
| | | | |
|-------|---|-------|--|
| To: | Mr. Matthew B. Rehfus, P.E., S.I. Highway Design Engineer, Franklin County Engineer's Office (FCEO) | From: | Nicholas M. Goodman, PE Stantec Consulting Services, Inc. |
| File: | 115792 - FRA-122-0.00 BMP Design Memo | Date: | April 9, 2024 |

**Reference: 115792 – Alum Creek Drive Widening – S.R. 317 to Groveport Road,
Stage One BMP Design Memo**

FRA-122-0.00, PID 115792 is a project located in Franklin County, Ohio, along Alum Creek Drive (CR-122). This project includes the widening of existing Alum Creek Drive from London-Groveport Road to Groveport Road. Improvements include complete bridge replacements over Big Walnut Creek, roadway lighting, proposed drainage improvements as well as additional enhancements to pedestrian safety with a shared-use path and concrete walk facilities for the entire length of the corridor. This project has a total earth disturbed area (EDA) of 43.58 acres (64.4 acres within construction limits, less 20.82 acres of mill and overlay) and will require post construction BMP's. The calculated treatment percentage for this project is 22.94%, which equates to 8.47 acres of the project EDA after factoring in the sheet flow out of right-of-way (per L&D Vol 2 – Sec. 1112.1). Water quantity treatment is not required due to the entire site draining to a 4th order stream (Big Walnut Creek), per Location and Design Manual, Volume 2, Section 1111.3.

This project will use a vegetated biofilter as the post construction BMP's. The attached calculation sheets and project site plan show the locations of each. The total area treated with the anticipated BMP's is 14.17 acres which meets the required 8.47 acres.

Stantec Consulting Services, Inc.

Nicholas M. Goodman, PE

Phone: (614) 643-4437

Attachment: Attachment

c. 115792_BMP Calculations



Ohio Department of Transportation - Office of Hydraulic Engineering

Post-Construction BMP Calculation Spreadsheet

Post Construction - Project Summary

Project Data

| | | Units |
|--|---------------|-------|
| Project EDA | 43.58 | acres |
| Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1112.2 | No | |
| BMPs Required? | BMPs Required | NA |
| Ain (New Impervious Area in New Permanent R/W) | 1.6 | acres |
| Does Entire Site Drain to Large River (>100 sq. miles)? | Yes | |
| Water Quality Treatment Required | Yes | |
| Water Quantity Treatment Required | No | |

Treatment Percent and Treatment Requirement

| | | |
|--|--------------|--------------|
| Aix (Project EDA that is inside the existing right-of-way) | 41.98 | acres |
| Ain (New Impervious Area in New Permanent R/W) | 1.6 | acres |
| T% (Treatment Percent) | 22.94 | % |
| Sheet Flow Out of Right-of-Way (L&D Vol. 2 Sec. 1112.1) | 6.65 | acres |
| Treatment Requirement | 8.47 | acres |

BMPs Provided

| BMP Name (¥) | BMP Type | Contributing Drainage Area (acres) | Contributing Drainage Area in ODOT R/W (acres) |
|--------------|---------------------|------------------------------------|--|
| VBF#1 | Vegetated Biofilter | 1.27 | 1.27 |
| VBF#2 | Vegetated Biofilter | 1.31 | 1.31 |
| VBF#3a | Vegetated Biofilter | 1.06 | 1.06 |
| VBF#3b | Vegetated Biofilter | 0.17 | 0.17 |
| VBF#4 | Vegetated Biofilter | 0.23 | 0.23 |
| VBF#5a | Vegetated Biofilter | 1.48 | 0.15 |
| VBF#5b | Vegetated Biofilter | 1.27 | 0.75 |
| VBF#6 | Vegetated Biofilter | 1.41 | 1.06 |
| VBF#7a | Vegetated Biofilter | 0.68 | 0.68 |
| VBF#7b | Vegetated Biofilter | 1.33 | 0.65 |
| VBF#7c | Vegetated Biofilter | 1.39 | 0.06 |
| VBF#8a | Vegetated Biofilter | 3.16 | 0.52 |
| VBF#8b | Vegetated Biofilter | 2.51 | 1.07 |
| VBF#8c | Vegetated Biofilter | 1.41 | 0.10 |
| VBF#8d | Vegetated Biofilter | 1.26 | 0.54 |
| VBF#9a | Vegetated Biofilter | 1.07 | 0.29 |
| VBF#9b | Vegetated Biofilter | 0.46 | 0.32 |
| VBF#10 | Vegetated Biofilter | 1.48 | 1.48 |
| VBF#11a | Vegetated Biofilter | 1.61 | 0.53 |
| VBF#11b | Vegetated Biofilter | 1.08 | 1.08 |
| VBF#12 | Vegetated Biofilter | 1.98 | 0.86 |

¥ - Note, areas have been subdivided when ditches are in series, refer to calc. sheet as well as site plan.

Treatment Provided

| | |
|--|-------|
| Total Area with ODOT R/W Treated (acres) | 14.17 |
| Treatment Requirements (acres) | 8.47 |
| Treatment Check | Good |



Ohio Department of Transportation - Office of Hydraulic Engineering

Post-Construction BMP Calculation Spreadsheet

BMP Submittal Requirements (Per L&D, Vol. 2, Sec. 1116.2)

| | | |
|---|-----|------|
| 1. Estimated Project Earth Disturbed Area | Yes | Good |
| 2. Treatment Percent Calculation | Yes | Good |
| 3. BMP Selected for use | Yes | Good |
| 4. Drainage area mapping for post-construction BMPs that show the total contributing drainage area and the amount of contributing area within ODOT right-of-way | Yes | Good |
| 5. Plan sheets showing locations of post-construction BMP | Yes | Good |
| 6. Calculations for each BMP | Yes | Good |
| 7. Explanation for any area that is not treated | Yes | Good |



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

Vegetated Biofilter

| Site Plan Callout | Location Information | | | | | Hydrology | | | Channel Characteristics | | | | | Analysis Results | | | |
|-------------------|----------------------|-------|---------------|-------------|------|-----------------------------|---|-----------------------|--|----------------------|----------------------|--------------------------------|--|--|---|--|-----------------------------|
| | VBF | Route | Begin Station | End Station | Side | Total Drainage Area (acres) | EDA Treatment Credit (acres) ¹ | WQ _F (cfs) | VBF Bottom Width (ft) ^{note2} | VBF Fore Slope (z:1) | VBF Back Slope (z:1) | VBF Longitudinal Slope (ft/ft) | Manning's Roughness Coefficient ³ | Depth of Runoff at WQ _F (inches) [*] | Velocity of Runoff at WQ _F (ft/sec) ⁴ | Standard Ditch Width (feet) ⁵ | Required Ditch Width (feet) |
| VBF#1 | VBF#1 | ACD | 231+20 | 239+74 | C | 1.27 | 1.27 | 0.743 | 4 | 4 | 4 | 0.0015 | 0.15 | 6.75 | 0.26 | 4 | 4 |
| VBF#2 | VBF#2 | ACD | 239+74 | 248+50 | C | 1.31 | 1.31 | 0.766 | 4 | 4 | 4 | 0.0031 | 0.15 | 5.66 | 0.28 | 4 | 4 |
| VBF#3 | VBF#3a | ACD | 257+31 | 263+75 | C | 1.06 | 1.06 | 0.620 | 4 | 4 | 4 | 0.0026 | 0.15 | 5.33 | 0.24 | 4 | 4 |
| | VBF#3b | ACD | 263+75 | 264+85 | C | 0.17 | 0.17 | 0.099 | 4 | 4 | 4 | 0.0043 | 0.15 | 1.64 | 0.16 | 4 | 4 |
| VBF#4 | VBF#4 | ACD | 264+85 | 266+38 | C | 0.23 | 0.23 | 0.123 | 4 | 4 | 4 | 0.0025 | 0.15 | 2.17 | 0.14 | 4 | 4 |
| VBF#5 | VBF#5a | ACD | 300+48 | 301+25 | RT | 1.48 | 0.15 | 0.715 | 4 | 2 | 2 | 0.0100 | 0.15 | 4.17 | 0.44 | 4 | 4 |
| | VBF#5b | ACD | 301+25 | 305+00 | RT | 1.27 | 0.75 | 0.608 | 4 | 2 | 2 | 0.0050 | 0.15 | 4.63 | 0.33 | 4 | 4 |
| VBF#6 | VBF#6 | ACD | 305+00 | 310+54 | RT | 1.41 | 1.06 | 0.733 | 4 | 2 | 2 | 0.0035 | 0.15 | 5.50 | 0.33 | 4 | 4 |
| VBF#7 | VBF#7a | ACD | 300+50 | 306+00 | C | 0.68 | 0.68 | 0.398 | 4 | 4 | 4 | 0.0065 | 0.15 | 3.23 | 0.29 | 4 | 4 |
| | VBF#7b | ACD | 306+00 | 311+00 | C | 1.33 | 0.65 | 0.778 | 4 | 4 | 4 | 0.0038 | 0.15 | 5.41 | 0.30 | 4 | 4 |
| | VBF#7c | ACD | 311+00 | 311+38 | C | 1.39 | 0.06 | 0.813 | 4 | 4 | 4 | 0.0159 | 0.15 | 3.75 | 0.50 | 4 | 4 |
| VBF#8 | VBF#8a | ACD | 310+54 | 313+00 | RT | 3.16 | 0.52 | 1.608 | 4 | 2 | 2 | 0.0239 | 0.15 | 5.19 | 0.77 | 4 | 4 |
| | VBF#8b | ACD | 313+00 | 319+00 | RT | 2.51 | 1.07 | 1.262 | 4 | 2 | 2 | 0.0030 | 0.15 | 8.10 | 0.35 | 4 | 4 |
| | VBF#8c | ACD | 319+00 | 319+50 | RT | 1.41 | 0.10 | 0.625 | 4 | 3 | 2 | 0.0250 | 0.15 | 2.92 | 0.56 | 4 | 4 |
| | VBF#8d | ACD | 319+50 | 323+00 | RT | 1.26 | 0.54 | 0.549 | 4 | 3 | 2 | 0.0050 | 0.15 | 4.31 | 0.31 | 4 | 4 |
| VBF#9 | VBF#9a | ACD | 318+50 | 321+50 | LT | 1.07 | 0.29 | 0.506 | 4 | 2 | 2 | 0.0025 | 0.15 | 5.09 | 0.25 | 4 | 4 |
| | VBF#9b | ACD | 321+50 | 322+50 | LT | 0.46 | 0.32 | 0.233 | 4 | 4 | 2 | 0.0100 | 0.15 | 2.13 | 0.29 | 4 | 4 |
| VBF#10 | VBF#10 | ACD | 312+00 | 322+46 | C | 1.48 | 1.48 | 0.866 | 4 | 4 | 4 | 0.0040 | 0.15 | 5.65 | 0.31 | 4 | 4 |
| VBF#11 | VBF#11a | ACD | 324+69 | 329+00 | C | 1.61 | 0.53 | 0.942 | 4 | 4 | 4 | 0.0038 | 0.15 | 5.99 | 0.31 | 4 | 4 |
| | VBF#11b | ACD | 329+00 | 336+88 | C | 1.08 | 1.08 | 0.632 | 4 | 4 | 4 | 0.0065 | 0.15 | 4.17 | 0.34 | 4 | 4 |
| VBF#12 | VBF#12 | ACD | 325+05 | 331+00 | RT | 1.98 | 0.86 | 0.867 | 4 | 4 | 4 | 0.0050 | 0.15 | 5.32 | 0.34 | 4 | 4 |

* Note - depth of flow exceeds the 4" maximum depth in some VBF locations, which is intentional due to engineering judgement and dictated by overall roadway profile and topography. Velocities and time of concentration convey the runoff per the designers' intent.

Total Treatment Credit Earned from VBFs (within R/W): 14.17 acres
 (Treatment is for quality only, not quantity)

Yellow: Requires Input (See instructions tab)

BMP Design Considerations

| | | | |
|---|--|-----|------|
| 1 | Do the VBF characteristics match the calculated flow and velocity checks using Manning's Equation above? | Yes | Good |
| 2 | Is the VBF a trapezoidal ditch with a flat bottom, not a radius ditch? | Yes | Good |
| 3 | Is the VBF width at least 4 feet? | Yes | Good |
| 4 | Is the depth of runoff for the WQ _F for each VBF less than or equal to 4 inches? | Yes | Good |
| 5 | Is the velocity of runoff for the WQ _F for each VBF less than or equal to 1.0 ft/sec? | Yes | Good |
| 6 | Does the "Total Drainage Area" include all onsite and off-site drainage to the VBF? | Yes | Good |
| 7 | Does each VBF include 4" of Item 659 Topsoil on the vegetated portion of the shoulder and foreslope? | Yes | Good |
| 8 | Does each VBF include Item 670, Ditch Erosion Protection? | Yes | Good |
| 9 | Are the station ranges and locations of the VBFs labeled on the Project Site Plan drawing? | Yes | Good |

C:\pw_working\infra01\ngoodman\0196311\115792_GB099.dwg LAST SAVED BY: ngoodman, 4/18/2024 9:57 AM LAST PRINTED BY: Goodman, Nicholas, 4/18/2024 10:05 AM

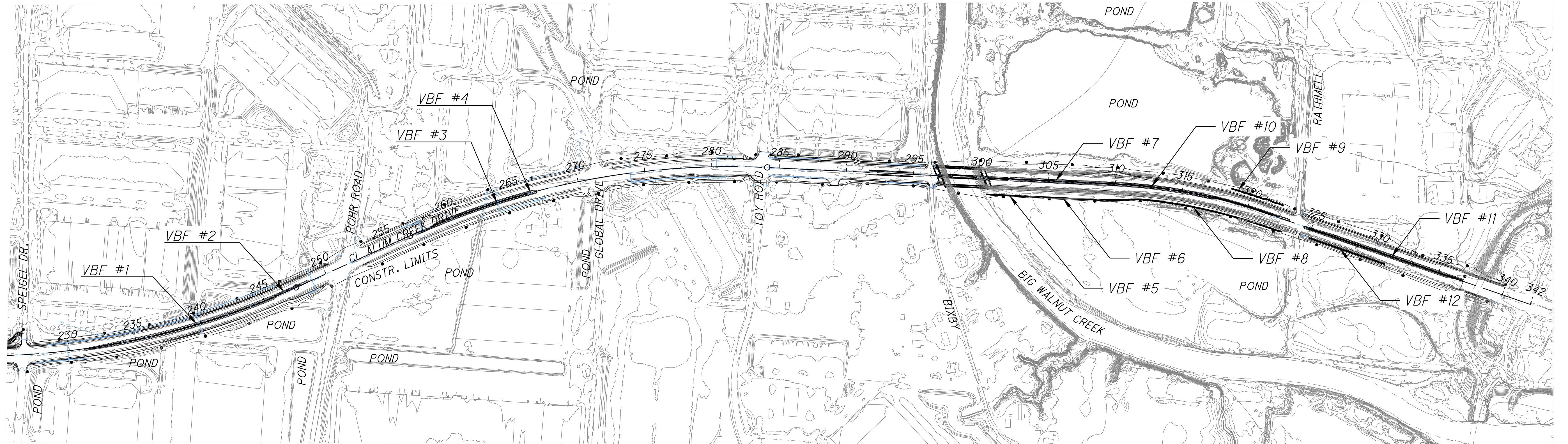
| PROJECT DATA | |
|---|------------------------|
| CONSTRUCTION TYPE | MAJOR REHAB / WIDENING |
| TOTAL AREA (RIGHT-OF-WAY) | 11.46 AC |
| PROJECT EARTH DISTURBED AREA | 43.58 AC |
| ESTIMATED CONTRACTOR EARTH DISTURBED AREA | 0.25 AC |
| NOTICE OF INTENT EARTH DISTURBED AREA | 43.83 AC |
| RUNOFF COEFFICIENT FOR PRE-CONSTRUCTION SITE | 0.3 - 0.9 |
| RUNOFF COEFFICIENT FOR POST CONSTRUCTION SITE | 0.3 - 0.9 |
| IMMEDIATE RECEIVING WATERS | BIG WALNUT CREEK |
| SUBSEQUENT RECEIVING WATERS | SCIOTO RIVER |
| IMPERVIOUS AREA FOR PRE-CONSTRUCTION SITE | 43.58 AC |
| IMPERVIOUS AREA FOR POST CONSTRUCTION SITE | 43.58 AC |

PROJECT DESCRIPTION

THIS PROJECT INCLUDES THE WIDENING OF EXISTING ALUM CREEK DRIVE (C.R. 122) FROM LONDON-GROVEPORT ROAD (S.R. 317) TO GROVEPORT ROAD. IMPROVEMENTS INCLUDE COMPLETE BRIDGE REPLACEMENT OVER BIG WALNUT CREEK, ROADWAY LIGHTING, PROPOSED DRAINAGE IMPROVEMENTS AS WELL AS ADDITIONAL ENHANCEMENTS TO PEDESTRIAN SAFETY WITH A SHARED-USE PATH AND CONCRETE WALK FACILITIES THE ENTIRE LENGTH OF THE CORRIDOR.

CALCULATED [CALC]
CHECKED [CK]

0 400 800
HORIZONTAL SCALE IN FEET



PROJECT SITE PLAN

| DESCRIPTION | SIDE | LOCATION OF VEGETATED BIOFILTER | | | | ONSITE TREATED |
|-------------------------|------|---------------------------------|------------|-------------------------|-----------------------|----------------|
| | | FROM STATION | TO STATION | FROM LAT/LONG (DEGREES) | TO LAT/LONG (DEGREES) | |
| VBF #1 | C | 231+20.00 | 239+74.00 | 39.8388 / -82.9332 | 39.8410 / -82.9339 | 1.27 |
| VBF #2 | C | 239+74.00 | 248+00.00 | 39.8410 / -82.9339 | 39.8431 / -82.9350 | 1.31 |
| VBF #3 | C | 257+31.00 | 264+85.00 | 39.8456 / -82.9364 | 39.8474 / -82.9373 | 1.22 |
| VBF #4 | C | 264+85.00 | 266+38.00 | 39.8474 / -82.9373 | 39.8478 / -82.9375 | 0.23 |
| VBF #5 | RT | 300+48.00 | 305+00.00 | 39.8571 / -82.9375 | 39.8583 / -82.9375 | 0.90 |
| VBF #6 | RT | 305+00.00 | 310+54.00 | 39.8583 / -82.9375 | 39.8598 / -82.9374 | 1.06 |
| VBF #7 | C | 300+50.00 | 311+38.00 | 39.8571 / -82.9379 | 39.8600 / -82.9378 | 1.39 |
| VBF #8 | RT | 310+54.00 | 323+00.00 | 39.8598 / -82.9374 | 39.8631 / -82.9366 | 2.23 |
| VBF #9 | LT | 318+50.00 | 322+50.00 | 39.8621 / -82.9377 | 39.8631 / -82.9373 | 0.61 |
| VBF #10 | C | 311+38.00 | 322+46.00 | 39.8600 / -82.9378 | 39.8630 / -82.9370 | 1.48 |
| VBF #11 | C | 324+69.00 | 336+88.00 | 39.8636 / -82.9367 | 39.8668 / -82.9353 | 1.61 |
| VBF #12 | RT | 325+05.00 | 331+00.00 | 39.8637 / -82.9364 | 39.8652 / -82.9358 | 0.86 |
| TOTAL EDA CREDIT | | | | | | 14.17 |

USGS QUADRANT MAPS - LOCKBOURNE

LATITUDE: 39°49'48"
LONGITUDE: -82°56'02"

LATITUDE AND LONGITUDE TO APPROX. CENTER OF PROJECT.

FRA-CR122-0.00

X
XX