

Water Diversion

- Background
- Bypass pumping
 - Installation
 - Inspections
 - Maintenance
- Diversion channel



Background

- Water diversion is primarily used when working in existing streams and isolates stream water from the work area
 - Water diversion may also be necessary when there are very large off-site areas that discharge large volumes of clean water through the construction zone.
- Different from dewatering operation because diversion does not involve filtering water - we should be introducing no sediment to water during water diversion
- Common types
 - Bypass pumping
 - Temporary diversion channels/pipes
- Commonly used when working adjacent to streams

Background (cont.)

- The contractor proposes an approach to divert water in the ECIP
- WisDOT approves their approach after consultation with WDNR.
- Once the practice is employed on the construction site, WisDOT should be visually inspecting the discharge water to determine if there is a visible sediment plume.
- If there is a visible plume, adjustments must be made to the operation.
- If bypass pumping, inlet and outlet need to be managed to prevent sediment from entering operation.
- If temporary channel, channel must be lined with non-erodible material to prevent sediment from entering operation.

Bypass pumping

Commonly used to maintain drainage during short duration projects.

Operation must be constructed to prevent the introduction of sediment to water.

Bypass pumping - Installation

Installation:

- If bypass pumping, inlet and outlet need to be managed to prevent sediment from entering operation.
- Non-erodible cofferdams are required upstream and downstream of work area. This prevents the stream water from contacting sediment in the work area.
- Stable outlet to prevent erosion (riprap, rock bags, plastic sheeting, etc.)
- Adequate pump size to prevent baseflows from overtopping cofferdam
- Analyzing the work zone to determine preparedness for high flow events
- Discharge is not filtered

Bypass pumping – managing the intake



- ▶ Good example: Managing pump intake water to prevent sediment being introduced to operation

Bypass pumping – managing the intake



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Bypass pumping – Non-erodible cofferdam



- ▶ Good example of a non-erodible sheet pile cofferdam. This is necessary to prevent diverted water from being exposed to sediment in the work area. There are many options for non-erodible cofferdams, such as:
 - sheet piles driven by pile driving equipment
 - metal plates pushed into the ground with excavating equipment
 - plastic wrapped concrete barriers or sandbags.

Bypass pumping – stable outlet



- ▶ Good example: This operation used a large plastic sheet to dissipate energy and prevent erosion at the pump outlet.
- ▶ There are many options to prevent erosion at the outlet

Bypass pumping – Inspection/maintenance

Inspection and maintenance

- If bypass pumping, inlet and outlet need to be managed to prevent sediment from entering operation.
- Inspect downstream cofferdam to ensure water is not back flowing into work area. If it is, fix leaks in cofferdam.
- Inspect stable outlet to ensure stream is not eroding
- Inspect water level at cofferdam and adjust pump capacity as needed. Be prepared for increases/decreases in water level based on forecast.

Methods to Divert Water in Channel or Pipe

Common methods:

1. Use existing culvert to divert water (sites with two or more culverts)
2. New temporary bypass culvert
3. Non-erodible temporary diversion channel
 - This method is the most susceptible to erosion and will be the focus of the training

Temporary diversion channel

- Used to maintain drainage during longer duration projects.
- Must be made to be non-erodible, to prevent the introduction of sediment to water.

Temporary diversion channel

- ▶ Good example of construction of a non-erodible diversion channel. A bulkhead was placed at the diversion channel entrance, which was used to prevent water from flowing during construction of the diversion channel.
- ▶ At the end of diversion channel construction, bulkhead was switched to divert flow from the main channel.
- ▶ Channel is lined with plastic, which is kept in place with weighted bags.



Temp diversion channel (cont.)



- ▶ Example: Diversion channel used to maintain drainage during construction of a box culvert.
- ▶ To prevent sediment from being introduced in channel, this operation used plastic material held in place with sandbags.

Temp. diversion channel (cont.)

