

ASSESSING INDIRECT IMPACTS TO AQUATIC RESOURCES

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November 1, 2023



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OBJECTIVES

- Corps Authorities
- Definitions
- Types of Indirect Impacts
- Avoidance/Minimization of Indirect Impacts



SECTION 404 CLEAN WATER ACT (CWA) 1972

- Section 404 of the CWA requires a permit for the discharge of dredged or fill material into a waters (aquatic resource) of the United States.
- Waters of the United States include lakes, streams, ponds, wetlands, etc. with a downstream tributary connection to a navigable water.



SECTION 10 OF THE RIVERS AND HARBORS ACT (RHA) 1899

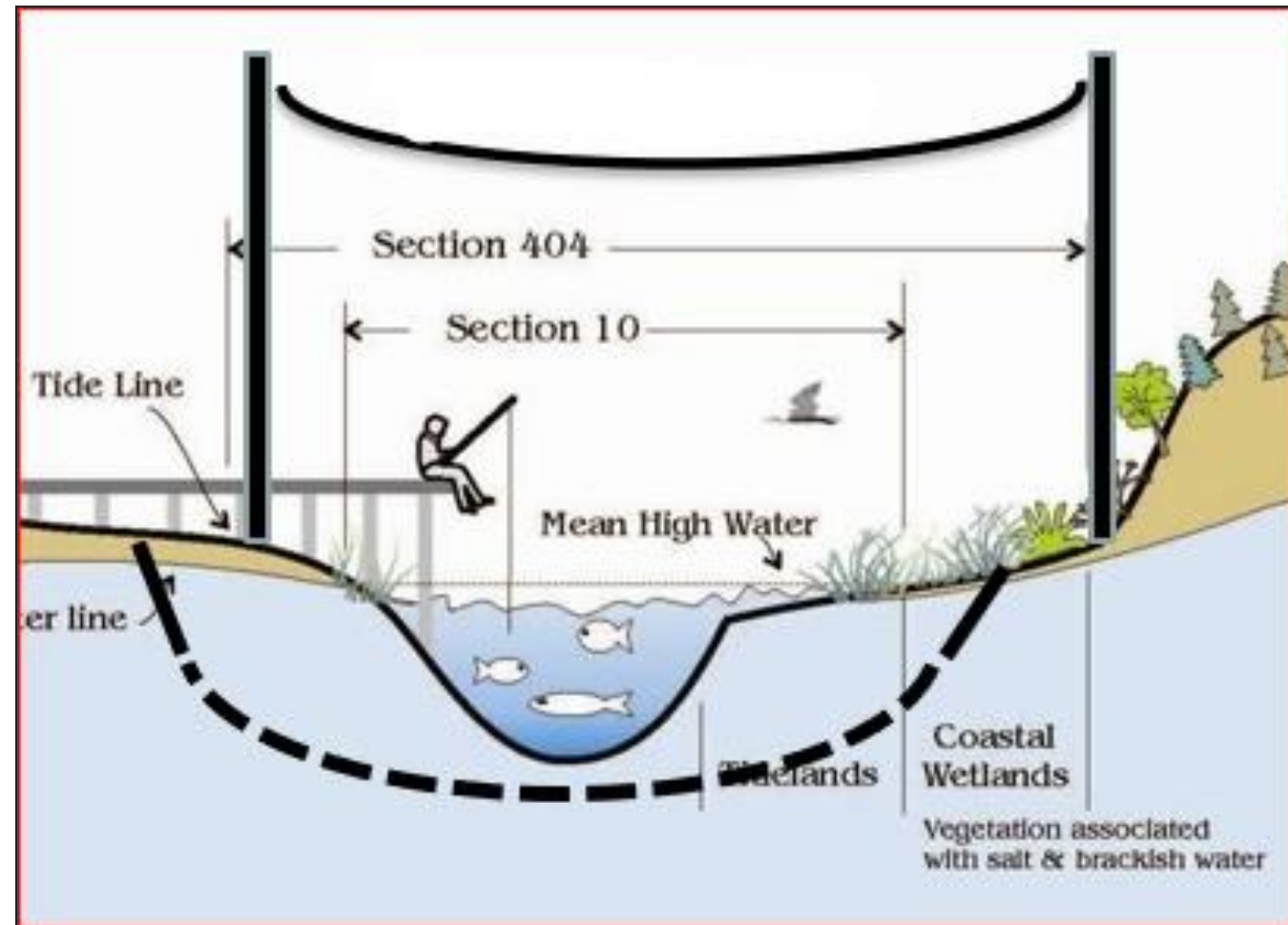
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Section 10 of the RHA requires a permit for any **work in, over or under** a navigable water.

Section 10 waters in Utah include:

- Bear Lake
- Bear River (from Idaho state line to town of Corrine)
- Flaming Gorge Reservoir
- Lower section of Green River
- Colorado River
- Lake Powell

<https://www.spk.usace.army.mil/Missions/Regulatory/Jurisdiction/Navigable-Waters-of-the-US/>





PROJECT IMPACTS ANALYSIS

When a permit is required for the discharge of dredged or fill material into any aquatic resource (AR) subject to Section 404 CWA and/or any work in, over or under a water subject to Section 10 RHA, the Corps must evaluate the direct, indirect and cumulative impacts of such discharge/work.

- Direct Impact- Loss of the AR in whole, or in part, due to the placement of dredged/fill material and/or impacts to navigation from construction of a structure.
- **Indirect Impact-** Loss or degradation of an AR's functions and services at a different location and/or time than the fill activity location.
- Cumulative Impact- Changes to the aquatic ecosystem caused by the combined impact of past, present and future human activities and natural processes.

Direct Impact + Indirect Impact = Total Project Impact to ARs

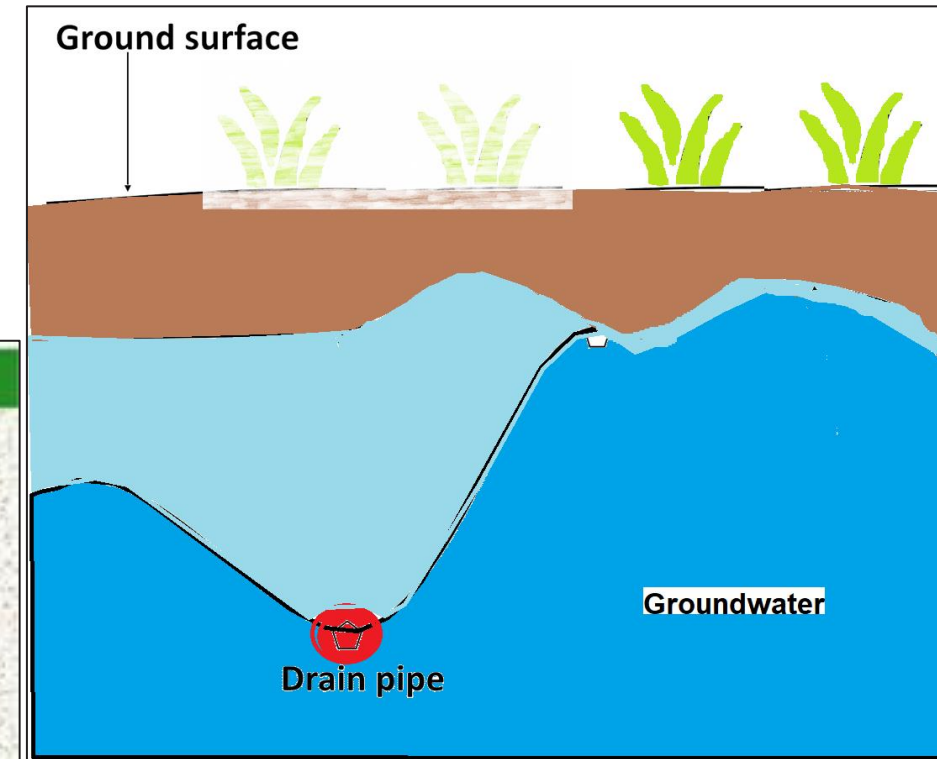
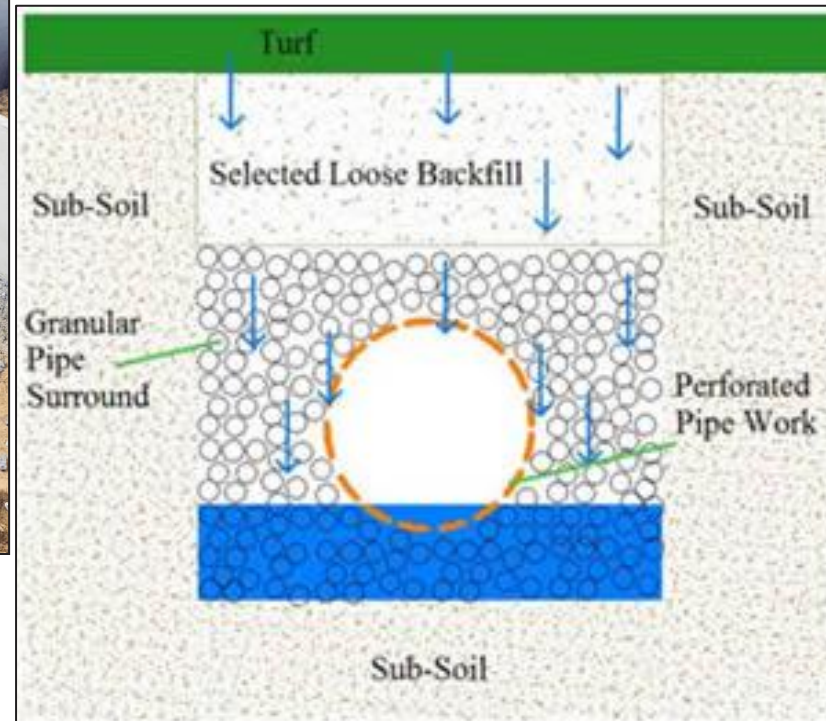
INDIRECT IMPACTS

Potential indirect impacts:

- Dewatering
 - Draining
 - Redirecting Surface Water
- Isolation
- Flooding/Inundation
 - Conversion
- Degradation of function

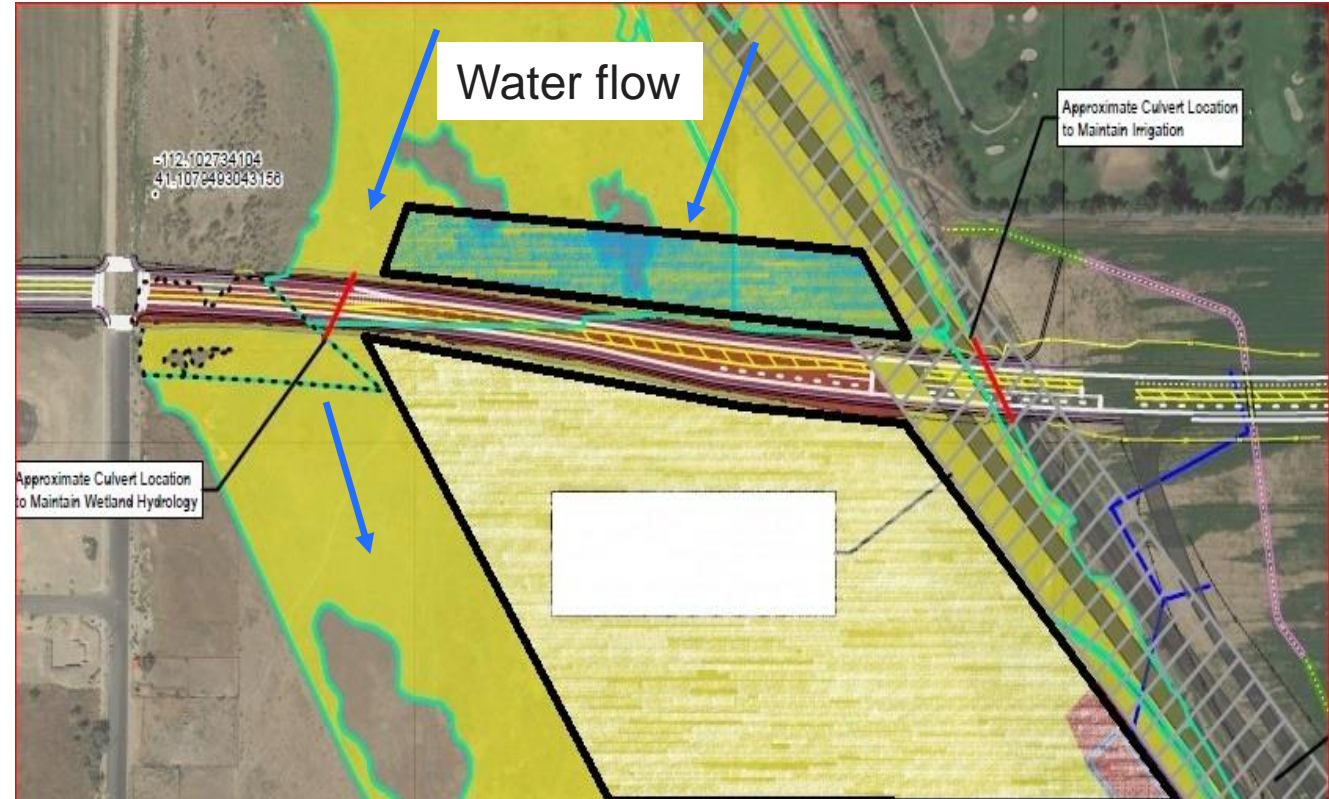
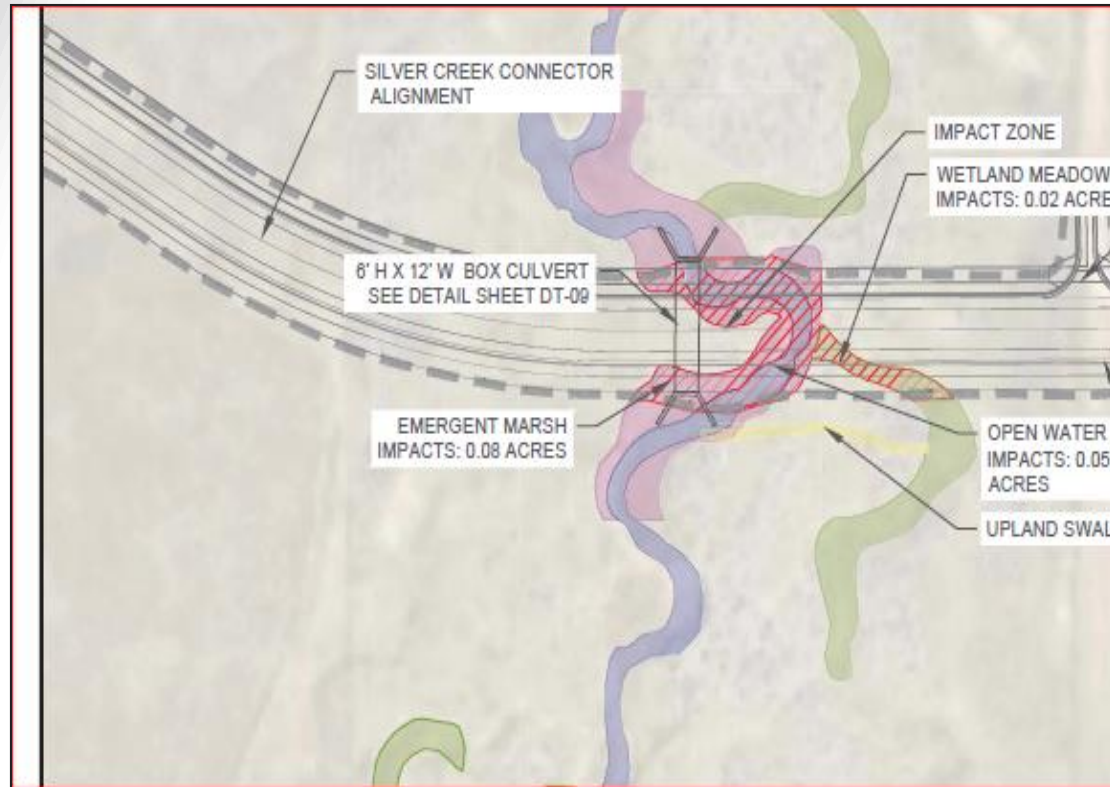
DRAINING OF GROUNDWATER

- Land/perimeter or tile drains
- Utility lines
- Cone of depression

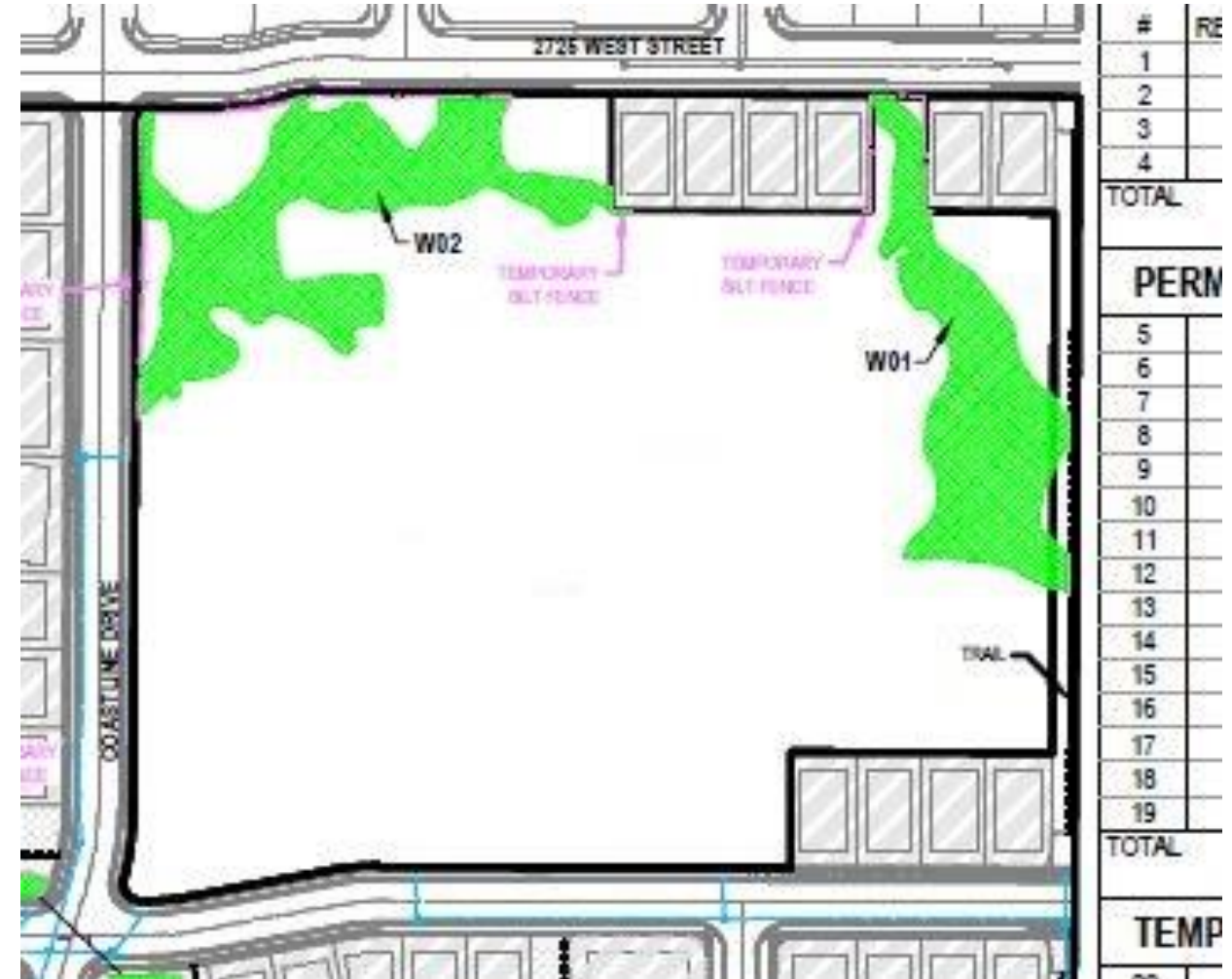
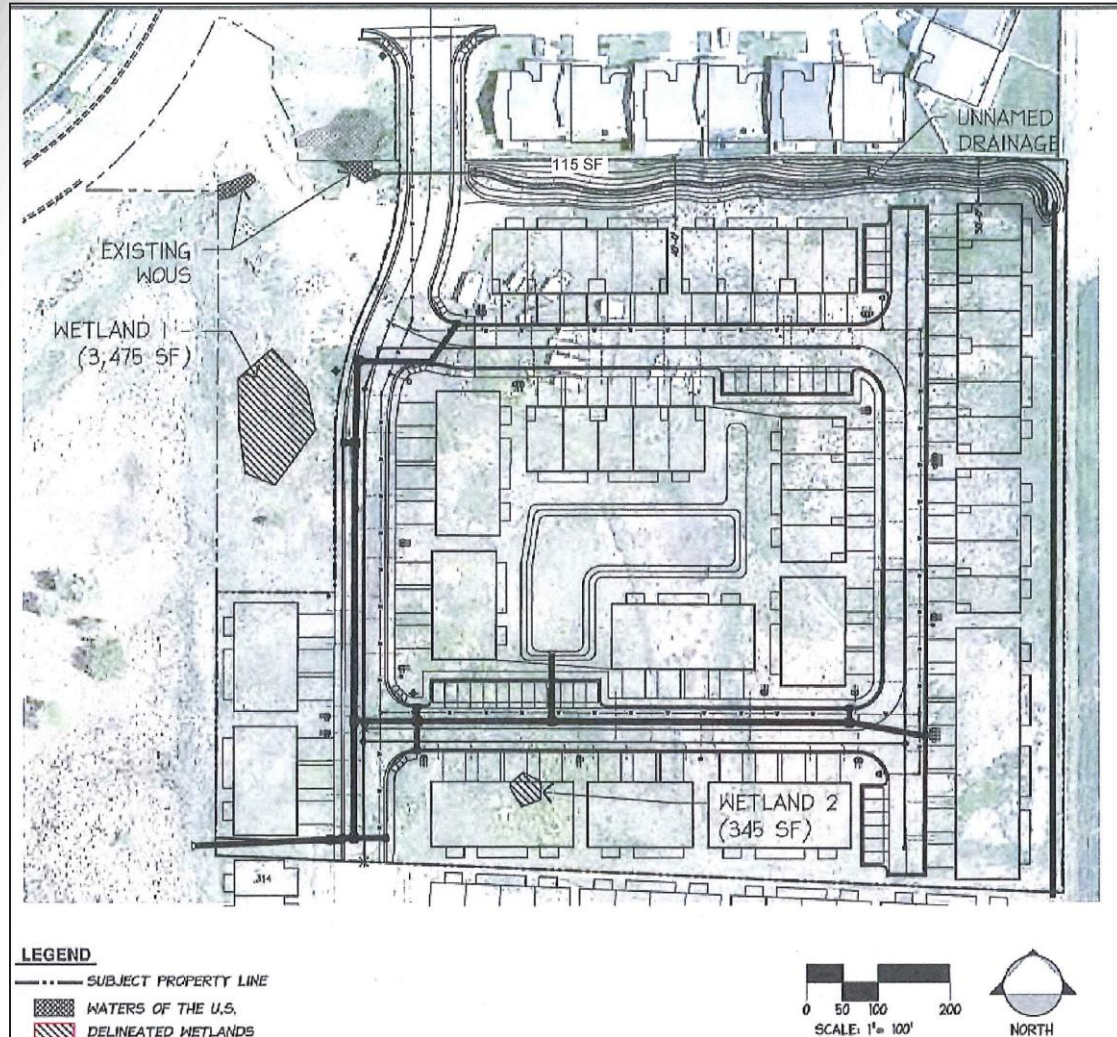


REDIRECTING SURFACE FLOW

- Dry out “downstream” by redirecting sheetflow
- Impound water/flood “upstream” of road



REDIRECTING SURFACE FLOW



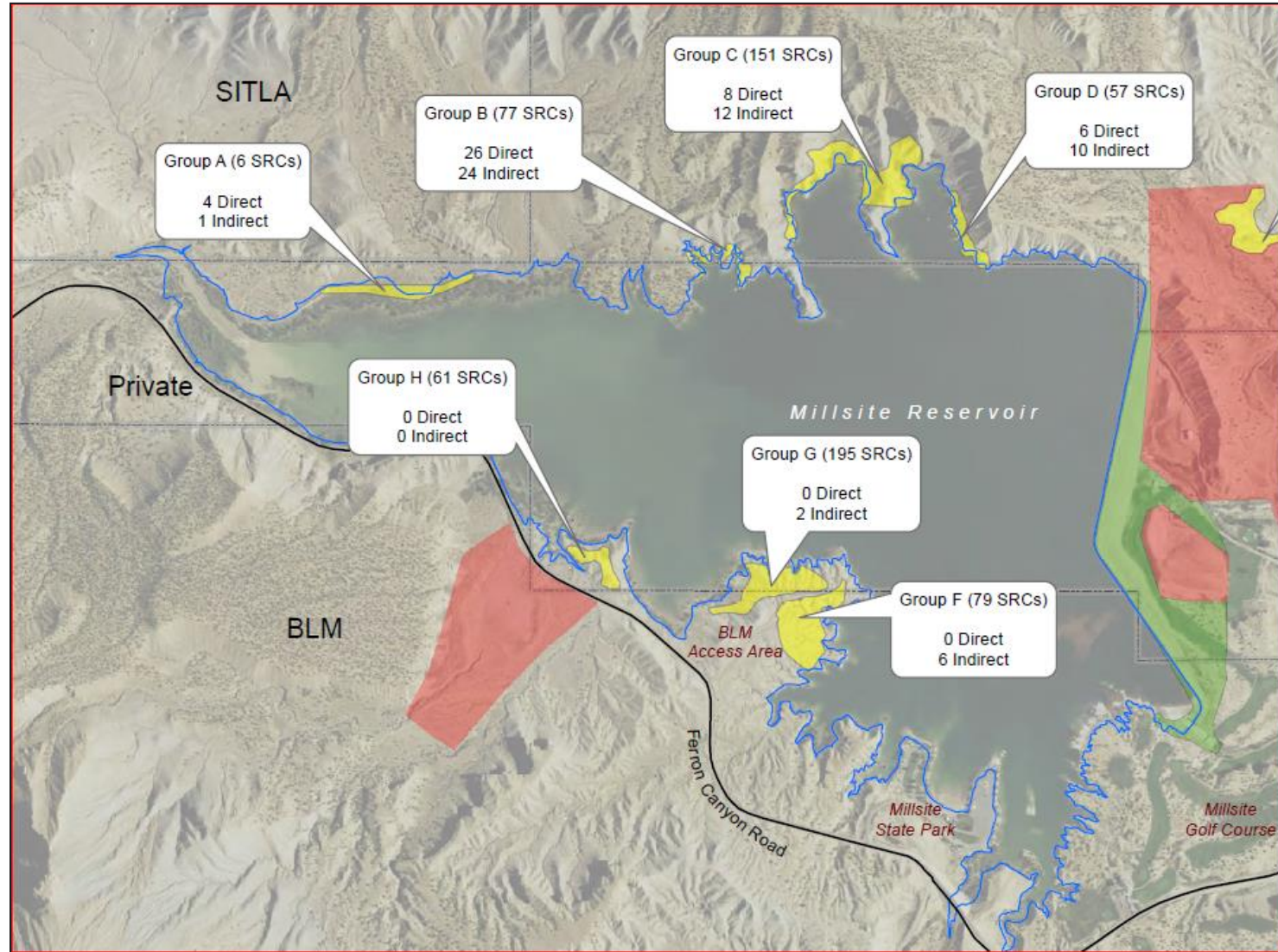


Severing hydrologic connection to downstream navigable water



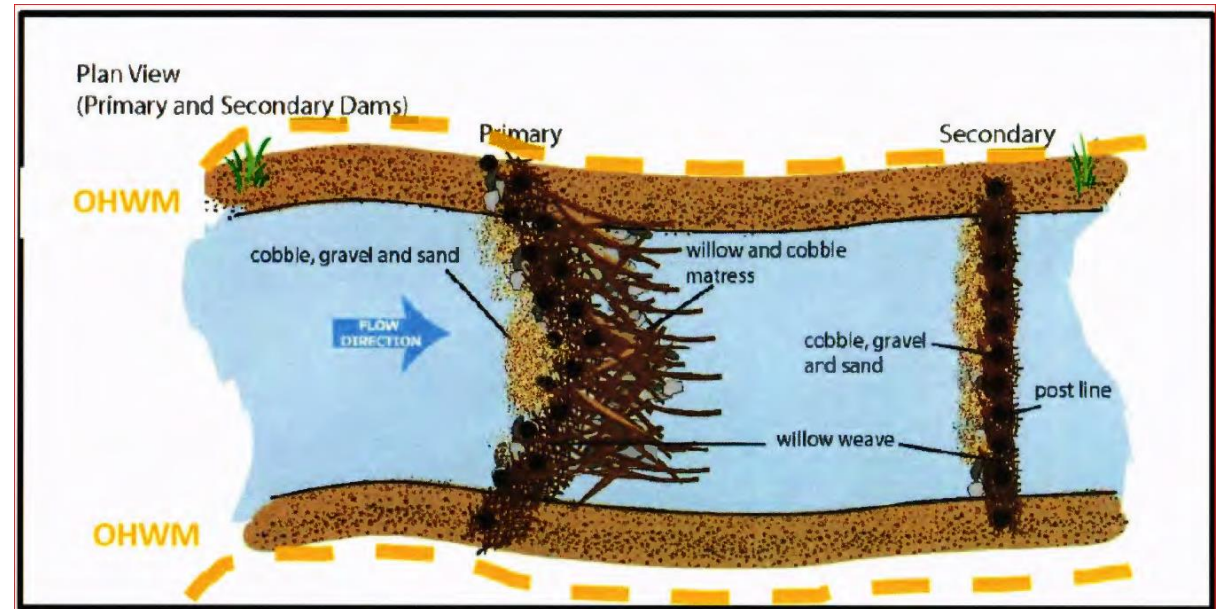
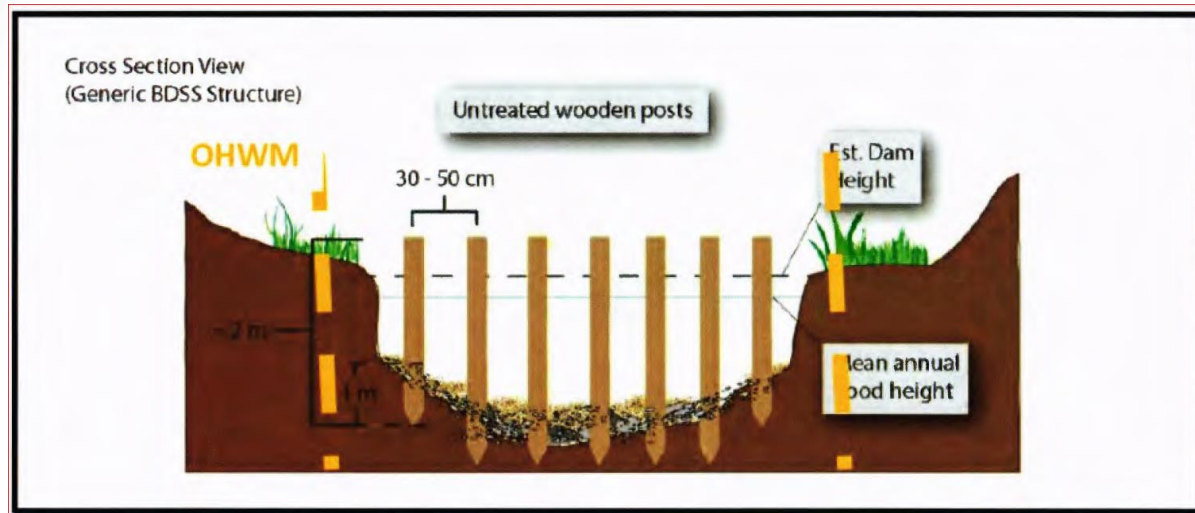
FLOODING/INUNDATION

Conversion of wetlands to open water



FLOODING/INDIRECT FILLING

When work has the “effect” of fill (example: beaver dam analogs [BDAs])



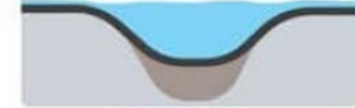
BDA EFFECTS



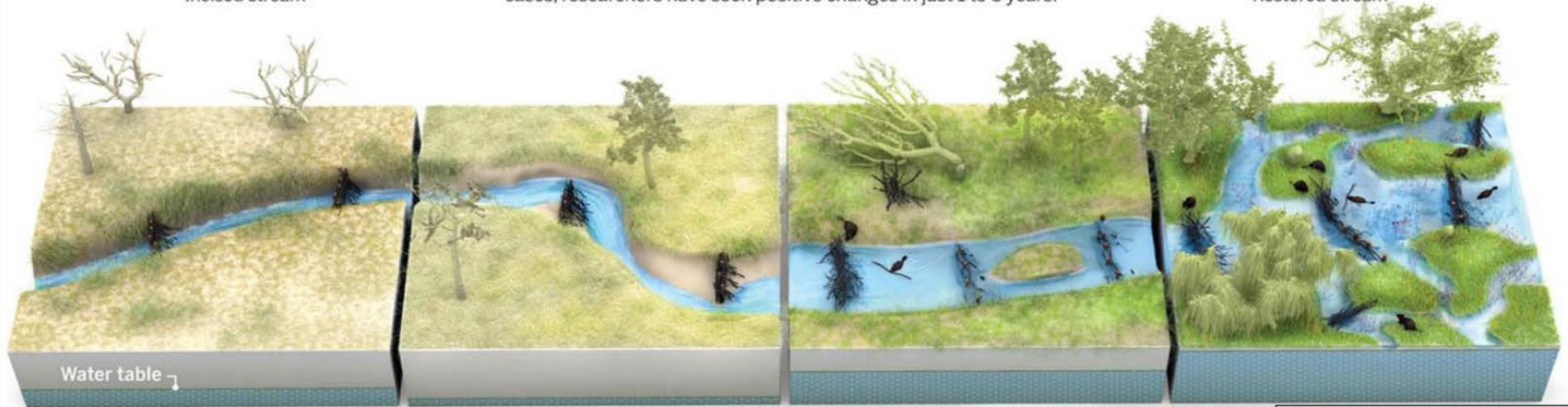
Incised stream

A stream comes back to life

Across the U.S. West, scientists and land managers are using beaver dam analogs (BDAs) to heal damaged streams, re-establish beaver populations, and aid wildlife. In some cases, researchers have seen positive changes in just 1 to 3 years.



Restored stream



UVWA (2018). "A Stream Comes Back to Life."

DEGRADATION OF FUNCTIONS

AR remains, but in a degraded state. Some functions eliminated, some degraded.



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AVOIDING/MINIMIZING INDIRECT IMPACTS



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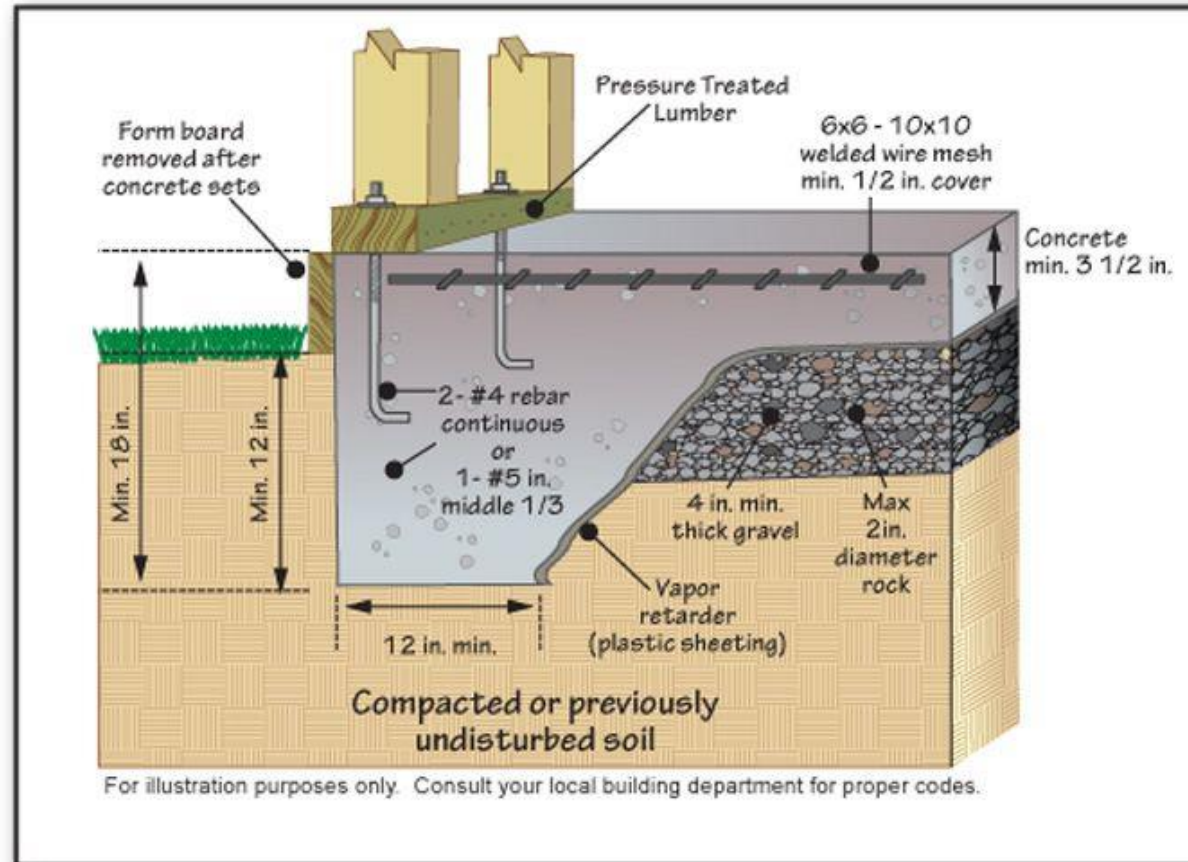
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AVOID DRAINING

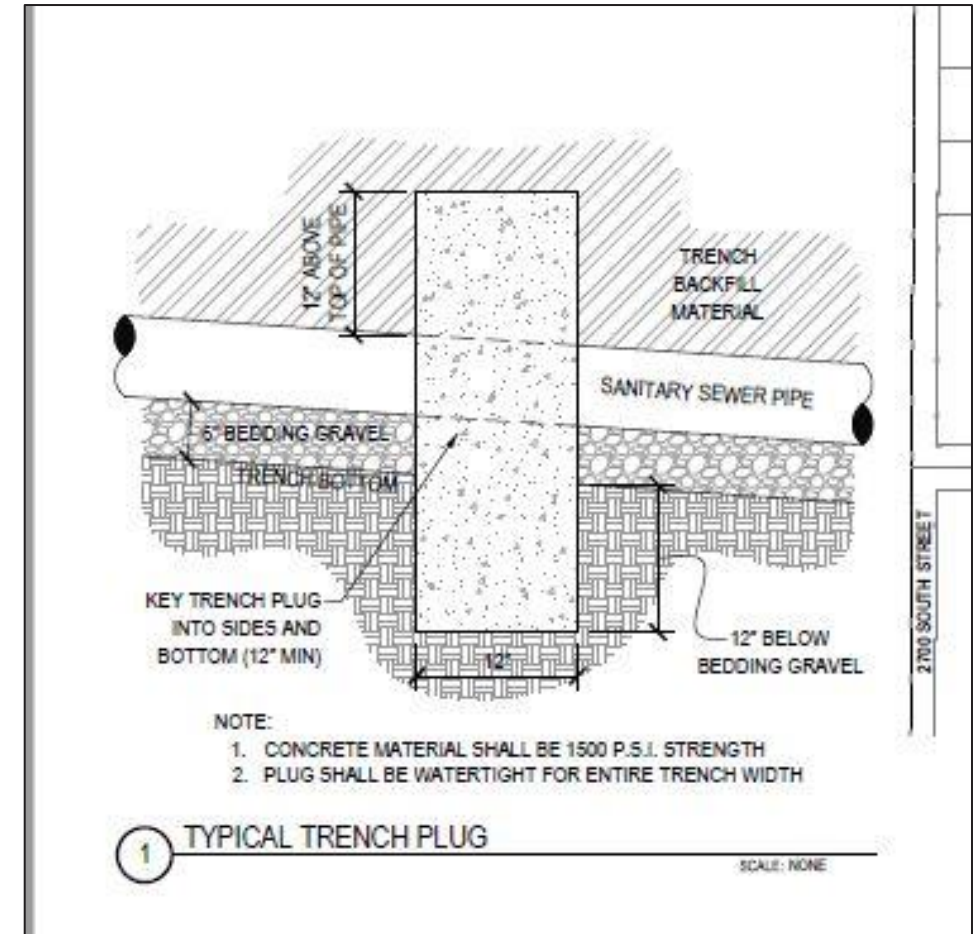
Slab on grade construction

- Eliminates need for ground drains



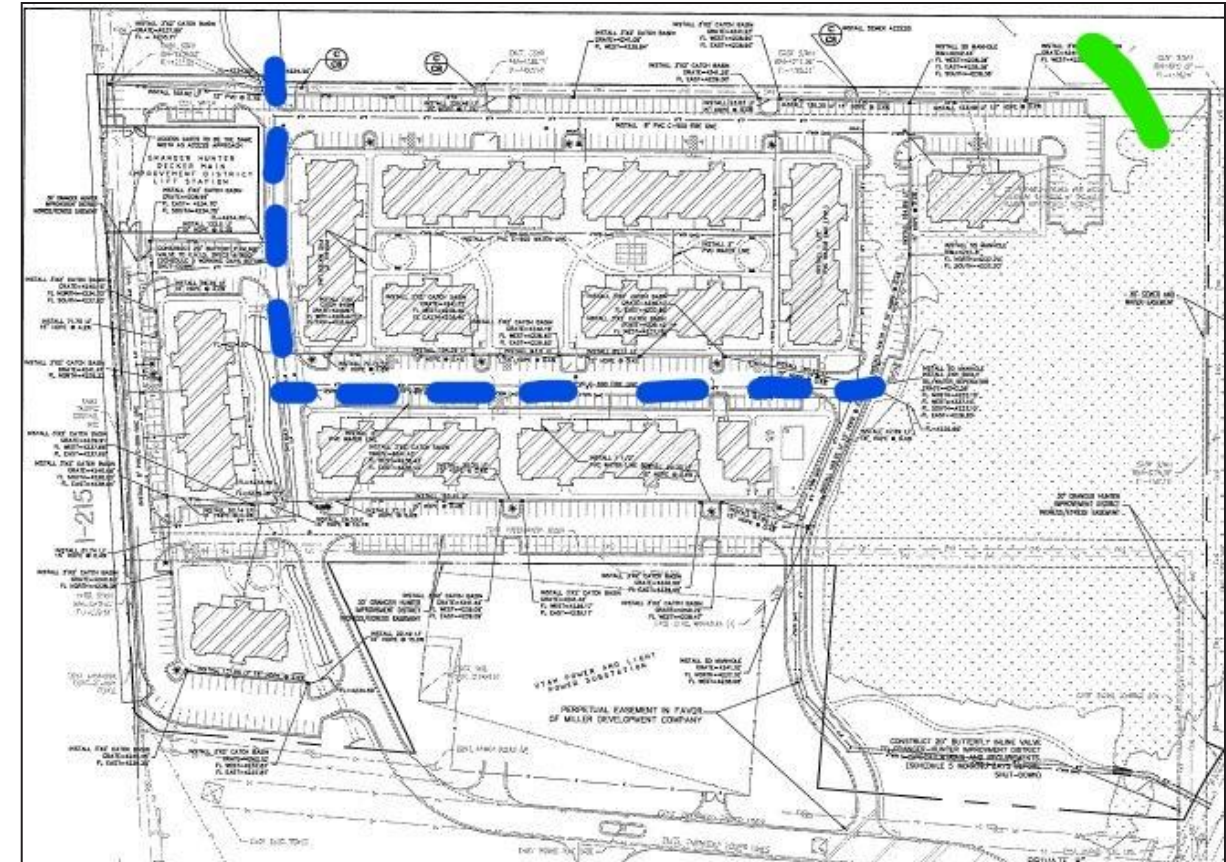
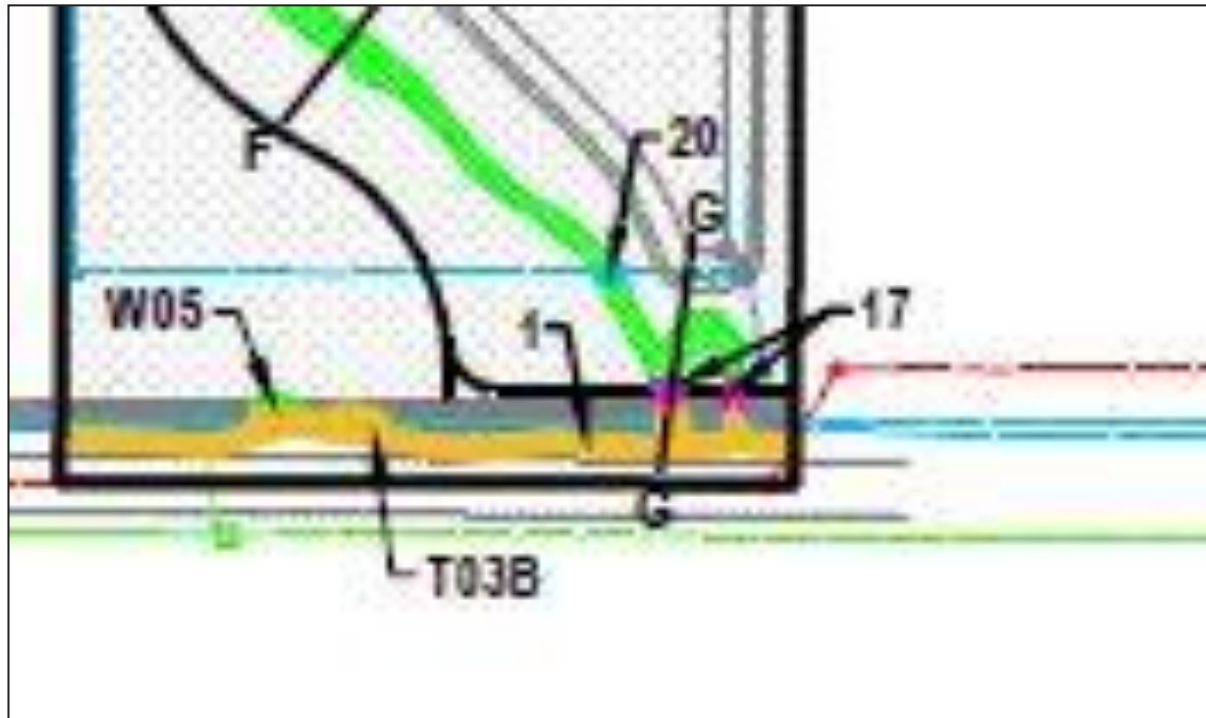
Utility line trench breaks/plugs

- Impermeable material (Clay/bentonite)



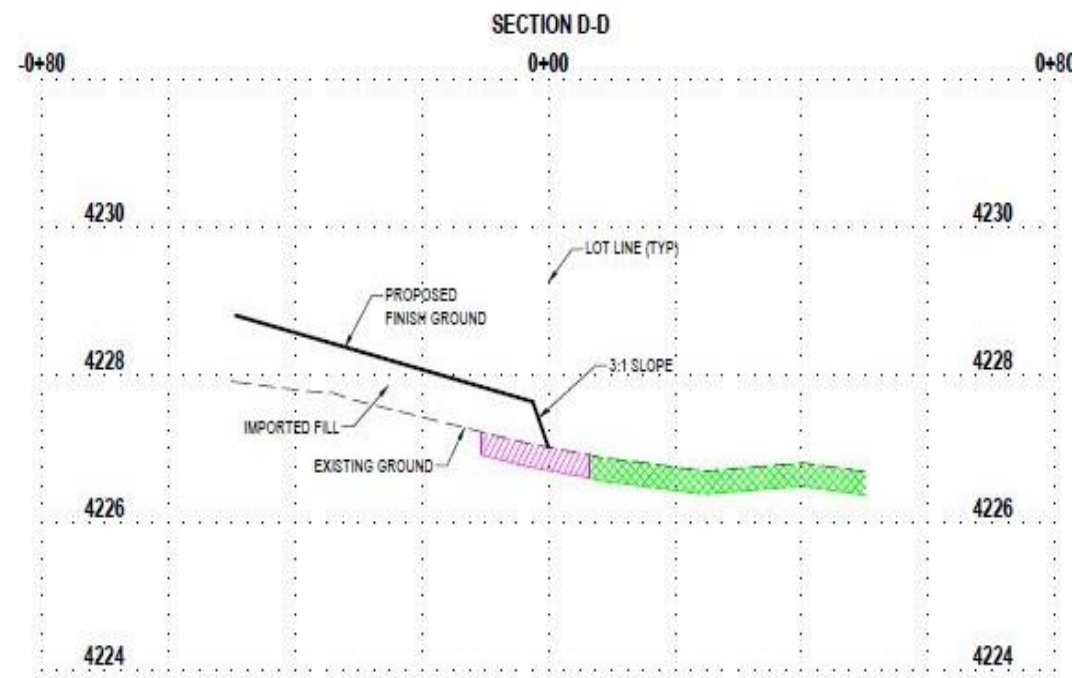
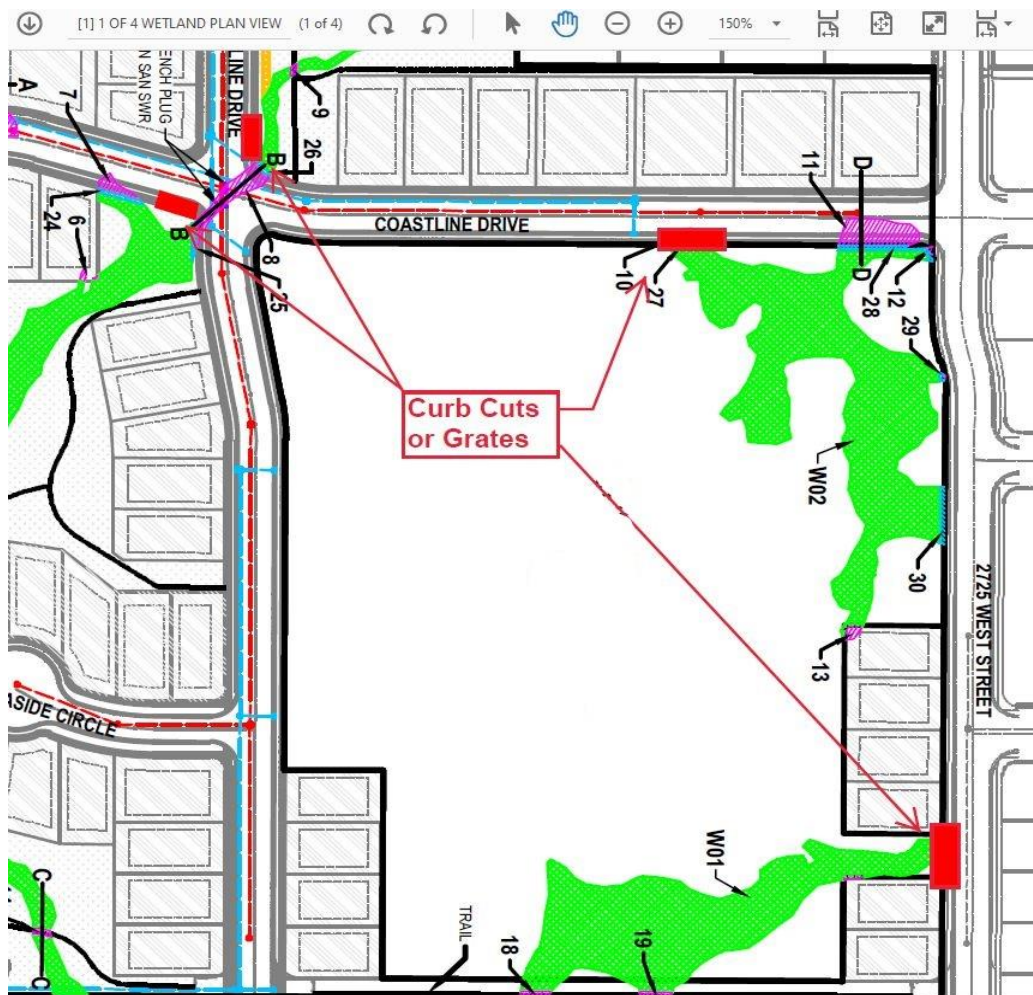
MAINTAIN DOWNSTREAM CONNECTIVITY

- Connect into storm drains
- Connect through pipes/culverts (blue)
- Recreate surface connection (green)



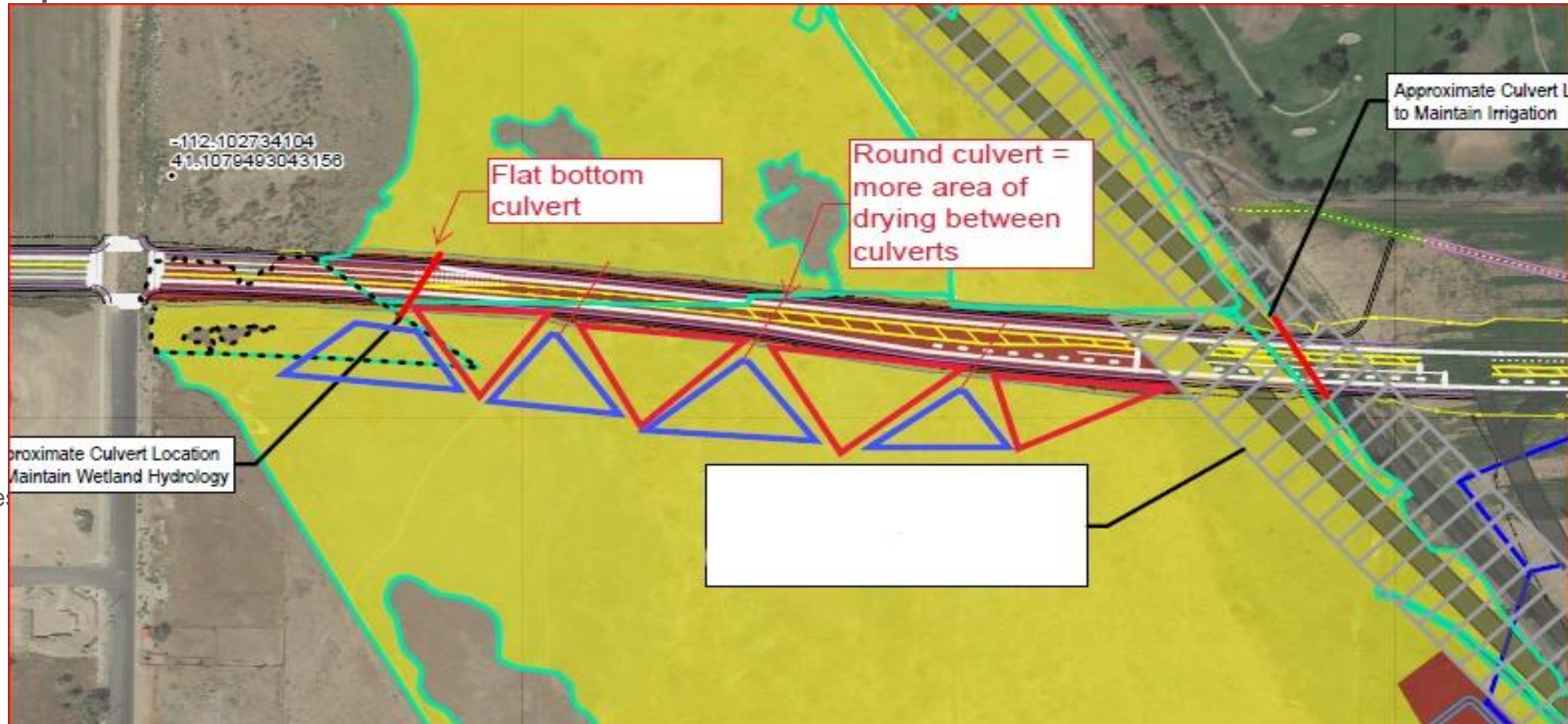
MAINTAIN SURFACE HYDROLOGY

- Curb cuts/grates direct water into open space/ARs
- Reverse grading away from roads/gutters into open space



ROADS

Install ample culverts*

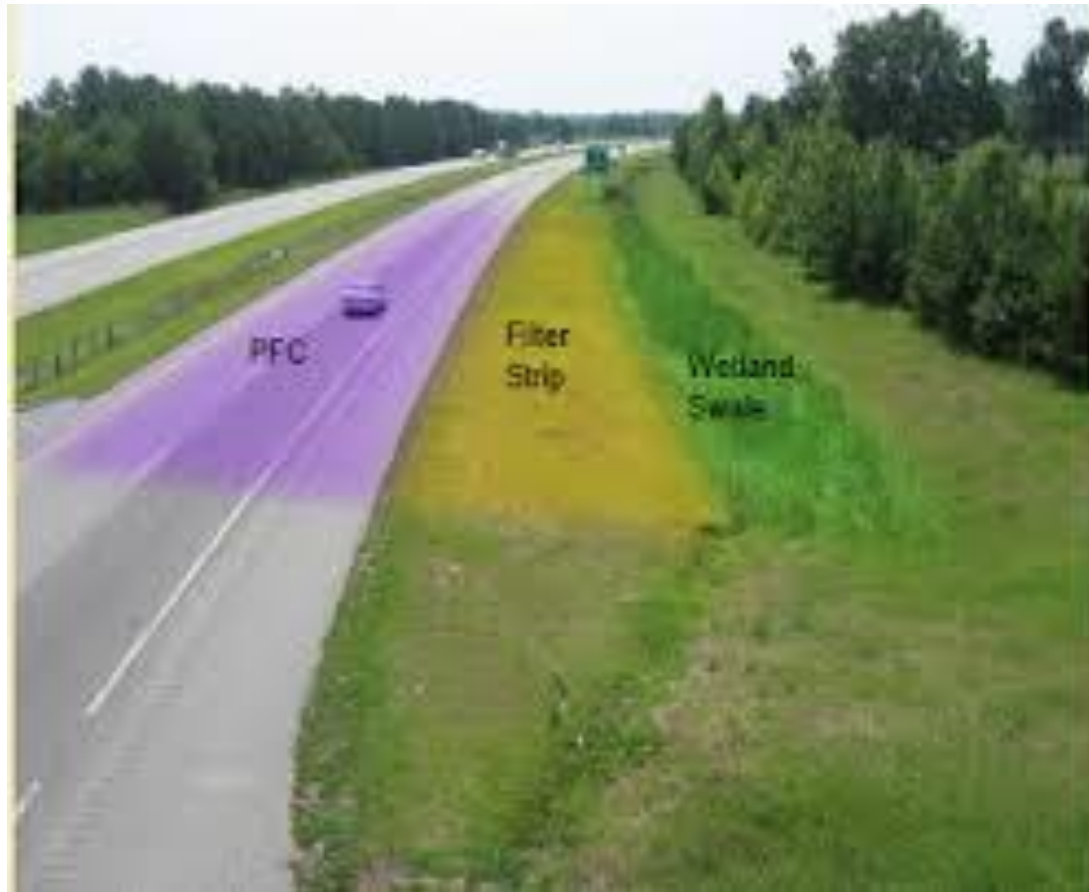


Note: Culvert de

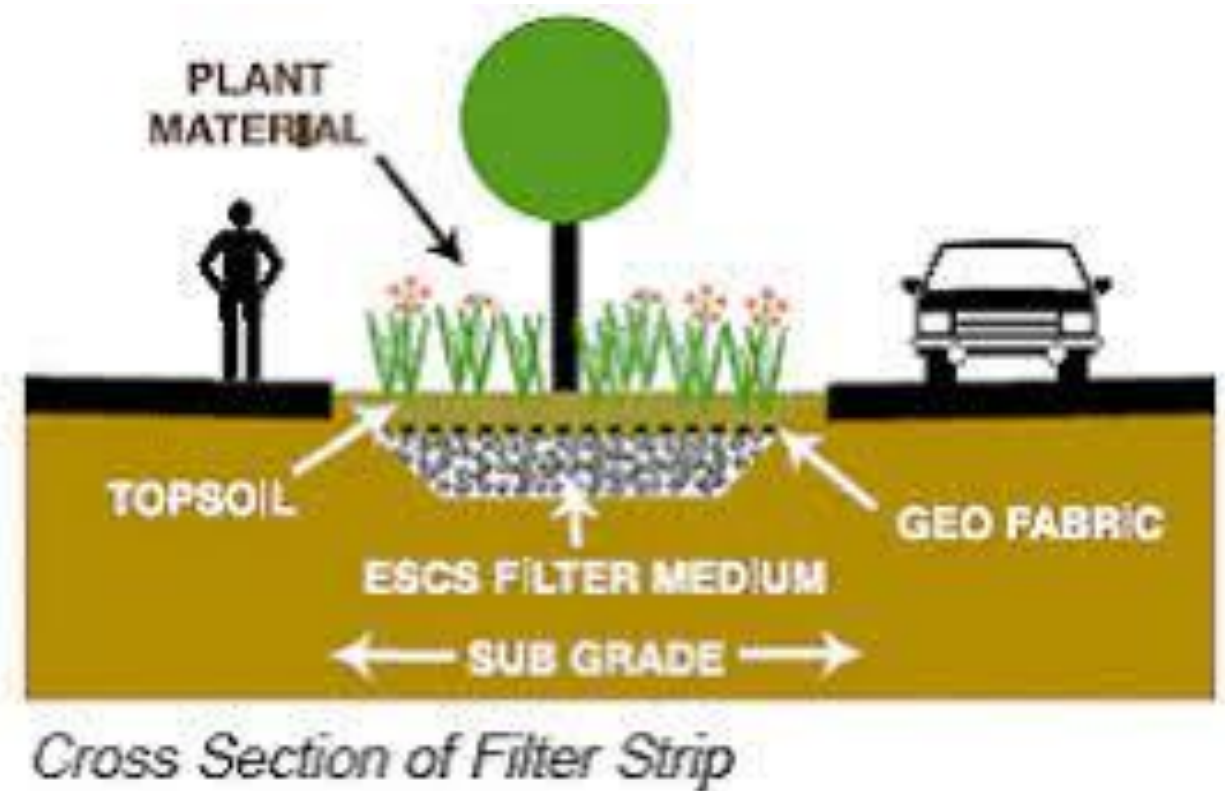
***Note:** Culvert shape can dictate sheetflow pattern

ROADS

- Use upland filter strips/bioswales
- Noise reducing pavement
- Reduce lighting

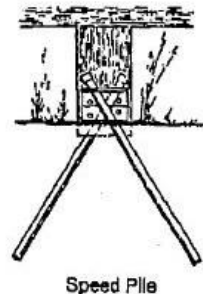
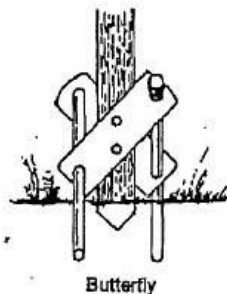
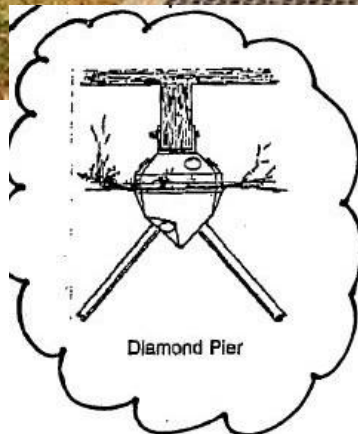
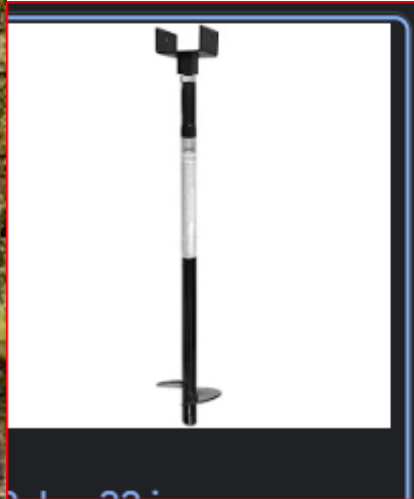


Filter medium in planter strips/medians



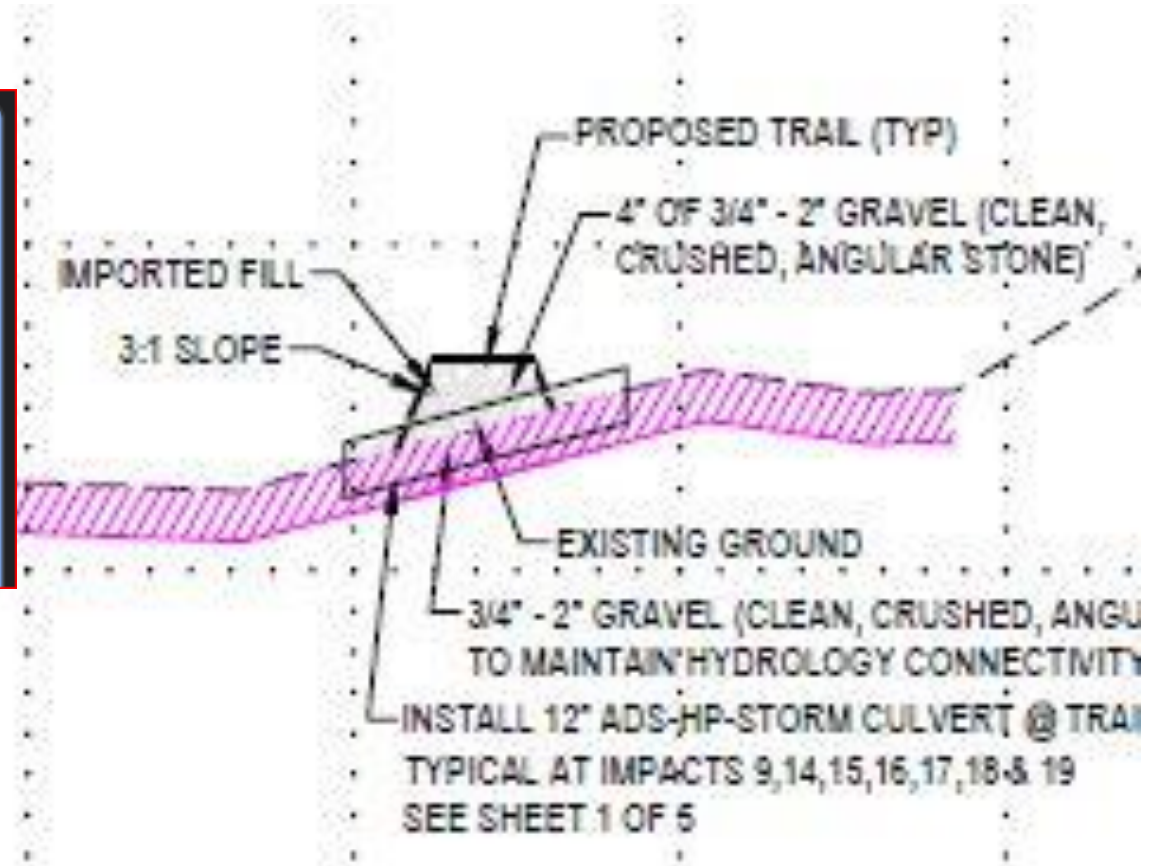
TRAILS

Construct boardwalks



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Culverts/porous substrate





QUESTIONS?



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