. Bureau of Reclamation (2003a) provides more detailed description of the existing structures on the East diversion, as well as current operation.

The West diversion canal is a 12.5-mile long canal that diverts water from the Twisp River. Water diverted from the Twisp supplies the west side of the valley between the towns of Twisp and Carlton. The West diversion requires a rock push up dam to be constructed with a bulldozer or other large equipment in the main channel of the river annually to capture water from the Twisp River into the canal, particularly during low flow periods. The MVID has also

found it necessary to place rocks and boards in the river to ensure sufficient water is diverted during low flow periods to make reliable irrigation deliveries.

The flows diverted into the west canal pass through a sluice headgate structure and then through an approximately 400 feet long diversion canal to two 7.25 feet-diameter paddle-wheel fish screens oriented perpendicular to the direction of flow. For fish that may enter the canal, a weir next to the fish screens provides fish bypass flows to a 400-yard-long natural side channel that discharges fish back into the river. A minimum flow of 5 cfs is always maintained through the fish bypass channel regardless of the operation of the diversion. The U.S. Bureau of Reclamation (2003b) provides more detailed description of the existing structures on the West diversion, as well as current operation.

3.2 Water Resources

Ice Age glaciation greatly influenced the water resources of the Methow Valley. The glaciers originally carved U-shaped valleys into the mountains' basalt core. As the continental ice sheet that once covered the area receded, however, deposits of glacial till and outwash filled the valleys, providing a broad, shallow alluvial aquifer. This aquifer is very permeable, allowing water to flow down the valley both underground as groundwater and in the rivers and streams as surface water. Under these conditions, the groundwater in the shallow alluvial aquifer and the surface water in the rivers and streams are described as being in hydraulic continuity with each other. The sediments of glacial till and outwash have since been reworked along major streams and tributaries resulting in coarsely textured and permeable soils. Most soils are gravelly sandy loams or stony fine sandy loams.

3.2.1 Surface Water

The Draft Methow River Basin Plan states that water quality in the Methow basin is affected by the discharge of municipal wastewater treatment systems, logging, grazing, land clearing, and road-building (Methow Valley Water Pilot Planning Project Planning Committee, 1994). Both rivers are found on the 303(d) list, which identifies streams that are priorities for development of Total Maximum Daily Load [TMDL] standards. Both rivers are listed as in-stream flow- and temperature-limited, which means they do not meet the water quality standards under the Clean Water Act. However the Methow River, within the project area, is classified by the State as Class A water quality (excellent), and the Twisp River above Twisp is classified as AA (extraordinary).

As stated earlier, surface waters from the Methow and Twisp Rivers are diverted to supply the east and west sides of the Methow Valley, respectively. The MVID Water Supply Facility Plan (MWG, 1996) indicates that the MVID diversion points are capable of diverting enough water from these rivers to supply the MVID with its historic mean diversion rate of about 66.8 cfs.

The East canal has historically diverted an average of about 41 cfs from the Methow River although diversions have decreased to 15-24 cfs in the past three years as a result of the consent decree agreement restricting diversions based on river flows and appropriate velocities. Historically, September irrigation diversions are the highest however the consent decree has altered this situation. The average historic September East canal diversion of 39.3 cfs was about 13 percent of the mean September flow in the Methow River at that point.

The West canal has historically diverted an average of about 26 cfs of water from the Twisp River (MWG, 1996) although, like the situation on the East canal, flows have recently been restricted between 24 and 15 cfs by the consent decree. The West canal rejoins the Methow River at RM 28.9, upstream of Carlton. The point at which the West canal diverts water is about 2.3 miles upstream of the USGS gauging station located at RM 1.6 on the Twisp River. The mean river flow at the gauging station during the month of September is 54 cfs. The average historic September diversion amount of 24.6 cfs is approximately 46 percent of the mean September flow in the Twisp River at that point. Although surface water diversions provided enough water, substantial portions of the MVID, particularly the lower stretches, did not receive dependable water supplies because the MVID conveyance and distribution facilities were inefficient and not sufficiently maintained. Many of these underserved areas were excluded from the MVID under the 2000 exclusion. With present diversions limited, some users are still underserved even after these exclusions. To remedy this situation, MVID is undertaking a canal management planning process using data and engineering obtained from previous BPA funding, that identified canal inefficiencies and proposed solutions such as lining, piping, and reshaping to match deliveries to available water supplies.

3.2.2 Groundwater

Groundwater in the Methow Valley is recharged principally from rain, snowmelt, and stream run-off into the shallow alluvial aquifer that underlies the valley. Groundwater levels are also affected as surface water is applied to fields and percolates back into the aquifer, and as the existing canal systems leak water back into the aquifer. Because the majority of the groundwater is heavily influenced by surface sources and is in continuity with the river, the chemical character of the groundwater in the Methow subbasin can probably best be characterized by the surface water quality in the Methow River.

Although the MVID delivers surface water for irrigation, some individual landowners use groundwater from privately owned wells for domestic use and/or irrigation to replace water deliveries from the MVID. The total number of such wells, and the amount of irrigation water they supply is unknown. However, it appears that more than 200 recorded domestic and irrigation wells exist in the MVID service area. The irrigation wells (about 23 of the 200 documented wells) are concentrated near the lower reaches of the East and West canals (MWG,1996).

A recent U.S. Geological Survey study focused on the hydrogeology of unconsolidated sedimentary deposits, water quality, and exchanges between the surface and ground waters in the Methow Basin (Konrad et al., 2003). One of the study's conclusions was that groundwater and surface water sampled in 2001 were generally of high quality. The study also showed that groundwater discharge from unconsolidated sedimentary deposits in the Methow River Basin is a primary source of baseflow in the Methow and Twisp rivers. Conversely, unconsolidated aquifers are recharged by infiltration of snowmelt and rainfall, groundwater flow from nearby aquifers, and seepage from rivers and irrigation canals. The study also concluded that seepage from about 73 miles of unlined irrigation canals (including the MVID canals, among others) within the Subbasin recharges the aquifer in the late spring and summer. This seepage is returned to the rivers downstream of the diversions and most likely results in a transient increase in instream flows during late summer and early fall. The amount of streamflow increase due to the unlined MVID canals is unknown. During later summer, while irrigation demand is still high, this recharge does not offset the MVID diversions, however it does in the

fall as diversions are reduced and eventually cease. The recharge from irrigation drops to almost zero by February.

3.3 Soils

Ice glaciation greatly influenced the water resources in the Methow Valley. The glaciers originally carved U-shaped valleys into the mountains' basalt. As the continental ice sheet receded, deposits of glacial till and outwash filled the valleys, providing a broad, shallow alluvial aquifer. This aquifer is very permeable allowing water to flow both underground and groundwater, and in rivers and streams as surface water. The sediments of glacial till and outwash have since been reworked along major streams and tributaries resulting in coarsely textured and permeable soils. Konrad et al. (2003) further discusses the geology and hydrogeologic interpretation for the Methow Basin. Most soils are gravelly sandy loams or stony fine sandy loams.

3.4 Vegetation

The Okanogan Highlands Province is characterized by moderate slopes, broad rounded summits, and broad river valleys (Franklin and Dyrness, 1988), and the primary natural plant community consists of high desert steppe. This association is characterized by bunchgrasses and threetip sagebrush. The steppe is arid to semiarid, with low precipitation, warm-to-hot summers, and relatively cold winters.

The project landscape is confined to the valley bottoms, and lies adjacent to the Methow and Twisp Rivers. The Methow Valley is predominantly agricultural bottomland and upland steppe. Most of the valley bottom vegetation communities are croplands that grow hay, alfalfa, wheat, peas or orchards. Steppe communities are located upslope of the existing canals where native vegetation is relatively undisturbed. Dominant vegetation along the canals consists of both species that are drought-tolerant and those that tolerate both moist and dry conditions. The habitat at the East diversion and fish screen site shows evidence of past disturbance. Small rocks and bare ground without vegetation represent an estimated 35 percent of the surface. The West diversion and fish screen site is well vegetated along the canal banks and in the immediate vicinity of the existing screens. Some plant species observed during an October 28, 2003 site visit included the following:

East Site		**West Site**	
Red alder	Box elder	Willow sp.	Mannagrass
Bitterbrush	Phacelia sp.	Snowberry	Horsetail
Horsetail	Bulbous bluegrass	Birch (dark)	Orchardgrass
Mannagrass	Calamagrostis sp	Goldenrod	Rose sp.
		Bitterbrush	Bentgrass

Riparian zones are areas that are located adjacent to aquatic systems with flowing water and that contain elements of both aquatic and terrestrial ecosystems that mutually influence each other. Some portions of the canals resemble true riparian characteristics because water is contained within them during the irrigation season and other parts of the year, as well. A 1996 survey of riparian vegetation along the canals conducted for the MVID Water Supply Facility Plan identified hydrophytic, facultative, and drought-tolerant species (Parametrix, 1995, in MWG, 1996). Most of the riparian areas within or next to the canals contain relatively low species richness and a predictable list of species.

A review of the National Wetland Inventory quadrangle maps shows wetland classifications in the general project vicinity, particularly associated with the Twisp or Methow Rivers or its floodplains (Table 5). Naturally occurring wetlands may be found in the project area associated with stream margins, floodplains, and natural seeps. Some areas along the canal, where leaking canal water supports water-dependent vegetation, may also be recognized as wetlands. However, these areas were examined by both Parametrix in 1995 and by wetland experts from the U.S. Army Corps of Engineers in 1997 and were found not to have the characteristics that define a wetland, except for the vicinity of the West canal, intake, and screens. These characteristics are a combination of soils, hydrology, and vegetation factors.

Table 5. Wetlands in the General Vicinity of the Diversions along the Twisp and Methow Rivers [1]

EAST DIVERSION SITE	WEST DIVERSION SITE
Riverine unconsolidated shore, seasonally flooded	Riverine, upper perennial, open water, permanently flooded
Palustrine scrub shrub, seasonally flooded	Palustrine, forested, temporarily flooded
Palustrine, Forested, seasonally flooded	Palustrine, scrub Shrub, seasonally flooded
Palustrine Emergent seasonally flooded	Riverine, unconsolidated shore, seasonally flooded

[1] Classification codes follow Cowardin et al. (1979)

3.5 Fish

The Methow Basin provides about 182 miles of streams used by several anadromous fish species, including chinook, sockeye, and coho salmon and steelhead trout (Mullan et al., 1992). Little is known about sockeye and coho salmon use of the MVID project area. However, such use appears to be minimal because of the basin's location and characteristics (BPA, 1997b).

The Methow River basin is fairly high upstream in the Columbia River system. Because of its location, anadromous fish that use the basin are subjected to many impacts during their migrations up and down the Columbia River, including passage and associated mortality at nine mainstem Columbia River dams, and overharvest in downstream fisheries (WDW et al., 1990; Caldwell and Catterson, 1992). Fish are particularly affected at the Columbia River mainstem dams, as they make their way up the system to spawn and as the juveniles return to the ocean. Both rivers include designated uses for salmonid migration, rearing, spawning, and harvesting (WAC 173-201A).

Resident species that do not migrate to the ocean include rainbow, cutthroat/rainbow hybrid, brown, brook, and bull trout; and mountain whitefish. Table 6 lists the fish known to use the project area. The species of primary concern in this portion of the basin are chinook salmon (summer and spring), summer steelhead trout, and bull trout, because they are listed under the Endangered Species Act (http://www.nmfs.noaa.gov/prot_res/species/ESA_species.html and http://www.nmfs.noaa.gov/prot_res/overview/es.html and http://raysweb.net/specialplaces/pages/trout.html). Because the factors affecting fish often depend on the species' individual life histories (stages), Table 7 illustrates the life history timing of Methow and Twisp River salmonids in the project area.

■ Spring Chinook

Spring Chinook spawn in the upper mainstem reaches of the Methow and Twisp rivers. The fish use both rivers in the MVID project area, mainly for passage. However, spawning surveys

Table 6. Representative Fish Species that Occur in the Methow and Twisp Rivers

Anadromous Fish	Resident Fish
Summer chinook salmon	Rainbow trout
Spring chinook salmon	Cutthroat trout
Fall chinook salmon	Eastern brook trout
Coho salmon	Bull trout
Summer steelhead trout	Brown trout
	Mountain whitefish
	Largescale sucker
	Longnose dace
	Redside shiner
	Sculpin

Source: (BPA, 1997)

Table 7. Life History Timing of Chinook, Steelhead, and Bull Trout in the Methow and Twisp Rivers

Fish Species	Adults return from Ocean	Spawning	Incubation/Emergence	Juvenile rearing	Young Migrate Downstream
Spring Chinook	May – Aug.	Sept.-Oct.	Oct.-March	Year Round	Apr.–Aug.
Summer Chinook	Aug-Oct.	Sept.-Nov.	Sept.-April	Jan.-March	Apr.-Oct.
Fall Chinook	Oct.-Nov.	Nov.	Nov.-March	Mar.-July	June
Summer Steelhead	Aug.-May	Mar.-June	June-Sept.	Year Round	Apr.-May
Bull Trout	---	Sept.-Nov.	Oct.-April	Year Round	---

Source: BPA, 1997

conducted in the basin have identified redds near the diversions on both rivers, including both above and below the Twisp diversion. Spring Chinook juveniles spend about one year rearing in freshwater before they out-migrate to the ocean.

In-basin limiting factors for spring Chinook include the following: intermittent flow in some reaches, low flows because of irrigation diversions, substandard diversion screens, winter icing, and habitat losses from development in riparian areas (WDW et al., 1990; Caldwell and Catterson, 1992). The goal in the basin is to obtain a sustainable harvest of 2,000 fish, to be shared between sport and Tribal fisheries, while maintaining genetic integrity and a balance of spawners in tributaries of the subbasin (WDW et al., 1990; Caldwell and Catterson, 1992).

■ Summer Chinook

Summer Chinook spawn in the lower- and mid-mainstem Methow River reaches up to the Chewuch River confluence (RM 50.1); this area includes the MVID project area on the Methow River. Summer Chinook are not known to spawn or rear in the Twisp River at the present time, although they have in the past. The river basin is being managed to encourage the natural production of summer Chinook according to current conditions (i.e., hatchery summer Chinook are not released into the Twisp River).

Adult summer Chinook migrate into the system beginning in late August, and spawn in late September through early November. Smolts emigrate in the spring, typically before diversions begin. Summer Chinook juveniles spend about 3 to 4 months rearing in the Methow system before out-migrating to rear in the Columbia River impoundments (D. Bambrick, Yakama Indian Nation, pers. comm., 1997).

In-basin factors limiting summer chinook production include the following: low stream flows because of irrigation diversions, and in-stream and riparian habitat losses (WDW et al., 1990). The goal in the basin is to obtain a sustainable harvest of 3,000 fish, to be shared between sport and Tribal anglers while maintaining the unique characteristics of the stock.

■ Fall Chinook

Fall chinook use a small part of the mainstem Methow River. They are not known to use any tributary streams (including the Twisp River) for spawning or rearing. Little is known about the life history of fall chinook in the Methow River, except that they migrate into the system in October, and spawn in November; smolt emigration most likely occurs in June. Documented fall chinook redds have been located only in the lower reaches of the Methow River, downstream of the MVID project area. There is currently no management plan for fall chinook in the Methow Basin because of the lack of information on their basin use.

■ Summer Steelhead

Summer steelhead are present in the Methow and Twisp rivers and in most accessible tributaries in the basin. Adults begin entering the Methow system in July, and continue their migration into the system through October. During the winter, many adults return to the Columbia River's warmer waters. Spawning occurs in the upper mainstem Methow River upstream of the MVID project area and in tributaries, including the Twisp River, beginning in March and continuing into early June. Juveniles rear near spawning areas in tributaries. However, many smolts also emigrate from smaller tributaries to rear in the warmer waters of the mainstem Twisp and Methow rivers. Hatchery releases in the Methow Basin, from Wells Dam brood stock, averaged 370,664 summer steelhead smolts per year from 1981 through 1987 (WDW et al., 1990).

The basin's steelhead management goal is to rebuild natural runs and maintain genetic integrity, while allowing a harvest of 10,000 hatchery steelhead for sport and Tribal anglers. The after-harvest escapement target is 3,200 natural fish. In-basin factors limiting summer steelhead production include the following: mortalities from winter icing, spring runoff flooding, lack of in-stream winter cover, and inefficient screen systems at diversion points.

■ Sockeye Salmon

Sockeye salmon are known to use the Methow Basin in small numbers. Sockeye that use the Methow and Twisp river systems are somewhat different from typical sockeye, in that they do not rely on lakes or reservoirs for spawning. Redds have been recorded up to Winthrop in the mainstem Methow River and also in the Twisp River (Caldwell and Catterson, 1992). There is minimal information about escapement or life-history information specific to the Methow River basin. Sockeye enter the system in September; and peak spawning occurs in late September and early October. Emergence, rearing areas, and out-migration timing are uncertain. There is currently no management plan.

■ Resident Fish

The Methow and Twisp rivers support a significant recreational fishery for rainbow, brown, and brook trout. The Twisp River drainage is the most extensively used area for recreation in the MVID project area. Rainbow trout are stocked in the Methow Basin to help support the recreational fishery. Brook trout were introduced into the Methow Basin in the early 1900s and they can interbreed and hybridize extensively. Cutthroat, bull, and brook trout appear to have similar temperature preferences, are found primarily in the cooler upper reaches of the Twisp River, and are probably not found in the MVID portion of the lower Twisp River. These trout species are also found primarily in the upper Methow River and tributaries; however, some bull trout and brook trout have been documented in the MVID portion of the Methow River. Rainbow trout are found throughout the MVID project area in the Methow and Twisp rivers. Cutthroat and rainbow trout are spring spawners (April through early May), but cutthroat trout emergence is typically later than that for rainbow trout because cutthroat prefer cooler water temperatures. Bull trout and whitefish typically spawn in the fall months, and develop over the winter months.

3.6 Wildlife

The project area wildlife is characteristic of the lower elevation fauna of the Okanogan Highlands. The U.S. Forest Service prepared a list of the terrestrial wildlife that may occur in the project area (USFS, 1997). The represented habitats for which the lists were prepared are (1) the hot-dry, lowest elevation Ponderosa forest/grassland associations, and (2) all relatively open non-forested areas including steppe, croplands, and riparian areas. Terrestrial wildlife include 309 species of amphibians, reptiles, birds, or mammals, and over 77 percent (238 species) of the total are birds; 16 percent (48 species) are mammals; and the remaining 7 percent (23 species) the combined amphibian and reptilian species. Further details about the project area wildlife may be found in BPA (1997). In addition, the Methow Subbasin Summary also provides additional information on the more common wildlife in the project areas (WDFW, 2001).

3.7 Threatened and Endangered Species

Table 8 displays the plant and animal species that are protected under the ESA and that could be found in Twisp and Methow rivers. The FWS has administrative responsibility for the listed terrestrial species and resident fish including bull trout, while NOAA Fisheries has responsibility for anadromous fish, such as steelhead and Chinook salmon. In accordance with the ESA, a Federal agency is required to consult with either or both of these agencies when listed species could be affected by actions they would take. In addition, the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires consultation with NOAA Fisheries on activities that may adversely affect Essential Fish Habitat (EFH). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (PFMC, 1999). The project area is considered EFH for Chinook and coho salmon.

3.8 Cultural Resources

Information on Tribal Rights and Traditional Uses can be found in BPA (1997). In October 1996, staff from BPA's cultural resources contractor, archaeological and historical services, conducted a field investigation of the East and West canals. The possible pipeline, reservoir, and well locations for Alternative 1 were also inspected. Two artifacts were recorded. Although

Table 8. ESA-Listed Species that Could be Present in the Project Areas

Common Name	Federal Status	Critical Habitat Designated [1]	Essential Fish Habitat	Agency Jurisdiction
Spring Chinook Salmon	Endangered	February 2000	Yes	NOAA Fisheries
Summer Steelhead	Endangered	February 2000	No	NOAA Fisheries
Bull trout	Threatened	Proposed	NA	FWS
Bald eagle	Threatened	No	NA	FWS
Northern Spotted Owl	Threatened	Yes	NA	FWS
Gray Wolf	Endangered	No	NA	FWS
Grizzly Bear	Threatened	No	NA	FWS
Canada lynx	Threatened	No	NA	FWS
Ute ladies' tresses	Threatened	No	NA	FWS

NA = Not applicable.
[1] Critical habitat designations by NOAA Fisheries have been suspended and are under review. The U.S. District Court for the District of Columbia approved a National Marine Fisheries Service consent decree on April 30, 2002, withdrawing a February 2000 critical habitat designation for the salmon and steelhead species listed in this table.

five cultural resource sites have previously been identified in the vicinity of the canal, only the Chilliwist Trail is within the project area. It is also known that unmarked Native American cemeteries are located in the area, and one known cemetery has been marked with a rock (Confederated Colville Tribal member, public meeting, 1996).

In November of 2003, a BPA archaeologist surveyed the East and West fish screen replacement proposal sites, including the fish and water bypass and electrical cable trenching areas. No cultural materials were found.

The MVID canal system has been determined to be eligible for inclusion on the National Register of Historic Places (National Register), under Criterion A (property associated with events that have made a significant contribution to the broad patterns of our history). The system has been the most significant irrigation feature in the Methow Valley. Although neglect and numerous changes in the structural materials have caused substantial deterioration, both the East and West canals are still mostly located in the original right-of-way.

3.9 Socioeconomics and Land Use

The MVID is one of about 50 irrigation districts in Washington State. Irrigation districts operate under state law and their purpose is to distribute available water efficiently, equitably and fairly to all users (WDOE and Washington State University, 1995). Land uses in the project area include intensive agricultural, urban, recreational residential, tourist, commercial, and unclassified areas including forest, grazing, and dryland farming. Mining and timber-related activities occur mainly in the upper subbasin, and hay fields, pastures, cattle ranching, and fruit orchards dominate the land uses in the lower valley. Public lands of the Mount Baker-Snoqualmie and Okanogan National Forests surround the Methow Valley.

The Methow Valley local economy historically has been centered on mining and logging, supplemented by agriculture. However, more recent interests are lumber and wood products production, recreation, and tourism. Agriculture remains an important component of the local economy. Residential development has been relatively strong in the valley with absentee owners predominating in the area, owning as much as perhaps 60 percent of the land. Property values are increasing, particularly in the northern portion of Methow Valley.

CHAPTER 4 ENVIRONMENTAL IMPACTS

This chapter describes possible impacts that would be caused by construction of the proposed action and alternatives for the project. As mentioned earlier, the proposed action addressed in the 1997 EA is similar to Alternative 1, with a few minor differences. These differences will be discussed as appropriate for the alternative. We refer the reader to Alternative A in the 1997 EA for a more elaborate explanation of anticipated impacts for Alternative 1. Table 9 provides a comparative evaluation of impacts among the alternatives.

4.1 Water Resources

4.1.1 Proposed Action– Fish Screen Replacement

Water Quantity
None of the activities proposed under this alternative are expected to cause long-term adverse water quantity impacts. Operation of the new screens would not alter or affect the water quantity entering or passing through the canal systems; however, the latest WDOE Order (03 WRCR-5904), summarized in Table 1, will reduce the amount of water the MVID can legally divert after September 15, 2006. The upgraded screens are designed to operate under a range of flows that include both the current diversion rates for the MVID and any future diversion rates set by the revised WDOE Order.

The proposed temporary screened water bypass at each diversion site would ensure that irrigation water is provided to the irrigators while the new fish screens are being constructed. This temporary bypass would only convey water until the new screens are in place and become functional, at which time the temporary bypasses would be shut down and decommissioned. Accordingly, there would be no change or alteration in the MVID water quantity provided, compared to previous irrigation seasons.

Water Quality
East Canal. Placement of a cofferdam below the diversion headgate would not impact water quality in the Methow River. The canal flows would be terminated and allowed to drain to the canal system before the cofferdam is installed. Turbid water that may result from placement of this cofferdam would not be allowed to pass through the existing fish bypass and return to the Methow River. Minor turbidity associated with this cofferdam installation and removal is not expected to cause any problems.

No temporary fish bypass is needed during construction of the new East diversion screen, as the canal can be sealed off at the diversion point on the river. The existing fish bypass would be sealed to prevent flows to the Methow River. A new permanent fish bypass would be constructed that would comply with current fish passage standards (NMFS, 1995 and 1996) to return fish safely and effectively to the Methow River.

Placement of cofferdams for construction of the fish bypass outfall and the temporary iiirgation bypass intake in the Methow River would temporarily isolate an area about 4,200 square feet in size. This inwater work should be accomplished in less than one day. During the cofferdam placement, some localized, short-term sediment and turbidity discharges would be expected to occur in the immediate area. In addition, during removal of the cofferdams, short-term turbidity

Table 9. Environmental Analysis Summary

Resource	Proposed Action – Fish Screen Replacement	Alternative 1 - Conversion to Groundwater Wells and Pressurized Pipe System	Alternative 2- No Action
Water	Construction - Short-term localized turbidity during cofferdam construction; Negligible water temperature effects; cofferdams to prevent discharges during construction period; Potential impacts mitigated through conditions in permits. O&M - No differences from current conditions. No effects on groundwater from existing conditions; No effect to water quantity; New fish screens sized to accommodate range of flows likely to be required under WDOE order.	Construction – Potential impact in/around rivers, mitigated through conditions in permits. O&M – improved water temperatures because more water left in river; decrease in suspended solids in irrigation water. Development of three groundwater wells would allow more water to be left in the Methow and Twisp rivers above their confluence; Potential impacts on groundwater and existing wells should not affect surface waters; Activity regulated under Hydraulic Project Approval and water quality permit by WDFW; Would be mitigated through WDOE regulation of well locations; Would eliminate groundwater recharge from leaking canals; Water use reduced from 67+ to about 46 cfs or less, depending on WDOE order.	Construction - No impacts. O&M - No impacts. If irrigation is halted, water would at least temporarily remain instream and not flow into the canals; Groundwater flow may be affected due to lack of water in canals providing seepage to groundwater.
Soils	Localized, isolated, short-term erosion impacts from construction; Mitigated through confined area of disturbance and use of erosion prevention measures.	Localized, isolated, erosion impacts from well excavation and laying pipeline; construction mitigated through use of erosion prevention measures.	No erosion impacts; Ongoing impact of soil/substrate movements from annual construction of push-up dam at the West diversion site.
Vegetation	Localized construction disturbance to vegetation; up to about 1.3 total acres of vegetation could be disturbed; Minimal number of trees to be removed; site revegetation plan would accelerate site rehabilitation using native species.	Minor potential for impacts on wetlands, mitigated through careful facility siting and conditions in permits. Impacts on about 33 acres of riparian vegetation from elimination of water from canal seepage; potentially mitigated through land	No impacts to vegetation unless irrigation is halted – in that case impacts to riparian vegetation along the canals similar to Alternative 1 but without potential mitigation.

		owners providing irrigation and through improvements to natural riparian areas along the Twisp and Methow Rivers above their confluence. Potential for weed problems resulting from construction controlled through site rehabilitation and weed control programs.	
Fish	Construction – temporary potential impacts to fish during placement of coffer dams in Methow River due to disturbance and handling. O&M - Substantial fish passage and screening improvements; Would prevent fish mortality and/or injury; Would facilitate fish returns to river that could contribute to increased fish numbers in Subbasin; Would eliminate "take" of ESA-listed species.	Construction – Potential impacts from sedimentation mitigated through conditions in permits; Even greater improvement in fish passage than proposed action through removal of diversions and screens; Return of diversion sites on Methow and Twisp Rivers to more natural conditions. Push up dams at West Diversion no longer needed O&M – Increases in habitat area for anadromous fish and bull trout life stages in the Twisp and Methow rivers above their confluence. Would eliminate take of ESA-listed species	No difference from current conditions: fish would continue to be entrained into irrigation canals; Fish bypass could continue to cause harm to fish; Continued "take" of ESA-listed species unless irrigation canals discontinued under consent decree.
Wildlife	Minor temporary displacement of wildlife during construction; otherwise no long-term consequences to wildlife; minor disturbance to habitat would be mitigated through site rehabilitation to native species and would not cause long-term adverse wildlife effects	Impacts from construction, loss of access to open water in canal and reduction in riparian habitat supported by canal seepage; partially offset by increased in-stream flows benefiting natural riparian habitat along both rivers above their confluence, and maintenance of vegetation by land owners electing to do so. Negligible impacts on endangered or threatened species, except possible displacement of bald eagle perching.	No impacts to wildlife unless irrigation is halted; in that case impacts similar to Alternative 1 except for direct construction impacts.

Cultural Resources	No cultural resource impacts; screens are not considered contributing elements to National Register eligibility of the canal system; Potential benefit to tribal and other anglers if fish numbers were to increase as a result of the project.	Potential construction impacts on historic canal, archaeological sites, and or traditional use sites mitigated through: 1.surveys, 2. careful siting of new facilities, 3. formal recordation of the canal system, and 4. consultation with SHPO and Tribes; Potential benefit to tribal and other anglers if fish numbers were to increase as a result of the project.	No direct effect on cultural resources; Continued impact to tribal and other fisheries due to lower fish numbers unless irrigation is halted.
Socioeconomics/ Land Use [1]	No change in land use; no socioeconomic changes in to local community. Construction costs fully covered by BPA and WDFW = $1.23 million; Annual MVID and O&M costs estimated to be $129,000; [2] Source of funding for possible water conservation improvements uncertain; Only minor O&M changes to the current; would assist BPA and BOR in meeting BiOp #149.	Would resolve growing MVID concerns regarding water conveyance losses; Minor land use changes for new wells or well fields and associated facilities; Funding sources uncertain - possible economic costs to MVID members if Federal, state, or outside funding cannot be obtained; Construction costs estimated at $3.76 million; Annual MVID and O&M costs estimated to be $119,000. O&M costs would raise assessment for those remaining in the district. Benefit to property values for those who would obtain more reliable source of irrigation water; Detriment for those who value aesthetic benefit of canal. Some benefit to future growth and development through deposit of saved water into state water rights trusts; Could result in future growth – induced impacts.	No change to the existing land use; Possible socioeconomic impacts if irrigation is halted; land uses could change if orchards or crops fail as a result; No funds available to protect fish or meet water conservation needs. Annual MVID and O&M costs estimated to be $118,000.

[1] Cost estimates, originally developed in the 1997 EA, have been projected into current year dollars based on a calculated average Consumer Price Index (CPI) from 1997 to the present. These estimates are relatively conservative when compared to other methodologies.

[2] Cost estimate = $117,000 normal MVID O&M, plus $12,000 for MVID subcontract with WDFW for screen reviews and maintenance.

can also be expected. The new fish bypass outfall would permanently impact about 1,600 square feet along the east bank of the Methow River. Both cofferdams would be composed of clean native cobble fill, sand bags, ecology blocks or other clean material (see items 22 and 44 in Appendix B).

Construction of the fish return pipe would require a corridor that is approximately 20 feet wide for installation of the pipe and the outfall structure. Once the pipe is installed in the trench, the trench would be backfilled and the surface restored and revegetated with native vegetation. Water quality impacts from erosion are expected to be negligible because the work area is isolated by cofferdams, located away from flowing water, and because use of silt fences would prevent eroded materials from reaching the Methow River. All excess material from the pipeline trench would be moved to an acceptable disposal area and not allowed to erode or slough into the Methow River (see items 8, 19, 23, 27, and 48 in Appendix B).

West Canal. No inwater work is proposed in the Twisp River. The placement of three coffer dams in the West canal and fish bypass channel would isolate the work area to minimize any possible erosion and turbidity discharges into the Twisp River. Placement of the cofferdams would result in localized and short-term impacts to water quality because of the small size of the cofferdams and the sequencing for placement. The two canal cofferdams and the fish bypass channel cofferdam would each be about 400 square feet in size. The cofferdams would be placed in the following sequence to minimize the possibility of water quality impacts:

1. terminate flows to main canal below fish screen
2. install cofferdam No. 1 in main canal downstream of fish screen
3. install temporary fish bypass (95 feet long)
4. terminate flows to existing bypass channel
5. allow flow to pass to new temporary bypass
6. install cofferdam No. 2 down canal of new temporary bypass intake
7. install cofferdam No. 3 just upstream of new temporary bypass outfall.

Construction of the temporary fish bypass at the West canal screen site would have minimal impact on water quality within the canal and existing fish bypass channel. The proposed 95-foot-long fish bypass pipe would be installed in a trench in the dry. Water quality impacts would occur at the West Canal and at the bypass channel when the trench is connected at the upper and lower ends; however less than 10 to 15 cubic yards of material would be removed at the edges of these areas. The placement of energy dissipation blocks in the side channel at the pipe exit would minimize erosion.

The vegetation removal area for the temporary fish bypass and water bypass pipe corridors would be approximately 10 feet wide. A minimal amount of vegetation and soil would be removed near the connected areas of the pipes. Inwater work would involve installation of the pipe and energy dissipation blocks in the fish bypass channel.

The potential risk of hazardous material spills affecting water quality would be minimized by requiring all machinery fueling and maintenance to occur over 150 feet away from the ordinary high water mark at both sites. Equipment used below the ordinary high water mark would be cleaned and inspected daily to ensure hazardous materials (gas, oil, hydraulic fluid) from normal operation are not introduced into the aquatic environment. Hazardous material containment

systems would be on site and available for use. Trained personnel would be required to be on-site to respond immediately to a spill during any phase of construction in which hazardous material may come into contact with the river (see items 8, 13, 19, 21, 23, 27, 28, 46, 47, and 48 in Appendix B regarding equipment use, site disturbance, and associated pollution and erosion controls.

4.1.2 Alternative 1 - Groundwater Well/Pressurized Pipe Irrigation

Impacts to water quantity and quality for both surface and groundwater from Alternative 1 would be very similar to those discussed in the 1997 EA, pages 38-42. The only changes would be:

- the total water use may possibly be reduced below the 46 cfs anticipated in the 1997 EA, depending upon the final WDOE order and subsequent litigation; and
- the exclusion of some MVID members and conversion to individual wells to meet their irrigation needs has already occurred.
- Piping of leaking laterals for efficiency improvements has been completed.

These three changes would not result in impacts not already anticipated in the 1997 EA.

A new study by the U.S. Geological Survey (USGS 2003) looked at the issue of canal seepage to groundwater, which was discussed in the 1997 EA. The new study generally corroborates our conclusions in the 1997 EA, which were that leaking MVID canals do contribute to groundwater. The individual contribution of the MVID canals to the recharge is still not clear from the USGS report; however, it does conclude that the seepage from all of the leaking Methow Basin irrigation canals eventually returns to the rivers and boosts stream flows in late summer and fall. This increase in streamflow appears to taper off by January. If Alternative 1 were to be implemented, this increased streamflow may be reduced by the amount of contribution of the MVID canals, since they would be piped and no longer would leak.

4.1.3 Alternative 2 - No Action

The no action alternative would not impact surface or groundwater quality. Water quantity available for irrigation would be drastically affected if NOAA Fisheries halted irrigation due to enforcement of the ESA. Under this scenario, surface and groundwater impacts would be similar to those of Alternative 1. The water normally diverted for irrigation would remain instream and benefit flows in both the Twisp and Methow rivers. Groundwater flows would tend to move from the river out to the surrounding areas instead of being distributed throughout the length of the canal and irrigated areas due to canal seepage and irrigation returns.

4.2 Soils

4.2.1 Proposed Action– Fish Screen Replacement

The total area that would be disturbed by construction at both project sites is expected to be about 1.3 acres, which represents the minimum amount of reasonable disturbance for staging and construction of the project (see item 14 in Appendix B). This includes 0.7 acres for the staging areas, the excavation routes for new fish and temporary water bypass facilities, and/or areas for removal and replacement of the new screens. An additional 0.6 acres (2,080 feet long X 12 feet wide = 24,960 square feet area) of disturbance is expected for trenching and placement of the buried electrical service to both sites.

An estimated 2,875 cubic yards of excavated material would be required for various components at the East site, along with about 1,450 cubic yards of backfill, 100 cubic yards of riprap, and about 130 cubic yards of concrete. At the West site, an estimated 1,270 cubic yards of excavated material would be required, along with about 390 cubic yards of backfill, 20 cubic yards of riprap, and about 130 cubic yards of concrete. The physical site disturbance to the soil and surface resources would be mitigated/offset with the use of erosion controls, site grading, and revegetation practices that would minimize erosion and accelerate the rehabilitation of disturbed soils and vegetation (see items 8, 13, 20, 23, 27, 28, 47, 48, and 50 in Appendix B).

4.2.2 Alternative 1 - Groundwater Well/Pressurized Pipe Irrigation

Impacts to soils would be the same as those discussed in the 1997 EA on pages 64-65.

4.2.3 Alternative 2- No Action

There would be no impacts to soils from the no action alternative.

4.3 Vegetation

4.3.1 Proposed Action– Fish Screen Replacement

An estimated 1.3 acres of vegetation could be disturbed or altered during construction of the fish screen replacements and associated project features. The water and fish bypass pipes would be routed so as to disturb as little native established vegetation as possible. Care would be taken to restrict the number of trees to be removed (see item 49 in Appendix B). An estimated 10 live and 10 downed trees are expected to be removed at the East site, and up to 15 trees would be disturbed at the West site to complete the screen replacement and reshape the canals proximal to the fish screens. The trees to be removed would be alder, black cottonwood, and box elder.

Marginal wetland plant representation is observed along the canals. However, since these riparian areas have been artificially created by the irrigation facilities and do not meet the hydric soils criteria for official designation as wetlands, they are not protected under Federal, state, or local laws or regulations. Long-term alteration of wetland values, uses, and functions are not expected from implementation of the proposed action. No net wetland loss would be expected from implementation of the proposed project.

Although one ESA-listed plant, Ute ladies' tresses, is potentially found in the area, this species was not found in the area during two separate botanical surveys. See chapter 5.2 for a more detailed discussion on ESA consultation for this and other listed species.

Disturbed areas would be revegetated in accordance with a Site Rehabilitation Plan and Pollution and Erosion Control Plan that are each defined in items 19, 28, and 47 in Appendix B. Revegetation would be completed in the summer or fall of 2004, depending on weather conditions and suitability for vegetation planting/seeding.

4.3.2 Alternative 1 - Groundwater Well/Pressurized Pipe Irrigation

Impacts to vegetation from Alternative 1 would be very similar to those discussed in the 1997 EA, pages 69-72. Vegetation growing along canals that have been accustomed to receiving annual water would no longer rely on that water source because water would no longer be provided in these open water environments. The only change is that Ute ladies'-tresses is now listed under the ESA. This species was not found to be in the area during two separate botanical surveys. See chapter 5.2 for a more detailed discussion on ESA consultation for this and the other listed species.

4.3.3 Alternative 2- No Action

The no action alternative would not impact (positively or negatively) vegetation unless irrigation was halted for more than a year. In that case, impacts to riparian vegetation would be similar to that described for Alternative 1, where dewatering would likely affect the plants that are represented along the canals. However, the potential mitigation for impacts to vegetation along the canals would most likely not be available.

4.4 Fish

4.4.1 Proposed Action– Fish Screen Replacement

The proposed replacement of the fish screens would offer long-term biological protection and comply with current Federal and state fish screen and passage standards and criteria (NMFS 1995 and 1996) for the ESA-listed fish (see items 6, 17, and 18 in Appendix B) in the project area, while maintaining the MVID's access to irrigation water. The most current standards and criteria have been incorporated into the design of the screens at both diversion sites which are being manufactured by the WDFW Screen Shop in Yakima, Washington. During ESA consultation under the Habitat Improvement Program Biological opinion, NOAA Fisheries has concurred with the latest MVID engineering designs (NOAA Fisheries, Northwest Region, 2003b) and would conduct a follow-up inspection after the construction phase is completed (see item 7 in Appendix B). The screen upgrades would likely provide optimal long-term protection for all listed fish species and life stages, thereby resulting in long-term beneficial effects to these fish populations. The fish screens would meet the requirement for openings of 3/32 inch or less, would be angled to the flow to minimize impact injuries, and would facilitate fish bypass back to either the Methow River or Twisp rivers. The screens are specifically designed to prevent entrapment against the screens, and prevent entrainment of both the anadromous and resident fish into the irrigation canal. Additionally, replacing and upgrading the existing fish screens would be a means to support fish conservation and protection. It is also important to state that the proposed temporary water bypass pipe intakes would also be screened to protect fish from getting entrained and/or entrapped into this system, even though these temporary pipes are expected to be operational for only a three-month period of time (May 1 – August 1, 2004). The screen for these temporary structures would also receive concurrence from NOAA Fisheries to ensure compliance with latest screen designs (NMFS, 1995 and 1996) and to prevent potential fish conflicts.

On-going evaluations conducted in other Washington state basins confirm that fish screens constructed to current criteria and properly operated and maintained protect fry from

injury/mortality and achieve bypass guidance rates in the 90 to 99% range. Studies in the Yakima Basin, as an example, have shown that survival and guidance rates associated with fish movement through new fish screen facilities range from 95 to 100 percent.

The general allowable instream work window established for the Methow River from its confluence at the Columbia River to Winthrop, Washington is July 15 to September 30, and the general work window for the Twisp River is July 15 to August 31 (pers. com. Connie Iten, WDFW, October 26, 2003). Normal instream work windows are established based on the life history timings in the local areas. These timeframes are designed to avoid/minimize direct adverse impacts to fish that could be affected during construction activities. Since the construction period for the proposed action would not be entirely within these acceptable instream work windows, certain components of the normal life cycle of individual fish species could be affected if these species are in the immediate project area at that time. For example, Table 7 identifies several life stages of fish that could be present during the proposed work: young Chinook migrating downstream, early Chinook adult spawning, year round juvenile Chinook, steelhead, and bull trout rearing. Construction during any of these life stages could interfere with ability of fish to continue their life requirements if these species are in the project areas. However, the only instream work that could affect fish would be the placement and removal of the proposed cofferdams in the Methow River. These cofferdams are intended to isolate the work area so that construction of the fish bypass outfall and temporary irrigation bypass intake may occur in the dry and that fish are excluded from the actual work site. Construction of the cofferdam is expected to take only about a day and removal would also take an estimated one day period of time or so. There is no known critical or important fish habitat present in that location of the Methow. Any direct working interface in the river that could affect fish would be very localized and short lived, with minimal associated disturbance to fish. BPA has initiated consultation with the NOAA Fisheries on Chinook salmon and steelhead in accordance with Section 7 of the ESA, and we have received their concurrence to proceed, providing that certain conditions are fulfilled (see Appendix B). Chapter 5.2 further discusses compliance with the ESA.

As mentioned above, inwater work is expected at the East diversion site during construction of the fish bypass outfall and the temporary water bypass to the canal. The habitats present at the two inwater sites are not expected to normally attract large numbers of fish. Installation of the cofferdams in the Methow River likely would minimally affect adult fish passage. The construction areas are on the side of the river that is not a migration corridor. Juvenile fish passage should not be affected by the construction activities. Heavy equipment construction noise is expected to create minimal disturbances to juvenile or adult fish that may be proximal to these inwater work sites. This is due to the expected minimal area of disturbance and short duration of work. Minor short-term turbidity is expected.

No inwater work would occur in the Twisp River, although some work would occur in the West diversion canal and the fish bypass channel. Noise and vibration created during construction and heavy equipment operation within the project area of the river could marginally affect resident and anadromous fish that could be present in the nearby area. Potential adverse effects would be minimized by restricting disturbance to a small area, using best management practices, and the fact that the level and duration of these activities are expected to be limited.

During the early construction phases, standard practices would be employed to isolate the work areas from the adjacent aquatic environments through the placement of coffer dam structures.

This isolation of in-water work is a required condition by NOAA Fisheries when conducting activities in habitats occupied, or suspected of being occupied, by listed fish (see item 25 in Appendix B). During dewatering, it is possible that some juvenile fish could become inadvertently trapped between the coffer structures and the existing screen structures. If this would be the case, special care would be employed to return the stranded fish back to the river in a safe and effective manner. NOAA Fisheries provides certain fish capture, release, and salvage procedures that are to be followed if fish need to be returned to the river (see items 26 and 34 in Appendix B). During removal of existing screens and replacement of the new screens, no fish injury or mortality is anticipated, as the cofferdams would be in place to protect fish.

4.4.2 Alternative 1 - Groundwater Well/Pressurized Pipe Irrigation

Impacts to fish from Alternative 1 would be very similar to those discussed in the 1997 EA, pages 52-58. The only change is that summer steelhead, spring chinook salmon, and bull trout are now all listed under the Endangered Species Act in the project area. See Chapter 5.2 for a more detailed discussion on ESA consultation for this and the other listed species.

4.4.3 Alternative 2- No Action

The no action alternative would result in continued impacts to both listed and non-listed fish in the Twisp and Methow rivers. Unless irrigation was halted, juvenile fish would continue to be entrained into the canals through the screens, and/or be injured by the screens or the bypass pipe. NOAA Fisheries has documented that juvenile fish are making their way past the screens and can be found in the canals downstream of the screens. If irrigation were halted, the East diversion canal can be shut off entirely with no possibilities of fish passage into the system, but the West diversion canal would most likely be required to divert a 5 cfs flow to the bypass channel, thereby continuing to expose juvenile fish to possible entrainment and/or injury at the screen.

4.5 Wildlife

4.5.1 Proposed Action– Fish Screen Replacement

Construction impacts to wildlife habitat at the fish screen sites are discussed under vegetation in chapter 4.3.1 above. Removal of the vegetation is not expected to adversely affect wildlife, however a bird nesting survey of the trees to be removed would be conducted prior to construction, and measures taken to prevent impacts to nesting.

Noise and human-related commotion caused by construction is not expected to produce high decibel levels for prolonged periods. However, some wildlife may be temporarily displaced from the sites during construction related activities and be forced to temporarily relocate until work is completed and the crews leave the construction sites. The temporary displacement is not expected to cause long-term consequences to movement patterns or interrupt life history patterns. Because water quantity is not expected to change from the current seasonal fluctuations, wildlife use is therefore not expected to change.

The ESA-listed wildlife species that could be affected by construction and operation of the proposed project are: bald eagle, northern spotted owl, gray wolf, grizzly bear, and Canada lynx.

BPA has initiated consultation with the FWS on these species in accordance with Section 7 of the ESA, and we expect to arrive at a conclusion by the time the final EA is completed. Chapter 5.2 further discusses compliance with the ESA.

4.5.2 Alternative 1 - Groundwater Well/Pressurized Pipe Irrigation

Impacts to wildlife from Alternative 1 would be very similar to those discussed in the 1997 EA, pages 82-83. The only change is that Canada lynx has been listed under ESA as a threatened species in the project area. See chapter 5.2 for a more detailed discussion on ESA consultation for this and the other listed species.

4.5.3 Alternative 2- No Action

The no action alternative would not impact wildlife unless irrigation was halted for several years. In that case, impacts to wildlife resulting from changes to riparian vegetation along the canals and in the riparian areas of the Methow and Twisp rivers downstream of the diversions would be similar to those of Alternative 1.

4.6 Cultural Resources

4.6.1 Proposed Action– Fish Screen Replacement

The proposed action would not adversely impact cultural resources. In November of 2003, a BPA archaeologist surveyed the East and West fish screen replacement proposal sites, including the fish and water bypass and electrical cable trenching areas. No cultural materials were found and the survey report was forwarded to the State of Washington Office of Archaeology and Historic Preservation in January 2004 to comply with Section 106 of the National Historic Preservation Act of 1966. In a February 6, 2004 letter, the Deputy State Historic Preservation Officer concurred with BPA's findings that the fish screen project would have "no adverse effect" on the National Register eligible MVID. Because the existing screens are less than 50 years of age, they are considered to be non-contributing to the overall historic character of the entire irrigation system. The SHPO stated that further consultation on this matter was not necessary.

4.6.2 Alternative 1 - Groundwater Well/Pressurized Pipe Irrigation

Impacts to cultural resources would be the same as discussed on page 95 in the 1997 EA.

4.6.3 Alternative 2- No Action

There would be no direct impacts to cultural resources from the no action alternative; the existing impact to tribal and other fisheries due to the losses of fish into the canals, screens, and bypasses would continue unless irrigation was halted.

4.7 Socioeconomics and Land Use

4.7.1 Proposed Action – Fish Screen Replacement

Construction of the fish screen upgrades is not expected to alter the socioeconomics of the local or regional community. No changes are expected to property values, land use, the local economy, or Methow Valley growth and development as a result of implementing the proposed action. The irrigators would continue receiving water in the same manner as they have the last few years.

The newly constructed screens would only slightly change the visual appearances of the East and West canal and diversion sites. However, it is not expected that these changes would be detrimental. Revegetation of the sites with native vegetation would improve the visual landscape of the East canal site.

Because BPA and WDFW would largely absorb the costs for this proposal, there would be no economic constraints placed upon the local or regional community. The MVID would be responsible for the operation and maintenance of the new screens to ensure the new facilities function properly and troubleshoot any problems/constraints that may arise in the future. The screens have an estimated life span of up to 50 years, which could be extended with good maintenance. The O&M costs would not be markedly higher than those currently incurred by the MVID for the existing screens. MVID irrigation assessments are currently lower than similarly situated districts.

4.7.2 Alternative 1 - Groundwater Well/Pressurized Pipe Irrigation

Impacts to socioeconomics and land use from Alternative 1 would be very similar to those discussed in the 1997 EA on pages 87-89. However, cost estimates, originally developed in the 1997 EA, have been projected into current year dollars based on a calculated average Consumer Price Index. The major differences are:

- The current estimated cost of this alternative is $5.24 million, which includes $1.48 million in reimbursements to members who leave the district. The members have already been excluded and the reimbursement is expected to be completed by March 2004. Construction costs to implement this alternative would be about $3.76 million.

- Currently, there is no funding source identified for this alternative. Monies set aside by BPA for this alternative have been designated for reimbursement of the members leaving the district, the already implemented on-farm efficiencies (including replacement of the lateral feeds from the canals to the fields), and the remainder is currently earmarked for the fish screen replacement work, pending environmental review.

- Annual O&M costs are estimated to be $119,000. This estimate includes costs for electricity for pumping water. Costs have inflated in general since 1997, and costs for electricity have increased even more rapidly than other costs.

4.7.3 Alternative 2- No Action

Under the no action alternative, BPA funding would not be available. The MVID would need to seek alternative funding sources or assess its members for the costs of the fish screen replacements. If alternative funding could not be secured, the MVID would likely be in violation of its consent decree (see chapter 1.3.2) and NOAA Fisheries could halt irrigation. If this would occur, socioeconomic impacts could ultimately include loss of annual crops and orchards, and adverse effects on hay production. Over time, this could lead to changes in land use from agricultural to other uses and lower land values.

4.8 Cumulative Impacts

Cumulative impacts can result from “individually minor but collectively significant actions taking place over a period of time ” (40 CFR 1508.7). These impacts are recognized as the effects of future activities that are reasonably certain to occur in the watershed (CEQ 1997). The MVID project is one of several hundred past and present watershed management projects initiated under the Northwest Power Planning Council’s Fish and Wildlife Program.

In its Watershed Management Program EIS, and subsequently in the Fish and Wildlife Implementation Plan EIS, BPA addressed the need to establish a comprehensive and consistent strategy to guide implementation of its fish and wildlife mitigation and recovery program (BPA, 1997c; BPA, 2003). The cumulative impacts of future watershed management projects considered together with past, present, and future human actions in the Columbia River Basin, were addressed in these documents. These EISs concluded that overall, watershed management throughout the Columbia River Basin would provide a net benefit to water quality, fish, and fish habitat, as well as to other natural resources such as soils, vegetation, and wildlife.

In the 1997 EA, BPA considered a variety of alternative actions that could address the broader need and purposes outlined for the MVID rehabilitation project (BPA, 1997b). Some of these broader needs and purposes have been at least partially met with the actions that have occurred to date. However, if the proposed action is selected, the MVID may need to take additional actions to be able to meet the WDOE order while still providing an adequate supply of water to its members. The BOR is currently drafting plans that would upgrade the MVID diversions to address other fish passage problems related to the annual push-up dam on the Twisp River (West canal diversion) by replacing it with a more permanent, reliable and fish-friendly structure. In addition, reductions in the MVID withdrawls could further improve fish passage and flow. To achieve those reductions, the MVID could repair or replace portions of the remaining canals to slow or stop the leaking of water from them. It is unclear whether the MVID will be required to pursue these canal improvements because such improvements are, in part, dependent on the final WDOE supplemental order to address excessive conveyance losses of the MVID irrigation system and available funding. The effects of these actions are summarized in Table 9 and discussed throughout chapter 4. No funding has yet been identified for implementing these actions but, to the extent possible, they have been addressed in this final EA even though they do not appear to be reasonably foreseeable. Actions that are not proposed for funding through BPA have to go through the next stage of the Council’s subbasin planning process. BPA has no plans to conduct further work on the MVID system.

These additional actions would not be necessary under Alternative 1. However, Alternative 1, if implemented, would pose a different set of cumulative impacts, repeated here from the 1997 EA:

- the cumulative impacts on the groundwater aquifer and the Methow and Twisp rivers of changing the MVID diversions from direct withdrawals from the two rivers to individual wells or a combination of individual and community wells;
- the cumulative impact of loss of water-dependent vegetation and wildlife habitat along the canal along with past and present losses due to other factors; and
- the cumulative impact of higher assessment costs to MVID members who must deal with past, present, and future increases in costs due to other factors, which may lead to a shift from agriculture to other land uses.

These impacts have been addressed both in the 1997 EA and this final EA, but are summarized in this chapter as well, so that overall cumulative impacts that involve multiple resources are addressed. In addition, this alternative, in combination with other implemented MVID actions taken, could collectively add to beneficial effects to fish passage, water conveyance efficiency, and preservation of irrigated land use in the Methow Valley.

CHAPTER 5 ENVIRONMENTAL CONSULTATION, REVIEW AND PERMITS

5.1 National Environmental Policy

This final EA is prepared in accordance with the National Environmental Policy Act (NEPA) (42 USC 4321 et seq.) and implementing regulations, which require Federal agencies to assess the impacts of their proposed actions on the environment. Under NEPA, BPA has the option to prepare an environmental assessment to provide evidence and analysis for determining whether to prepare an environmental impact statement, or a finding of no significant impact (FONSI).

5.2 Endangered Species Act

A biological assessment (BA) was prepared in 1997 and again in 1999 to address impacts on threatened and endangered species of previous MVID proposals in accordance with Section 7 of the ESA, (BPA, 1997a and BPA, 1999). These previous MVID proposals had some elements common to the present proposed project. The responses BPA received from the agencies are summarized in Table 10. However as a result of the current proposal, and due to the updated list of ESA species since 1999, BPA has reinitiated consultation with the FWS and NOAA Fisheries.

Table 10. Agency Responses to Previous MVID ESA Consultations

Biological Assessment Reference	Agency Response Date	Responding Agency	Response Comments
BPA, 1997a	Oct. 1997	FWS	FWS concurred with BPA that the project [Alternative 1 as described in this EA] would have no effect to the Northern spotted owl, grizzly bear or gray wolf, and may affect but would not adversely affect the bald eagle
BPA, 1997a	Dec. 1997	NMFS	Concurred that the project [Alternative 1 as described in this EA] would not likely affect the listed Columbia River steelhead
BPA, 1999	Jan. 2000	FWS	Concurred that the on-farm conservation and lateral replacement project is not likely to adversely affect the bull trout and Ute ladies'-tresses, and would not affect the Canada lynx
BPA, 1999	Feb. 2000	NMFS	Concurred that the on-farm conservation and lateral replacement project is not likely to adversely affect the Upper Columbia River steelhead or the Upper Columbia River spring Chinook salmon or adversely modify any proposed critical habitat

For species under their jurisdiction (see Table 8), BPA prepared a BA for the FWS to reflect the fish screen replacement project now proposed (Craven Consulting Group, 2003 and amended by BPA (Keller 2003)). The BA was sent to the FWS on December 22, 2003 for their review and concurrence. Our determination for the bald eagle, gray wolf, Canada lynx, and bull trout was "may effect, not likely to adversely affect." Our determination for the Ute ladies'-tresses, northern spotted owl, and grizzly bear was "will not affect."

In their January 20, 2004 letter and accompanied Biological Opinion, the FWS concurred with BPA's findings on the bald eagle, and gray wolf and stated that the project is not likely to jeopardize the continued existence of the Canada lynx. The letter focused attention on two discretionary reasonable and prudent measures (RPMs) for bull trout and prescribed five terms and conditions on how to implement those measures. These RPMs must be met to satisfy the resident fish concerns under jurisdiction by the FWS. These measures are listed as items 35 and 36 on Appendix B, and five terms and conditions (items 37 – 41) are identified to attain the RPMs. A follow-up telephone conversation among Greg Van Stralen (FWS), Connie Iten (WDFW), and Carl Keller (BPA) was conducted to request clarification and better definition on effectively attaining the required terms and conditions, if the proposed action were selected. The following practicable standards for meeting the RPMs were developed and would be applied to reflect realistic onsite conditions and human safety during project construction:

- Snorkeling to be conducted only if flows are below 200 cfs, and if visibility is at least 10 feet.
- To minimize harm to bull trout during cofferdam installation: a. background turbidity levels shall be determined at 100 foot intervals upstream and downstream of the project location; b. if safe to snorkel, the area within 100 yards downstream of the project site would be checked for fish. If fish are found, snorkeling would be repeated at 3 hour intervals until fish have left the area; c. immediately prior to cofferdam construction, fish would be moved out of the affected area by walking through the affected project area and repeated accordingly. When the cofferdam construction is completed, the affected areas would be salvaged for any fish inadvertently entrained in the dewatered work area; and d. if a sediment/turbidity plume exceeds 5 nephelometric turbidity units above background sediment, exceeds 10% above background, for a distance of more than 300 feet below the project site, work shall cease until background levels are once again met. Adjustment of ramping is not practicable in the mainstem of the river and would not apply.

Consultation has also been initiated with NOAA Fisheries, specifically for the ESA-listed anadromous fish under their jurisdiction (see Table 8). BPA used the Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Habitat Improvement Program (HIP) in the Columbia River Basin (NOAA Fisheries, 2003b) to provide ESA coverage for this project; the proposed MVID project qualifies under Category 2 – "Small Scale Instream Habitat Actions – Fish Passage Activities." There are a total of 32 terms and conditions that must be met to satisfy listed anadromous fish concerns under this programmatic biological opinion. These are identified as items 3 to 34 in Appendix B and would be implemented if the proposed action were selected.

5.3 National Historic Preservation Act

The MVID canal system was recommended as eligible for inclusion on the National Register of Historic Places (National Register), under Criterion A (property associated with events that have made a significant contribution to the broad patterns of our history). The system has been the most prominent irrigation feature in the Methow Valley. Although neglect and numerous changes in the structural materials have caused substantial deterioration, both the East and West canals are still mostly located in the original rights-of-way.

The current fish screens were constructed after the canal systems were built, and were replaced in the 1960s and 1970s. Therefore, the screens are considered non-contributing elements of

the National Register eligibility. In surveys conducted 1996 and November 2003, no cultural resources were identified in the vicinity of the fish screens, bypass pipe routes, or electrical service alignments. Reference is made to chapter 4.6.1 in this Final EA regarding our compliance responsibilities with Section 106 of the National Historic Preservation Act of 1966.

5.4 Coastal Management, Shorelines, Wetlands, and Hydraulic Approval

A Washington Joint Aquatic Resource Permits Application (JARPA) was prepared and sent to the WDFW and the local government by the MVID on September 8, 2003. The JARPA is an application form that consolidates up to seven permit applications for state and local permits in the state of Washington, and also serves as the mechanism to apply for appropriate Clean Water Act Section 404 permits, if needed, as well. Specifically, the JARPA was filed for a Hydraulic Project Approval (HPA) (http://www.wa.gov/wdfw/hab/hpapage.htm) and State Environmental Policy Act (SEPA) clearance. Part of the proposed project would be in a wetted perimeter of the Methow River and would require a Hydraulic Project Approval. Under state law known as “Hydraulic Code” (RCW 75.20.100-160), the HPA is intended to regulate construction in a manner that prevents damage to the state’s fish, shellfish, and their habitat. The project is currently being reviewed by the WDFW who administers that program for the state of Washington. The SEPA is currently being reviewed by the WDOE.

Because the proposed project would not take place in navigable waters and because less than 25 cubic yards of fill would be deposited in wetlands, a Federal Corps of Engineers Clean Water Act Section 404 permit would not be required for implementation of the proposed action. Most riparian areas along the canals are not jurisdictional wetlands because they are artificially established and do not meet the soils characteristics to be classified as wetland, or they are upland riparian areas (Parametrix, 1995).

The Coastal Zone Management Act of 1972 requires that Federal actions directly affecting the coastal zone be undertaken in a manner consistent, to the maximum extent possible, with the State's coastal zone management program. Washington's coastal zone management program is implemented through the provisions of the State Shorelines Management Act, including shoreline management programs developed/administered by the counties. The Coastal Zone Act Reauthorization Amendments of 1990 also require that proposed Federal facilities fully comply with Federal consistency requirements, as determined by and through consultation with a designated coastal zone management agency. County jurisdiction is invoked under the Shoreline Master Program for projects within 200 ft. of the ordinary high-water mark of Shorelines of Statewide Significance (or within the 100-year floodplain), or for projects requiring a floodplain development permit (Okanogan County, 1997). The Twisp and Methow rivers and their associated wetlands are considered shorelines of Statewide Significance.

Wherever possible, construction in jurisdictional wetlands or shoreline areas would be avoided, and MVID groundwater pumping would be designed to avoid affecting surface jurisdictional wetlands through groundwater withdrawal. Federal and county agencies would regulate facilities built by local landowners with jurisdiction over wetlands and waters protection.
In addition, BPA would take the following measures, when practicable, to assure consistency with the county’s Shoreline Master Plan.

Location of structures within the identified shoreline has been avoided through design, where possible. Where locations within the shoreline area could not be avoided, BPA consulted with

the appropriate state and local agencies to determine the best placement of the structure. In shoreline areas, disturbed land would be restored as closely as possible to pre-project contours and replanted with native and local species. However, there is one location where site topography would require bank disruption at the fish bypass outfall on the Methow River. Several provisions would be made before and after shoreline areas would be disturbed including implementation of an Operations and Maintenance Plan, Pollution and Erosion and Control Plan, and Site Rehabilitation Plan (see items 8,15, 19, and 28 in Appendix B). Erosion control measures would be implemented within 150 feet of shoreline area (see item 23 in Appendix B).

5.5 Compliance with Floodplain and Wetlands Environmental Review Requirements

Department of Energy Regulations (10 CFR 1021 and 1022), implementing Executive Orders 11988 and 11990 (May 24, 1977), require BPA to ensure that the potential effects of any action it may take in a floodplain are evaluated; that wetlands protection is considered in decisionmaking, and that the potential impacts of any new construction proposed in a wetland are evaluated. However, wetlands protection and evaluation do not apply if the wetland activities are located on non-Federal property, which is the case with the MVID fish screen project. Also, the structures and construction for both sites would occur out of the 100-year floodplains of the Twisp and Methow rivers according to the Federal Emergency Management Agency mapping. Therefore, the MVID project would not impact floodplains.

5.6 Local Plans

The proposed MVID actions would be located in areas covered by the Okanogan County Comprehensive Plan and the Methow Valley Plan, an addendum to the comprehensive plan. The comprehensive plan is a declaration of policies, but as such, contains no regulations or minimum standards. Most of the MVID system is located in either the Methow Valley Review District's Uplands zoning district (20-acre minimum lot size) or the MVRD 5 zone (5-acre minimum lot size). The irrigation facilities are consistent with these zonings.

<u>Critical Area Regulations</u>
Okanogan County adopted critical area regulations under the State's Growth Management Act of 1990, as amended, to protect wetlands, areas with critical recharging effects on potable water, frequently flooded areas, geologically hazardous areas and fish and wildlife habitat conservation areas. The existing and proposed MVID facilities are located in some of these areas. WDOE and MVID would continue to coordinate the proposed actions with the county planning department to specifically address any concerns regarding zoning or conflict with critical areas.

5.7 Farmlands

The Farmland Protection Policy Act (7 U.S.C. 4201 et. seq.) requires BPA to identify and quantify adverse impacts of the proposed action on farmlands. The location and extent of prime and other important farmlands designated by the Natural Resource Conservation Service (NRCS; formerly Soil Conservation Service) were obtained from NRCS soil survey information. The NRCS has designated most of the soils on the valley bottoms as farmland of statewide importance. The proposed project and alternative 1 would not cause a change to the

agricultural use of farmlands, and it would not jeopardize the continued existence of area farms. The no action alternative, however, could directly influence disposition of water conveyance through the canals and to agricultural fields. If the consent decree was enforced under the no action alternative, irrigation diversions could be halted, resulting in no water available for irrigating farmlands.

5.8 Wild and Scenic Rivers

The Methow River system, including the entire Twisp River and over half of its tributaries, has been recommended for inclusion in the Washington State Scenic Rivers Program. The Twisp River is considered a River of Statewide Significance. The proposed action and alternatives would not affect these designations.

5.9 Other

In accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), properties at inactive or active sites are generally evaluated to address any contamination from past or current activities. To determine the likelihood of hazardous on-site substances, BPA assesses existing fee-owned properties that are planned to be acquired or leased. Before the start of any construction, BPA would conduct a Phase I Environmental Land Audit of both fish screen sites to evaluate presence or absence of contamination. Although it is unlikely that contamination sources would be identified at the East and West diversion sites, any identified contamination would be assessed and, if necessary, cleaned up before construction is started.

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APPENDIX A

Summary of Comments to the Preliminary Environmental Assessment

APPENDIX A

COMMENTS to the Preliminary Environmental Assessment
MVID East and West Diversion Screening Proposal

As part of its NEPA public review process for this project, BPA sent notification to a number of individuals and contacts in October 2003 informing them that BPA would prepare an environmental assessment (EA) for the proposed fish screen replacement action. BPA also invited those who were interested to request a copy of the EA for review and comment when that document became available. That same month, BPA also published a similar notice in the Methow Valley News (Twisp, Washington) and The Chronicle (Omak, Washington).

When the preliminary EA became available for comment in early December 2003, and in response to their requests, BPA sent hard copies of the document to 56 individuals and electronic copies of it were sent to 11 individuals in early December 2003. BPA requested that comments be filed by January 2, 2004. Only one comment response was officially received (Okanogan County Noxious Weed Control Board). Their comments are summarized below, along with our responses.

Also summarized below are comments raised by EarthJustice, on behalf of their client, the Okanogan Wilderness League. Their letter was received by BPA in September, 2003, and our responses are also included below.

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Commenter: Okanogan County Noxious Weed Control Board (OCNWCB)
BPA Comment Log #: MVIDFS-001
Date Received: December 24, 2003
Comments Summarized:

* Recommends MVID remove and or treat existing noxious weed infestations before any ground disturbance and encourages MVID practice and maintain effective weed control on all property and right-of-way roads.

* Recommends establishment of a Long Term Noxious Weed Control Plan that utilizes an integrated approach. Provide annual treatment to the project area by a licensed applicator to reduce spread of noxious weeds.

* Suggests disturbed soil be revegetated with suitable certified grass mixture to compete with noxious weeds.

* Suggests using an Integrated Weed Management plan.

* OCNWCB notes infestations of Scotch Thistle, Dalmatian Toadflax, Hoary Cress, Diffuse Knapweed, and Poison Oak along the canal systems.

* Suggests weed identification education prior to ground disturbance to establish a long-term prevention and spread of noxious weeds to adjacent properties. Suggests

preventative measures to keep the following areas weed free, treated and vegetated: paths, roads, trails, fence lines, parking lots and areas surrounding the project sites.

Response to the Comments: BPA finds that the comments by the OCNWCB are sound, warranted practices that can reasonably be incorporated with the project. However, our ability to condition (require) these recommendations and suggestions is confined to construction activities at the East and West fish screen sites. We have included the construction related measures in the Final environmental assessment, and have encouraged the MVID to follow-up on the other recommendations with the CCNWCB.

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Commenter: EarthJustice, on behalf of the Okanogan Wilderness League (OWL)
Date: letter of September 10, 2003
Comments Summarized and Response to the Comments:
* BPA must consider all reasonable alternatives to the proposed action. Reconsider elimination of the canals in favor of a pressurized pipe system and full conversion from surface water diversions to ground water withdrawals.
Response: BPA has done so. See especially section 2.2 and Table 4 in the Final 2004 EA. We included full analysis of the alternative suggested by OWL even though MVID had already rejected this alternative.

* BPA's 1997 FONSI did not encompass the installation of fish screens, and the EA did not consider the Pollution Control Hearings Board Order.
Response: The Final 2004 EA considered both these issues as part of the proposed action and its analysis throughout the document. The 2004 FONSI will encompass the installation of fish screens.

* A proper NEPA analysis must consider any new facts since the last analysis to determine whether an alternative use of funds would more likely advance the goals of preserving instream flows in the Methow and Twisp Rivers
Response: In developing the Final 2004 EA, BPA considered a host of new information, including but not limited to that provided by OWL. Studying all reasonable alternative uses of funds to advance the goal of preserving instream flows may be an admirable goal, but BPA's purpose and need for this proposed action is not so broad, and such a study is beyond the scope of the current BPA proposal. (See sections 1.1 and 1.2 of the Final EA).

* Funding the preferred alternative will waste money and make it impossible to get the MVID diversions out of the Twisp and Methow rivers permanently (personal comm. between Philip Key (BPA) and EarthJustice attorneys, Mike Mayer and John Aram, and their client, Lee Bernheisel (OWL) on September 13, 2003). Replacing screens does not resolve the problem of the diversions dewatering the rivers to the detriment of the fish.
Response: BPA notes OWL's opinion. BPA's purpose and need for the proposed action, as described in section 1.1 and 1.2 of the Final 2004 EA, does not include permanently removing the MVID diversions out of the Methow and Twisp rivers. While diversion removal may be a goal of OWL, such removal would not meet BPA's purpose

and need for the proposed action. Moreover, funding the proposed action would not preclude removing the diversions; in fact, the Bureau of Reclamation is currently working on plans for a diversion modification.

As discussed in the Final 2004 EA, replacing the screens in conjunction with the authorized diversion reductions being pursued by the Department of Ecology, would provide improved fish passage and flows with regard to MVID's irrigation withdrawals. Even if this is not the best alternative, it has been rigorously compared with the OWL proposal and is reasonable in light of the concerns the project is meant to address.

//

APPENDIX B

Mitigation Plan
for the Construction and Maintenance of the MVID Fish Screen Replacement Project

APPENDIX B

MITIGATION PLAN

FOR THE

CONSTRUCTION AND MAINTENANCE OF THE MVID FISH SCREEN REPLACEMENT PROJECT

W://KEC\EAs-EQ-13\MVID\Terms and Conditions table.doc

BPA is responsible to ensure that various terms, conditions, and requirements associated with the project are completed in order to enable funding for project implementation. The following sources define the requirements to be met:

1. Final Environmental Assessment for the MVID Project, East and West Diversion Screening Proposal;
2. February 23, 2004 Custom Report for the "Endangered Species Act Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation Management Act Essential Fish Habitat Consultation, Habitat Improvement Program";
3. January 30, 2004 FWS BO letter for the project; and
4. December 24, 2003 Okanogan County Weed Control Board letter.

Through a joint effort with various stakeholders and concerned entities, the following table enumerates the mitigation measures that will be implemented:

#	MITIGATION TASKS	SOURCE OF MITIGATION REQUIREMENT	WHERE WILL REQUIREMENT BE ADDRESSED/DOCUMENTED -WHEN	TIMELINE FOR IMPLEMENTING REQUIREMENT A	PARTY TO ENSURE IMPLEMENTATION
1	Prepare Final EA	P.L. 91-190, 42 U.S.C. 4321-4347, Jan. 1, 1970, 83 Stat 852) as amended	▪ Final EA –March 15, 2004	March 15, 2004	BPA (C. Keller)
2	Prepare FONSI	P.L. 91-190, 42 U.S.C. 4321-4347, Jan. 1, 1970, 83 Stat 852) as amended	Finding of No Significant Impact document - March 15, 2004	March 15, 2004	BPA (C. Keller)
3	Secure all regulatory permits before project implementation and follow the permit conditions	HIP BO Custom Report – General Condition 1 –p.2 of 16	▪ Final EA – March 15, 2004	Before project construction	BPA (C.Keller)
4	Actions that affect listed plants and animals must be consulted with the FWS	HIP BO Custom Report – General Condition 2 –p.2 of 16	▪ Final EA – March 15, 2004	Ongoing, by March 15, 2004	BPA (C.Keller)
5	Project modification must be re-evaluated before work may be carried out	HIP BO Custom Report – General Condition 3 – p.2 of 16	▪ Standard Operating Procedure	Before project construction	MVID (V.Jolley) MWH (B. Cutting) BPA (C. Keller)
6	Consult design with NOAA Fisheries – ensure consistency w/ fish Passage Facility Guidelines and Criteria	HIP BO Custom Report – Condition 1 – p.3 of 16	▪ Final EA – March 15, 2004 ▪ BPA to put in MWH contract– March 15, 2004	Complete by March 15, 2004	BPA (C. Keller) BPA (L. Hermeston)
7	NOAA Fish to: 1. verify passage installation, 2. measure hydraulic conditions, and 3. identify successful passage	HIP BO Custom Report – Condition 2 – p.3 of 16	▪ Standard Operating Procedure	Post construction	NOAA Fisheries (B. Nordlund) to do follow-up
8	O&M of fish screen in accord with O&M	HIP BO Custom Report –	▪ Plan drafted by BOR; finalize plan by April	During and post	MVID (V. Jolley) to

	Plan to be prepared	Condition 3 – p.3 of 16	15, 2004 ▪ Implementation of O&M Plan ongoing ▪ BPA to put in MWH contract to finalize – March 15, 2005	construction	implement MWH (B. Cutting) with assistance from BOR (G. Knott)
9	Fish screens to be consistent with NOAA Fisheries Screen criteria and guidelines	HIP BO Custom Report – Condition a – p.4 of 16	▪ Final EA – March 15, 2004 ▪ BPA to put in MWH contract –March 15, 2004	During and post construction	BPA (C. Keller) NOAA Fisheries (B. Nordlund) BPA (L. Hermeston)
10	Fish passage to be designed in accordance with NOAA Fisheries passage guidelines and criteria	HIP BO Custom Report – Condition b – p.4 of 16	▪ Final EA – March 15, 2004 ▪ BPA to put in MWH contract –March 15, 2004	During and post construction	BPA (C. Keller) NOAA Fisheries (B. Nordlund) BPA (L. Hermeston
11	Screens to be sized to match historic water use	HIP BO Custom Report – Condition c – p.4 of 16	▪To ensure that screens are sized to coincide with traditional water right uses in the district ▪ BPA to put in MWH contract –March 15, 2004	Before and during construction	BPA (L. Hermeston) contract with MWH (B. Cutting)
12	O&M of fish passage in accord with O&M Plan to be prepared	HIP BO Custom Report – Condition d – p.4 of 16	Same as #8 above	Same as #8 above	Same as #8 above
13	Project proponent will prepare vegetation plan to: a. require native species, b. identify seed/plant source, seed mixes, soil preparation, etc., c. include vegetation management strategies, d. address abiotic factors, and e. certify only noxious weed-free vegetation for revegetation	HIP BO Custom Report – Condition a. – p.5 of 16	▪ Final EA – March 15, 2004 ▪ BPA to put in MWH contract– March 15, 2004 ▪ Incorporate into final Site Rehabilitation Plan; see #28 below ▪ Finalize plan by April 15, 2004	During and post construction	BPA (C. Keller) BPA (L. Hermeston and C. Keller) contract with MWH (B. Cutting)
14	Minimum area	HIP BO Custom Report – Condition 1.a. -p.8 of 16	▪ Final EA – March 15, 2004 ▪ BPA to put in MWH contract –March 15, 2004 ▪ Incorporate into final Site Rehabilitation Plan – April 15, 2004	During construction	BPA (C. Keller) BPA (L. Hermeston); contract with MWH (B. Cutting)
14	Timing of in-water work	HIP BO Custom Report – Condition 1.b. -p.8 of 16	▪ Final EA – March 31, 2004 ▪ BPA to put in MWH contract – March 15, 2004 ▪ HIP BO Form 2 dated December 15, 2004	During construction	BPA (C. Keller) BPA (L. Hermeston); contract with MWH (B. Cutting) BPA (C. Keller)
16	Cessation of work	HIP BO Custom Report – Condition 1.c. -p.8 of 16	▪ BPA to put in MWH contract –March 15, 2004	During construction	BPA (L. Hermeston); contract with MWH (B. Cutting)
17	Fish screens to be consistent with NOAA Fisheries Screen criteria and guidelines	HIP BO Custom Report – item 1.d -p.8 of 16	Same as # 9 above	Same as # 9 above	Same as # 9 above
18	Fish passage to be designed in accordance with NOAA Fisheries passage guidelines and criteria	HIP BO Custom report – item 1.e -p.8 of 16	Same as # 10 above	Same as # 10 above	Same as #10 above

19	Pollution and Erosion Control Plan	HIP BO Custom Report – item 1.f -p.8 and 9 of 16	▪ Final EA – March 15, 2004 ▪ Draft plan prepared; finalize plan by April 15, 2004 ▪ BPA to put in MWH contract –March 15, 2004	During and Post Construction	BPA (C. Keller) BPA (L. Hermeston and C. Keller) contract with MWH (B. Cutting)
20	Treat construction discharge water by addressing: water quality, discharge velocity, spawning areas, and pollutants	HIP BO Custom report – item 1.g -p.9 of 16	▪ Incorporate into final Pollution and Erosion Control Plan – see #19 above ▪ Finalize by April 15, 2004 ▪ BPA to put in MWH contract– March 15, 2004	During Construction	BPA (L. Hermeston and C. Keller) contract with MWH (B. Cutting)
21	Peconstruction activity to include making, emergency erosion controls, and temporary erosion controls	HIP BO Custom report – item 1.i -p.9 of 16	▪ Incorporate into final Pollution and Erosion Control Plan – see #19 above ▪ Draft prepared by BOR (G. Knott), finalize April 15, 2004 ▪ BPA to put in MWH contract– March 15, 2004	Before Construction	BPA (L. Hermeston and C. Keller) contract with MWH (B. Cutting)
22	Temporary access roads to address steep slopes, minimizing soil disturbance, temporary stream crossing, and obliteration of temporary access roads	HIP BO Custom report – item 1.j -p.9 of 16	▪ Incorporate into final Site Rehabilitation Plan – see #28 below ▪ BPA to put in MWH contract– March 15, 2004	During, and Post Construction	BOR prepared BPA (L. Hermeston and C. Keller) contract with MWH (B. Cutting)
23	Heavy equipment	HIP BO Custom Report – item 1.k -p.10 of 16	▪ Final EA – March 15, 2004 ▪ Incorporate into final Pollution and Erosion Control Plan – see #19 above ▪ BPA to put in MWH contract– March 15, 2004	Before Construction	BPA (C. Keller) BPA (L. Hermeston and C. Keller) contract with MWH (B. Cutting)
24	Site preparation	HIP BO Custom Report – item 1.l -p.10 of 16	▪ BPA to put in MWH contract – March 15, 2004 ▪ Incorporate into final Site Rehabilitation Plan (see #28 below) and final Pollution and Erosion Control Plan (see #19 above)	Before Construction/ Staging	BPA (L. Hermeston) contract with MWH (B. Cutting)
25	Isolation of in-water work area	HIP BO Custom Report – item 1.m -p.10 of 16	▪ Final EA –March 15, 2004 ▪ Incorporate into final Pollution and Erosion Control Plan – see #19 above ▪ Finalize by April 15, 2004 ▪ BPA to put in MWH contract– March 15, 2004	During Construction	BPA (C. Keller) BPA (L. Hermeston) contract with MWH (B. Cutting)
26	Fish capture and release	HIP BO Custom Report – item 1.o -p.10 and 11 of 16	▪ Final EA - March 15, 2004 ▪ BPA to put in MWH contract – March 15, 2004	During Construction	BPA (C. Keller) BPA (L. Hermeston) contract with MWH (B. Cutting) WDFG (C. Iten)
27	Earthwork	HIP BO Custom Report – item 1.p. – p.11 of 16	▪ BPA to put in MWH contract – March 15, 2004	During Construction	BPA (L. Hermeston) contract with MWH

					(B. Cutting)
28	Site Rehabilitation Plan	HIP BO Custom Report – item 1.r - p12 of 16	▪ Site Rehabilitation Plan- in draft; finalize by April 15, 2004 ▪ BPA to put in MWH contract –March 15, 2004 ▪ Finalize plan April 15, 2004	April 15, 2004	BPA (L. Hermeston and C. Keller) contract with MWH to complete plan and ensure implementation
29	Implementation monitoring	HIP BO Custom Report – item 1.t - p.13 and 14 of 16	▪ Incorporate with Site Rehabilitation Plan – see #28 above ▪ Report due 120 days after end of construction	During and post construction	BPA (C. Keller) to receive monitoring reports on related and pertinent topics
30	Annual monitoring report	HIP BO Custom Report – item 1.u - p.14 of 16	▪ Standard Operating Procedure - database maintained by BPA	Post construction;	BPA (N. Weintraub) provide annual reports to NOAA Fisheries
31	Annual coordination	HIP Custom Report – item 1.v - p.14 of 16	▪ Standard Operating Procedure	Post Construction	BPA (KEC responsibility)
32	Confirmation of fish presence	HIP BO –pages 192 and 193, section 2.6.3 Terms and Conditions – item 1.c.	▪ Final EA (BPA) – March 15, 2004 ▪ Incorporate with snorkel surveys, #39 below ▪ BPA to put in MWH contract – March 15, 2004	Before and during construction	BPA (C. Keller) WDFW (C. Iten) MWH (B. Cutting)
33	Project access	HIP BO – pages 193, section 2.6.3 Terms and Conditions – item 1.d.	▪ Incorporate into O&M Plan -see #8 above ▪ BPA to put in MWH contract to finalize – March 15, 2004	During construction	MWH (B. Cutting)
34	Salvage notice	HIP BO –page 193, section 2.6.3 Terms and Conditions – item 1.f.	Incorporate with fish capture and release #26 above	See #26 above	See #26 above
35	Minimize bull trout disturbance downstream of project B	FWS BO – RPM no.1 –p.75	▪ Final EA – March 15, 2004 ▪ BPA to put in MWH contract – March 15, 2004	During construction	BPA (C. Keller) BPA (L. Hermeston) contract with MWH (B. Cutting)
36	Minimize habitat degradation and temporary degradation of downstream habitat B	FWS BO –RPM no. 2 –p.75	▪ Final EA – March 15, 2004 ▪ BPA to put in MWH contract – March 15, 2004	During construction	BPA (C. Keller) BPA (L. Hermeston) contract with MWH (B. Cutting)
37	Biologist on-site during construction B	FWS BO – to implement RPM no.1 above - p.76	▪ Final EA (BPA) – March 15, 2004	During construction	Partner in this project WDFW (C. Iten) to be onsite biologist during construction
38	Adjust ramping rates B	FWS BO – to implement RPM no. 1 above - p.76	▪ Incorporate into MWH contract – March 15, 2004	During construction	BPA (L. Hermeston) contract with MWH (B. Cutting)
39	Snorkel surveys B	FWS BO – to implement RPM no. 1 above - p.76	▪ Surveys to be conducted accordingly, by WDFW – during inwater work if safe	During project in-water work	Partner in this project WDFW (C. Iten) to be

			conditions prevail		onsite biologist during construction
40	If contaminant spill, contact FWS B	FWS BO – to implement RPM no. 2 above – p.76	▪ Incorporate with Pollution and Erosion Control Plan – see #19 above ▪ Finalize by April 15, 2004 ▪ BPA to put in MWH contract – March 15, 2004	During construction	BPA (L. Hermeston) contract with MWH (B. Cutting)
41	Contact FWS if sediment discharge exceeds 100 yards downstream B	FWS BO – to implement RPM no. 2 above – p.76	▪ BPA to put in MWH contract – March 15, 2004	During construction	BPA (L. Hermeston) contract with MWH (B. Cutting)
42	Concerns by the Okanogan County Weed Control Board (Board)	Their letter received December 24, 2003	▪ Final EA – March 15, 2004 ▪ Incorporate with Site Rehabilitation Plan – see #28 above ▪ BPA to put in MWH contract – March 15, 2004	Before, during, and post construction	BPA (L. Hermeston and C. Keller) contract with MWH (B. Cutting) to ensure Board's concerns are included and implemented
43	Mitigation Measure –construct in the dry	Final EA – section 2.1.4	▪ Final EA – March 15, 2004 ▪ See #25 above	See #25 above	See #25 above
44	Mitigation Measure – use clean cobble to construct cofferdams	Final EA– section 2.1.4	▪ Final EA – March 15, 2004 ▪ BPA to put in MWH contract – March 15, 2004	During construction	BPA (L. Hermeston and C. Keller) contract with MWH (B. Cutting)
45	Mitigation Measure –employ fish salvage efforts	Final EA– section 2.1.4	▪ Same as salvage notice (#34); incorporate with fish capture and release (#26) above	See #34 and #26 above	See #34 and #26 above
46	Mitigation Measure –do not discharge turbid water directly into river	Final EA– section 2.1.4	▪ BPA to put in MWH contract – March 15, 2004 ▪ See #20 above	See #20 above	See #20 above
47	Mitigation Measure –prepare Pollution and Erosion Control Plan	Final EA– section 2.1.4	▪ See #19 above	See #19 above	See #19 above
48	Mitigation Measure –monitor for any leakage of equipment fluids	Final EA– section 2.1.4	▪ Incorporate with Pollution and Erosion Control Plan – see #19 above ▪ Finalize by April 15, 2004 ▪ BPA to put in MWH contract – March 15, 2004	During construction	BPA (L. Hermeston) contract with MWH (B. Cutting)
49	Mitigation Measure –restrict removal of trees	Final EA– section 2.1.4	▪ Incorporate with vegetation plan – see #13 above ▪ BPA to put in MWH contract – March 15, 2004	See # 13 above	BPA (L. Hermeston) contract with MWH (B. Cutting)
50	Mitigation Measure –revegetate and restore	Final EA– section 2.1.4	▪ Incorporate with vegetation plan – see #13	See #13 above	BPA (L. Hermeston)

	site		above ▪ Finalize by April 15, 2004 ▪ BPA to put in MWH contract – March 15, 2004		contract with MWH (B. Cutting)

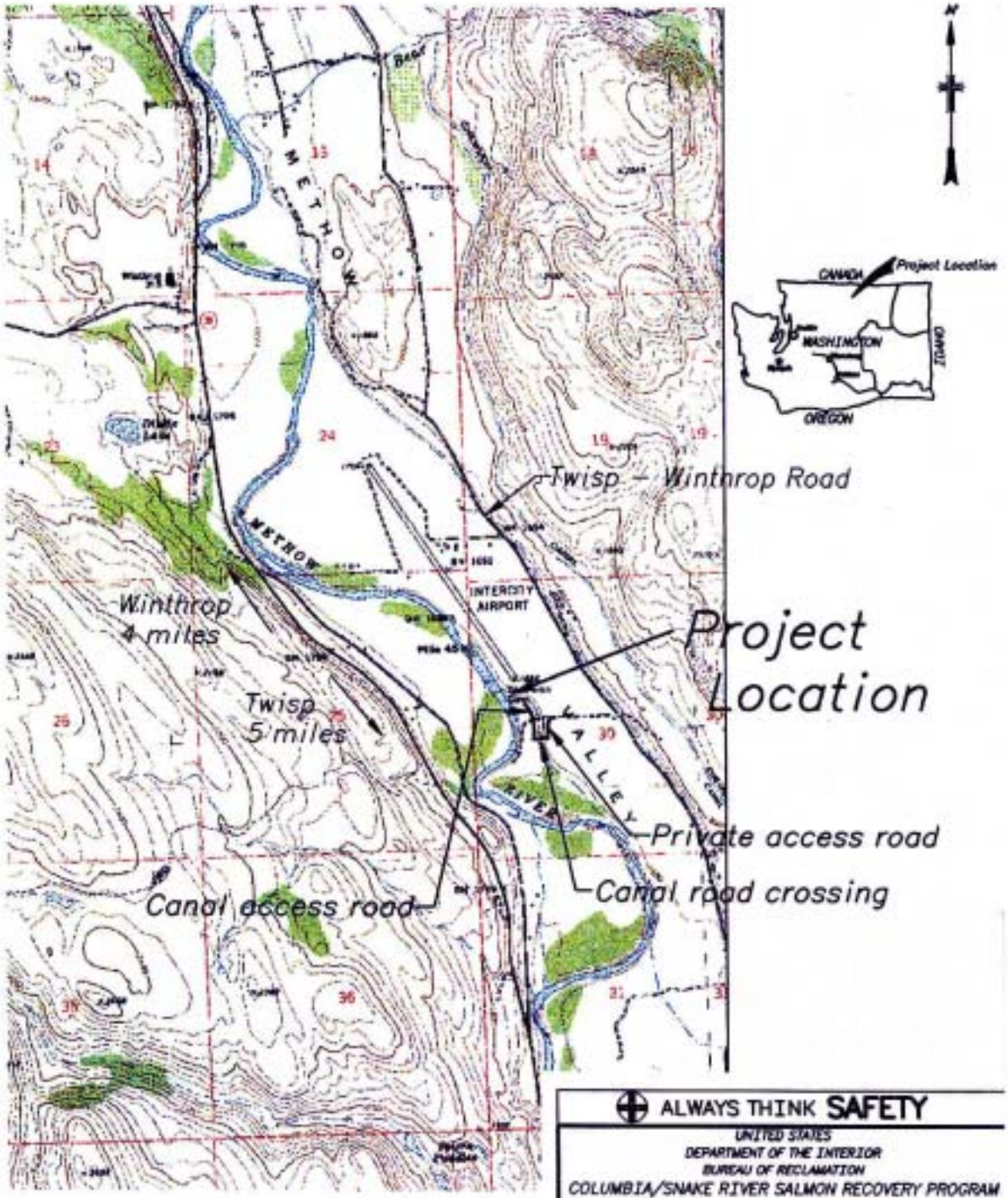
A target timeline: 1, start of project contracting and construction = March 15, 2004; 2. start of primary construction = May 15, 2004; 3. estimated construction period = 8-10 weeks; 4. completion of all on-site construction = August 1, 2004

B In their January 20, 2004 letter and accompanied Biological Opinion, the FWS focused attention on two reasonable and prudent measures (RPMs) for bull trout, and prescribed five terms and conditions on how to implement those two RPMs. A follow-up telephone conversation was made in order to request clarification and better definition on how to alternatively attain the RPMs, under real field circumstances. The following practicable standards for meeting the RPMs were agreed among the FWS and BPA, and WDFW (the representative onsite biologist during construction):

1. Snorkeling to be conducted only if flows are below 200 cfs, and if visibility is at least 10 feet.
2. To minimize harm to bull trout during cofferdam installation: a. background turbidity levels shall be determined at 100 foot intervals upstream and downstream of the project location; b. if safe to snorkel, the area within 100 yards downstream of the project site will be checked for fish. If fish are found, snorkeling will be repeated at 3 hour intervals until fish have left the area; c. immediately prior to cofferdam construction, fish will be moved out of the affected area by walking through the affected project area and repeated accordingly. When the cofferdam construction is completed, the affected areas will be salvaged for any fish inadvertently entrained in the dewatered work area; and d. if a sediment/turbidity plume exceeds 5 NTUs above background sediment, exceeds 10% above background, for a distance of more than 300 feet below the project site, work shall cease until background levels are once again met.

APPENDIX C

MVID East Fish Screen Designs



0 1 1.5
SCALE OF MILES

ALWAYS THINK **SAFETY**

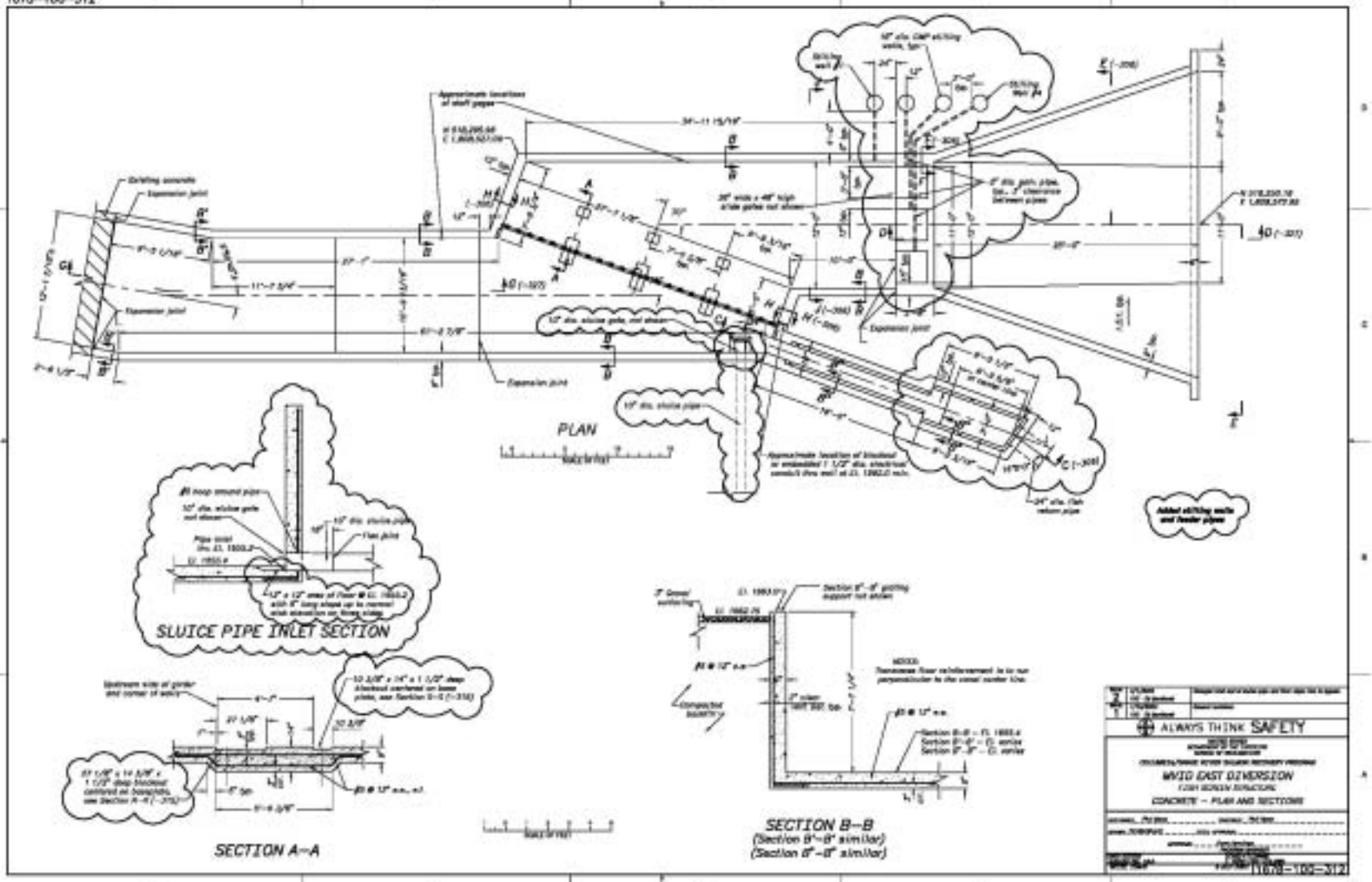
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION

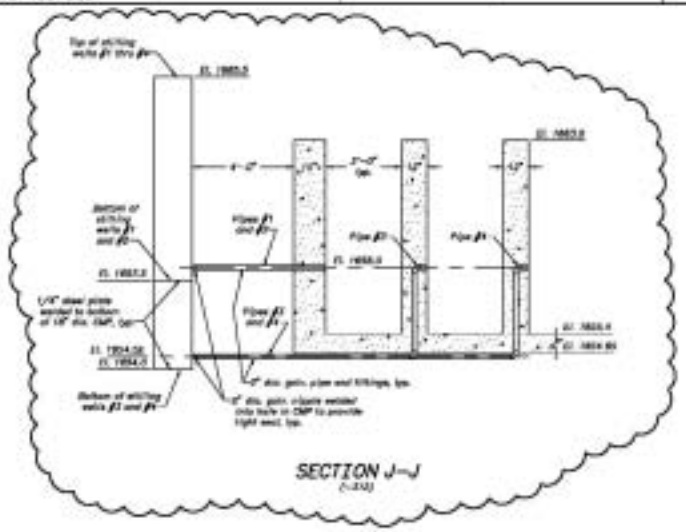
LOCATION MAP

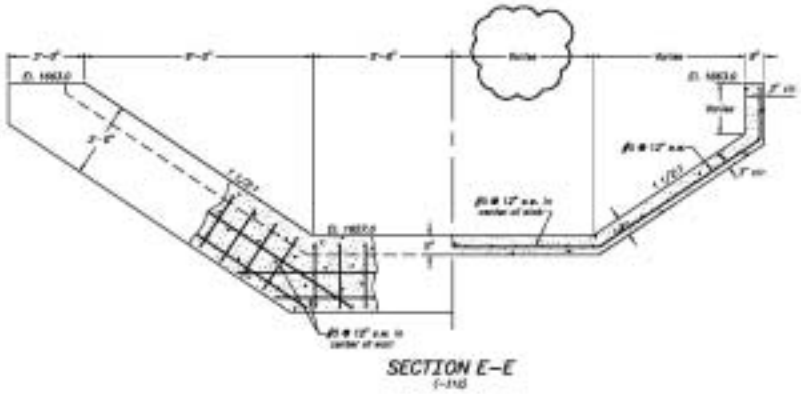
DESIGNED	TECH. APPROVAL
DRAWN SGrome	SUBMITTED
CHECKED	APPROVED REGIONAL ENGINEER
CADD SYSTEM AutoCAD Rel. 15.06	CADD FILENAME 1678-100-305.DWG
BOISE, IDAHO MAY 1, 2003	1678-100-305

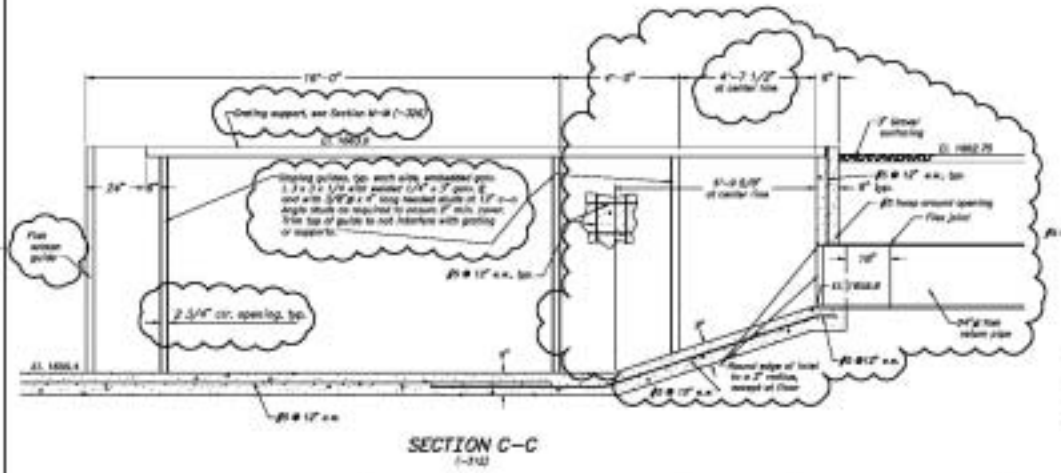
1678-100-312

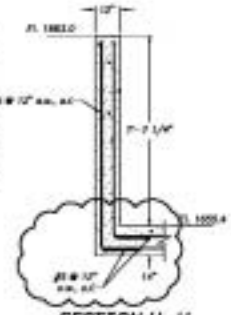

PLAN
SLUICE PIPE INLET SECTION
SECTION A-A
SECTION B-B
(Section B'-B' similar)
(Section B"-B" similar)
ALWAYS THINK SAFETY
WVID EAST DIVERSION
CONCRETE - PLAN AND SECTIONS
1678-100-312

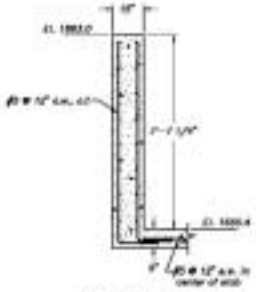
1678-100-308











ALWAYS THINK SAFETY

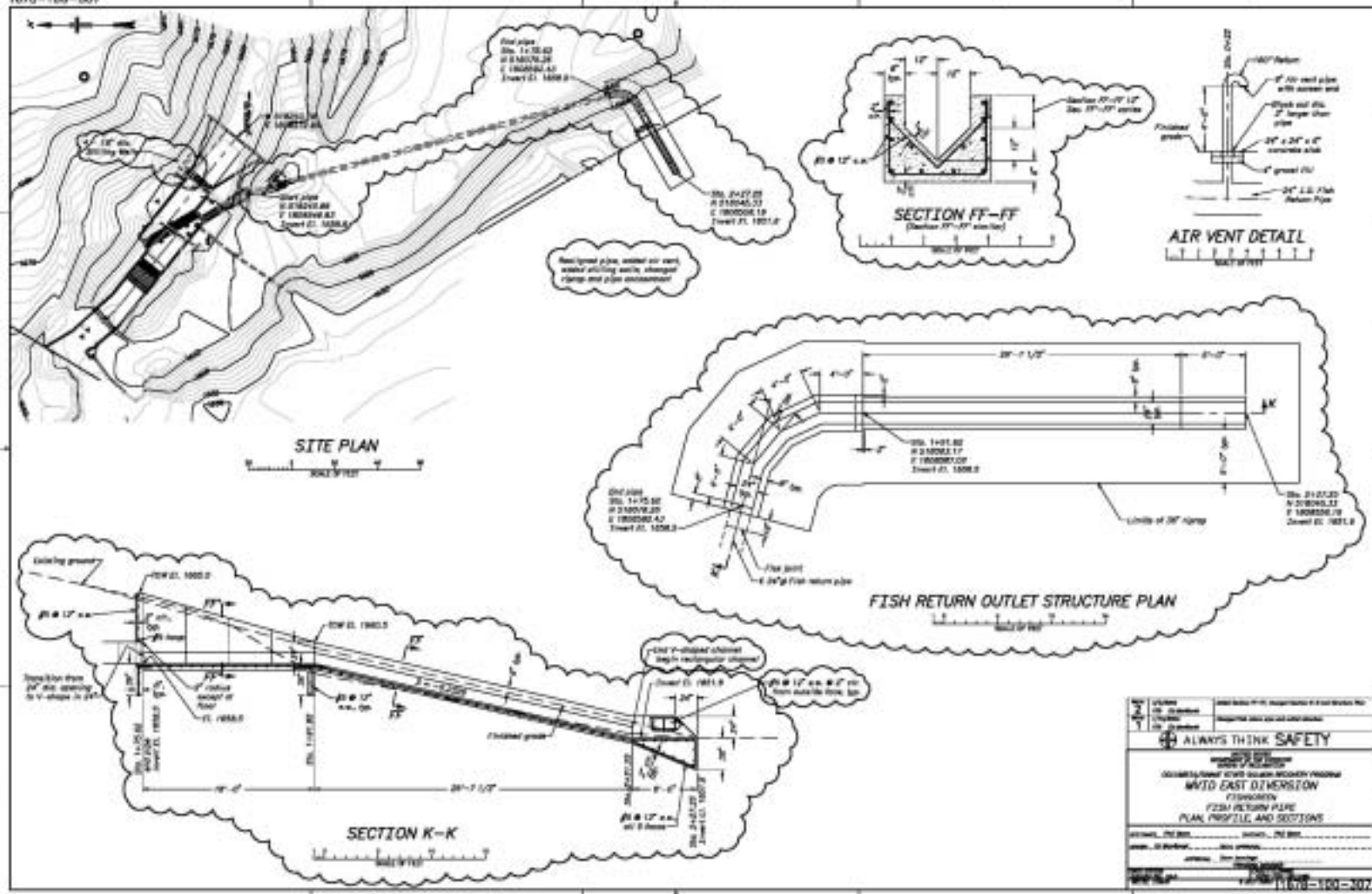
WVID EAST DIVERSION

FISH SCREEN STRUCTURE

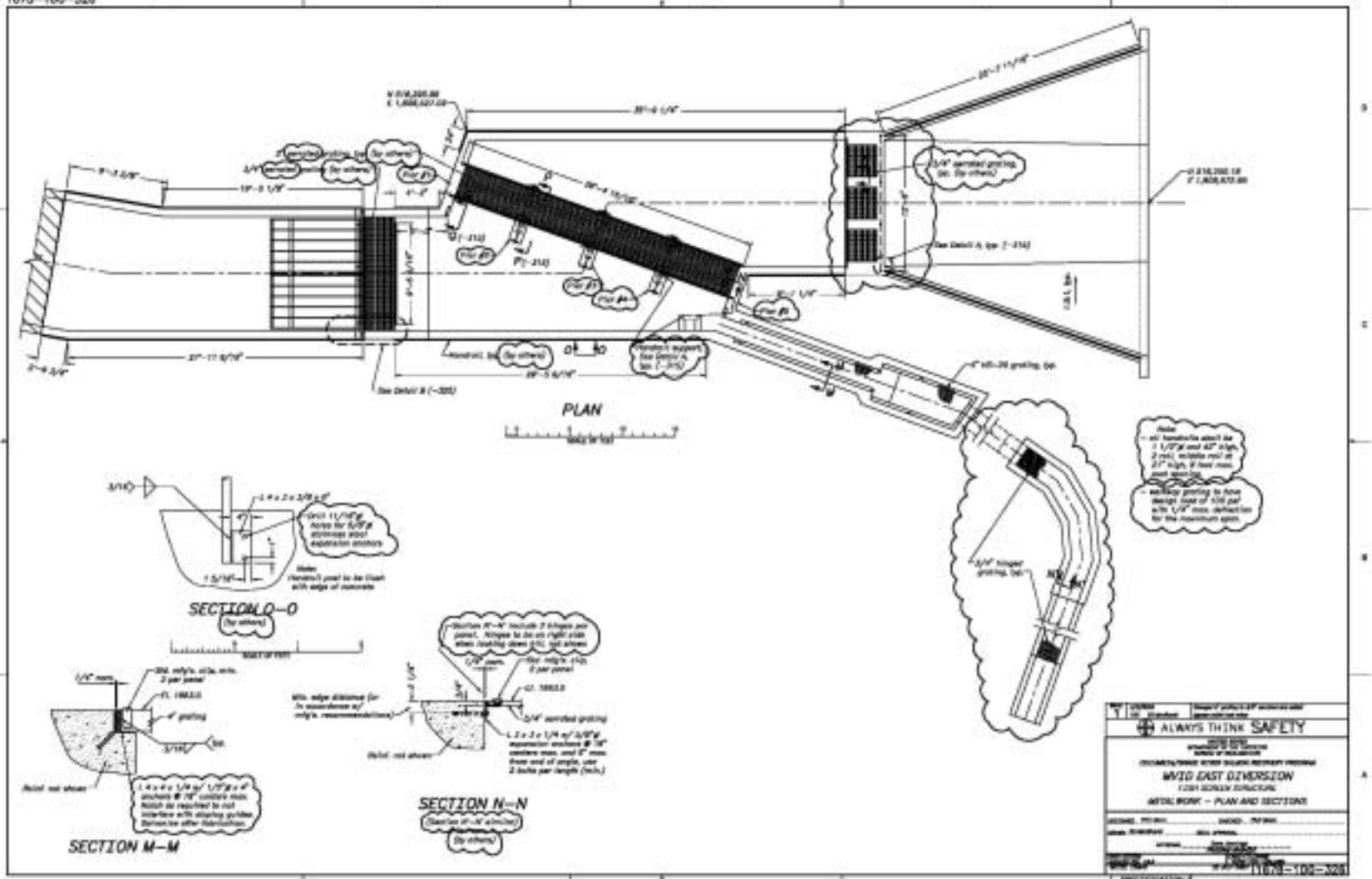
CONCRETE SECTIONS

1678-100-308

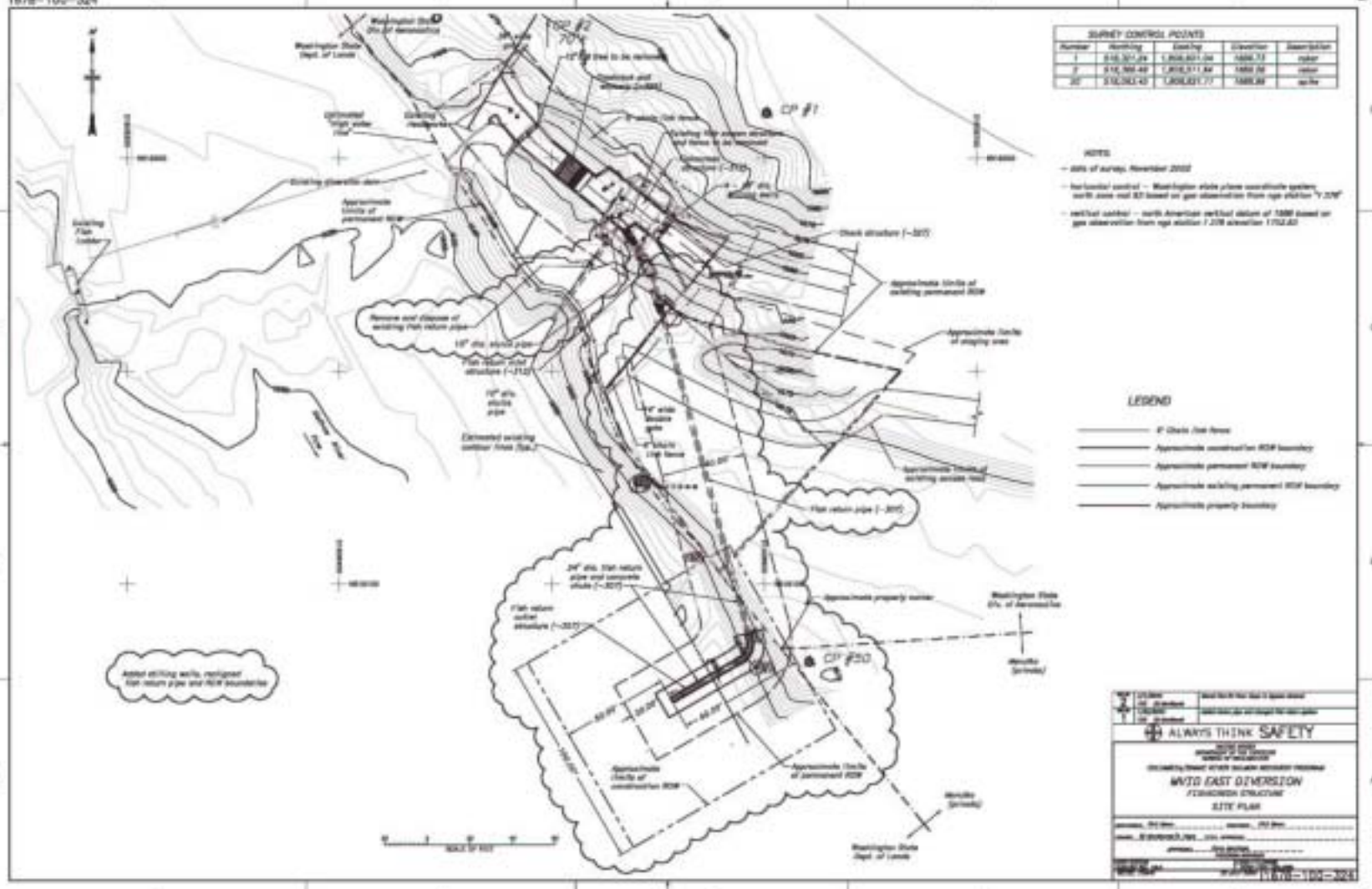
1678-100-307


SITE PLAN
SECTION FF-FF
AIR VENT DETAIL
FISH RETURN OUTLET STRUCTURE PLAN
SECTION K-K
ALWAYS THINK SAFETY
MATO EAST DIVERSION
FISH RETURN PIPE
PLAN, PROFILE, AND SECTIONS
1678-100-307

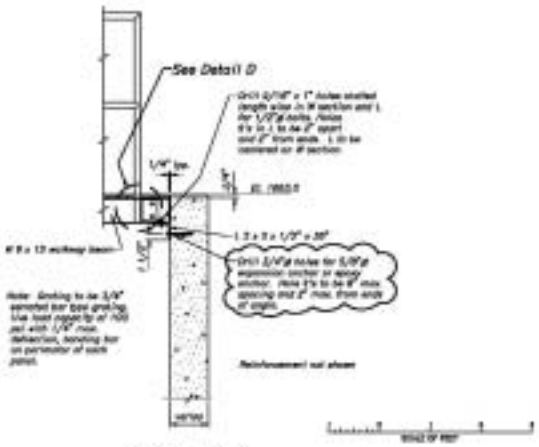
1678-100-328


PLAN
SECTION O-O
SECTION M-M
SECTION N-N
ALWAYS THINK SAFETY
MVID EAST DIVERSION
METAL WORK - PLAN AND SECTIONS

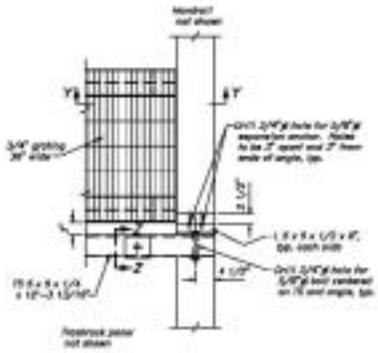
1678-100-324


SURVEY CONTROL POINTS
LEGEND
ALWAYS THINK SAFETY
WVTD EAST DIVERSION
FISHWAYS STRUCTURE
SITE PLAN
1678-100-324

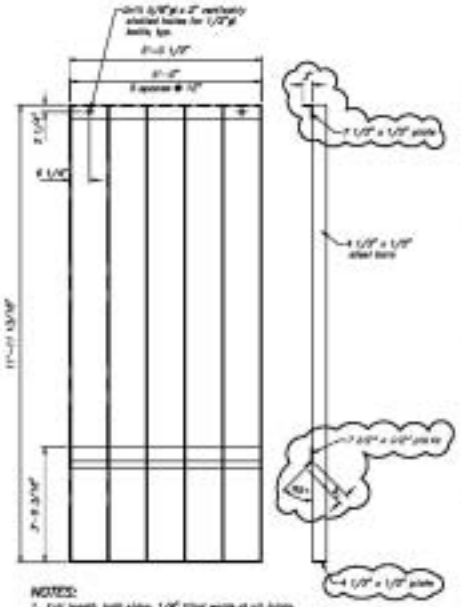
1578-100-325



SECTION Y-Y
(by others)

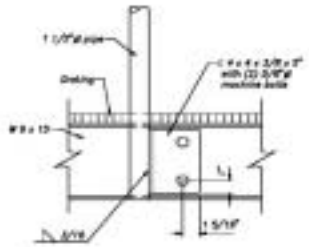


DETAIL B
(~325)
(by others)

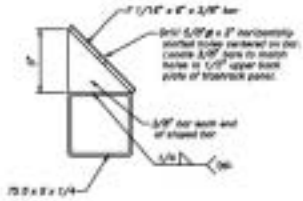


TRASHRACK PANEL – ELEVATION
(2 Required)
(by others)

NOTES:
1. Full length, both sides, 1/4" fillet weld at all joints.
2. Diagonal measurements for each panel to be within 1/4".
3. Install panels to provide equal spacing at walls and between panels.



DETAIL D
(by others)



SECTION Z-Z
(by others)

ALWAYS THINK SAFETY

WVID EAST DIVERSION
FISHBONEN STRUCTURE
METAL WORK
TRASHRACK SECTIONS, ELEVATION, AND DETAILS

1578-100-325

1678-100-330

13

Panel No. : MVID PPM	Section :	BUS: 240/120 Volts	☒ Main Ckt. Breaker 125 AMP
Location : MVID – East	Serving : Fishscreen	1 PH 3 WIRE 200 AMP	☐ Main Lugs Only
Fully Rated SCI 10,000 RMS SYS AMPS	☐ Feed Through Lugs ☐ Sub Feed Lugs	☐ Isolated Ground Bus	☐ Flush Mount ☐ Top Feed ☒ Surface Mount ☒ Bottom Feed

LOAD TYPE	CIRCUIT DESCRIPTION	CONN VA	C.B. AMP	C.B. POLE	C.B. CKT	PH	C.B. CKT	C.B. POLE	C.B. AMP	CONN VA	CIRCUIT DESCRIPTION	LOAD TYPE
M	SCREEN MOTOR	741	20	2	1	N/A	2	2	20	741	SCREEN MOTOR	M
M	—— " ——	741	20	2	3	N/A	4	2	20	741	—— " ——	M
M	SCREEN MOTOR	741	20	2	5	N/A	6	2	20	741	SCREEN MOTOR	M
M	—— " ——	741	20	2	7	N/A	8	2	20	741	—— " ——	M
R	GFCI RECEPTACLE	1800	20	1	9	N/A	10	1	20	1920	SPARE	
	SPARE	1920	20	1	11	N/A	12	1	20	1920	SPARE	
	SPARE	1920	20	1	13	N/A	14	1	20	1920	SPARE	
	Space				15	N/A	16				Space	
	Space				17	N/A	18				Space	
	Space				19	N/A	20				Space	
	Space				21	N/A	22				Space	
	Space				23	N/A	24				Space	
	Space				25	N/A	26				Space	
	Space				27	N/A	28				Space	
	Space				29	N/A	30				Space	
	Space				31	N/A	32				Space	
	Space				33	N/A	34				Space	
	Space				35	N/A	36				Space	
	Space				37	N/A	38				Space	
	Space				39	N/A	40				Space	
	Space				41	N/A	42				Space	

Total Receptacle (R) Load @ 180VA/each=X100% for first 10KVA & 50% for remainder: kVA

Total Non-coincidental (E) Load: kVA

Total Lighting (L) Load @ 125% : kVA

Total Motor (M) Load : kVA

Total Heating (H) Load : kVA

Total Non-continuous (N) Load : kVA

Largest Motor (25% added to demand load): HP kVA

TOTAL CONNECTED LOAD : kVA	CONNECTED AMP Total Amp / PH :	A	B	C	TOTAL DEMAND LOAD AMP kVA

ALWAYS THINK SAFETY

MVID – EAST FISHSCREEN

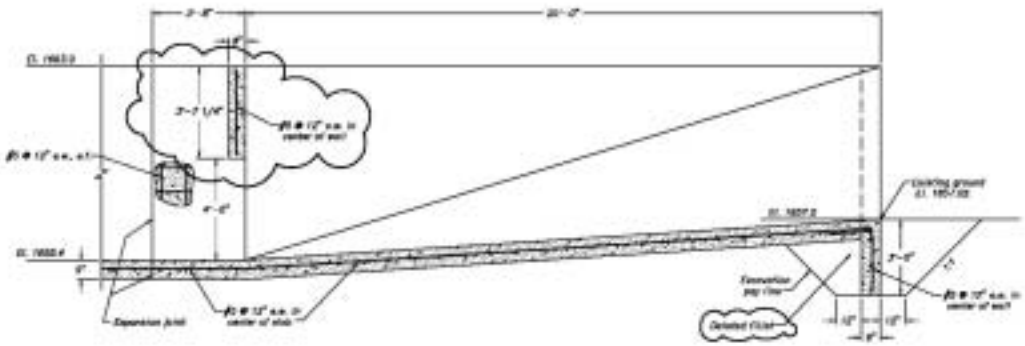
ELECTRICAL INSTALLATION

PANEL SCHEDULE

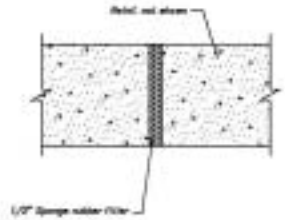
1678-100-330

13

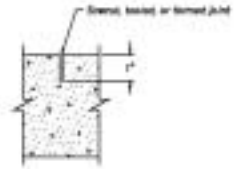
1678-100-327



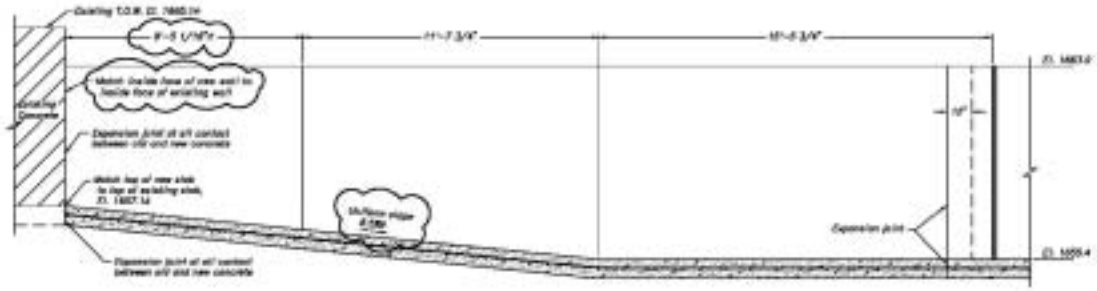
SECTION D-D



TYPICAL EXPANSION JOINT



TYPICAL CONTRACTION JOINT



SECTION G-G

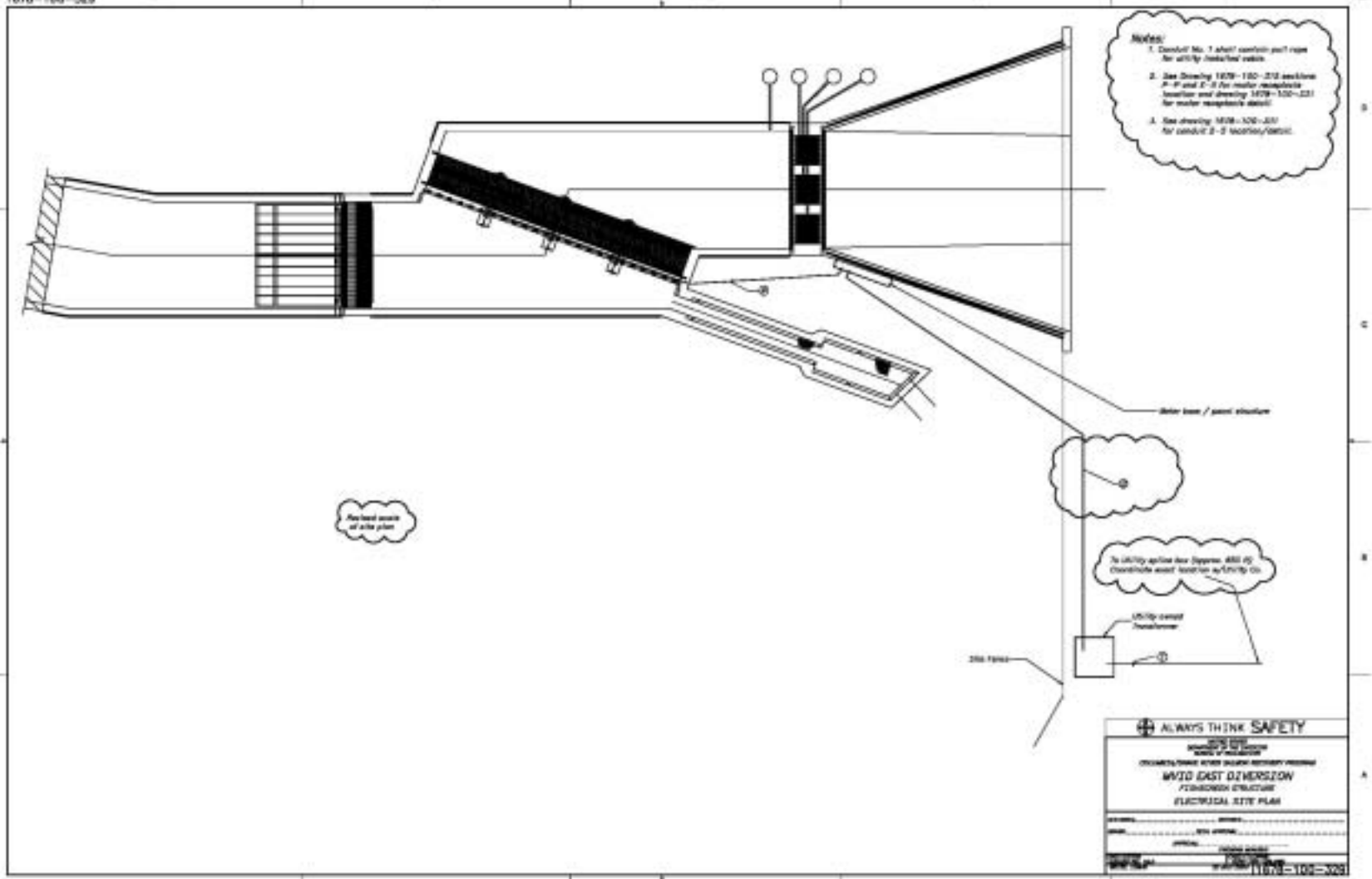
NOTE:
Transverse construction or contraction joint
@12' max. spacing in walls and floors
between expansion joints, in section C-C only

ALWAYS THINK SAFETY

WYIO EAST DIVERSION
FLOODWALL STRUCTURE
CONCRETE SECTIONS AND DETAILS

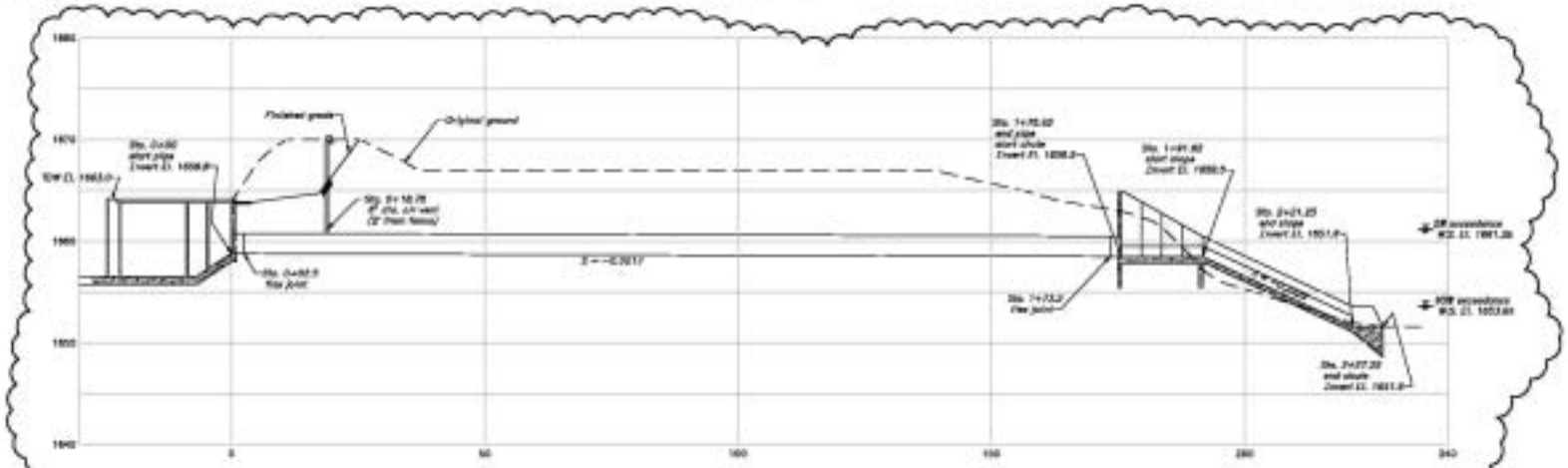
1678-100-327

1678-100-329

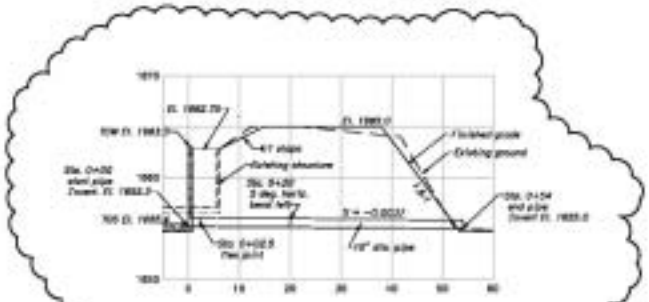

Notes:
1. Conduit No. 1 shall contain cat7 rope for utility inside/out cable.
2. See Drawing 1678-100-212 sections P-P and E-E for meter receptacle location and drawing 1678-100-231 for meter receptacle detail.
3. See drawing 1678-100-231 for conduit E-E location/detail.
Meter base / panel structure
Flat head screw at site plan
To utility spline box (approx. 450 ft) (coordinate exact location w/Utility Co.
Utility owned transformer
Site fence
ALWAYS THINK SAFETY
WVID EAST DIVERSION
FISHSCREEN STRUCTURE
ELECTRICAL SITE PLAN
1678-100-329

1676-100-344

7A



FISH RETURN PIPE – PROFILE



10" DIA. SLUICE PIPE – PROFILE

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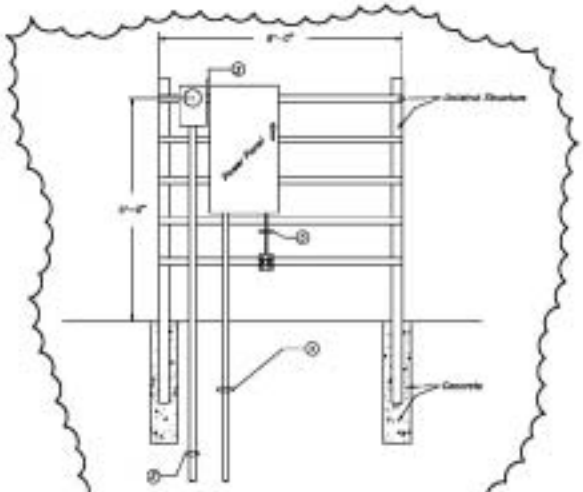
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION

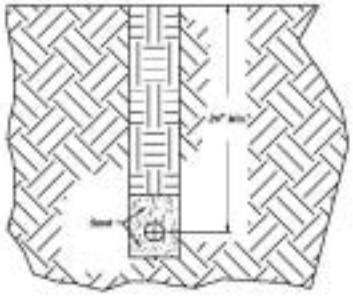
FISH RETURN PIPE AND SLUICE PIPE PROFILES

1676-100-344

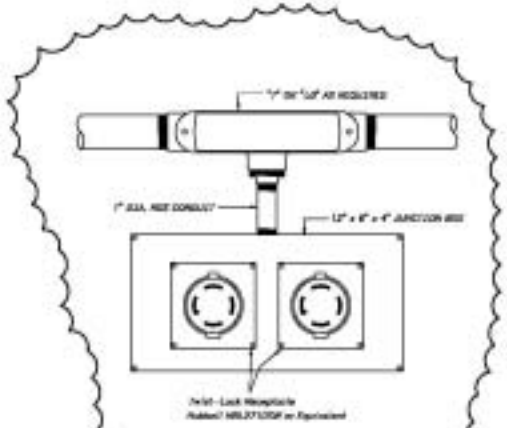
7A



METER BASE / PANEL DETAIL



CONDUIT/ TRENCH DETAIL



MOTOR RECEPTACLE DETAIL

CONDUIT & CABLE SCHEDULE

Conduit No.	Cable	Conduit Size	From	To	Remarks
1	(BY OTHERS)	2"	UTILITY SPLICE	UTILITY XFMR	UTILITY INSTALLED CABLE
2	3-1C No. 3/0	2"	UTILITY XFMR	METER BASE	BURRIED/SURFACE MOUNT
3	4-1C No. 3/0 No. 4 GRND	2"	METER BASE	PANEL	NIPPLE
4	12-1C No. 10	1-1/2"	PANEL	MOTOR RECEPTACLES	EMBEDDED/BURRIED/SURFACE
5	3-1C No. 12	3/4"	PANEL	RECEPTACLES	SURFACE

Notes:

1. Conduit No. 1 Shown on Drawing 1878-100-329.
2. Field Verify Panel Mounting Location.
3. Provide Motor Plug (Hubbell HBL20115W or Equivalent) to Match Receptacle.

ALASKA DIVISION SAFETY

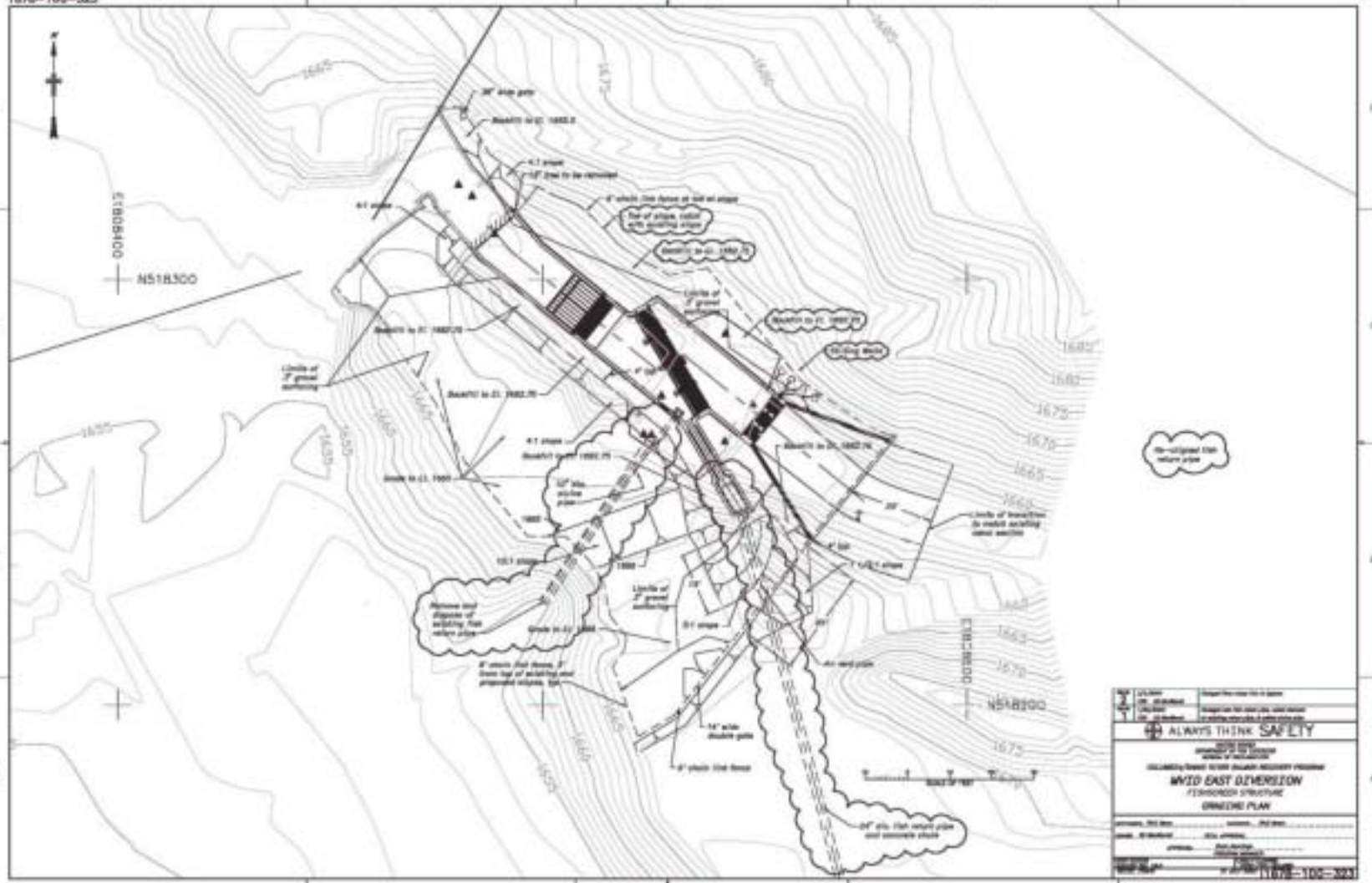
MVID – EAST FISHSCREEN

ELECTRICAL INSTALLATION

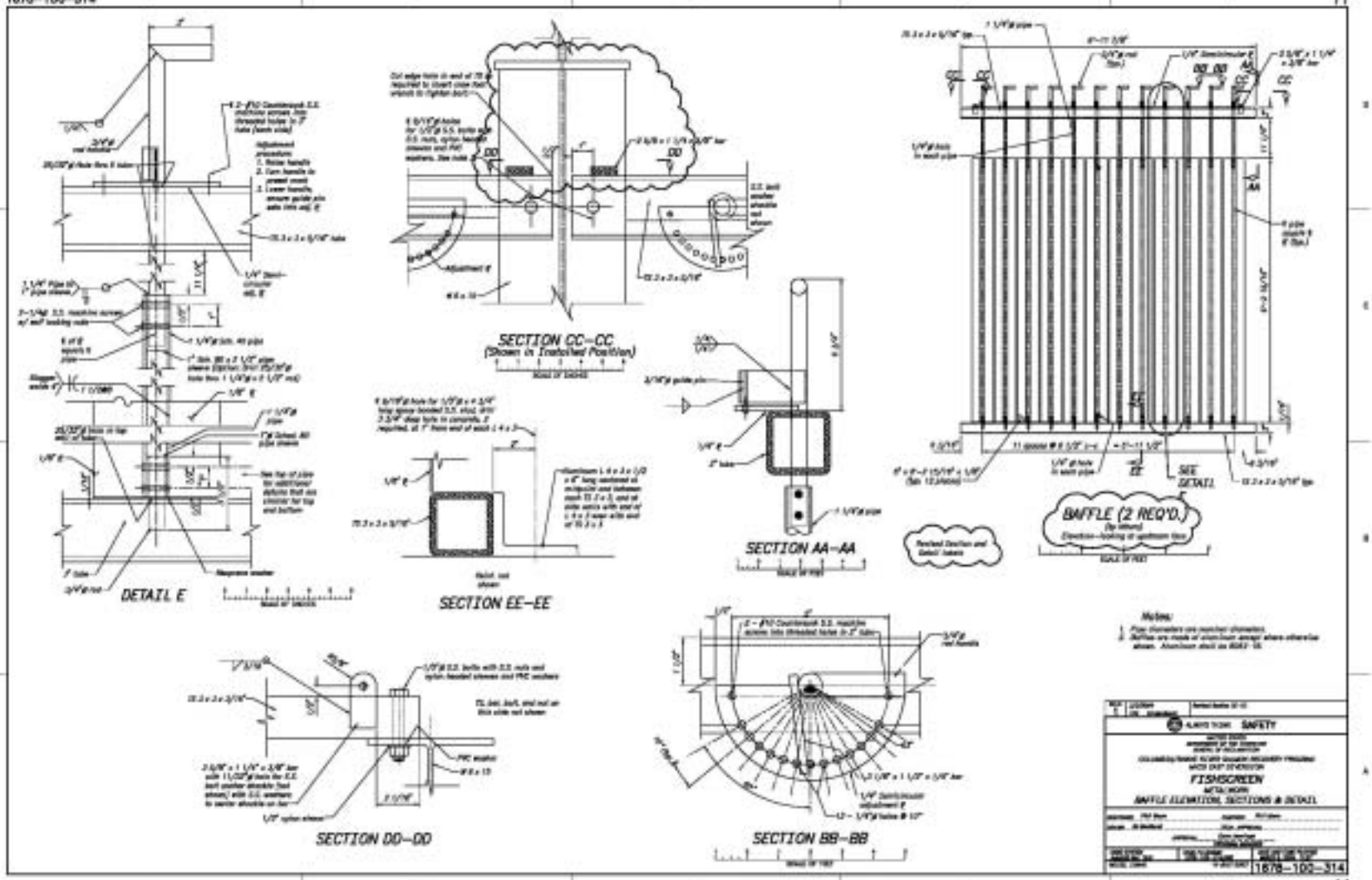
CONDUIT SCHEDULE & DETAILS

1878-100-331

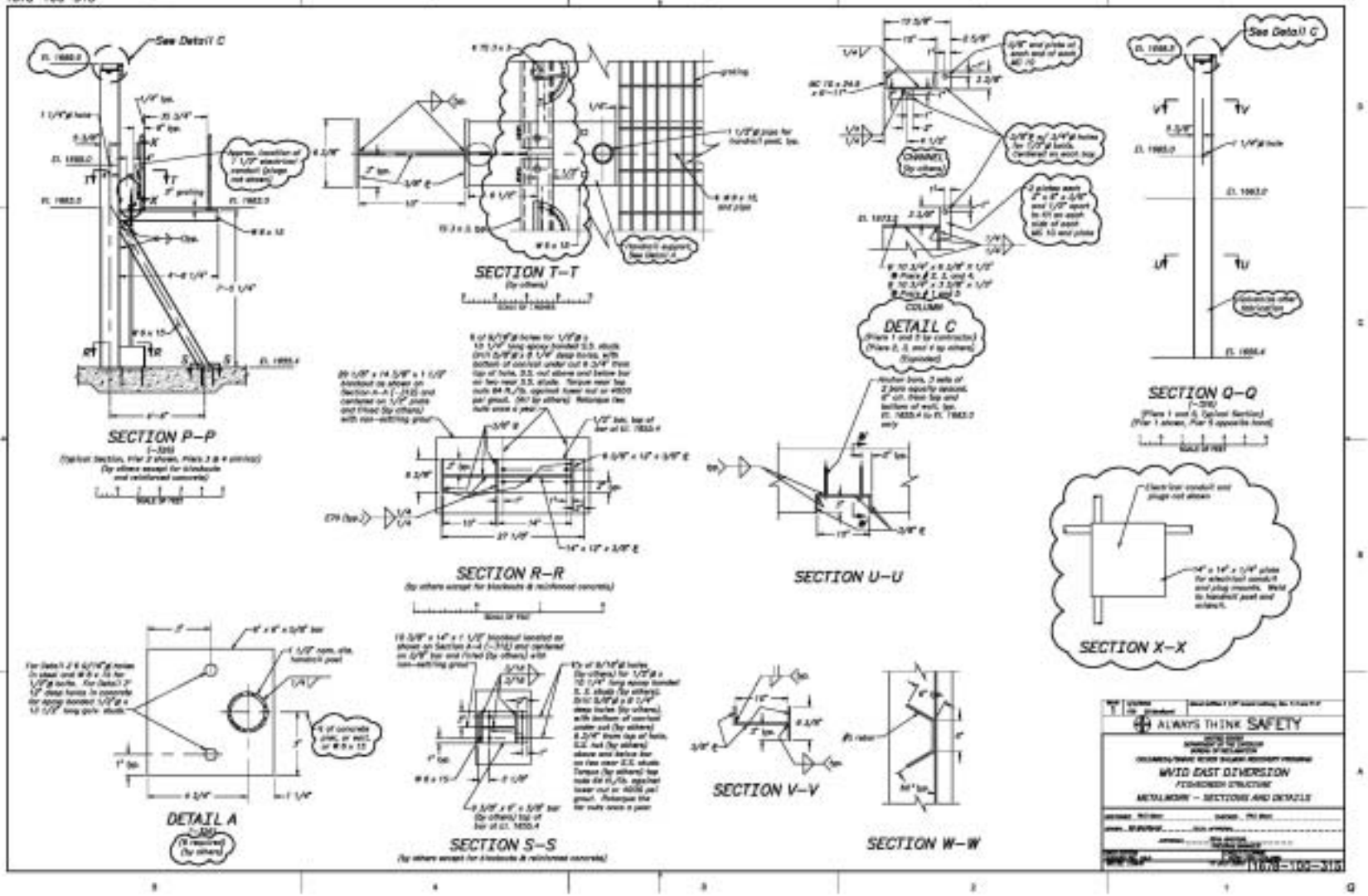
1878-100-323


N518300
N518300
1645
1650
1655
1660
1665
1670
1675
1680
1685
ALWAYS THINK SAFETY
WVID EAST DIVERSION
FISHWORKER STRUCTURE
GRADING PLAN
1878-100-323

1678-100-314


DETAIL E
SECTION CC-CC
(Shown in Installed Position)
SECTION AA-AA
SECTION EE-EE
SECTION DD-DD
SECTION BB-BB
BAFFLE (2 REQ'D.)
SEE DETAIL
Revised Section and Detail Labels
Notes:
SAFETY
FISHSCREEN
METALWORK
BAFFLE ELEVATION, SECTIONS & DETAIL
1678-100-314

1678-100-315

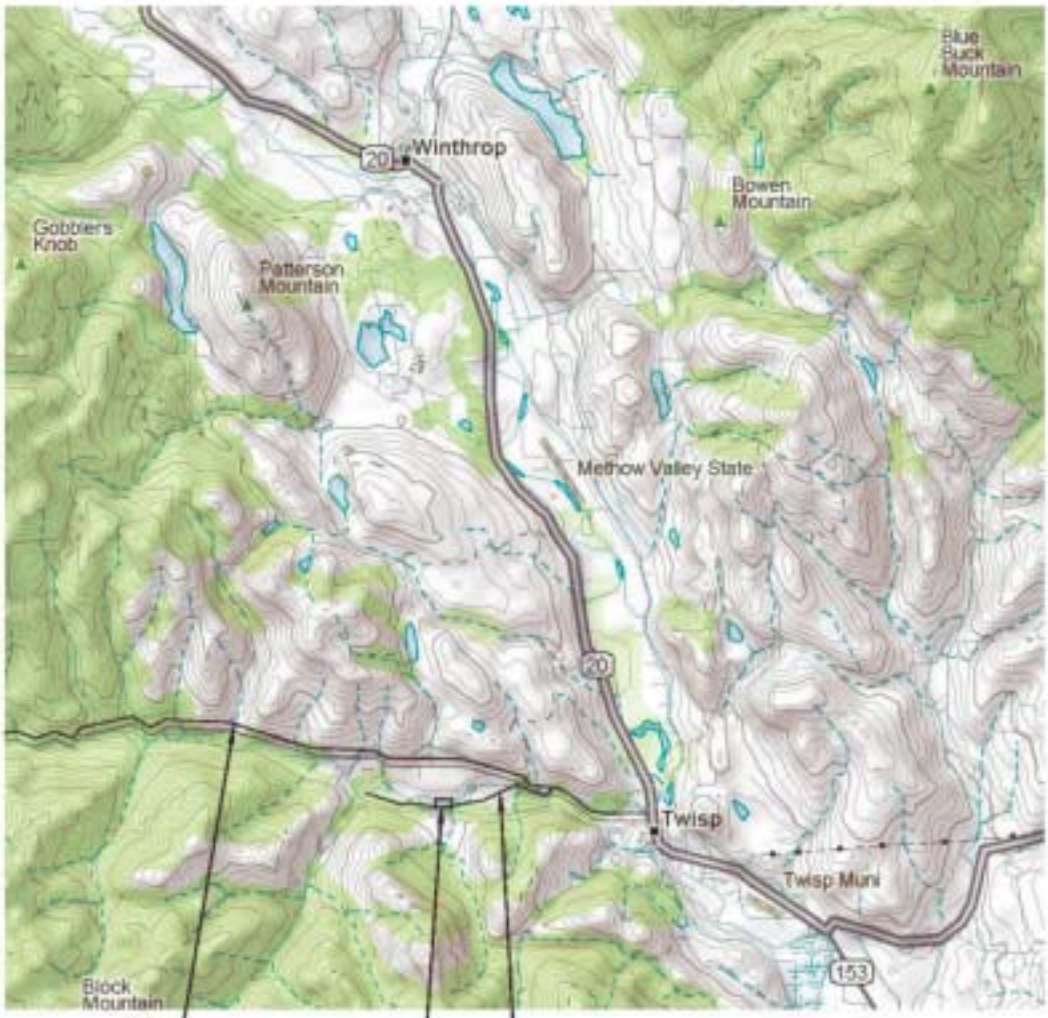

SECTION P-P
SECTION T-T
DETAIL C
SECTION Q-Q
SECTION R-R
SECTION U-U
SECTION X-X
DETAIL A
SECTION S-S
SECTION V-V
SECTION W-W
ALWAYS THINK SAFETY
WVID EAST DIVERSION
METALWORK - SECTIONS AND DETAILS
1678-100-315

APPENDIX D

MVID West Fish Screen Designs

1678-155-2

2



N

Twisp River Road

Poorman Creek Road

MVID West Canal Screen Location

APPROX. SCALE OF MILES

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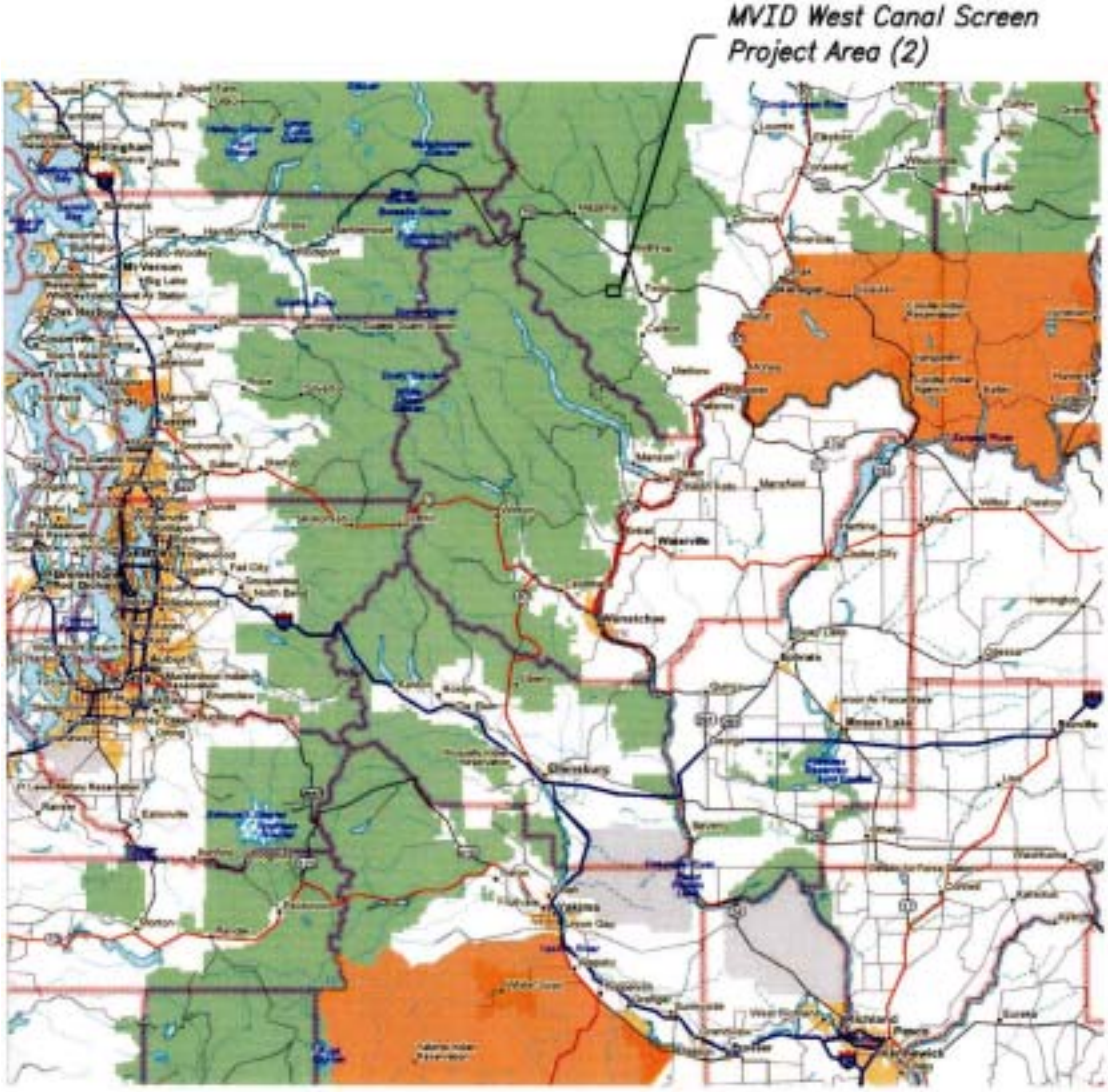
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM — WASHINGTON
FISH PASSAGE AND PROTECTION FACILITIES

METHOW VALLEY IRRIGATION DISTRICT
WEST FISH SCREEN STRUCTURE
LOCATION MAP

DESIGNED: Franklin Christensen CHECKED: JUNE 1997
DRAWN: Franklin Christensen SECT. APPROVAL: John Medford
PROGRAM MANAGER

LEAD OFFICE: PACIFIC NORTHWEST REGION
LEAD FIELD OFFICE: YAKIMA FIELD OFFICE
YAKIMA, WASHINGTON
JULY 24, 2007
UNIT AND TEAM PLOTTER SCALE: 1:1
1678-155-2



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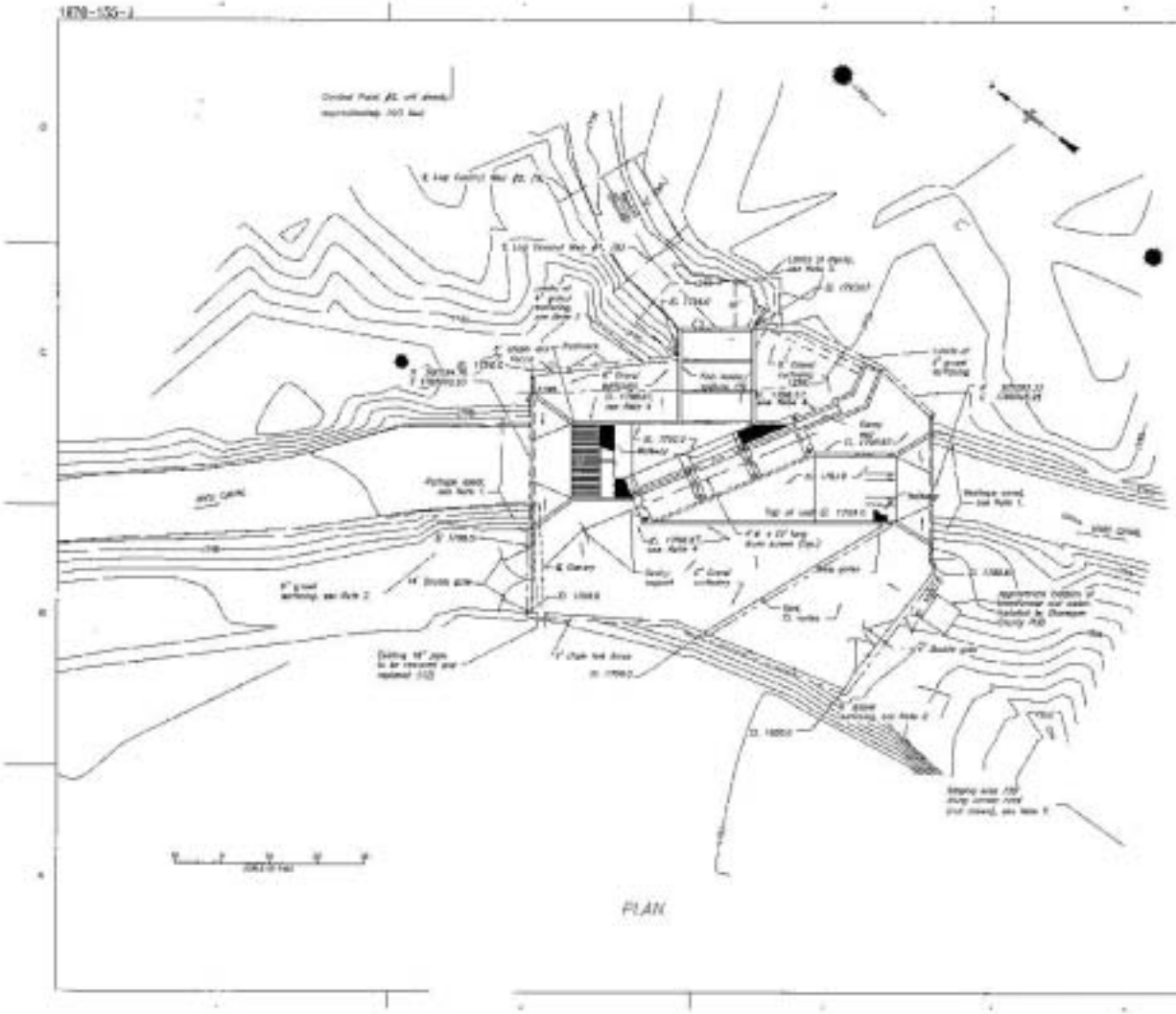
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM – WASHINGTON
FISH PASSAGE AND PROTECTION FACILITIES

METHOW VALLEY IRRIGATION DISTRICT
WEST FISH SCREEN STRUCTURE
VICINITY MAP

DESIGNED Dwandolyn Christensen CHECKED Kyle Hill
DRAWN Dwandolyn Christensen TECH. APPROVAL John Weichel
PROGRAM MANAGER

CADD SYSTEM AUTODESK MICROSTATION	CADD FILENAME 1678-155-1.DWG	DATE AND TIME PLOTTED 07/29/2003
	JULY 24, 2003	1678-155-1



NOTES:

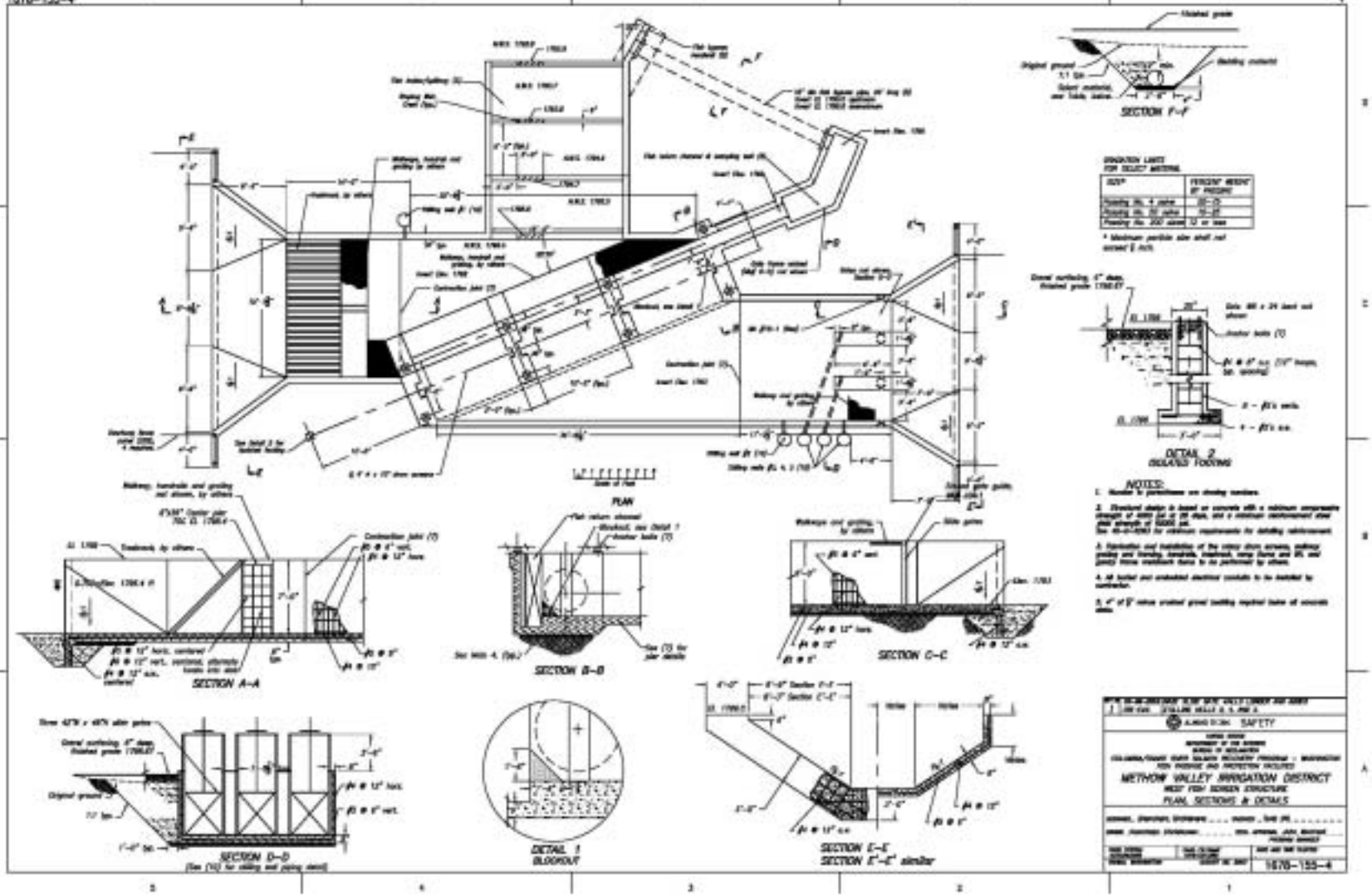
SURVEY CONTROL:

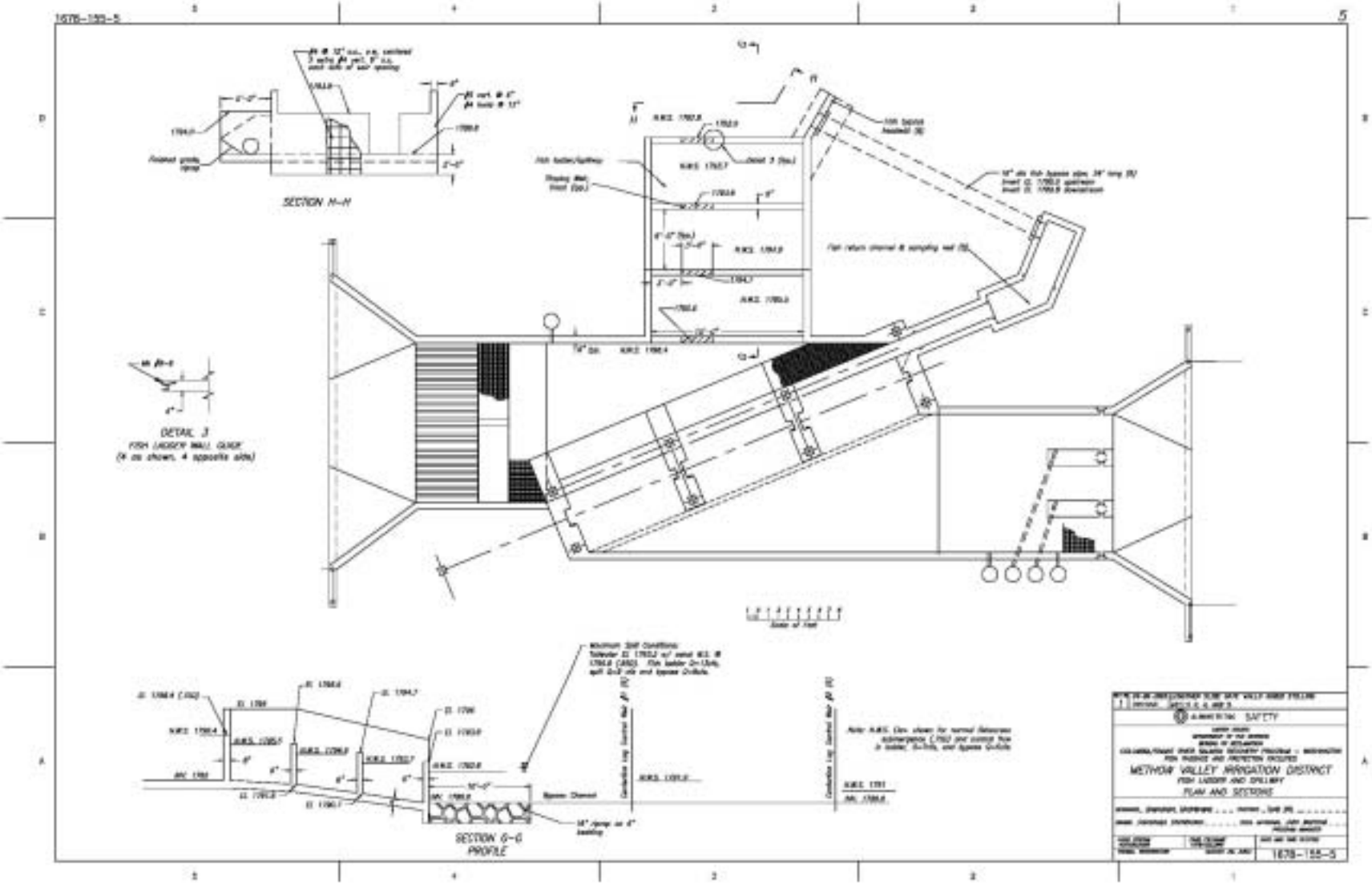
LEGEND:

METHOW VALLEY IRRIGATION DISTRICT

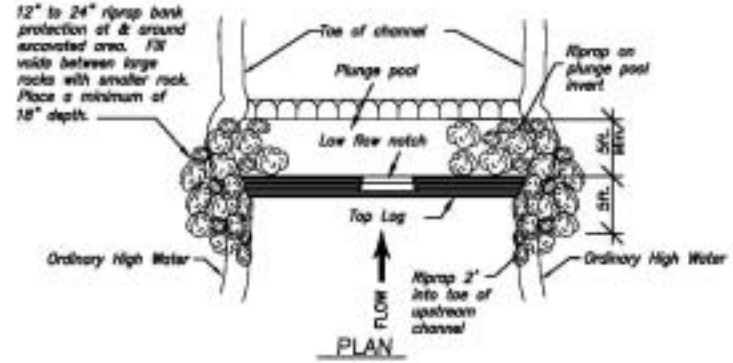
SITE PLAN

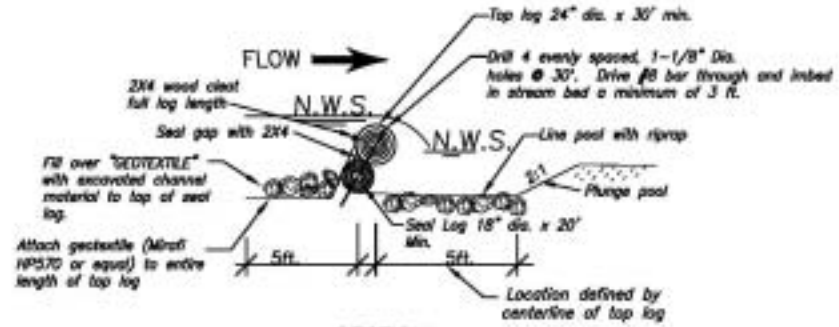
1876-155-4

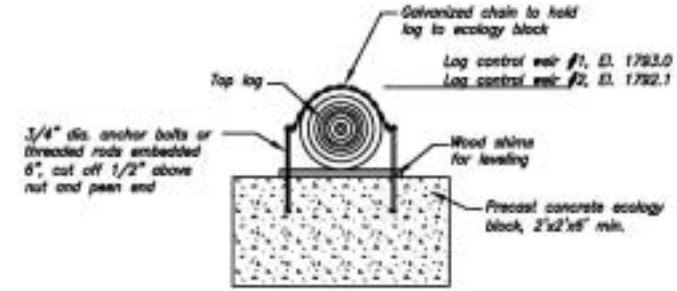

PLAN
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
SECTION E-E
SECTION E'-E' similar
SECTION F-F
DETAIL 1
BLOCKOUT
DETAIL 2
GALVANIZED FOOTING
NOTES:
SAFETY
METHOW VALLEY IRRIGATION DISTRICT
WEST FORK SCREEN STRUCTURE
FINAL SECTIONS & DETAILS
1876-155-4

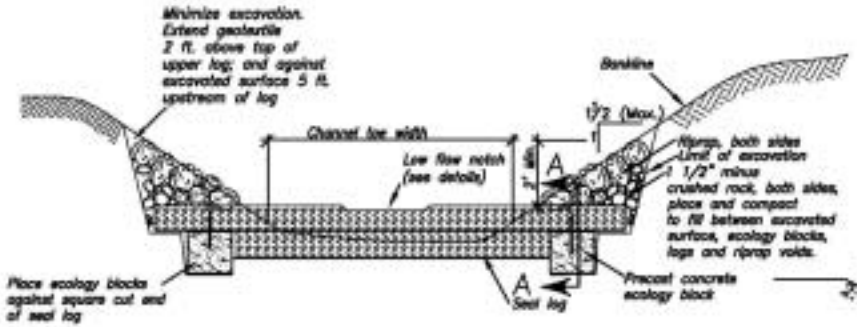

1676-155-5
SECTION H-H
DETAIL 3
SECTION G-G
PROFILE
SAFETY
METHOW VALLEY IRRIGATION DISTRICT
FISH LADDER AND SPILLWAY
PLAN AND SECTIONS
1676-155-5

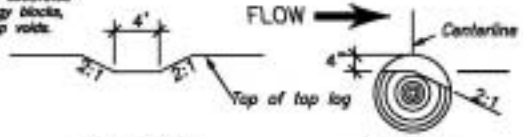
1678-155-6











ELEVATION SECTION
LOW FLOW NOTCH DETAILS

NOTES:

1. Not To Scale
2. See Drawings 1678-155-3 and 5 for Log Control Weir Locations
3. Drawing adapted from State of Washington Department of Fish and Wildlife Specifications

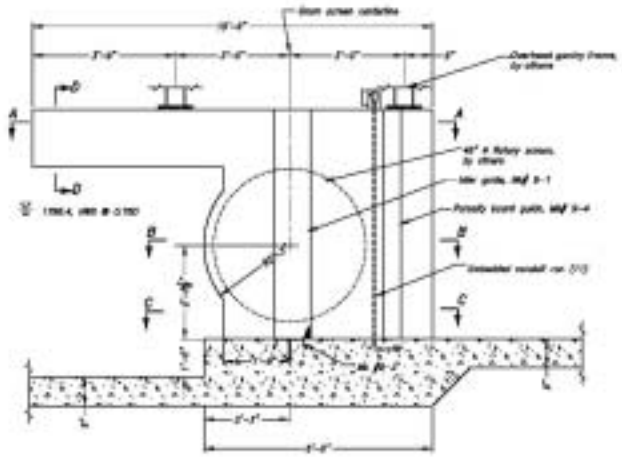
SAFETY

WETHOW VALLEY IRRIGATION DISTRICT

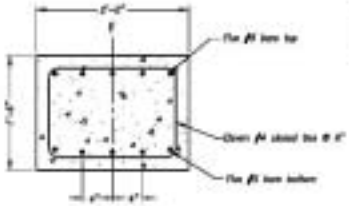
LOW CONTROL WEIRS #1 AND #2
FLOW SOLUTIONS, GOALS

1678-155-6

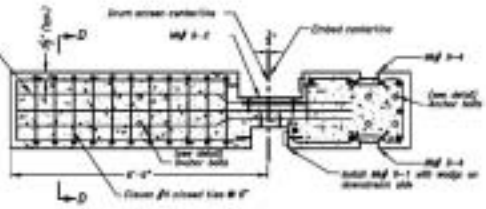
1676-155-7



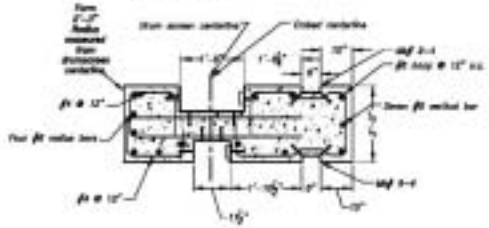
PIER ELEVATION



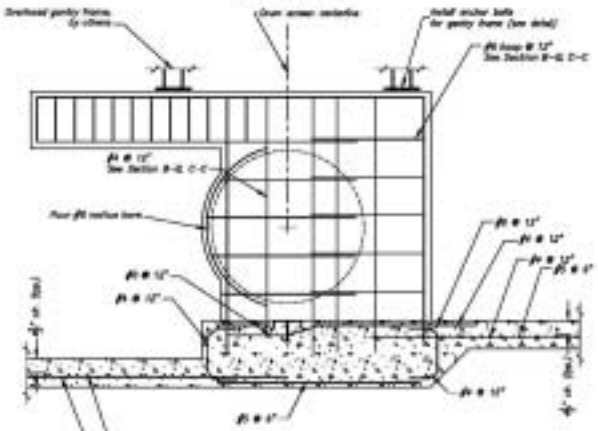
SECTION D-D



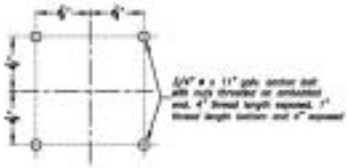
SECTION A-A



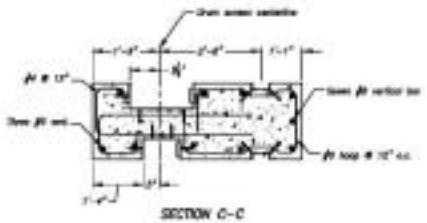
SECTION B-B



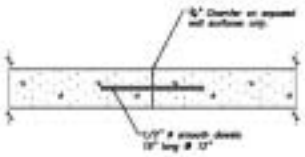
REINFORCEMENT DETAIL



ANCHOR BOLT DETAIL



SECTION C-C



TYPICAL FLOOR AND WALL CONTRACTION JOINT

NOTES:

Stoop and other guide centerlines are offset N'Downstream from screen centerline and overhead gantry frame.

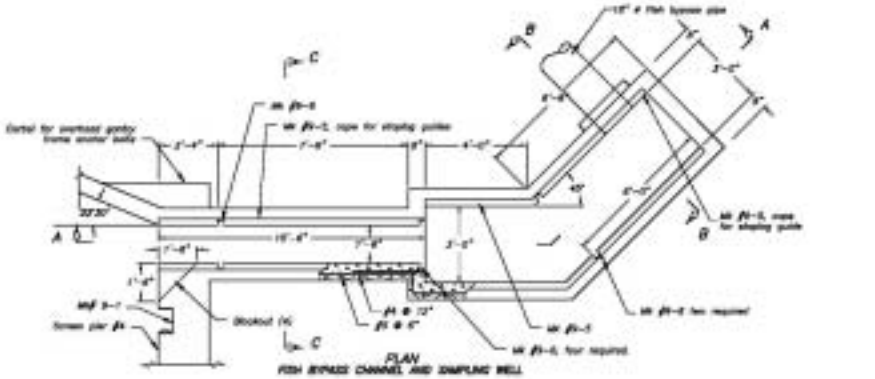
ALWAYS THINK SAFETY

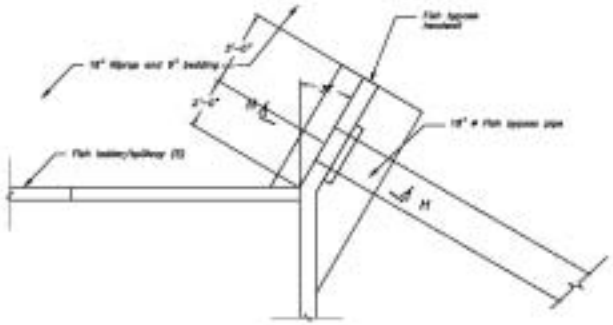
METROW VALLEY IRRIGATION DISTRICT

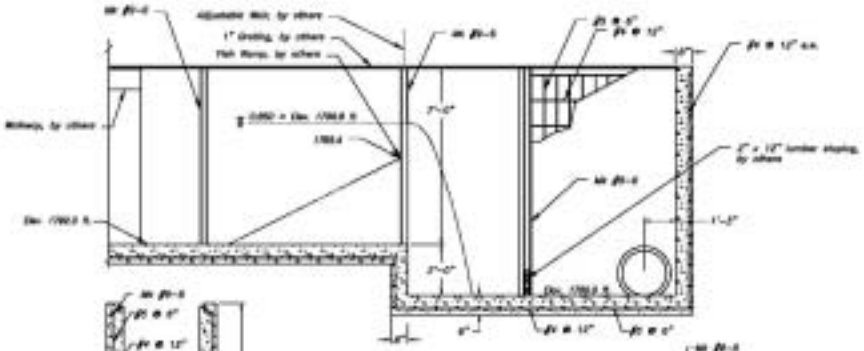
STANDARD PIER FOR 48" ø ROTARY SCREEN

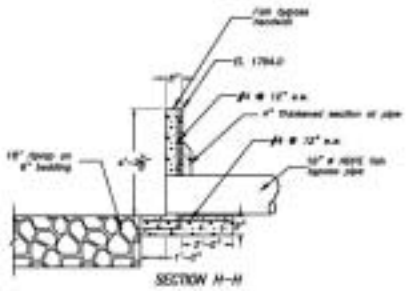
		1676-155-7

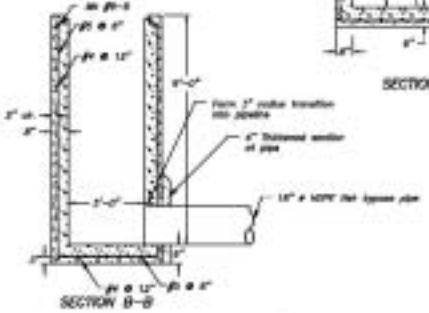
1678-155-8

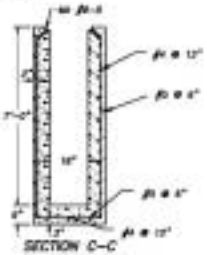


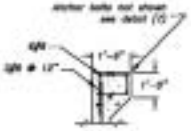












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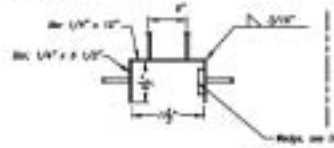
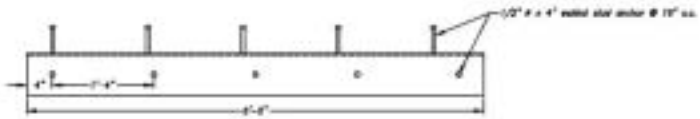
METHOW VALLEY IRRIGATION DISTRICT
FISH BYPASS CHANNEL, DAMPING WELL
& OUTLET STRUCTURE

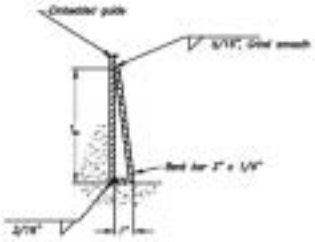
1678-155-8

1678-155-9

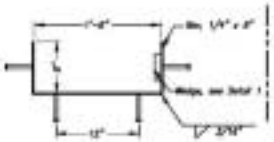


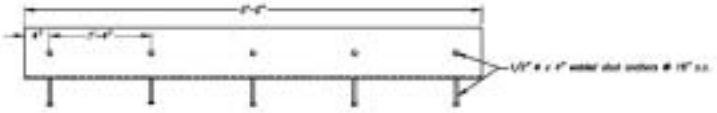


MKJ 9-1, SLIDE GUIDE, three required

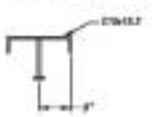


Detail 1

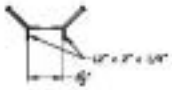


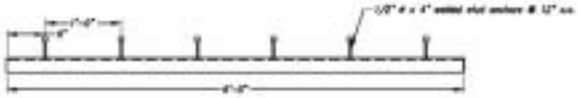


MKJ 9-2, DRIVER GUIDE, three required

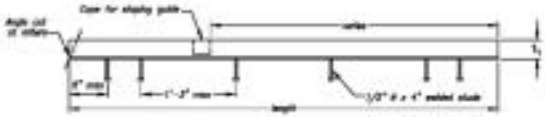


MKJ 9-3, SILL PLATE, three required

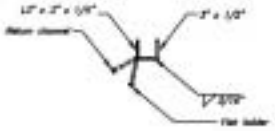


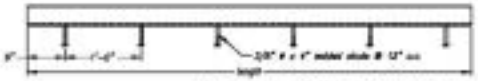


MKJ 9-4, POROSITY BOARD GUIDES, six pairs required



PLAN VIEW, MKJ 9-5, EMBEDDED GRATING FRAME, four required
Per as shown, See opposite





MKJ 9-6, EMBEDDED STOPLOG GUIDE, fourteen required

1. Hot dip galvanized after fabrication

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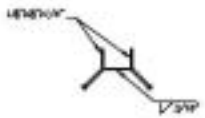
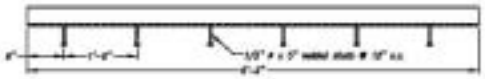
METHOW VALLEY IRRIGATION DISTRICT

MISCELLANEOUS EMBEDED METAL WORK

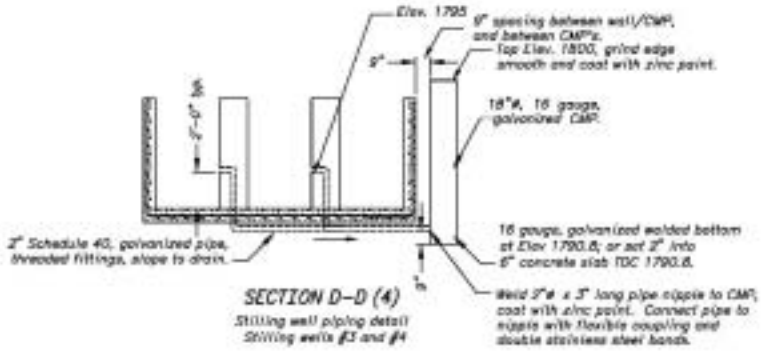
1678-155-9

1628-155-10



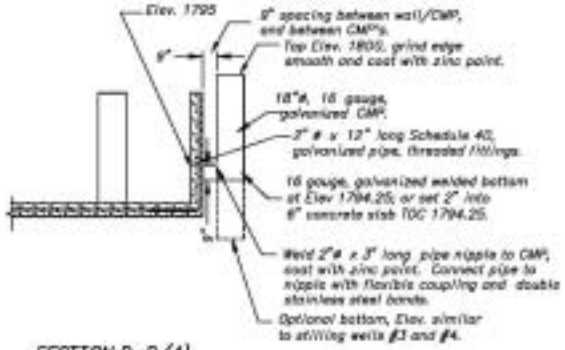


WSF 10-1, SLIDE GATE GUIDE, six required



SECTION D–D (4)

Stilling well piping detail
Stilling wells #3 and #4



SECTION D–D (4)

Stilling well piping detail
Stilling wells #2, and #5, #1 is similar

1. hot dip galvanized after fabrication

1	12-8-2017	[illegible]

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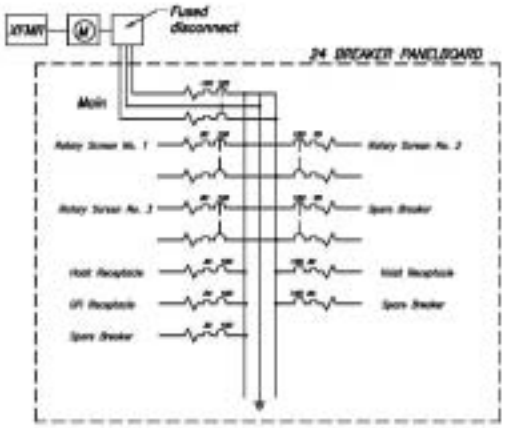
[illegible]

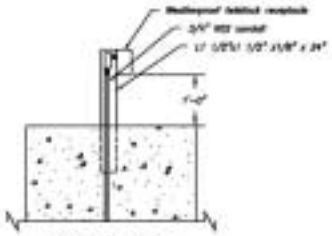
METHOW VALLEY IRRIGATION DISTRICT
WEST FIRST AVE. PUMPHOUSE AND WORK
AND STILLING WELL PIPING DETAIL

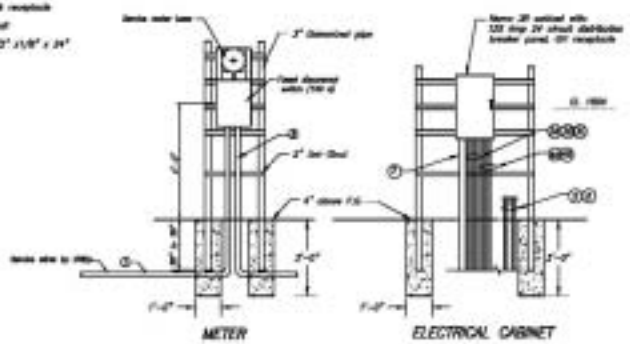
Designed: [illegible] Date: [illegible]
Drawn: [illegible] Checked: [illegible] Approved: [illegible]

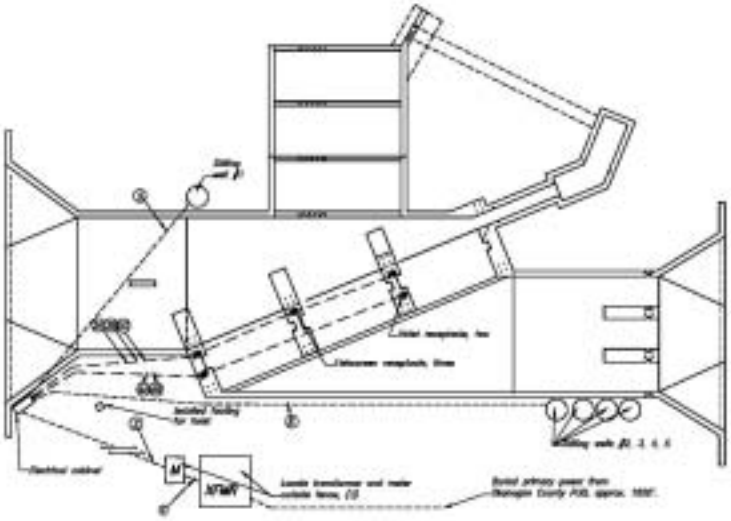
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1628-155-10

1678-155-11









CONDUIT & CABLE SCHEDULE

Conduit No.	Cable	Conduit Size	From	To	Remarks
1	By Utility		Service STMT	MWV	Coordinate w/ Okanogan County PUD
2	4-1C No. 2	2"	Meter/Fused Disconnect	Breaker Panel	Buried
3A, 3B, 3C	4-1C No. 12	Wire - 3/4"	Breaker Panel	Tub Screen Motor Receptacle	Buried/Embedded conduits
4A, 4B	3-1C No. 12	Wire - 3/4"	Breaker Panel	Hoist Receptacles	Buried/Embedded conduits
5	Future	3/4"	Breaker Panel	Utility Hut #1	Buried, cap ends @ 2' TREES/SM
6	Future	1 1/2"	Breaker Panel	Utility Hut #2	Buried, cap ends @ 2' TREES/SM

See 104-2-737 for symbols

SAFETY

METHOW VALLEY IRRIGATION DISTRICT

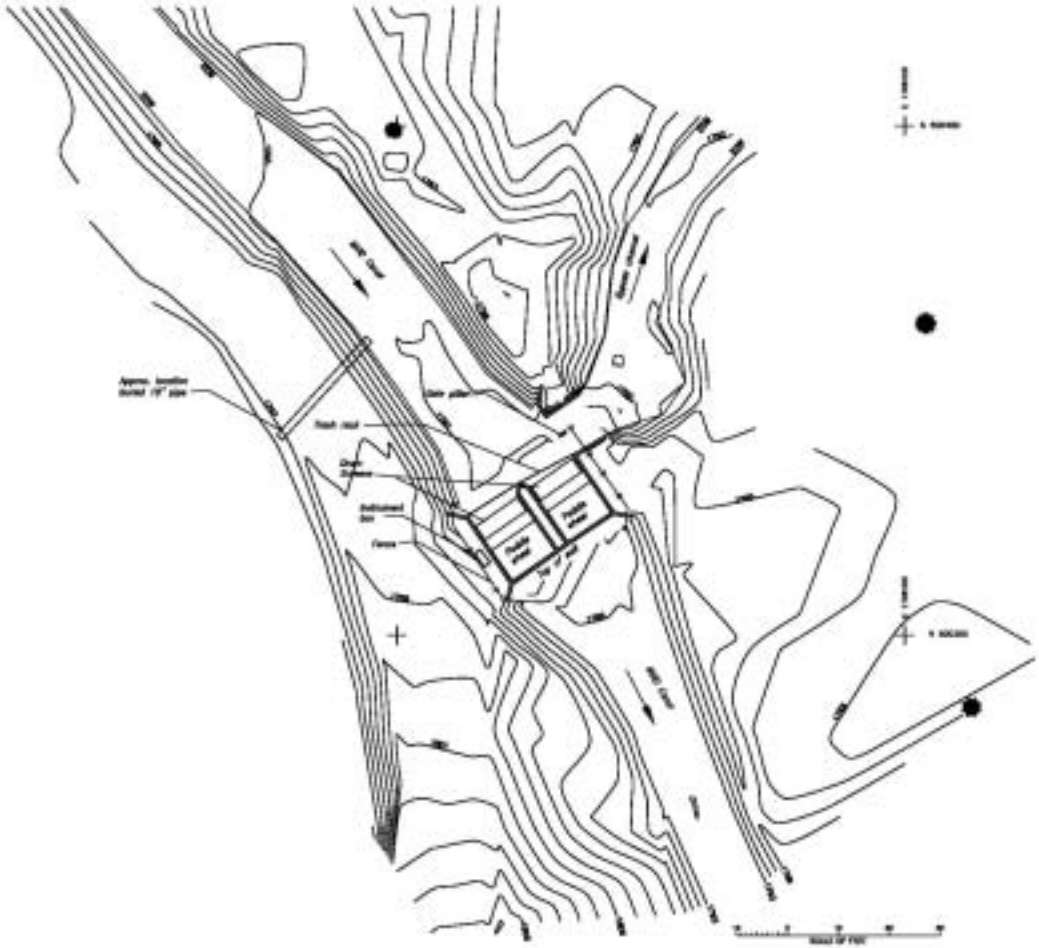
ELECTRICAL INSTALLATION

METER DISTRIBUTION PANEL, RECEPTACLES AND CONDUIT

1678-155-11

1878-155-12

12



NOTES:

1. Remove and dispose of existing concrete structure, sandstone, wood, and fence.
2. Instrument box is to be removed by others prior to construction.
3. Remove and replace existing 18" pipe, 2 feet upstream of new Intersection structure.

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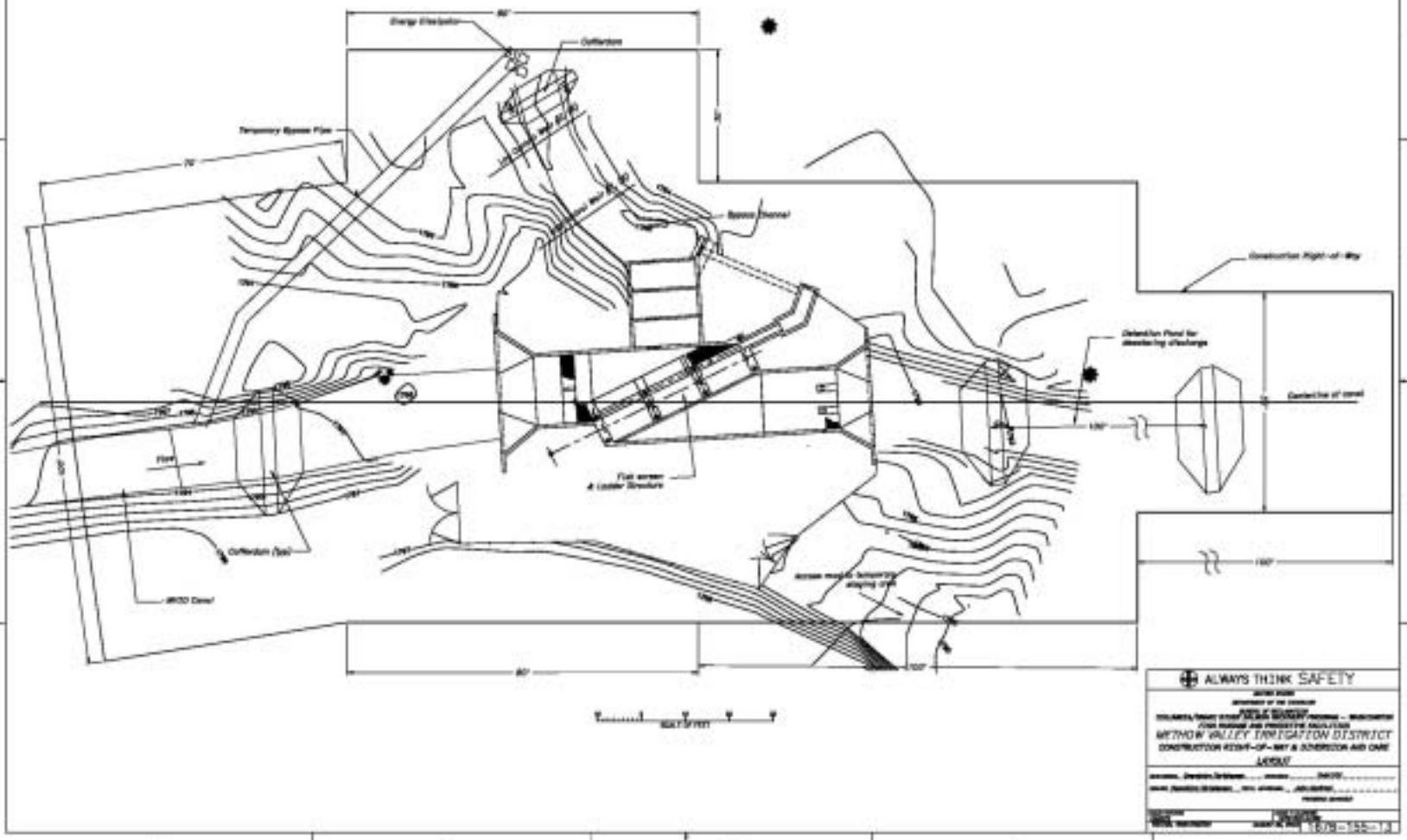
METHOW VALLEY IRRIGATION DISTRICT

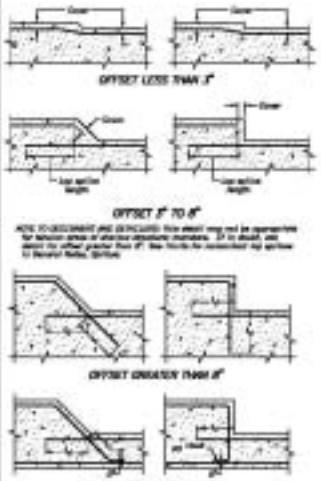
EXISTING FISH SCREEN STRUCTURE AND BYPASS

SITE PLAN

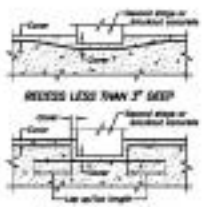
1878-155-12


Energy Dissipator
Deflectors
Temporary Bypass Pipe
Bypass Channel
Construction Right-of-Way
Detention Pond for dewatering discharge
Centerline of canal
Fish screen & Loader Structure
Deflectors (typ)
WSDD Canal
Access road to temporary stoplog crane
ALWAYS THINK SAFETY
WEITHOW VALLEY IRRIGATION DISTRICT
CONSTRUCTION RIGHT-OF-WAY & DIVERSION AND CARE
LAYOUT
1878-155-13

40-D-6263



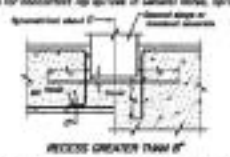
TYPICAL OFFSET DETAILS



RECESS LESS THAN 3" DEEP

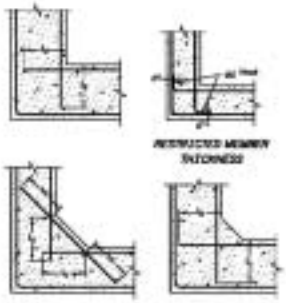
RECESS 3" TO 8" DEEP

NOTE TO DESIGNERS AND DETAILERS: this detail may not be appropriate for tension areas or shallow structural members. If in doubt, use detail for recess greater than 8". See Table for minimum lap splices in Standard Details, Splices.

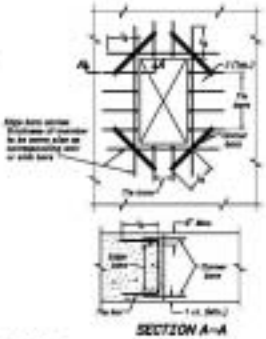


RECESS GREATER THAN 8"

TYPICAL BLOCKOUT RECESS DETAILS
(Dowel stage concrete shown)



TYPICAL CORNER DETAILS



SECTION A-A

OPENINGS:
TABLE FOR ADDITIONAL REINFORCEMENT

MEMBER THICKNESS	TOP BARS	SIDE BARS	CORNER BARS
Less than 1'-0"	None	1 - #5	2 - #5 (2)
1'-0" to 1'-6"	None	2 - #5 (2)	4 - #5 (2 ea)
1'-7" to 2'-0"	#5 @ 1'-0"	2 - #5, each	4 - #5 (2 ea)
Over 2'-0"	#5 @ 1'-0"	Spc. @ 1'-0"	4 - #5 (2 ea)

Deck edge and rib bars along sides of openings where dimension is less than 1'-6".
Deck corner bars at sides of openings adjacent to floors, walls, or beams.
Deck corner bars if both dimensions of opening are less than 1'-6".

RECESSES:

Use corner bars in face of recesses deeper than 4" if either dimension of recess is equal to or greater than 1'-6".

ADDITIONAL REINFORCEMENT AROUND OPENINGS AND RECESSES

GENERAL NOTES 1/

UNLESS OTHERWISE SHOWN ON THE REINFORCEMENT DESIGN DRAWINGS, THE DETAILS AND NOTES SHOWN ARE MINIMUM REQUIREMENTS AND TYPICAL FOR ALL REINFORCEMENT DRAWINGS THAT REFER TO THIS DRAWING

ABBREVIATIONS:

bf = bottom face	br = bottom row	bl = bottom layer
tf = top face	tr = top row	tl = top layer
mf = mear face	mr = mear row	ml = middle layer
lf = far face	lr = far row	nr = near side
ef = each face	er = each row	fa = far side
if = inside face	ir = inside row	ns = each side
of = outside face	or = outside row	es = each end
	mr = middle row	ec = each corner

spc. = space or spaced
eq. spc. = equally spaced, equal spaces
d_b = nominal diameter or reinforcing bar
ui = uniformly varying lengths of bars between lengths shown
cl. = clear
ctr. = center or centers
UNFT = additional
l_d = development length

SYMBOLS:

Bars shown thus ——— #bar —— or ——— #bar indicate a group of the same size bars equally spaced.
An open circle at the end of a bar indicates a bend with the bar turned away from the observer.
A closed circle at the end of a bar indicates a bend with the bar turned towards the observer.
Splices shown thus ———— indicate a lap splice, not a bend in the bar.

DIMENSIONS:

Dimensions are to the centerline of the bars except for embedment of hooks, which are dimensioned to the outside of the bar.
Clear cover dimensions are marked "cl." and are dimensioned to the outside of the bar.

COVER:

Place the reinforcement so that the clear distance between face of concrete and nearest reinforcement is 3" for #6 bars and smaller, 2" for #8 bars through #11 bars. Provide 3" clear distance from face of concrete for all bars when the concrete is poured against earth or rock. Clear distance is to the design dimension line.
Reinforcement against construction joints shall have a minimum of 2" cover cover.

PLACING:

Reinforcement at small openings (max. 1'-6") in walls and slabs may be spread apart not more than 1.50 times the bar spacing.
Reinforcement may be adjusted laterally to maintain a clear distance of at least 1" between the reinforcement and pipes, outlet slips, anchor bolts, form ties, conduits, and other embedded materials. In heavily reinforced areas, relocation of the embedded material must be considered.
When bars are bent due to offsets less than 3" and recesses less that 3" deep, the slope of the inclined portion must not exceed 6 to 1.
Reinforcement parallel to anchor bolts or other embedded material shall be placed to maintain a clear distance of at least 1.33 times the maximum size aggregate.

SPACING:

The first and last bars in walls and slabs, stirrups in beams, and ties in columns are to start and end at a maximum of one half of the adjacent bar spacing. The minimum edge spacing shall be the smaller of either 2.5d_b or 3.5 of the adjacent bar spacing.

STANDARD HOOKS:

1. 180-degree bend plus 4d_b extension, but not less than 2½" at the free end of the bar.
2. 90-degree bend plus 12d_b extension at free end of the bar.

STIRRUP AND TIE HOOKS:

1. #5 bar and smaller, 90-degree bend plus 6d_b extension at the free end of the bar.
2. #6, #7, and #8 bars, 90-degree bend plus 12d_b extension at the free end of the bar.
3. #9 bars and smaller, 135-degree bend plus 6d_b extension at the free end of the bar.

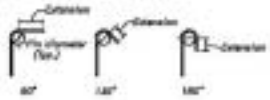


TABLE OF PIN DIAMETERS IN INCHES

Bar No.	3	4	5	6	7	8	9	10	11
Stirrups & ties	2½	3	3½	4½	5½	6	8½	10½	12
Ties in up and down bends	1½	3	2½	4½	5½	6			

REINFORCEMENT DOWELS:

Dowels installed on the drawing, such as #9(5), shall be embedded a length equal to l_d and shall have a projection equal to that required for lap splicing to a bar of the same diameter.

PLAIN DOWELS:

Plain dowels across construction joints shall be smooth bars uniformly coated with a film of oil before concrete placement. Viscosity of the oil shall have a SAE rating of not less than 20D.

ACCESSORIES:

Bar supports, spacers, and other accessories are not shown on the design drawings. The recommendations of the ACI Detailing Manual—1988, or other approved supporting systems may be used.

DRAWING REFERENCES:

Numerals in parentheses ( ) following notes and section letters or numbers indicate the number of the drawing upon which the section or detail is shown; for example (504) denotes drawing No. 337-D-504.

CODE AND DETAILING REFERENCES:

ACI Building Code Requirements for Structural Concrete (ACI 318-83).
ACI Detailing Manual — 1994.

NOTES TO DESIGNERS AND DETAILERS:

Splice lengths shown in the tables on this drawing are for Class B tension lap splices in accordance with ACI 318-83. Assumed conditions for these tables in addition to the requirements shown on this drawing are uncoated reinforcement, normal weight concrete, and the transverse reinforcement index (K_{tr}) equal to zero. Splices or development lengths other than those shown in the tables must be detailed on the reinforcement design drawings.
Some factors which require additional consideration are: Beams or columns with ties, lightweight aggregate concrete, epoxy-coated reinforcement, excess reinforcement, bars in compression, bundled bars, and seismic considerations.

SPLICES:

The minimum length of lap for splicing parallel bars shall be as given in the applicable table.
Staggered splices shall be separated to give 12 inches clear between ends of adjacent splices.
Bars spliced by mechanical lap splices shall not be spaced transversely farther apart than one-fifth the required lap splice length, nor 8" on centers.
When reinforcing bars of different size are to be spliced, the length of lap shall be governed by the smaller diameter bar.
Splices are to be made so that the required clear distances to face of concrete will be maintained.

f'c = 3000 psi TABLE 3 — 60 fy = 60,000 psi

Bar size No.	MINIMUM % to 6" BAR SPACING (INCHES)	LENGTH OF LAPPED SPLICE (INCHES)		DEVELOPMENT LENGTH l_d (INCHES)	
		TOP BARS *	OTHER BARS	TOP BARS *	OTHER BARS
3	3	17	13	13	10
4	3	23	18	18	14
5	3	30	23	23	18
6	3	36	28	28	22
7	3	42	32	32	25
8	3	49	37	37	29
9	3	57	44	44	34
10	3	67	51	51	40
11	3	76	58	58	45
6	3	32 **	25 **	25	20
7	3	37 **	29 **	29	22
8	3	43 **	33 **	33	25
9	3	50 **	38 **	38	29
10	3	59 **	45 **	45	35
11	3	67 **	51 **	51	40

f'c = 4000 psi TABLE 4 — 60 fy = 60,000 psi

Bar size No.	MINIMUM % to 6" BAR SPACING (INCHES)	LENGTH OF LAPPED SPLICE (INCHES)		DEVELOPMENT LENGTH l_d (INCHES)	
		TOP BARS *	OTHER BARS	TOP BARS *	OTHER BARS
3	3	15	12	12	10
4	3	20	16	16	12
5	3	26	20	20	16
6	3	32	24	24	19
7	3	37	28	28	22
8	3	43	32	32	25
9	3	50	38	38	30
10	3	59	45	45	35
11	3	68	52	52	40
6	3	28 **	22 **	22	17
7	3	32 **	25 **	25	19
8	3	38 **	29 **	29	22
9	3	44 **	34 **	34	26
10	3	52 **	40 **	40	31
11	3	60 **	46 **	46	36

* Top bars are all horizontal bars so placed that more than 12 inches of fresh concrete is cast below the development length or splice.
** Splices must be staggered.

10-1-87	CHANGED TO REFLECT CHANGES MADE TO REFLECT ACI 318-83 AND ACI DETAILING MANUAL
2-1-88	REPLACED REFERENCE TO ACI 318-71
2-1-89	REVISED TO REFLECT ACI 318-83
2-1-90	REVISED TO REFLECT ACI 318-83
2-1-91	REVISED TO REFLECT ACI 318-83
2-1-92	REVISED TO REFLECT ACI 318-83
2-1-93	REVISED TO REFLECT ACI 318-83
2-1-94	REVISED TO REFLECT ACI 318-83
2-1-95	REVISED TO REFLECT ACI 318-83
2-1-96	REVISED TO REFLECT ACI 318-83

U.S. DEPT. OF ENERGY SAFETY
OFFICE OF ENERGY RESEARCH
OFFICE OF ENGINEERING AND CONSTRUCTION MANAGEMENT
TRANSURANIC CONTAINMENT

GENERAL NOTES
AND MINIMUM REQUIREMENTS
FOR DETAILING REINFORCEMENT

40-D-6263

1/ Unless otherwise shown on the reinforcement design drawings or this drawing, follow the recommendations established by the ACI Detailing manual — 1994.

104-D-757

15

MISCELLANEOUS DESIGNATIONS

ALT	Alternator
A	Suffix designation for auxiliary control circuit
ASC	Adjustable speed controller
BFV	Butterfly valve
C or CAP	Capacitor
CB	Circuit breaker
C.L.F	Current limiting fuse
CNT	Counter
DV	Discharge valve
EXC	Exciter
F(s)	Fuse
GFCI	Ground fault circuit interrupter
GRD	Ground
GRS	Galvanized rigid steel conduit
GV	Gate or guard valve
HR	Hand reset (Use as suffix)
I	Input
IL	Indicating lamp, add prefix for color
LMC	Liquidtite steel conduit
MCC	Motor control equipment (2000 – 5000 volts)
M	Motor
MCC	Motor control center (600 – volts and less)
NP	Nameplate
NC	Normally closed
NO	Normally opened
NSPD	Nonsegregated phase bus
O	Output
PB	Pushbutton (Momentary contact type)
PBM	Pushbutton (Maintaining contact type)
PC	Programmable controller
PR	Probe operated relay (Refer to 15 for suffix)
REC	Rectifier
R/T	Resistance to current transducer
SF	Service factor
SS	Solenoid valve
SV	Solenoid operated valve
TD	Time delay on energization
TT	Thermal switch
V/I	Voltage to current transducer
VLV	Valve
WC	Water level contact on telemeter receiver (Refer to 15 for suffix)
WRM	Wound rotor motor
X,Y,Z	Suffix for auxiliary relay, switch, or contactor (MUX,CSM,PLR, ect.)
-1, -2, -3, etc.	Suffix for unit number for pumping units, gates, valves, ect.
1,2,3, etc.	Suffix for electrical device numbering, such as 701, 702, ect.
*	Delineated relay

RELAY DESIGNATIONS

AL	Alarm relay
BR	Bearing temperature relay
CR	Control relay
FL	Field loss relay
FR	Field application relay
GF	Ground protective relay
IS	Incomplete sequence relay
LS	Lockout relay
OC	Overcurrent relay
OL	Overload relay
OV	Overvoltage relay
PL	Pullout (Loss of synchronism relay)
RC	Remote control relay
RSP	Remote sensing relay
SC	Spurious sage (Damper winding) relay
SR	Shift register
TD	Time delay relay
UF	Under frequency relay
UV-SPP	Undervoltage single and reverse phase relay
WT	Winding temperature relay

CONTACTOR DESIGNATIONS

FC	Field contactor
LC	Lighting contactor
M	Main contactor
MA	Air compressor motor contactor
MF	Fan motor contactor
MG	Gate motor contactor
MO	Oil pump motor contactor
MW	Water motor contactor
	Other suffix as applicable
	-C Closing function
	-L Lowering function
	-O Opening function
	-R Raising function
S	Starting contactor
PS	Part winding
PT	Part transition contactor } Reduced voltage starting
R	Run contactor

SWITCH DESIGNATIONS

CS	Control switch
FDS	Foreign circuit disconnect switch
FS	Float switch (Use suffix letter_ – E-vessel, F-pipe, R-reservoir, S-sump, T-tank)
LS	Limit switch
PS	Pressure switch
SS	Selector switch
TS	Torque switch
TSW	Transfer switch

TRANSFORMER DESIGNATIONS

CCT	Control circuit transformer
CT	Current transformer
PT	Potential transformer
T	Transformer
TC	Transformer oil temperature
TL	Transformer oil level
TP	Transformer pressure relief
SST	Station service transformer

INSTRUMENT AND METER DESIGNATIONS

AM	Ammeter
AS	Ammeter transfer switch
CNT	Elect counter
CHT	Telegraphic instrument
FF	Fossi-Taylor meter
FGT	Phase shifting transformer
HDM	Recording demand meter
TM	Time meter
F	Voltmeter
DVR	Remoter
DVRG	Verbour meter
VS	Voltmeter transfer switch
W	Wattmeter
WH	Watthour meter
WHD	Watthour demand meter
	Indicates recording instruments. Use selected in not part of the symbol. Replace the asterisk with letter or letters depending on the function of the instrument

DEVICE SYMBOLS

	Control switch
	Ammeter transfer switch
	Voltmeter transfer switch
	Surge arrester
	Capacitor
	Reactor
	Potential transformer
	Current transformer
	Power or distribution transformer
	Six grounded connection
	Delta connection
	Broken delta connection
	Open delta connection (corner grounded)
	Disconnecting switch
	Liquid level switch (Normally open)
	Vacuum and pressure switch (Normally closed)
	Temperature actuated switch (Normally open)
	Flow actuated switch (Normally open)
	Limit switch-direct actuated (Normally open)
	Torque switch (Normally closed)
	3-Position selector switch
	Air circuit breaker (Semiconductor trip 1 Frame size, 2 Inverse time trip, 3 Instantaneous trip
	1 Rectifier, 2 Resistor, 3 Inverter
	Silicon controlled rectifier (Solid state DC switch)
	Air circuit breaker, electricity operated
	Air circuit breaker, withdraw type
	Contactor with thermal trip
	Contactor with magnetic trip
	Contactor with OT and magnetic trip relay
	Contactor (Normally open)
	Contactor (Normally closed)
	Auxiliary contactor (Closes when main device is closed)
	Auxiliary contactor (Open when main device is closed)
	Relay contact number
	Relay coil, contactor coil
	Non-gap disconnecting switch
	Fuse
	Fuse, current limiting type
	Instrument shunt
	Resistor
	Rheostat, or potentiometer
	Separable connector
	Indicating lamp R-white, R-red, G-green, Y-yellow, A-amber, B-blue
	Battery
	Bell
	Horn
	Pushbutton (Normally open, momentary contact)
	Pushbutton (Normally closed, momentary contact)
	Maintained contact pushbutton
	Probe, water level detector
	Limit interrupter switch
	Motor
	Triac (Solid state AC switch)
	Wound rotor motor

WIRING SYMBOLS

	Ground connection
	Interconnection between separately owned systems
	Duplex single-gang plug receptacle
	Single weatherproof plug receptacle
	Watertight three-phase power receptacle
	Single pole switch
	Three way switch
	Luminaire, letter indicates type, number indicates voltage
	Represents connection from external equipment. Does not necessarily represent a terminal block.
	High voltage cable termination
	Represents connection from external equipment via multi-pair control (signal) cable

GROUND SYMBOLS

	Cable exposed
	Cable embedded in concrete
	Cable concealed but not embedded
	Cable buried directly in earth
	Ground rod
	Welded or bolted connection
	Cable riser
	Indicates ground when required for clarity
	Ground connector per 40-D-4534, Fig. 4
	Ground ring

CONDUIT SYMBOLS

	Exposed
	Embedded in concrete
	Concealed but not embedded
	Buried directly in earth
	Bending toward observer
	Bending away from observer
	Dropped
	Pull box or junction box
	Designation number
	Liquid tight flexible metal conduit
	Bending bushing, conduit in cable

NOTES

1. If designations and symbols other than the ones shown on this drawing used, they shall be shown on the appropriate drawing.
2. For equipment designations and symbols refer to NEMA Standards Pub. 200-1970.
3. Symbols in control circuits are shown in the deenergized position. Liquid level switches are shown with liquid continuous empty. Vacuum and pressure switches are shown at ambient pressure. Temperature switches are shown at ambient temperature.

1-3-81	REVISED TITLE BLOCK AND REMOVED D-4534-4
1-3-81	
1-3-81	NOMENCLATURE
1-3-81	

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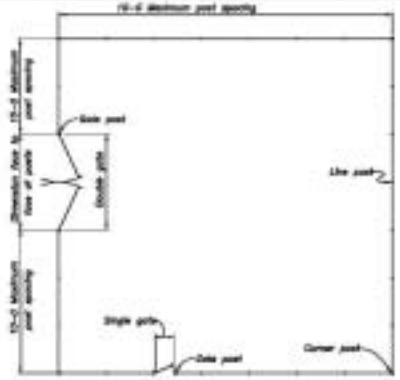
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SEATTLE DISTRICT

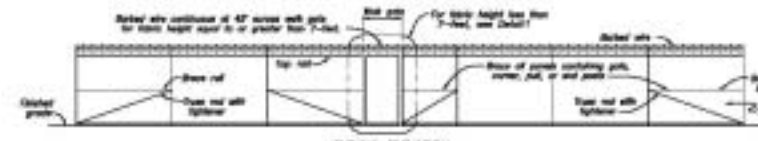
PUMPING PLANT
ELECTRICAL INSTALLATIONS
DESIGNATIONS AND SYMBOLS

DESIGNED	DATE	APPROVED	
DRAWN	DATE	CHECKED	DATE
CHECKED	DATE	APPROVED	DATE
CONTRACT NO.	DESIGNATION	SHEET NO.	
SHEET NO.	SHEET NO.	104-D-757	

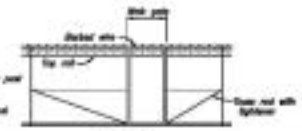
1022-153-255



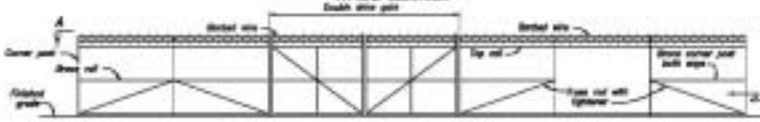
TYPICAL FENCING PLAN



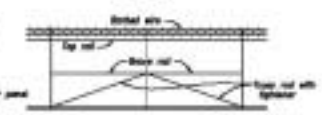
TYPICAL ELEVATION



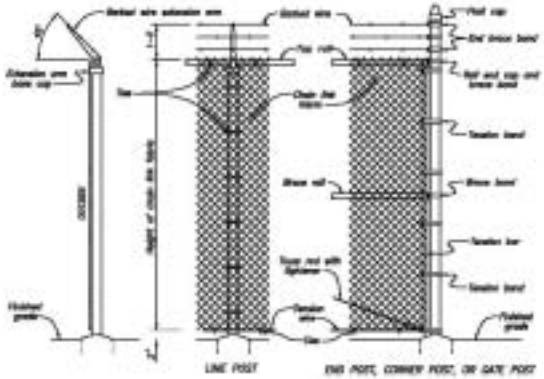
DETAIL 1



TYPICAL ELEVATION

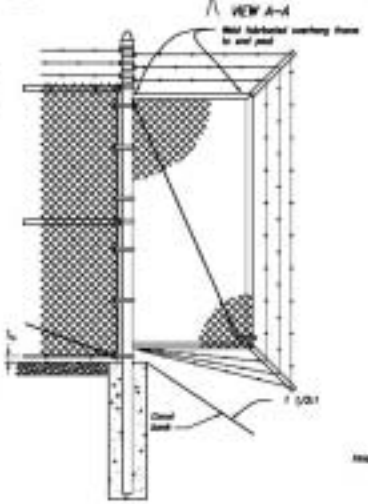


PULL POST

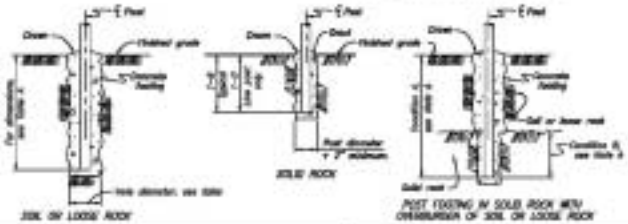


LINE POST

END POST, CORNER POST, OR GATE POST



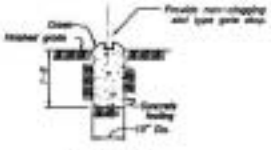
FENCE OVERHANG DETAIL



SOIL OR LOOSE ROCK

SOLID ROCK

POST FOOTING IN SOLID ROCK WITH OVERBURDEN OF SOIL OR LOOSE ROCK



GATE STOP FOOTING

TABLE A

POST FOOTING SIZES IN SOIL OR LOOSE ROCK				
POST	FABRIC HEIGHT	POST DIAMETER AS SHOWN	HOLE DEPTH	POST EMBEDMENT
Line	2 ft. to 4 ft.	6 inches	24 inches	21 inches
Line	6 ft.	8 inches	30 inches	27 inches
Line	8 ft. to 12 ft.	9 inches	36 inches	33 inches
Terminal	2 ft. to 6 ft.	10 inches	32 inches	29 inches
Terminal	8 ft. to 12 ft.	12 inches	38 inches	35 inches

Note: a Safety Condition A or Condition B.
Condition B: Depth required for footing in sand or loose rock.
Condition C: Depth required for embedment in rock.

NOTES

All fencing materials and accessories shall be in accordance with the specifications and the Chain Link Fencing Manufacturers Institute (CLFMI) standards.

All post and footer dimensions shall be in accordance with Table A (CLFMI). Concrete footing dimensions shall be in accordance with Table A above.

See site plans for fence layout and swing of gate.

Install pull posts at a maximum interval of 300 feet and at changes in horizontal or vertical alignment.

Weld all joints between tubular gate frame members and frame overhangs or use heavy fittings to provide tight and watertight connections.

Provide hinges, stops and keepers for all gates as specified. End posts, corner posts, pull posts, and gate posts are designed as terminal posts.

Brace rails are not required for fabric less than 2 feet high.

For footing grounding details, see 40-0-4226, 40-0-4228 and 40-0-4236.

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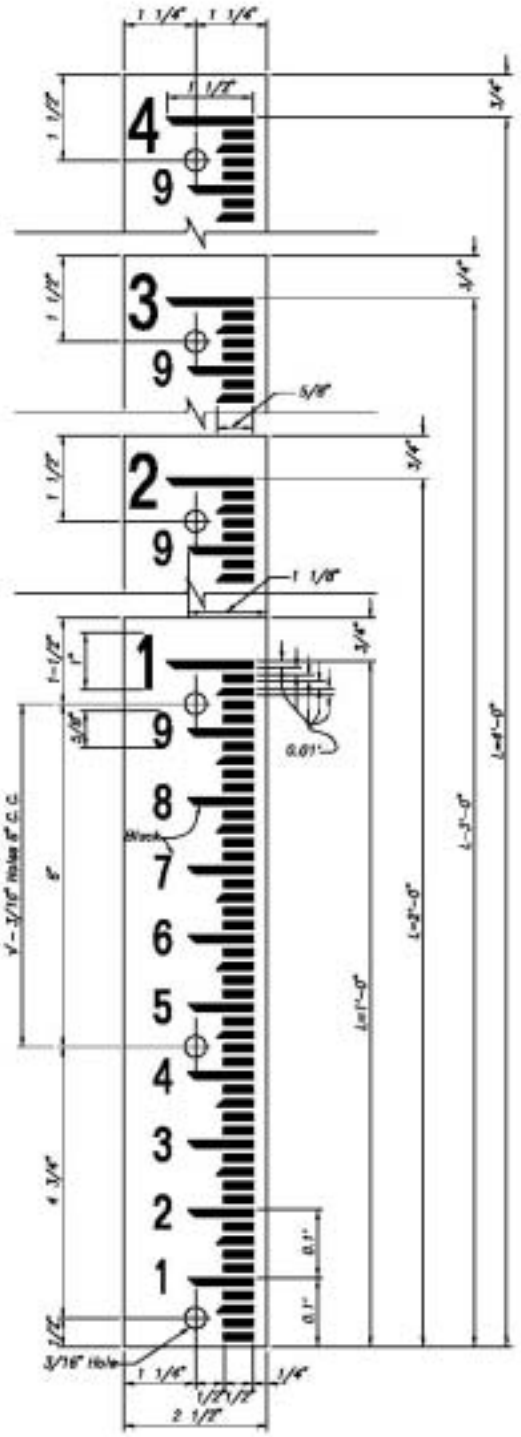
STANDARD DRAWINGS

CHAIN LINK FENCING DETAILS

CIVIL STANDARDS

9003–100–217



NOTES:

Gages to be of No. 18 gage (U.S. standard) mild steel plate and to be covered with porcelain enamel with a minimum thickness of 12 mils on numeral side and 3 mils on the reverse side and on edges where plate has been cut, punched or drilled.

All cutting, drilling and punching of the plates shall be completed before the porcelain enamel is applied.

The face of the gage shall be white and all numerals and graduations shall be black.

Graduations shall be sharp and accurate to the dimensions shown.

The length "L" shall be as given in the schedule. In case a greater length than 4'–0" is required the details shall be similar to details shown for shorter lengths.

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STANDARD DETAILS

ENAMELED WEIR GAGES

9003–100–217

APPENDIX E

East Diversion – Provisions for Temporary Irrigation Water During Fish Screen Replacement

APPENDIX E

EAST DIVERSION – Temporary Irrigation Flows During Fish Screen Construction

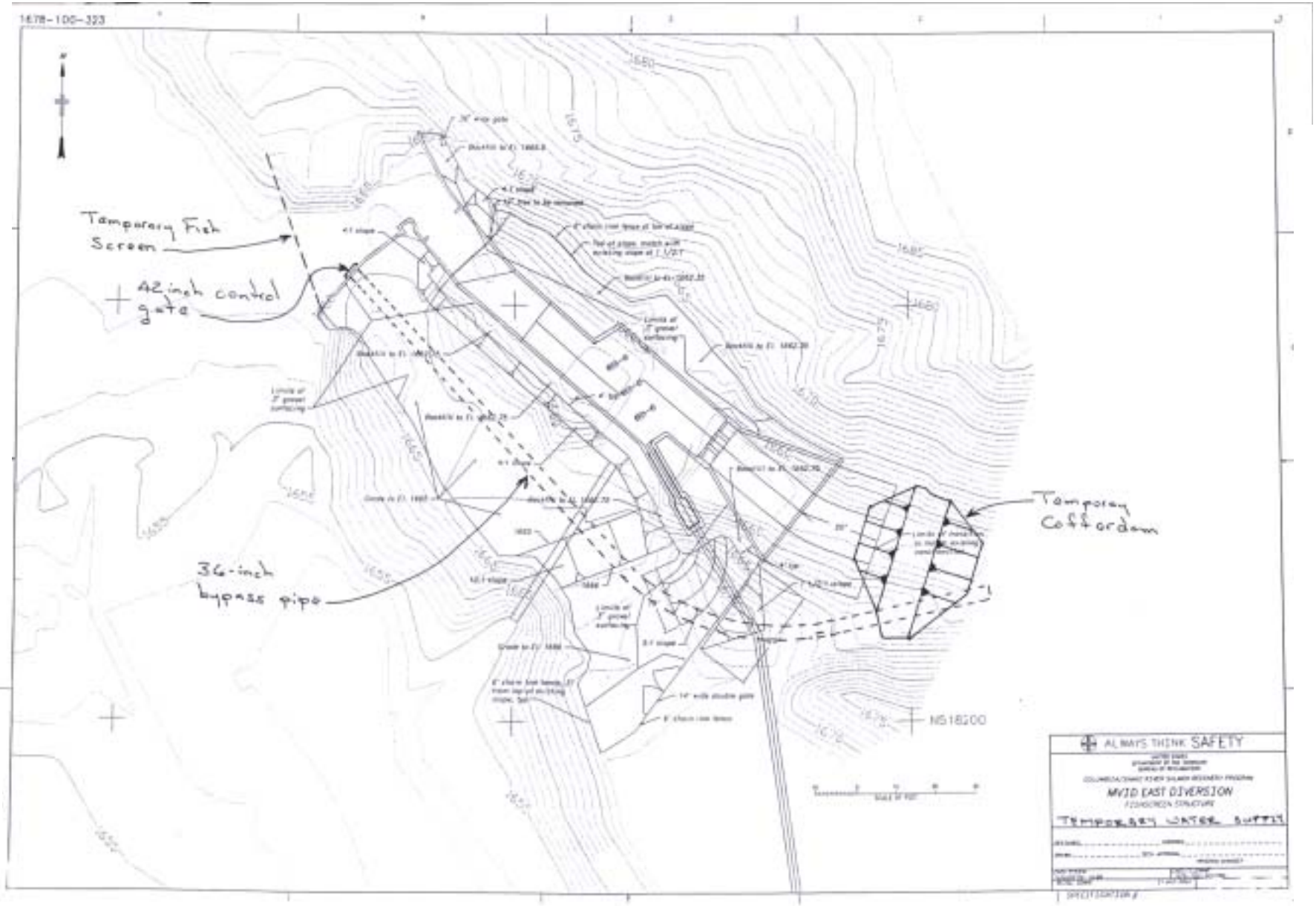
Prepared by Bill Cutting, MWH Americas, Inc.
Modified by BPA

Between 20 and 25 cubic feet per second (cfs) of water flow would be required to meet irrigation system user demands beginning on May 1, 2004 and continuing until the new fish screens are operational, on about July 31, 2004. If the construction time period extends beyond July 31, and construction of the new screens are not fully operational, additional water up to the water right of 30 cfs, may be required.

To supply the irrigation water until the diversion can be fully operational with the new traveling belt screen, a temporary water supply system consisting of a fish screen, conveyance pipe and flow control gate at the project site would be built. The fish screens would be installed at the existing headworks structure near the canal entrance. The screens would consist of two 8-foot high by 20-foot long synthetic mesh screen panels with 3/32-inch maximum size openings. The panels would be installed nearly parallel to the flow of the Methow River from the existing bank to the concrete headworks structure wall. The screens would be attached to the concrete wall and sealed to the bottom of the river and river bank to prevent fish from bypassing the screen and entering the headworks area. The screens would be held in position by a steel or timber structure that would also allow access for inspection of the screens. An automated air bubbler system would be provided to remove debris from the face of the temporary screens. An air compressor, air receiver tank and electric control valves and a timer would provide air to a series of pipes located behind the fish screens. Small openings in the pipes would direct a jet of air towards the back of the fish screen to push debris from the face of the screen and allow the debris to be carried downstream by the river current.

A 36-inch diameter smooth interior, corrugated exterior, high density polyethylene pipe will penetrate the headworks structure wall from that point to the existing canal, downstream of the new fish screen structure. The pipe would be buried between 8 and 12-feet deep from the current grade by about 200 feet long to avoid interference with the existing and proposed fish bypass. A 42-inch square control gate would be bolted to the front face of the headworks structure wall over the pipe penetration to allow the flow through the pipe to be adjusted. A sand bag, ecology block, or clean cobble cofferdam would be constructed in the existing canal between the new fish screen structure and the pipe outlet to prevent water from the canal from entering the excavation for the new fish screen structure.

Once the new fish screens are operational, the water bypass control gate would be closed and locked, the end of the 36-inch-diameter pipe will be cut off, capped and buried in the bank of the canal. The temporary fish screens and air bubbler system would be removed. The cofferdam would be removed from the canal and the canal reshaped to restore its hydraulic capacity.


1678-100-323
Temporary Fish Screen
42 inch control gate
36-inch bypass pipe
Temporary Cofferdam
N518200
ALWAYS THINK SAFETY
MVID EAST DIVERSION
FISHWAY STRUCTURE
TEMPORARY WATER SUPPLY

APPENDIX F

West Diversion – Provisions for Temporary Irrigation Water During Fish Screen Replacement

APPENDIX F

WEST DIVERSION – Temporary Irrigation Flows During Fish Screen Construction

Prepared by Bill Cutting, MWH Americas, Inc.
Modified by BPA

Between 20 and 25 cubic feet per second (cfs) of water will be required to meet irrigation system user demands beginning on May 1, 2004 and continuing until the new fish screens are operational on about June 15, 2004. If the construction time period extends beyond June 15, additional water, up to the water right of 30 cfs, may be required.

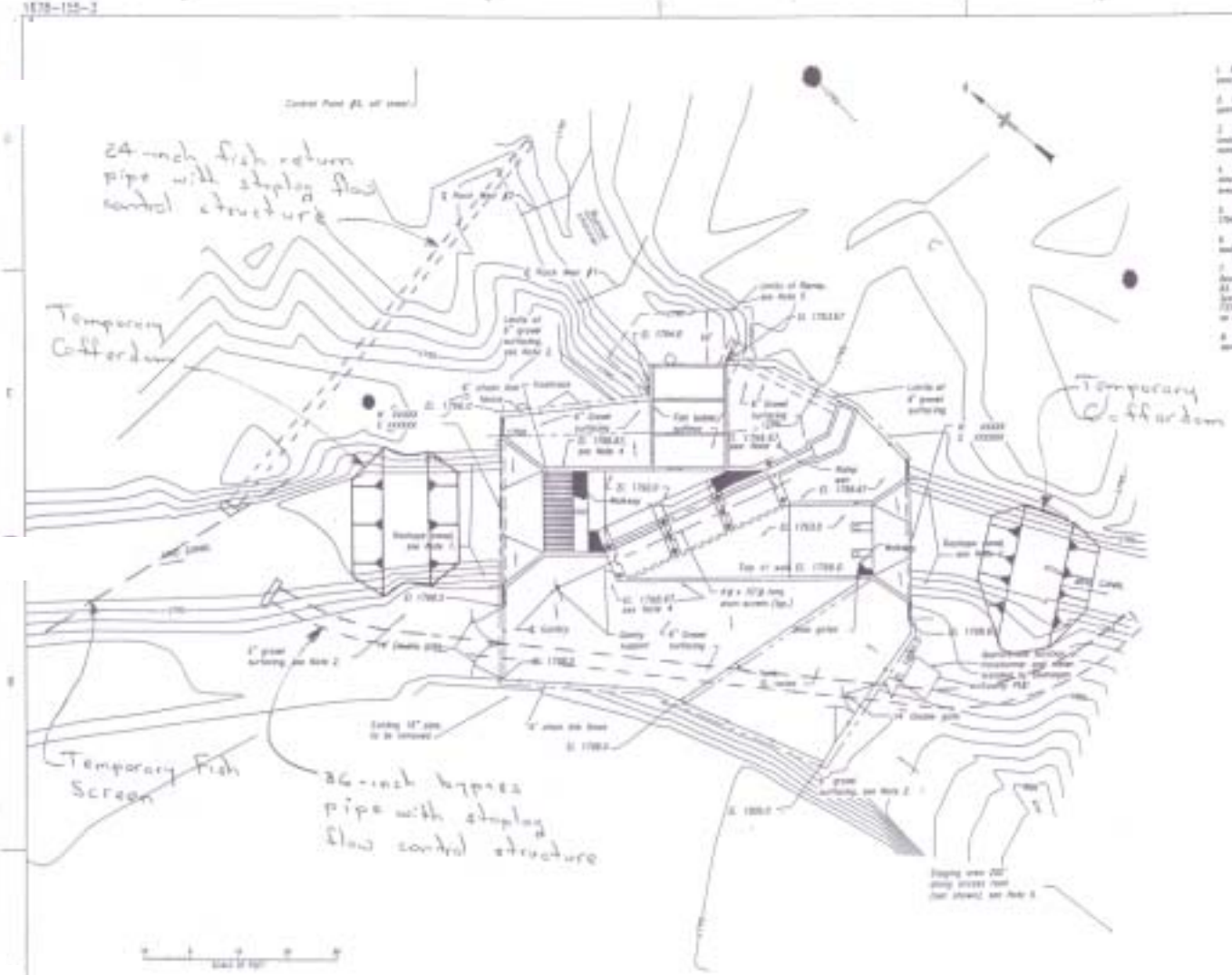
To supply this water, it is proposed to construct a temporary water supply system consisting of a fish screen, conveyance pipe, and fish return pipe at the project site. A plan of this system is shown on the attached drawing. The fish screens will be installed in the existing canal immediately upstream of the proposed fish screen structure. The screens will consist of three 8-foot high by 20-foot long synthetic mesh screen panels with 3/32-inch maximum size openings. The panels will be installed at an acute angle to the flow of the canal. The screens will be embedded a minimum of 1-foot into the canal bottom and banks to prevent fish from bypassing the screens. The screens will be held in position by a steel or timber structure that will also allow access for inspection of the screens. An automated air bubbler system will be provided to remove debris from the face of the screens. An air compressor, air receiver tank and electric control valves and a timer will provide air to a series of pipes located behind the fish screens. Small openings in the pipes will direct a jet of air towards the back of the fish screen to push debris from the face of the screen towards the canal where the current will carry the debris downstream.

A 24-inch diameter smooth interior, corrugated exterior, high density polyethylene pipe will return fish from the upstream end of the screens to the Twisp River via the existing bypass channel. The pipe will be buried between 4 and 6-feet deep and will be approximately 95-feet long. A stoplog flow control structure will regulate the water level in the canal and amount of flow returning to the river. A 36-inch diameter smooth interior, corrugated exterior, high density polyethylene pipe will extend from the downstream side of the fish screens to the existing canal, downstream of the new fish screen structure. The pipe will be buried between 5 and 8-feet deep to avoid interference with the proposed construction and will be approximately 190-feet long. A stoplog flow control structure will regulate the water level in the canal and allow the flow through the pipe to the canal to be adjusted. Sand, gravel and plastic sheet cofferdams will be constructed in the existing canal to prevent water from the canal from entering the excavation for the new fish screen structure. The flow into the canal from the Twisp River will be regulated by the existing headgate structure at the diversion from the river.

Once the new fish screens are operational, the ends of the 24-inch and 36-inch pipes will be cut off, capped and buried in the bank of the canal and the temporary fish screens and air bubbler system will be removed. The cofferdams will be removed from the canal and the canal reshaped to restore its hydraulic capacity.

Installation and removal of the temporary fish screen will disturb approximately 700 square feet of the bed and banks of the existing canal. Approximately 6,000 square feet of the bank surrounding the canal will be disturbed by excavation and backfill for installation of the fish return and bypass pipes. Of this amount, 2,000 square feet will also be disturbed by construction of the new fish screen structure and the site grading surrounding it. Installation of the pipelines will require excavation and replacement of approximately 700 cubic yards of sand and gravel. Installation and removal of the cofferdams in the canal will disturb approximately 1,500 square feet of bed and bank of the canal and will require the placement and removal of approximately 150 cubic yards of sand and gravel.

1878-155-3



PLAN

NOTES:

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]

SURVEY CONTROL:

POINT	NORTHING	EASTING	ELEVATION
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

LEGEND:

[illegible] Finished grade breakline, see Note 4

[illegible] Finished grade point elevation, see Note 4

[illegible] Survey control point, see Note 7

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[illegible]

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM - WASHINGTON
FISH PASSAGE AND PROTECTION FACILITIES

METHOW VALLEY IRRIGATION DISTRICT

WEST FISH SCREEN STRUCTURE

TEMPORARY BYPASS SUPPLY

DESIGNED: [illegible] REVIEWED: [illegible]

DRAWN: [illegible] SCALE: [illegible]

[illegible]