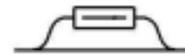




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4.2.3 Diversions: Pipes and Culverts



Source: MPCA (2019)

Definition and Purpose

Diversions culverts and pipes are temporary structures used on construction sites to redirect stormwater away from or through active work areas, keeping the work areas dry and the runoff unpolluted. Supported by measures like sandbags or pumps, they minimize sediment disturbance and direct flow into dewatering or sediment control systems, or cleanly through the active construction area, helping prevent erosion and protecting nearby water bodies (MPCA, 2019)

Appropriate Applications

Diversions pipes are used when sites have large upstream drainage areas. This measure reduces the volume of stormwater requiring treatment by segregating run-on associated with undisturbed areas from runoff associated with disturbed areas. Diversions pipes are most effective when natural slope conditions allow for gravity-driven flow without the need for pumping.

Limitations and Maintenance

Inspect the pipes for cracks and the outlet for signs of erosion (MCPA, 2019); repair as necessary. During storm events, ensure flow is adequately diverted (i.e., does not bypass the system) and the pipes can adequately convey the flow.



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

Planning and Design Considerations

The design of diversion pipes must be based on hydrologic and hydraulic analysis to ensure they can safely convey expected flow rates and velocities while minimizing erosion and downstream impacts (TDOT).

The minimum pipe diameter should be selected based on either the 2-year, 24-hour or 5-year, 24-hour event. Pipe diameter is calculated using Eqn 15 in Section 3.3.2.4 and Table 3.3.2.6-A if multiple pipes are necessary. The velocity at which the design storm leaves the pipe, V_p (Eqn 6, Section 2.1.2), is critical in designing an appropriate energy dissipator for the pipe outlet (Section 4.3.4).

When excavation is required, erosion can be controlled using trapezoidal transitions lined with riprap on geotextile fabric, sandbags, or similar materials (TDOT). Riprap should meet size specifications (minimum six inch diameter) and be over-excavated to match ditch grade. Use materials selected to withstand design velocities and shear.

Diversion pipe removal should be conducted carefully to prevent erosion and sedimentation. Inspect the site to confirm that the diversion is no longer needed and that stabilization measures have been installed (Section 3.3.2). Begin by removing the upstream diversion. Then, clear any sediment buildup, extract the pipe, and grade and revegetate all disturbed areas to ensure long-term stability.

Example Application

For sizing diversion pipes refer to Eqn 15, Table 3.3.2.6-A, and the example in Section 3.3.2.4 and 3.3.2.6.

References

- MPCA. (2019). *Minnesota Stormwater Manual: Construction stormwater practices – diversion and working in the dry.*
- TDOT. *Drainage Manual Ch5.*
- TDOT. *Drainage Manual Ch10.*