

BMP 15.00. Pumped Stream Diversion

DESIGN CONSIDERATIONS

Objectives

The primary purpose of all temporary diversion methods is to protect water quality by passing upstream flows around the active construction zone. Pumped Stream Diversion also allows in-water construction activities to take place under no-flow conditions, which may allow more efficient construction in a shorter time period.

Description

Pumped Stream Diversion is a temporary bypass system. Temporary dams are constructed upstream and downstream of the work area and water is pumped from a sump above the upstream dam. The water is conveyed around the work area and discharged back into the stream or river downstream of the downstream dam. The conveyance structure may be a pipe, flume, or bermed or excavated channel.

Other Names

Pump-Around, Temporary Diversion, Clear Water Diversion, Stream Diversion.

Applicability

Pumped Stream Diversion is often required during in-stream work that must be done under no-flow conditions and where the existing grade or physical setting is not sufficient for diverting the flow by gravity. For instance, during a culvert replacement, diverted water may need to be piped over the roadway from upstream to downstream. If the roadway crown is higher than the intake point, the grade would not be sufficient for gravity flow and Pumped Stream Diversion might be considered.

Selection Considerations

The designer should have a realistic estimation of project duration and time of year during which the construction activity will take place. If possible, the diversion should be limited to periods of low flow.

The designer must have a reliable estimate of base flow and potential peak flows during the construction period.

The design should consider whether the temporary diversion will cause greater environmental impacts

than if the project is constructed without temporary diversion. Factors such as the duration of the project, the sensitivity of the water body, the available area for pumps and bypass channel, the anticipated flow, and the season when the construction work will take place should all be considered.

Additional specific permit requirements including allowable work time periods or mitigation measures may be required by agencies, such as the U.S. Army Corps of Engineers, Alaska Department of Environmental Conservation, Alaska Department of Fish and Game, and Alaska Department of Natural Resources. The designer should allow adequate time to apply for and receive permits, and be cognizant of permit requirements in order to design a system that will meet permit conditions. Permits may dictate the design or layout decisions.

Require that spill prevention and control measures for pumps be provided.

Design

Consider having the Regional Hydraulics Engineer review the design. In addition to the Pumped Stream Diversion plan sheet, include the Temporary Diversion Conveyance plan sheet in the contract.

Flow Rate: Size the system for base flow plus estimated flow from a 2-year 24 hour rainfall event including runoff from drainage area during the anticipated time of construction. Consider tributary area and seasonal rainfall patterns. If there are large paved areas upslope, consider a larger sized system. Specify the flow rate, which will be used by the contractor to properly size the pump.

Pump Sizing: Pump capacity must be sufficient for the design flow, topographic relief, length of discharge line, and other system head losses.

Fish Streams: Consider type and placement of screens or fish proof fences, if necessary in fish-bearing streams.

Temporary Bypass and Dams: Design a diversion conveyance system that is appropriate for the project area. See BMP-34 and BMP-35 Temporary Diversion Conveyance.

Relationship to Other Erosion and Sediment Control Measures

Pumped Stream Diversions may be used when Temporary Diversion Conveyance is not adequate; see BMP-15. Additional dewatering within the work area may be required; see BMP-7 Contained Silt Control System and BMP-9 Excavation Dewatering.

Common Failures or Misuses

- Improper dam and pump sizing for potential high flow events.
- Inadequate energy dissipater at point of discharge into the waterway.
- Conducting diversion activities without confirming local, state, and federal permitting and design requirements.

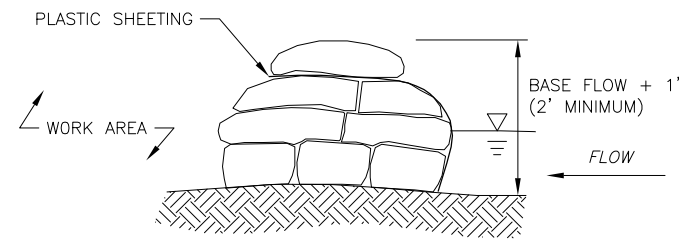
SPECIFICATIONS

Standard Specification

- 677 – Pumped Stream Diversion

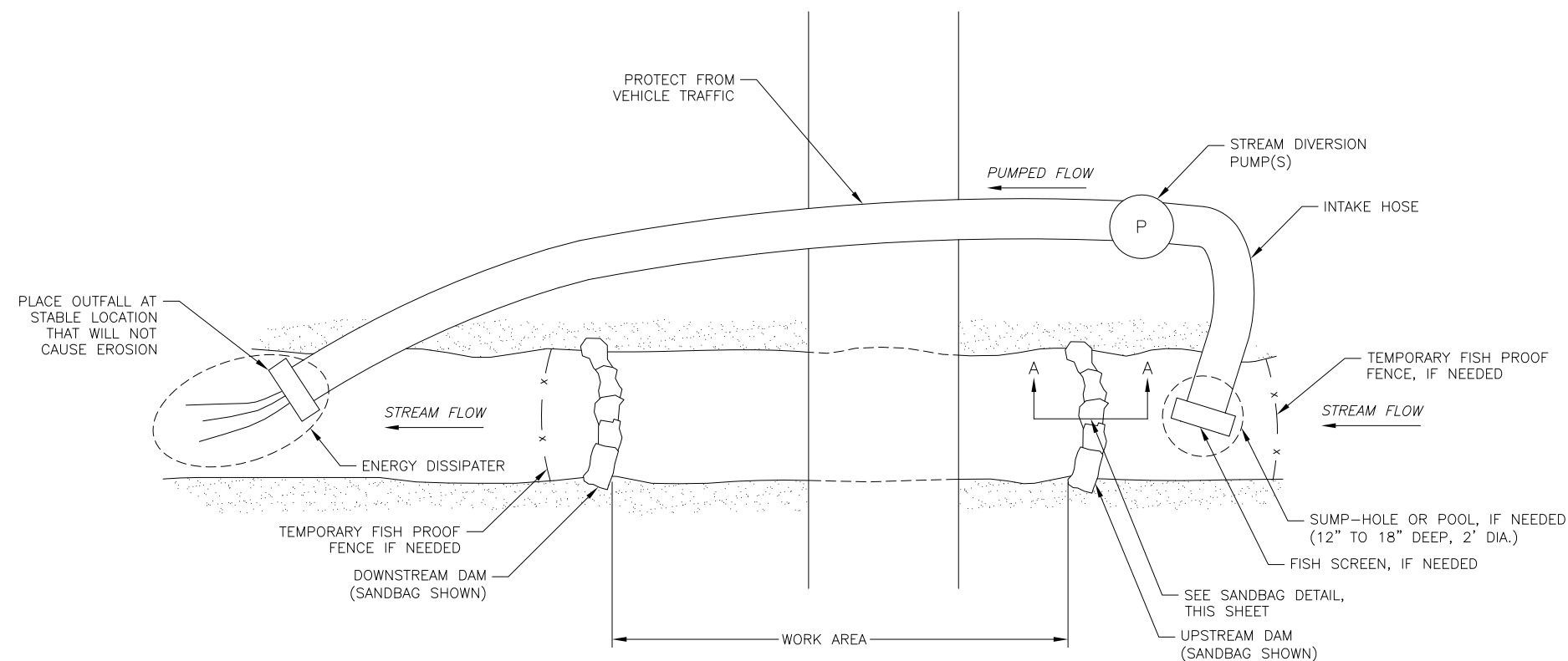
Drawing

- BMP-15.00 Pumped Stream Diversion
- BMP-34.00 and BMP-35.00 Temporary Diversion Conveyance
- BMP-07.00 Contained Silt Control System
- BMP-09.00 Excavation Dewatering



SECTION A-A

SANDBAG DAM
NOT TO SCALE



PLAN

PUMPED STREAM DIVERSION
NOT TO SCALE

PUMPED STREAM DIVERSION NOTES:

MATERIALS

DAM MATERIAL: SANDBAGS COVERED WITH PLASTIC SHEETING (30 MIL OR 2 OR MORE LAYERS OF 10 MIL), RIPRAP, STEEL PIPE PLATE, SHEETPILE, INFLATABLE BLADDERS, OR EQUIVALENT.

PUMP: SIZED FOR DESIGN FLOW IN CONTRACT, WITH INTAKE LINE, FITTINGS, AND NOZZLES.

ENERGY DISSIPATER: RIPRAP, SANDBAGS, T-BAR SPREADER, OR EQUIVALENT.

FISH BARRIER: FENCE OR SCREEN, IF NEEDED.

SPILL PREVENTION BMPS.

INSTALLATION

1. COORDINATE WITH DEPARTMENT FOR INSTALLATION OF FISH FENCE, IF NEEDED.
2. INSTALL A CONVEYANCE, SUMP (IF NEEDED), AND INTAKE HOSE.
3. INSTALL THE UPSTREAM AND DOWNSTREAM DAM.
4. PLACE THE PUMP IN AN AREA DESIGNED FOR ITS USE AND OPERATION WITH SPILL PREVENTION MEASURES.
5. INSTALL THE ENERGY DISSIPATER.

INSPECTION

1. WHEN PUMPING, MONITOR PUMPS, INTAKE AND DISCHARGE POINTS. ENSURE THAT PUMPS ARE ADEQUATELY SIZED.
2. INSPECT UPSTREAM AND DOWNSTREAM DAMS FOR OVERTOPPING, BYPASS, UNDERCUTTING, OR OTHER DEFECTS.
3. INSPECT THE CONVEYANCE STRUCTURE FOR LEAKS, EROSION, OR OTHER DEFECTS.
4. INSPECT DISCHARGE POINT FOR EROSION OR FAILURE OF THE ENERGY DISSIPATION MATERIAL.
5. INSPECT THE EQUIPMENT AREA FOR PROPERLY STORED FUEL AND OTHER POTENTIALLY HAZARDOUS SUBSTANCES.

MAINTENANCE

1. REINFORCE OR RESTORE ANY PORTION OF THE DAMS, CONVEYANCE STRUCTURE, OR ENERGY DISSIPATER.

REMOVAL

1. ENSURE STREAM BANKS AND SUMP ARE STABLE BEFORE REMOVAL
2. REMOVE THE DOWNSTREAM DAM FIRST, THEN THE UPSTREAM DAM.
3. REMOVE THE ENERGY DISSIPATER.
4. REMOVE THE INTAKE HOSE.
5. REMOVE THE TEMPORARY CONVEYANCE STRUCTURE. BACKFILL OR REGRADE AND RESTORE TO ORIGINAL CONTOURS.
6. REGRADE AND SEED OR PERMANENTLY STABILIZE ALL DISTURBED AREAS.

REVISIONS		
Date	Description	By

State of Alaska DOT&PF

PUMPED STREAM
DIVERSION

A
P
P
R
O
V
E
D

Date 12/2015 X/XX/XX