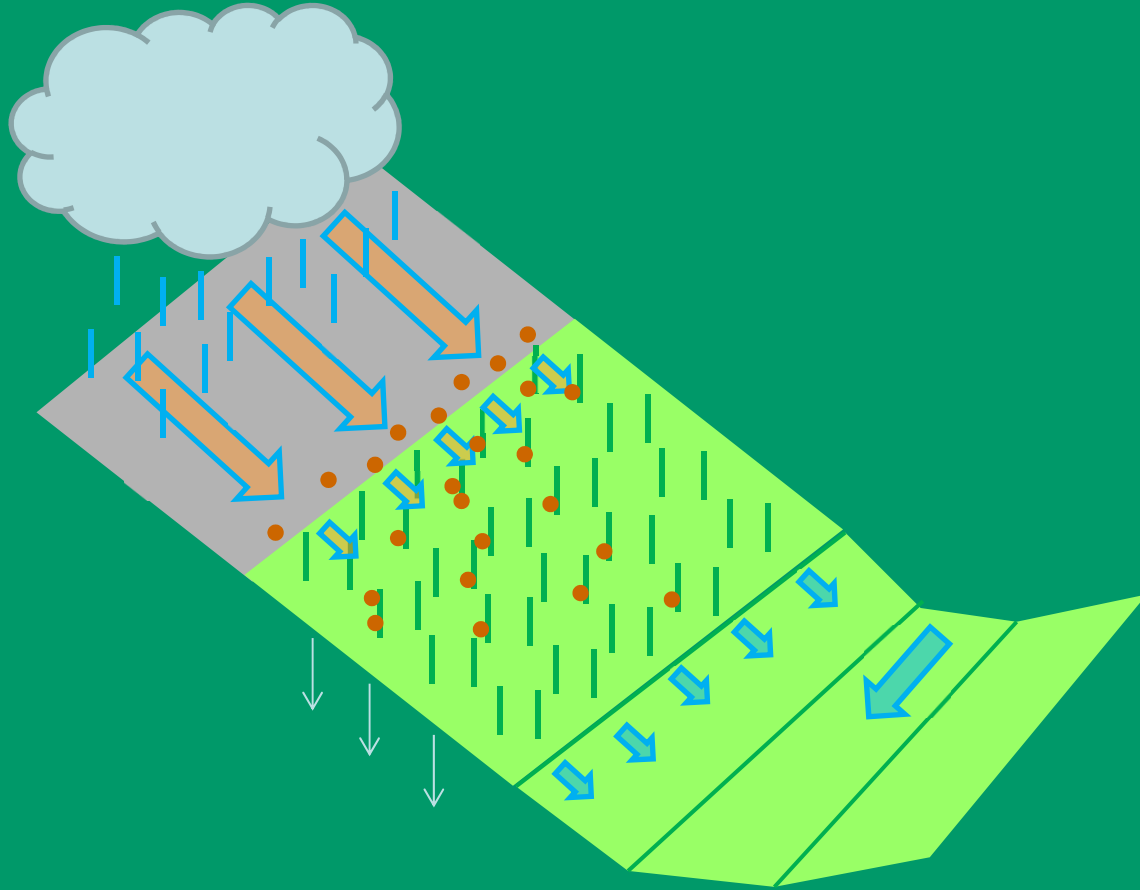# Vegetated Filter Strip Design

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% = [(A_{ix} x 20)+(A_{in} x 100)] / (A_{ix} + A_{in})
- T% = [(32.5 x 20)+(0.0 x 100)] / (32.5 + 0)
- T% = 20%
- 20% x 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**
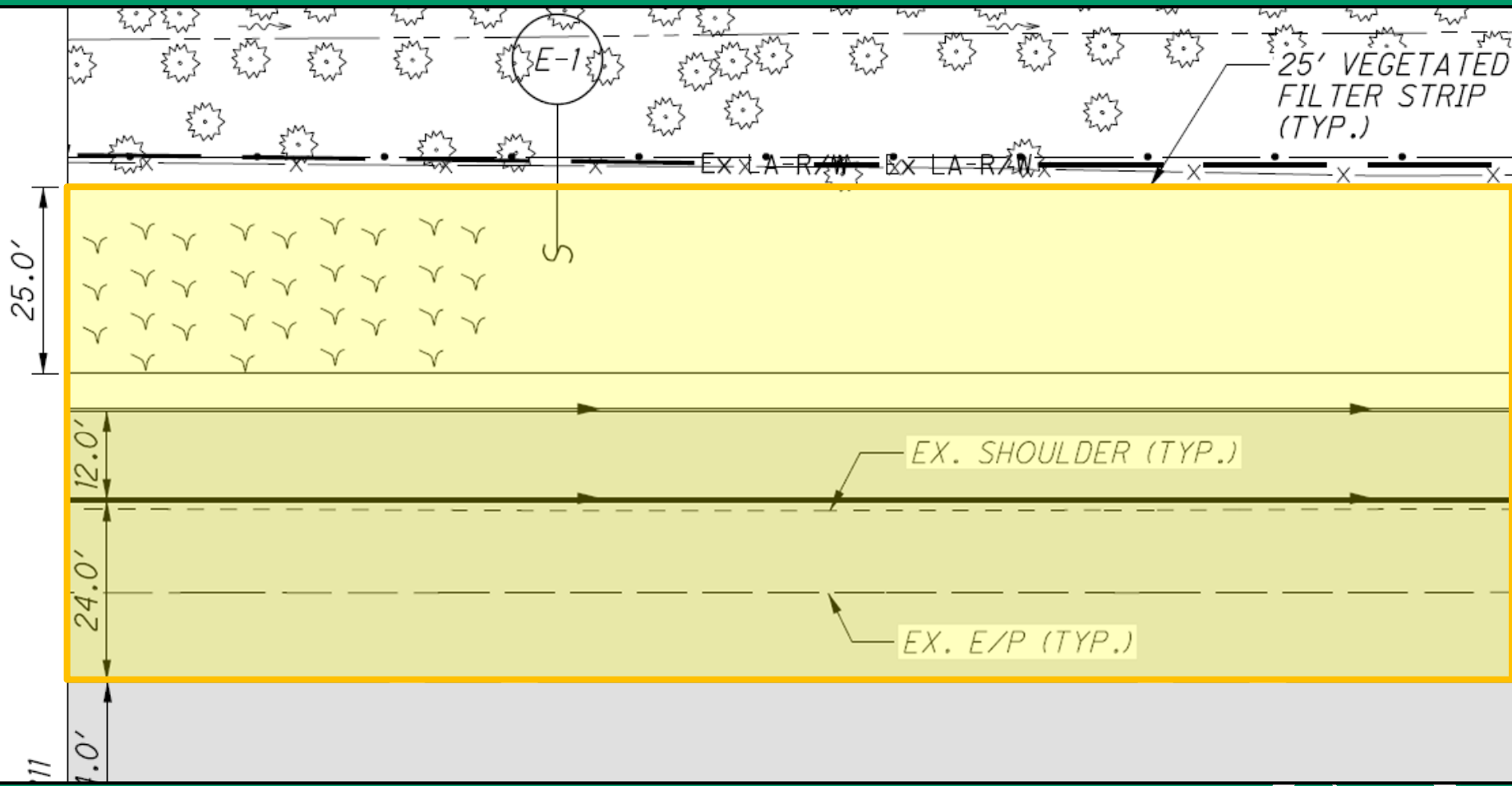 - No concentrated flow

Siting Analysis
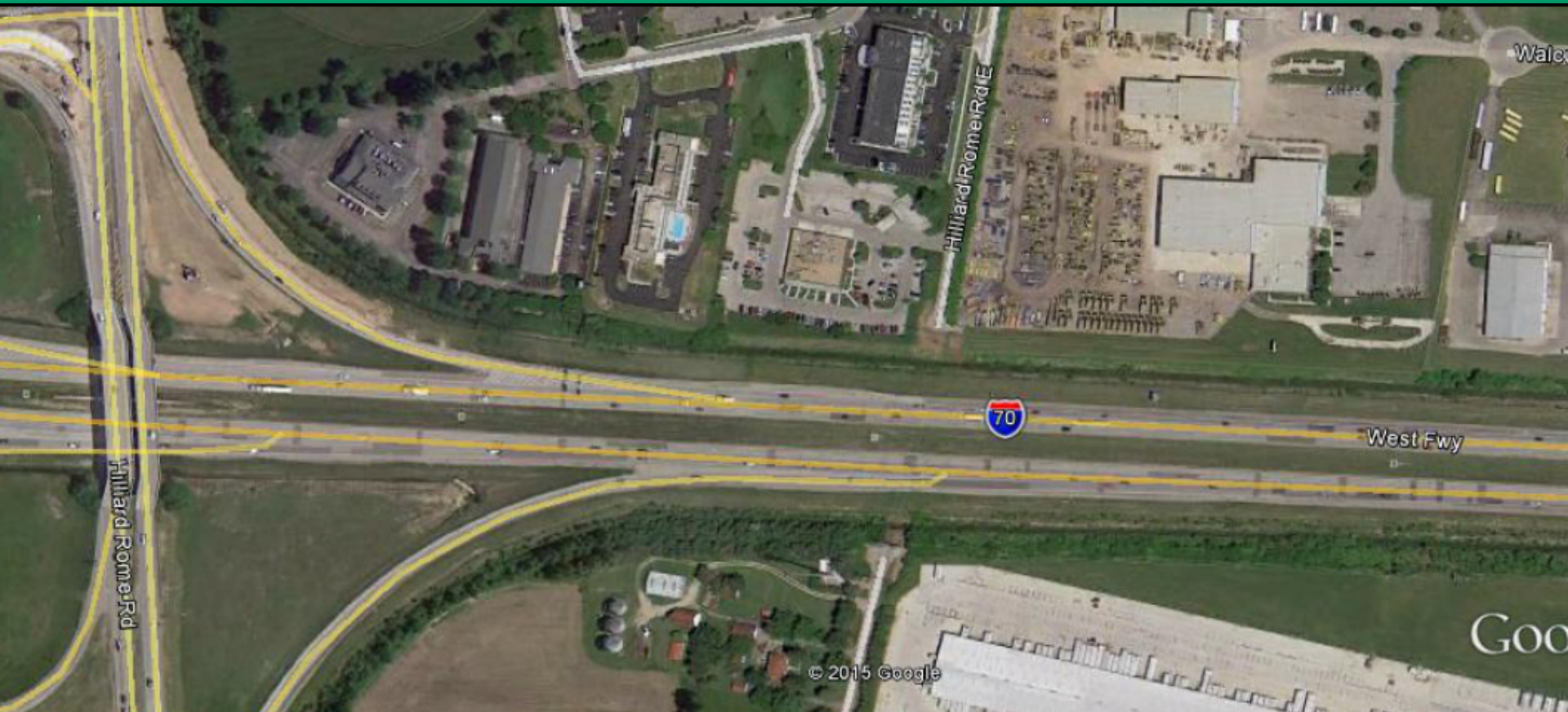
Design Process

- 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 1117-3

Maximum Pavement Width (ft.)	Slope (H:V)	Filter Strip Width (ft. minimum)
22	3:1 and flatter	15
24	3:1 and flatter	17
26	3:1 and flatter	18.5
28	3:1 and flatter	20.5
30	3:1 and flatter	22
32	3:1 and flatter	24
34	3:1 and flatter	25
48	6:1 and flatter	25

Vegetated Filter Strip Sizing

- **Typical cross section:**
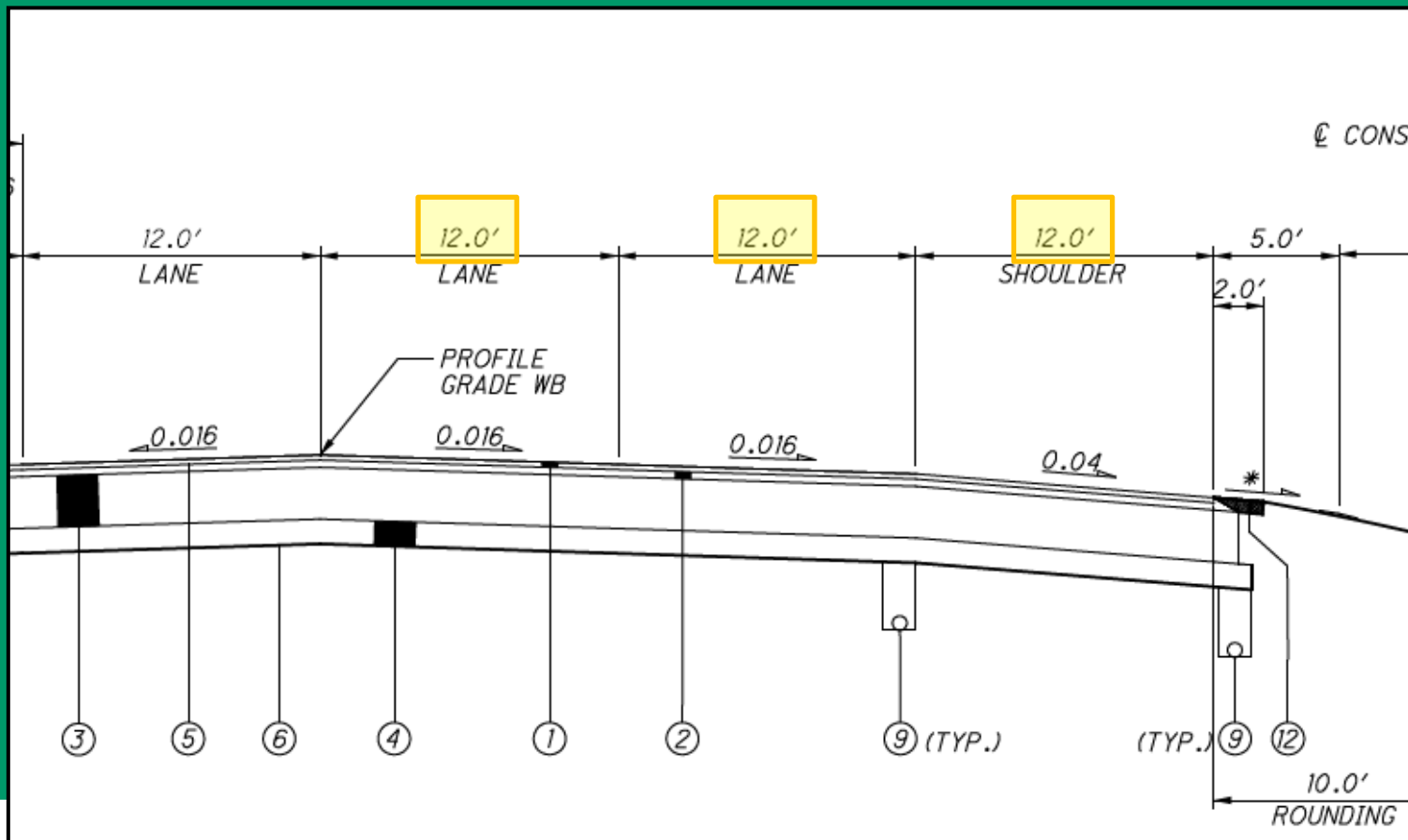
Vegetated Filter Strip Sizing

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

Table 1117-3

Maximum Pavement Width (ft.)	Slope (H:V)	Filter Strip Width (ft. minimum)
22	3:1 and flatter	15
24	3:1 and flatter	17
26	3:1 and flatter	18.5
28	3:1 and flatter	20.5
30	3:1 and flatter	22
32	3:1 and flatter	24
34	3:1 and flatter	25
48	6:1 and flatter	25

- **25ft strip at 6:1 slope or flatter**

Vegetated Filter Strip Sizing
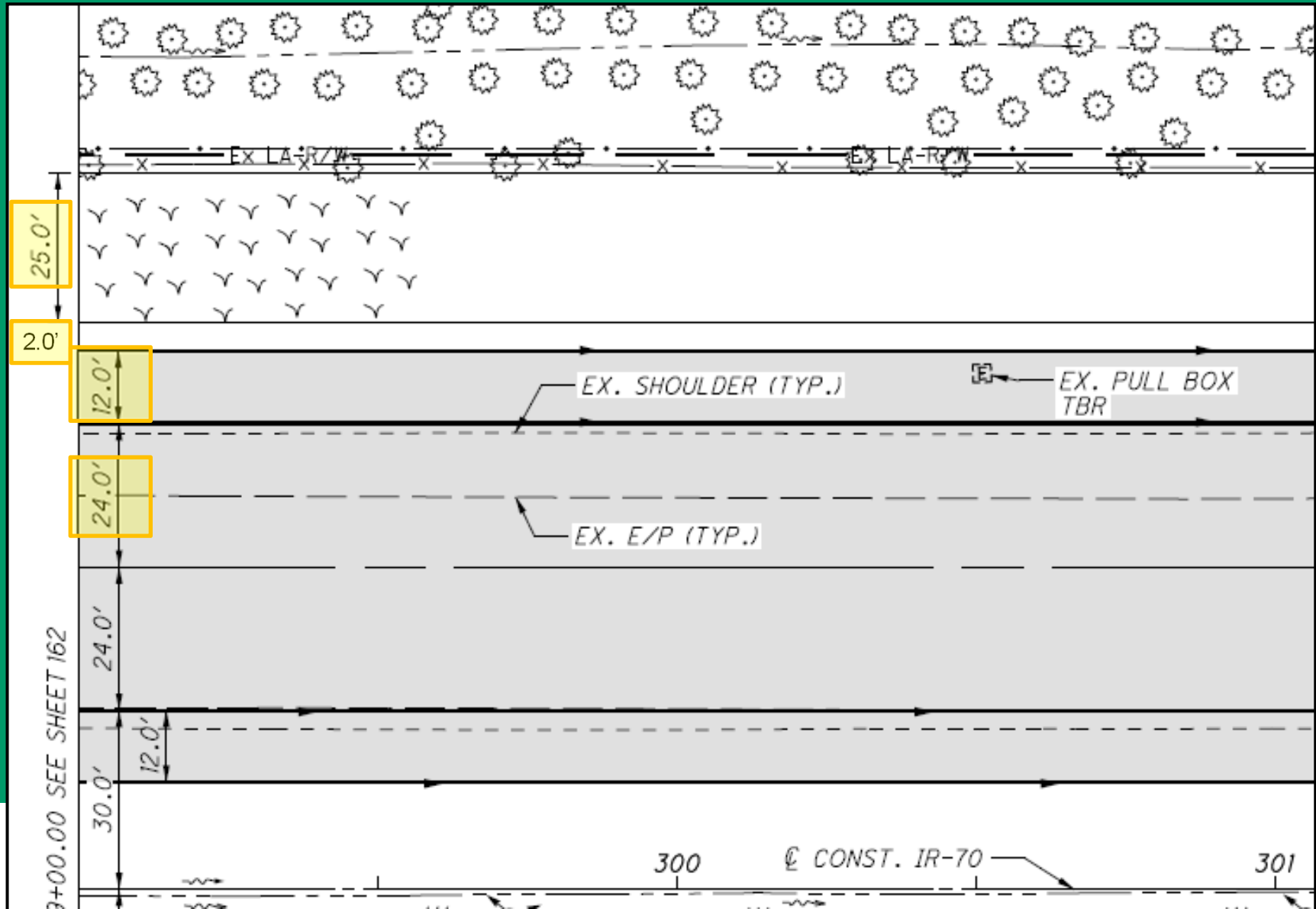
Vegetated Filter Strip Sizing

- **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

Maximum Pavement Width (ft.)	Slope (H:V)	Filter Strip Width (ft. minimum)
22	3:1 and flatter	15
24	3:1 and flatter	17
26	3:1 and flatter	18.5
28	3:1 and flatter	20.5
30	3:1 and flatter	22
32	3:1 and flatter	24
34	3:1 and flatter	25
48	6:1 and flatter	25

Can make VFS width wider, down to bottom of foreslope at inside edge of ditch or edge of R/W

Vegetated Filter Strip Sizing
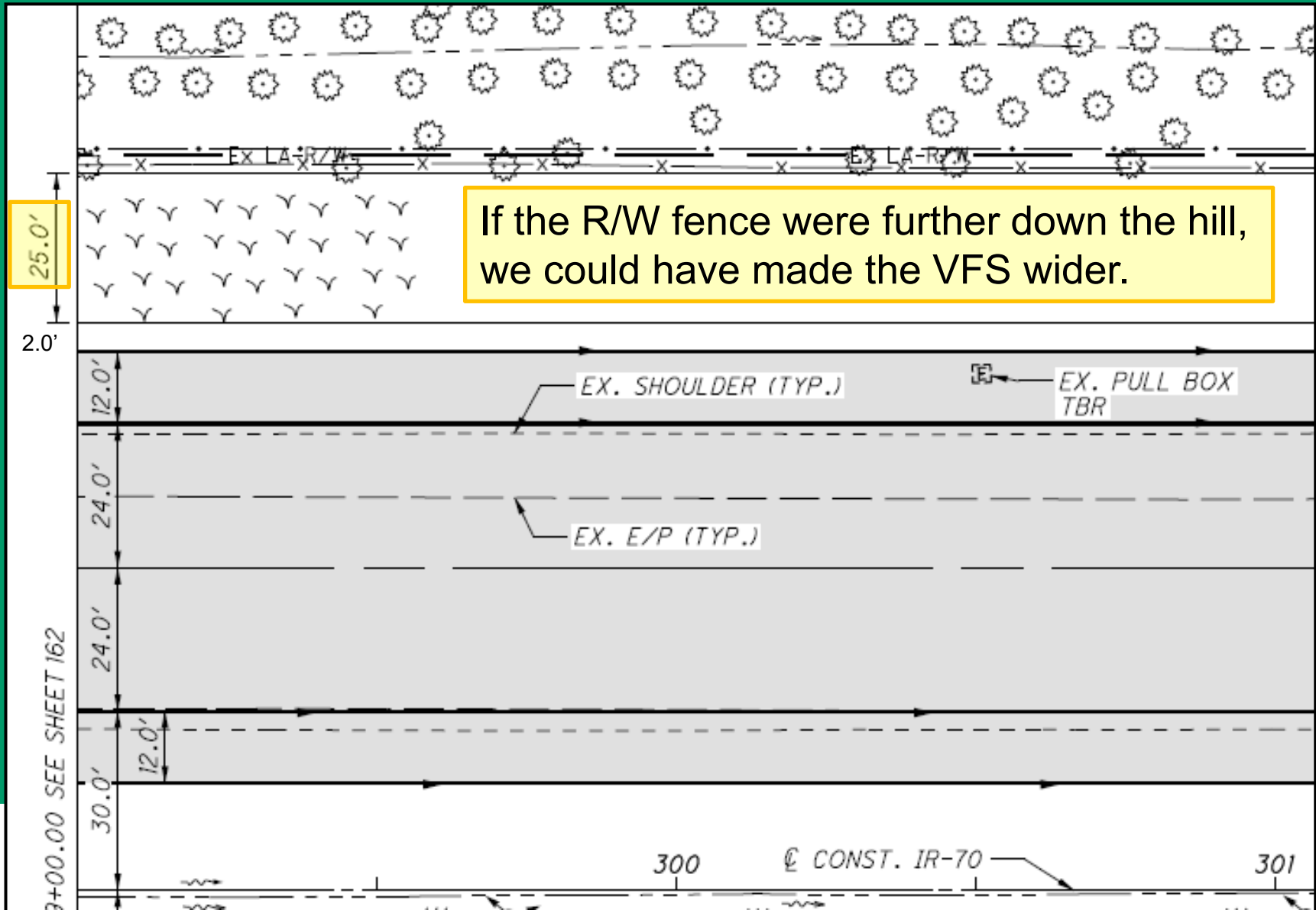
If the R/W fence were further down the hill, we could have made the VFS wider.

BMP Calcs Spreadsheet

Ohio Department of Transportation - Office of Hydraulic Engineering
Post-Construction BMP Calculation Spreadsheet

Vegetated Filter Strip

Filter Strip	Route	Begin Station	End Station	Side	Pavement Width (FT)	Filter Strip Width (FT)	Filter Strip Slope (z:1)	Filter Strip Length (FT)	Tributary Area in ODOT R/W (acres)	Filter Strip Area (SF)	Item 659 Topsoil Volume (CY)	Item 670 Erosion Protection Area (SY)
Filter Strip #1	IR 70	298+00	300+00	RT	36	25	8	200	0.19	5,000	61.7	555.6
Filter Strip #2	IR 70	300+75	333+60	RT	36	25	8	3,285	3.00	82,125	1,013.9	9,125.0
Filter Strip #3	IR 70	300+00	335+11	LT	36	25	12	3,511	3.35	87,775	1,083.6	9,752.8
Filter Strip #4								0			0.0	0.0
Filter Strip #5								0			0.0	0.0
Filter Strip #6								0			0.0	0.0
Filter Strip #7								0			0.0	0.0
Filter Strip #8								0			0.0	0.0
Filter Strip #9								0			0.0	0.0
Filter Strip #10								0			0.0	0.0

Total Treatment Credit from Vegetated Filter Strips (within R/W) **6.54** acres
(Treatment is for quality only, not quantity)

BMP Design Considerations | **Answer** | **Design Check**

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