

# Assessing and Minimizing Indirect Impacts

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US Army Corps of Engineers  
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# Objectives

- Identify common causes of indirect effects to/loss of aquatic resources
- Identify measures to avoid/minimize these effects/losses



# Indirect Impacts

- 33 CFR 330 as amended, defined in NWPs as:

“Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.”

- Reference to direct and indirect impacts throughout the NWP rules.
- Applies equally throughout the Corps Regulatory Program



# 33 CFR 320.4

- All compensatory mitigation will be for significant resource losses which are specifically identifiable, reasonably likely to occur, and of importance to the human or aquatic environment.



# NWP Allowable Losses

- No more than 0.5 acre cumulative loss of aquatic resource is authorized by most NWPs.



# Types of Indirect Impacts

- Draining/dewatering via intercepting groundwater
- Dewatering via interruption of sheet/surface flow
- Isolating from downstream connectivity
- Degradation of functions/services



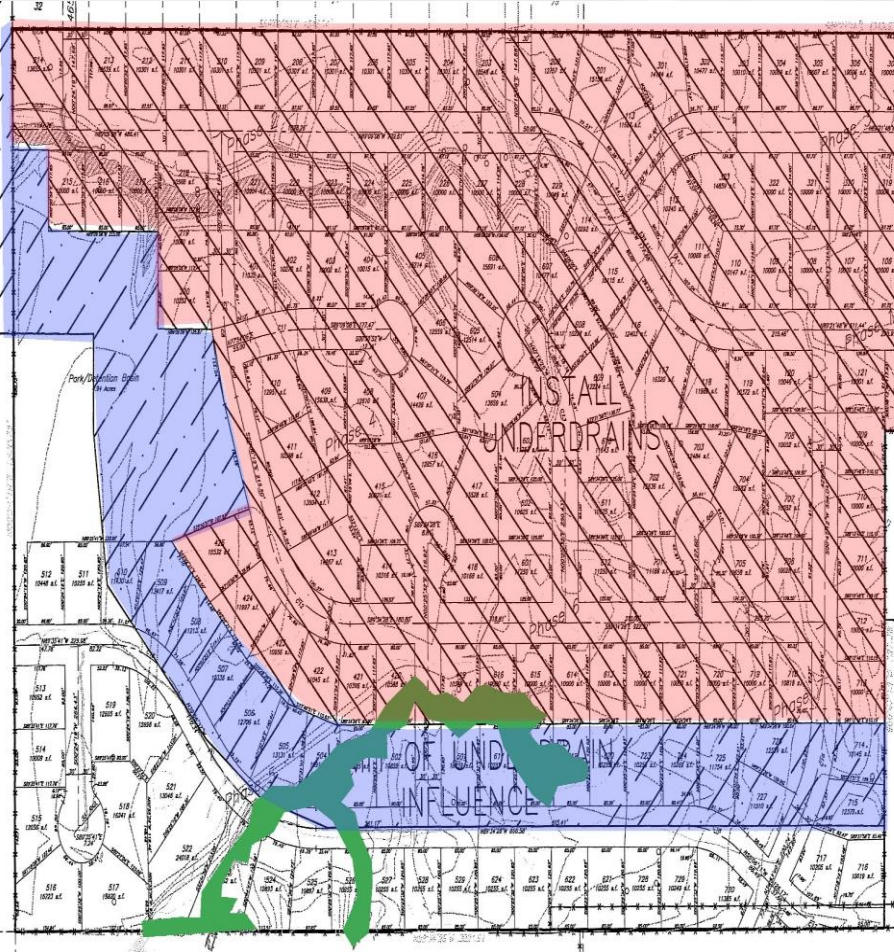
# Groundwater Interception



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# Groundwater Drains






# Off-Project Site Losses

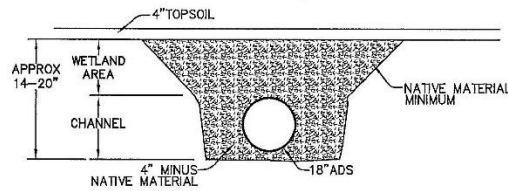
TOTAL PROJECT AREA - 205,059 sq. ft.  
4.71 acres

 WETLAND FILLED AREA - 3,154 sq. ft.  
0.07 acres

 WETLAND AREA

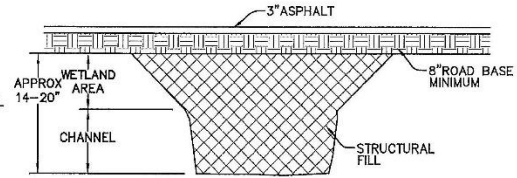
**FILL QUANTITIES:**

|                   |                  |
|-------------------|------------------|
| PAVEMENT:         | 87 CF            |
| 8" PIPE CROSSING: | 18 CF            |
| TOP SOIL:         | 2,931 CF         |
| STRUCTURAL FILL:  | 208 CF           |
| NATIVE MATERIAL:  | 10,305 CF        |
| ROAD BASE:        | 174 CF           |
| <b>TOTAL:</b>     | <b>13,721 CF</b> |



FILLED WETLAND NON PAVED AREAS

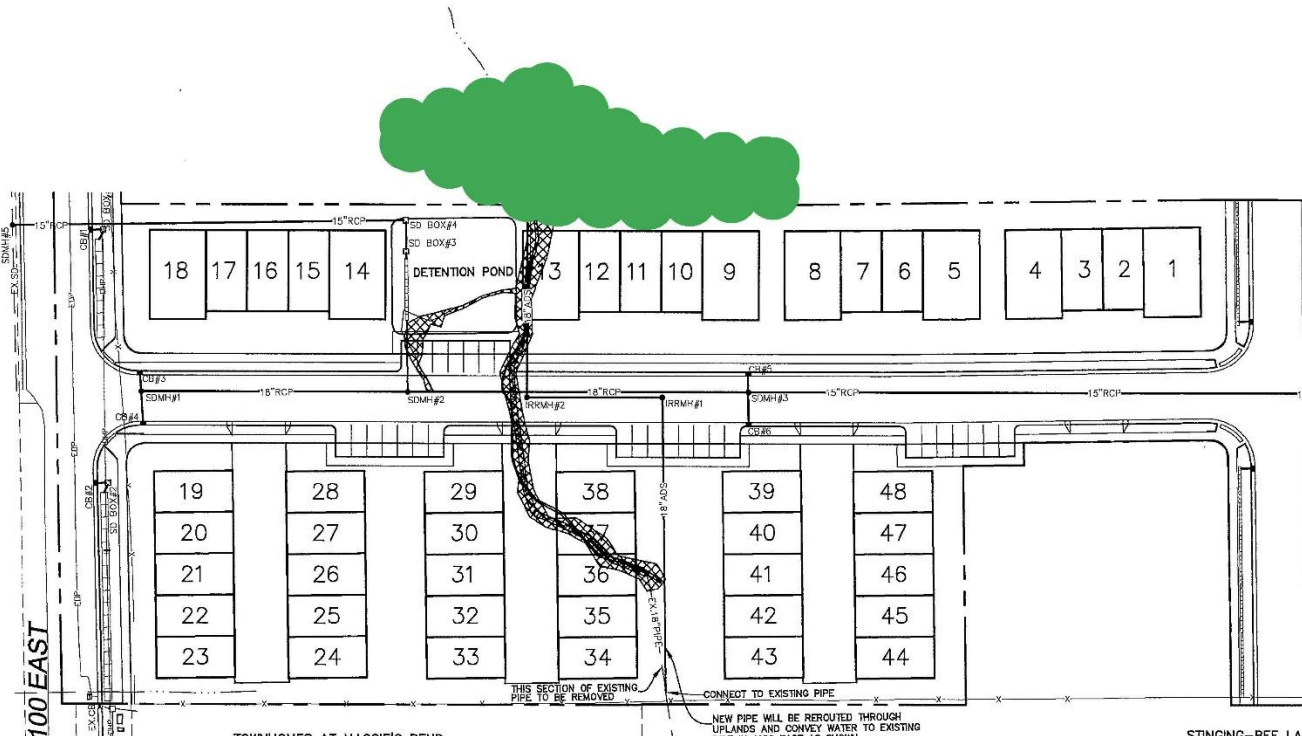
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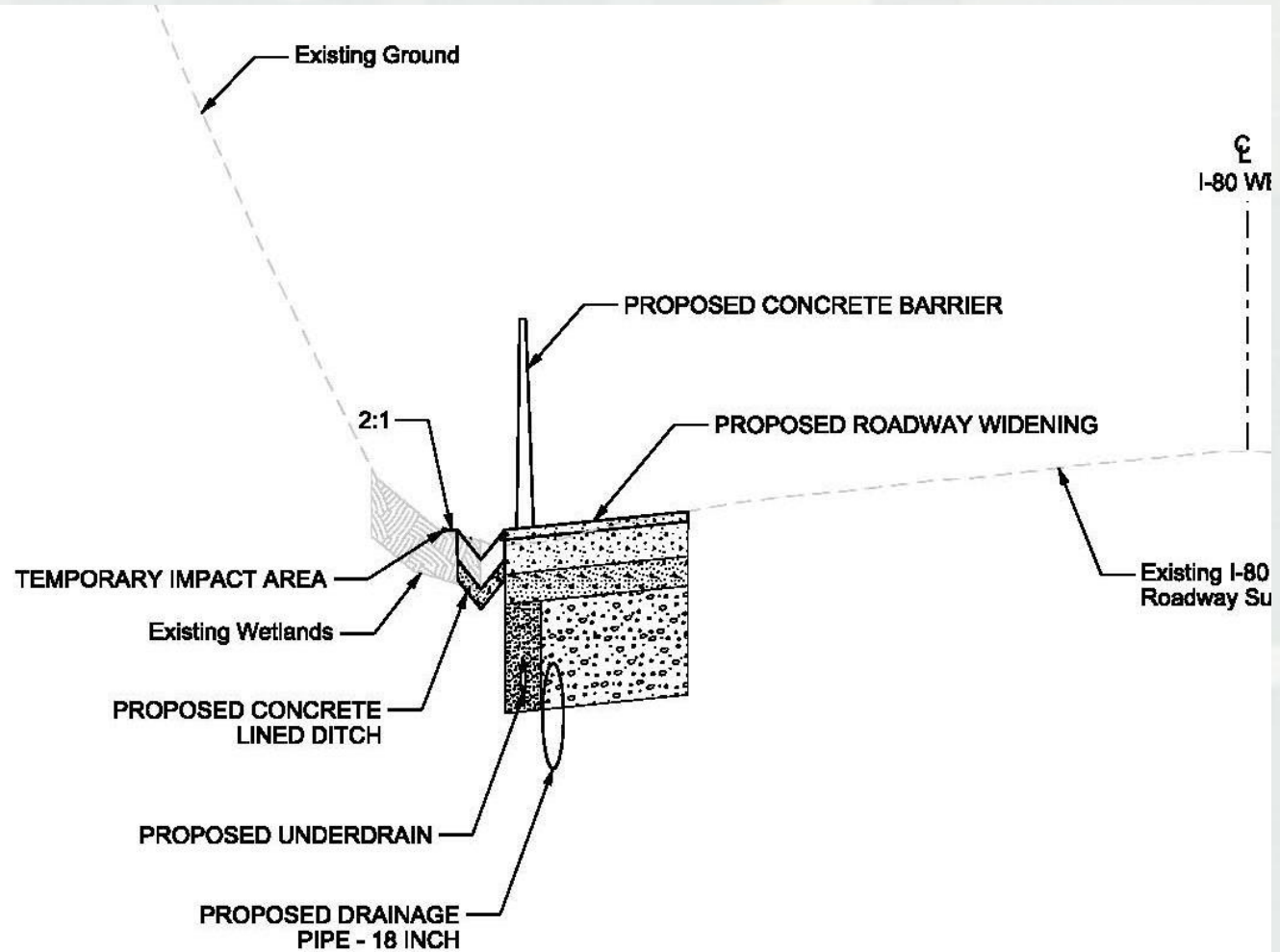
FILLED WETLAND PAVED AREAS

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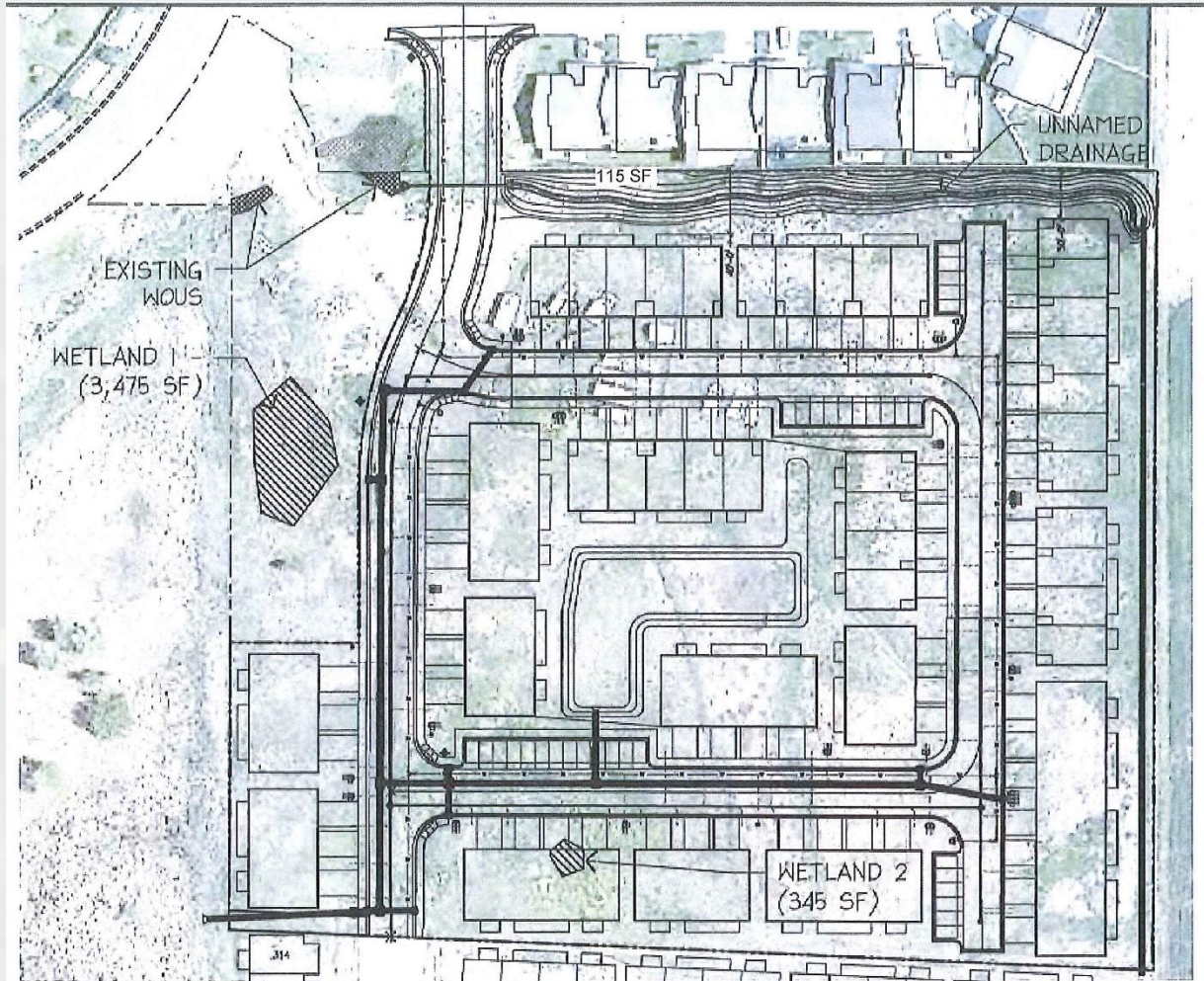
MARK A. WILSON  
27-017-0139



# Roadway Underdrains

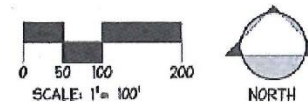


# Utility Lines

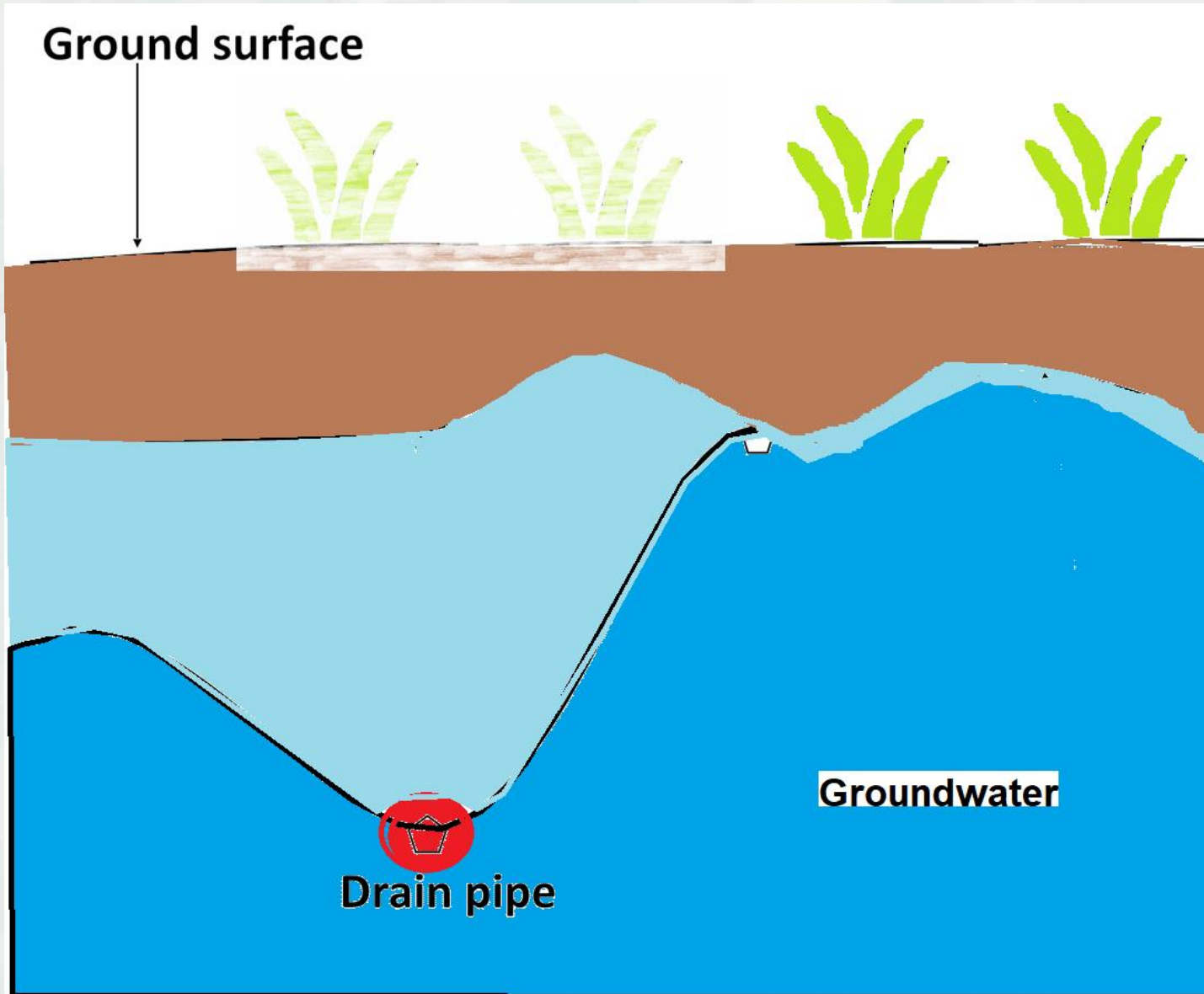


## LEGEND

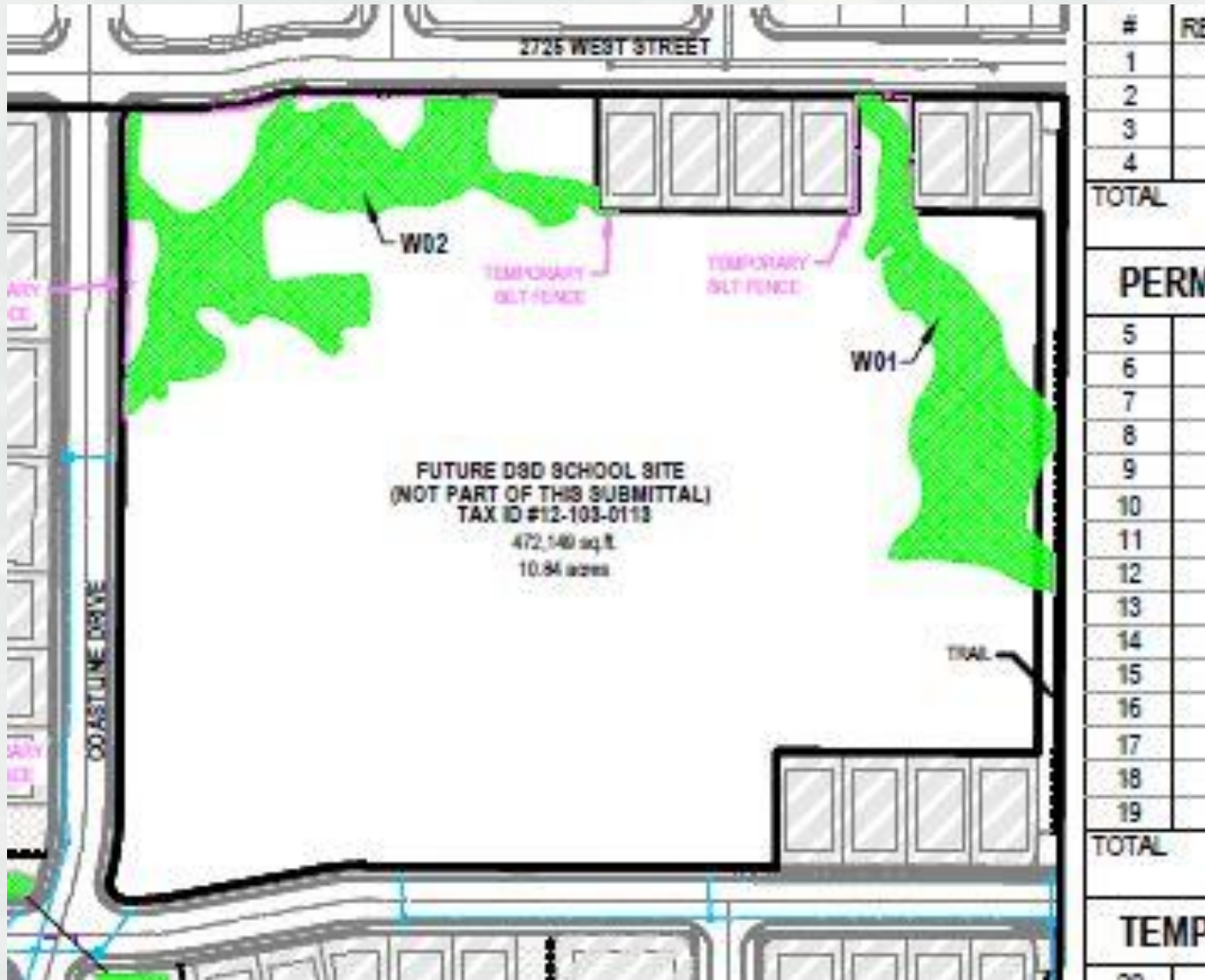
- SUBJECT PROPERTY LINE
- ▨ WATERS OF THE U.S.
- ▨ DELINEATED WETLANDS



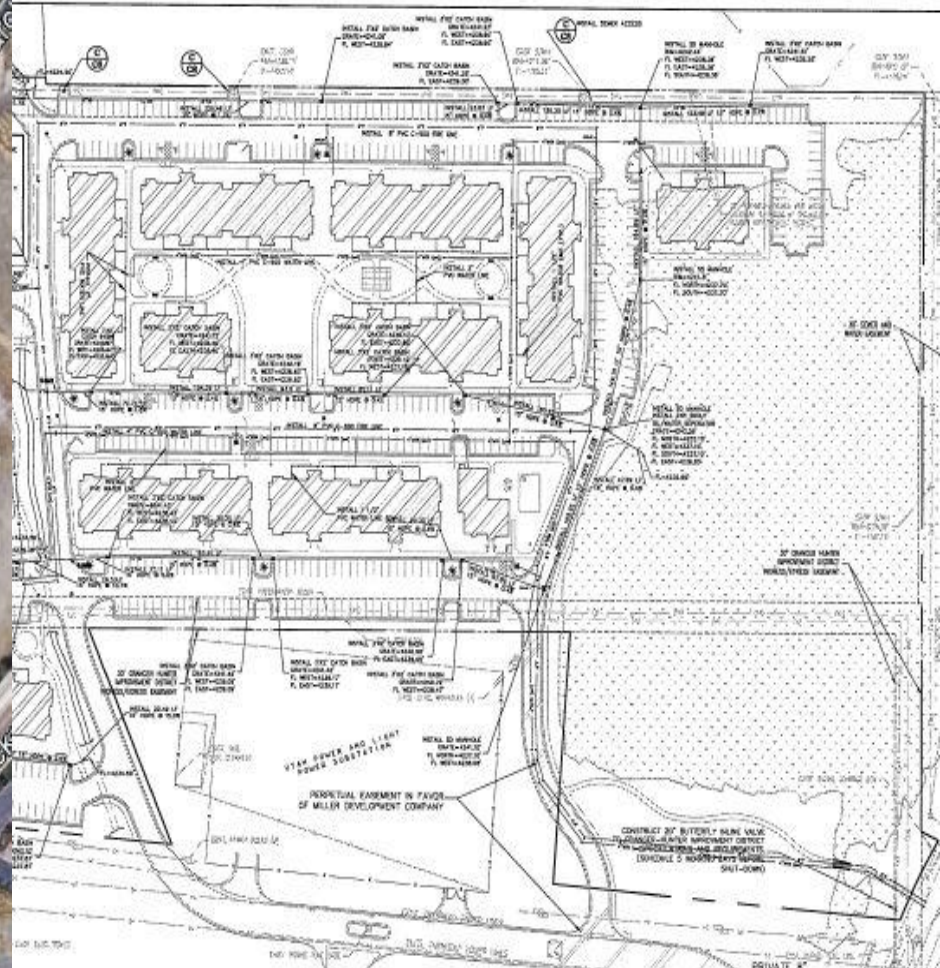
# Cone of Depression Effect



# Interruption of Surface Flow



# Isolating Downstream Connection



# Degrading Functions/Services



# Options to Avoid/Minimize Indirect Impacts



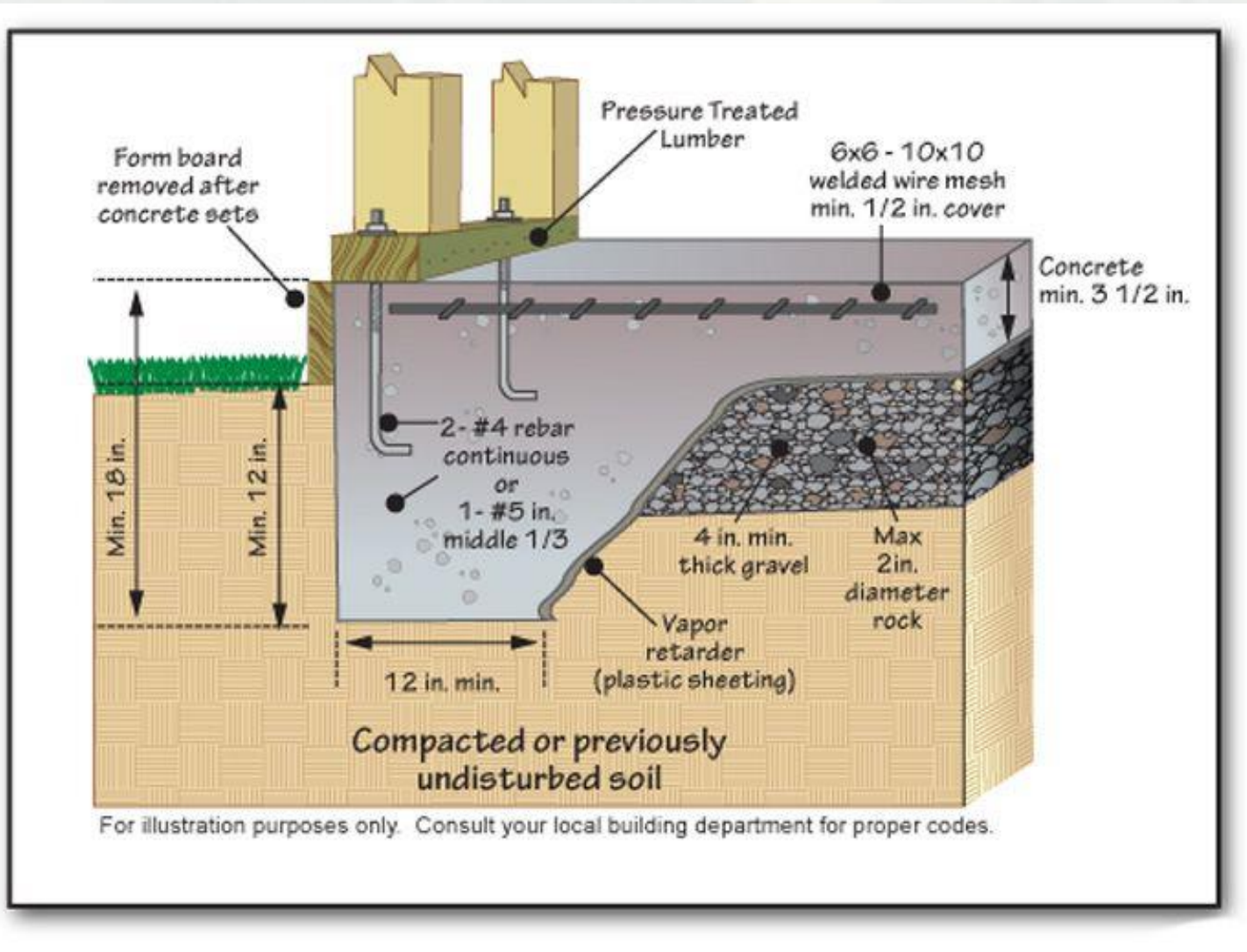


# Options

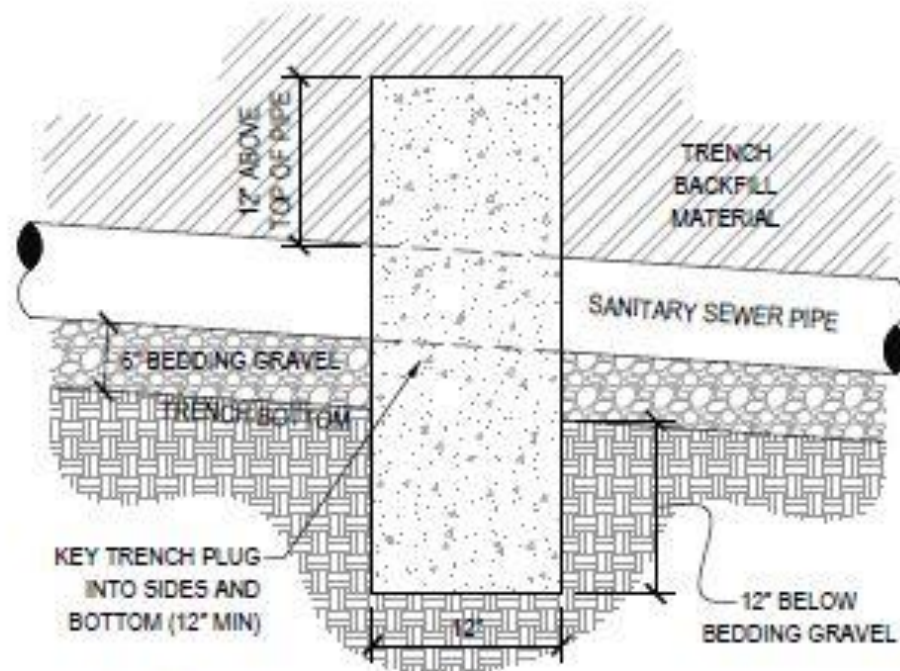
- Slab on grade construction
  - ▶ No land/perimeter drains
- Add utility line trench plugs/breaks
  - ▶ Impermeable clay/bentonite
- Re-direct runoff to ARs
  - ▶ Grade development towards ARs/open space
  - ▶ Curb cuts/drainage grates
- Maintain downstream connectivity
  - ▶ Construct boardwalks
- Use buffer/filter strips



# Slab-on-Grade Construction



# Utility Line Trench Plugs/Breaks



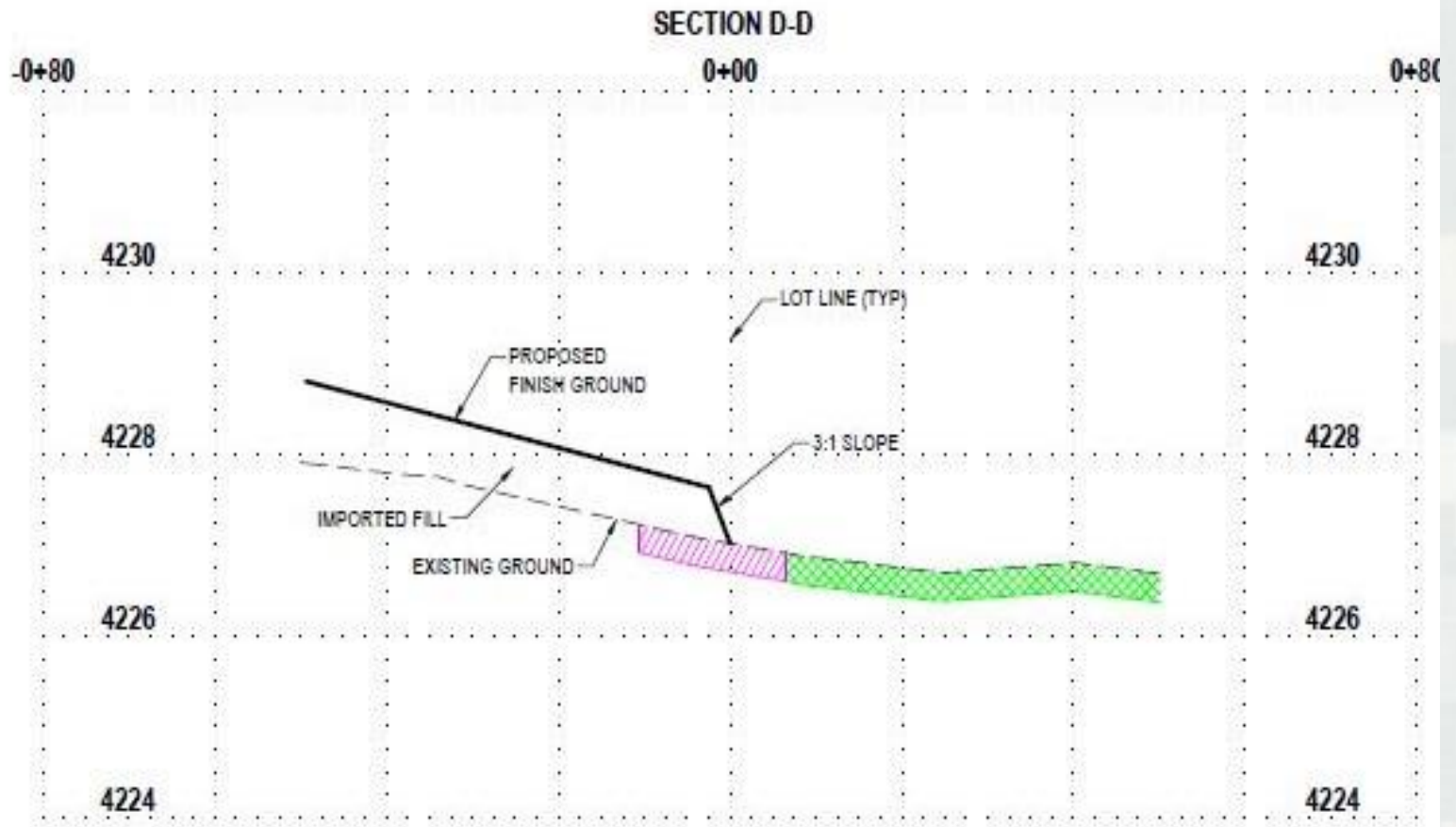
NOTE:

1. CONCRETE MATERIAL SHALL BE 1500 P.S.I. STRENGTH
2. PLUG SHALL BE WATERTIGHT FOR ENTIRE TRENCH WIDTH

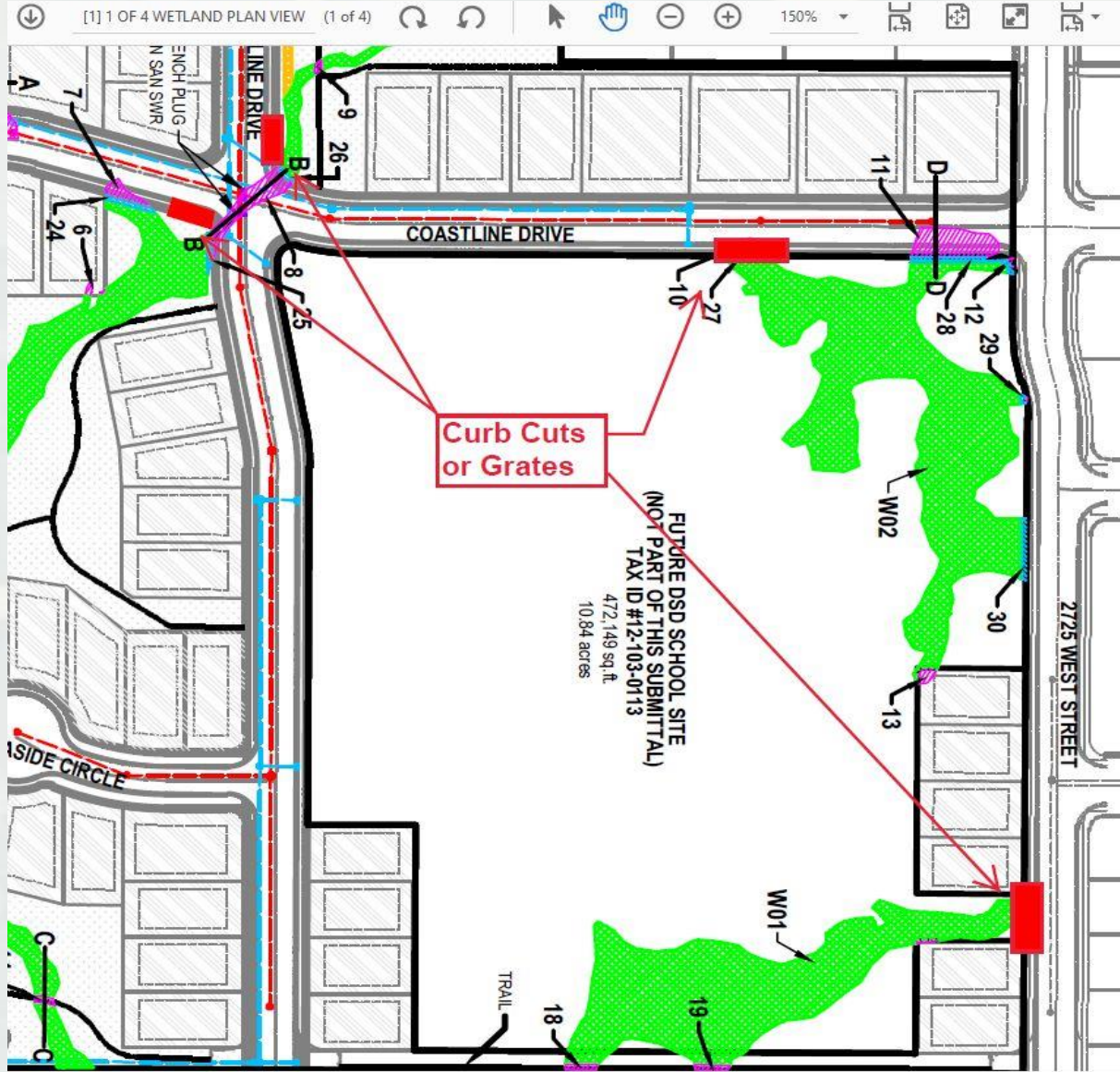
1 TYPICAL TRENCH PLUG

SCALE: NONE

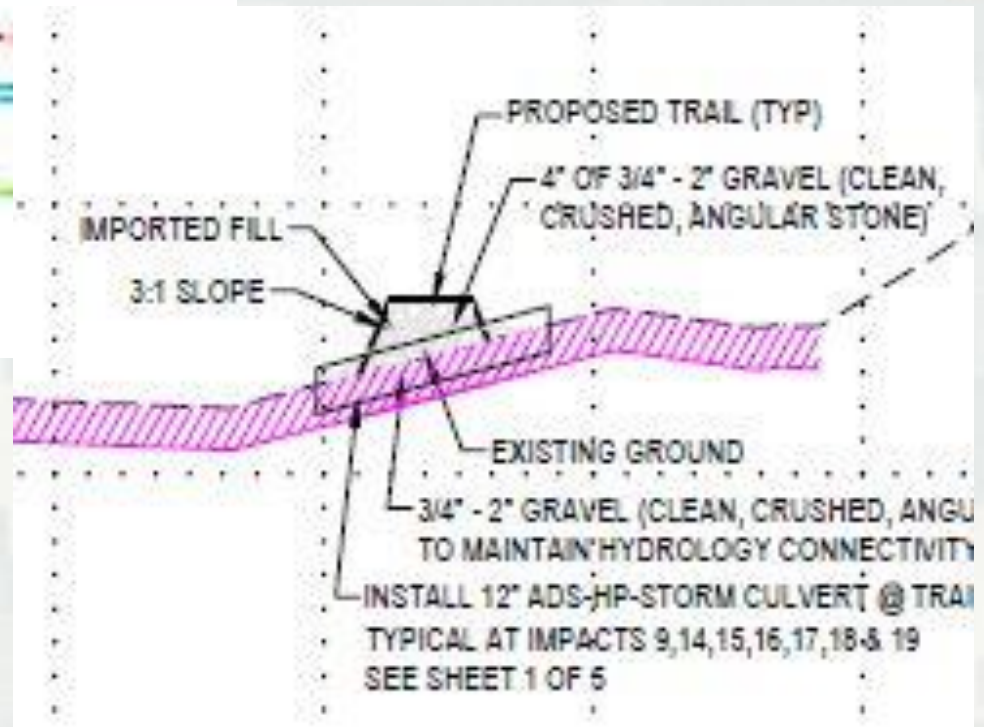
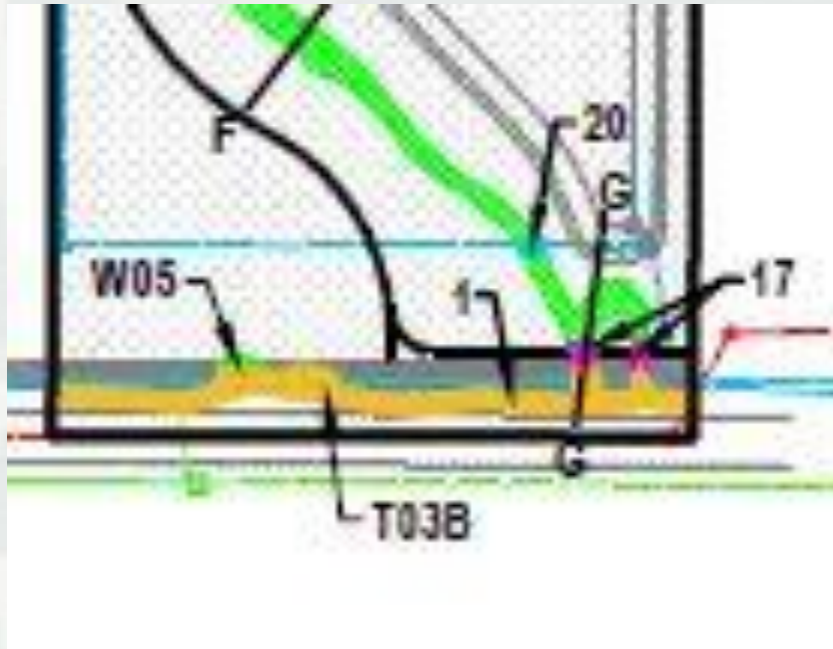
# Re-direct Stormwater



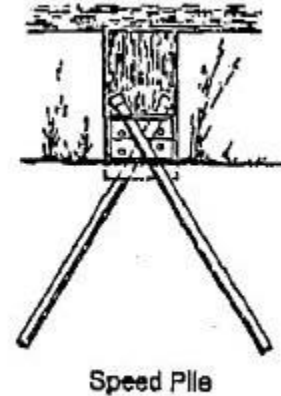
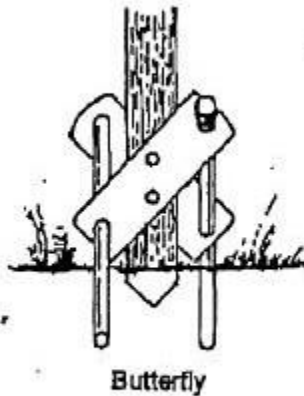
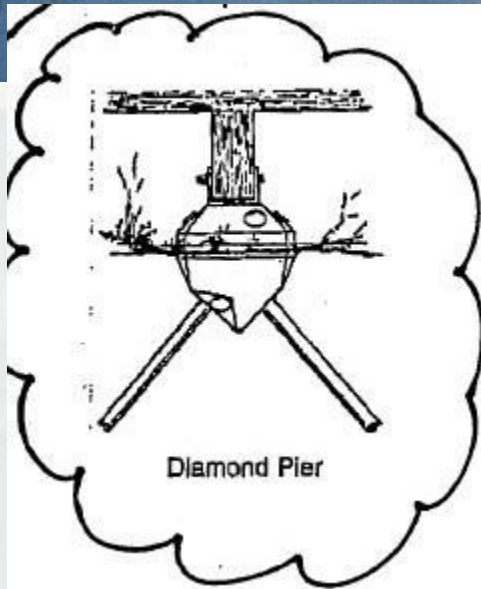
# Re-direct Stormwater



# Maintain Downstream Connection

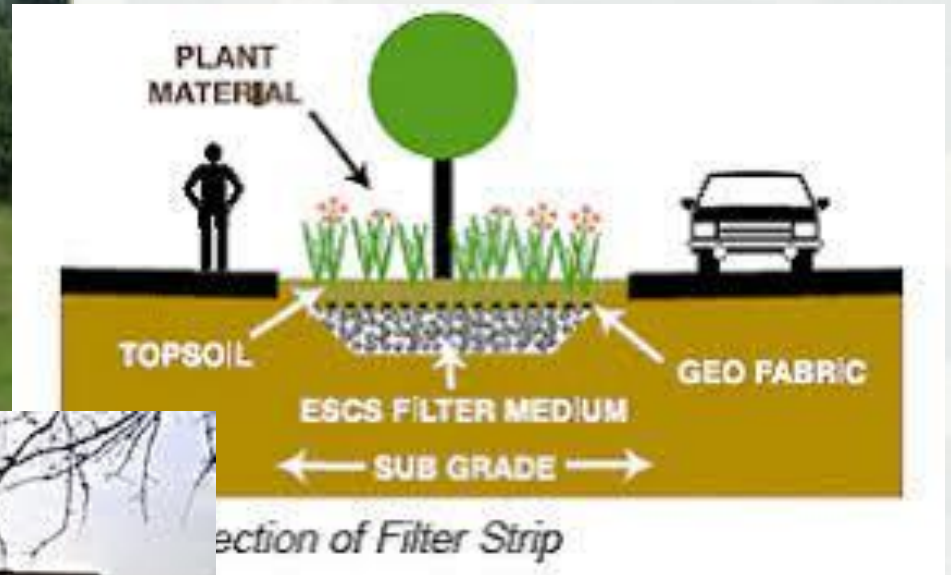


# Construct Boardwalks



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# Buffer/Filter Strips





# Questions?



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# Thank You

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## **Web Page:**

<http://www.spk.usace.army.mil/Missions/Regulatory.aspx>



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