Vegetated Filter Strip

- L&D Vol. 2 Section 1117.2.1
- Provides quality treatment only
Vegetated Filter Strip Treatment Processes
Design Process

- Treatment Goals
- Siting Analysis
- Veg. Filter Strip Sizing
- Other Considerations
Design Process

- Treatment Goals
- Siting Analysis
- Veg. Filter Strip Sizing
- Other Considerations
Project Example

- I-70 improvements in Columbus
- Add 4th lane near ramps
- Improve shoulders
- All within existing right-of-way
Project Example

- Project EDA = 32.5 ac
- All within existing right-of-way
- $A_{ix} = 32.5$ ac; $A_{in} = 0.0$ ac
- $T\% = \frac{[A_{ix} \times 20] + [A_{in} \times 100]}{A_{ix} + A_{in}}$
- $T\% = \frac{[32.5 \times 20] + [0.0 \times 100]}{32.5 + 0}$
- $T\% = 20\%$
- $20\% \times 32.5$ ac = 6.5 ac
Project Example

- Project EDA = 32.5 ac >= 1 ac
- Need a post-construction BMP
- All redevelopment
  - Need to treat 6.5 ac (20%)
- All in existing right-of-way
  - All existing right-of-way considered impervious
  - Therefore no “new impervious area in new permanent right-of-way”
  - Water quality treatment only required
Design Process

- Treatment Goals
- Siting Analysis
- Veg. Filter Strip Sizing
- Other Considerations
Siting Analysis

- Filter strips are 15 – 25 feet wide
- Filter strips are either 3:1 or 6:1 or flatter
- Look for long strips of grassy area next to the road that don’t go directly into a ditch
- Must sheet flow off of road
- No concentrated flow
Siting Analysis
Design Process

- Treatment Goals
- Siting Analysis
- Veg. Filter Strip Sizing
- Other Considerations
Vegetated Filter Strip Sizing

**Treatment credit:**

- “equal to the area of the roadway contributing to the slope and the area of the slope”
- Filter strip “measured along the vegetated slope beginning at the vegetation and ending at the inside edge of the ditch bottom”
Vegetated Filter Strip Sizing
### Vegetated Filter Strip Sizing

<table>
<thead>
<tr>
<th>Maximum Pavement Width (ft.)</th>
<th>Slope (H:V)</th>
<th>Filter Strip Width (ft. minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>3:1 and flatter</td>
<td>15</td>
</tr>
<tr>
<td>24</td>
<td>3:1 and flatter</td>
<td>17</td>
</tr>
<tr>
<td>26</td>
<td>3:1 and flatter</td>
<td>18.5</td>
</tr>
<tr>
<td>28</td>
<td>3:1 and flatter</td>
<td>20.5</td>
</tr>
<tr>
<td>30</td>
<td>3:1 and flatter</td>
<td>22</td>
</tr>
<tr>
<td>32</td>
<td>3:1 and flatter</td>
<td>24</td>
</tr>
<tr>
<td>34</td>
<td>3:1 and flatter</td>
<td>25</td>
</tr>
<tr>
<td>48</td>
<td>6:1 and flatter</td>
<td>25</td>
</tr>
</tbody>
</table>
Vegetated Filter Strip Sizing

Typical cross section:
### Vegetated Filter Strip Sizing

- 12ft + 12ft + 12ft = 36ft
- 36 > 34

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<tr>
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- 25ft strip at 6:1 slope or flatter
Vegetated Filter Strip Sizing
Vegetated Filter Strip Sizing

Treatment requirement = 6.5 ac

Treatment credit

(36 ft pavement + 2 ft gravel/grass + 25 ft filter strip) * length = 63 ft wide * length

Required length of filter strip:

6.5 ac * 43,560 SF/ac = 283,140 SF

283,140 SF / 63 ft = required length

Length = 4,494 ft
Design Process

- Treatment Goals
- Siting Analysis
- Veg. Filter Strip Sizing
- Other Considerations
Vegetated Filter Considerations

- No concentrated flow
- No ditch flow
- Add 4” of Item 659 topsoil
- Add Item 670, Slope Erosion Protection
- At least 70% vegetative cover
- No gullies or rills

Show in the Plans
Sample Plan Note

W104 **VEGETATED FILTER STRIP**

This plan utilizes vegetated filter strip(s) for post construction storm water treatment. Place either item 660 sodding or item 659 seeding and mulching with a 4-inch lift of topsoil and item 670, slope erosion protection to all disturbed areas designated as vegetated filter strips, the edge of shoulder, and the foreslope as specified in the plans.

Designer Note: Use this plan note on all projects that have vegetated filter strips identified in the plan. Pay for grass planting and topsoil as item 659 or item 660 and include with quantities for the rest of the project. Pay for erosion control mat as item 670, slope erosion protection and include with quantities for the rest of the project.
Vegetated Filter Strip Sizing

### Table 1117-3

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Can make VFS width wider, down to bottom of foreslope at inside edge of ditch or edge of R/W
If the R/W fence were further down the hill, we could have made the VFS wider.
# BMP Calcs Spreadsheet

**Ohio Department of Transportation - Office of Hydraulic Engineering**

**Post-Construction BMP Calculation Spreadsheet**

## Vegetated Filter Strip

<table>
<thead>
<tr>
<th>Filter Strip</th>
<th>Route</th>
<th>Begin Station</th>
<th>End Station</th>
<th>Side</th>
<th>Pavement Width (FT)</th>
<th>Filter Strip Width (FT)</th>
<th>Filter Strip Slope (z:1)</th>
<th>Filter Strip Length (FT)</th>
<th>Tributary Area in ODOT R/W (acres)</th>
<th>Filter Strip Area (SF)</th>
<th>Item 659 Topsoil Volume (CY)</th>
<th>Item 670 Erosion Protection Area (SY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter Strip #1</td>
<td>IR 70</td>
<td>298+00</td>
<td>300+00</td>
<td>RT</td>
<td>36</td>
<td>25</td>
<td>8</td>
<td>200</td>
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<td>5,000</td>
<td>61.7</td>
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**Total Treatment Credit from Vegetated Filter Strips (within R/W)**

6.54 acres

**BMP Design Considerations**

- A. Is the min. filter strip width 15-25 ft wide depending on L&D Table 1117-3? **Answer:** Yes **Design Check:** Good
- B. Is the slope 3:1 or flatter for 34 ft or narrower pavement drainage width **Answer:** Yes **Design Check:** Good
- C. Is the slope 6:1 or flatter for 35 - 48 ft pavement drainage width **Answer:** NA **Design Check:** Good
- D. Is the only contributing drainage to the filter strip from the road and shoulder? **Answer:** Yes **Design Check:** Good
- E. Does any concentrated flow or any outlets discharge to the filter strip? **Answer:** No **Design Check:** Good
- F. Is 4” of Item 659, Topsoil, included for the filter strip? **Answer:** Yes **Design Check:** Good
- G. Is Item 670, Slope Erosion Protection, included for the filter strip? **Answer:** Yes **Design Check:** Good

Additional notes can be viewed in the Excel Spreadsheet.
Narrow Vegetated Filter Strips

- L&D, Vol. 2, 1115.6.3
- Pedestrian Facilities and Shared Use Paths
Narrow Vegetated Filter Strips

- ALL EDA associated with paths
- No roadway improvements
- Quantity treatment not required
- Min. VFS width equal to width of contributing impervious area
- Max. slope is 3:1
- Sheet flow
Questions?

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