November 14th, 2025

Josh Meyerhofer
Senior Project Engineer
220 E. Buffalo Street
Milwaukee, WI 53202

RE: River Road Villas

Dear Josh,

Enclosed you will find our responses to your comments dated September 19th, 2025 regarding the plans submitted for the proposed River Road Villas Development in Pewaukee, WI.

General Comments

1. Issuance of *All Engineering Requirements Met Concurrence Letter* is required prior to application for & issuance of Building Permit. Items required for issuance of Concurrence Letter include:
    - Final site plans with all engineering comments addressed
    - WisDNR WRAPP Permit/NOI, and NOI for fill site, if disturbance over 1 acre
    - Financial Guarantees
    - Payment of Impact Fees
    - Recorded Developer's Agreement
    - Recorded Stormwater Maintenance Agreement
        - **Noted.**
2. Depending on the final design, the below listed permits or approvals may be needed. Please submit digital copies of permits to City for filing prior to starting construction and obtaining a building permit.
    - City of Waukesha Storm Water Erosion Control Permit if disturbance over 3,000 sf
    - City of Waukesha – Engineering Division Construction Permit for all RW work.
    - Applicable sewer connection charges per Chapter 29.11(c) will be owed to the City for this project. Coordinate with Waukesha Water Utilities.
        - **Noted.**
3. The construction drawings, and financial guarantees should be reviewed and approved prior to the construction being started and building permit issued. If the location of any work needs to be changed as a result of the approved construction drawings, the drawings should be updated to reflect the needed changes.
        - **Noted.**
4. In accordance with Wisconsin Administrative Code A-E 2.02(4): Each sheet of plans, drawings, documents, specifications and reports for architectural, landscape architectural, professional engineering, design or land surveying practice should be signed, sealed, and dated by the registrant or permit holder who prepared, or directed and controlled preparation of, the written material.
        - **Noted.**
5. Submit copy of geotechnical report. Confirm elevation of water table on site.
        - **Geotechnical report provided.**
6. Add note that all work within City right of way and City easements to be in accordance with current City Standard Specifications and details.
        - **Note Added.**
7. Add note: Notify City Engineering Dept. 5 days prior to work in City right of way.
        - **Note Added.**
8. Add note to drawings: Limits of final City street pavement and curb and gutter removal and replacements to be marked by City Engineering staff in field.
        - **Note Added.**
9. Driveway slopes shall not exceed 10%. The sidewalk cross slope shall be 1.5%.

- **Grades applied as requested.**

10. See all other comments, including TrackIT summary & stormwater requirements.
    - **Noted.**
11. Submit all required checklists for Development Submittals. See City's Development Handbook.
    - **Checklists provided with submittal.**

C1.0

12. Note that wetland fills indicated are Per DNR wetland exemption EXE-SE-2025-68-0198 included in submittal
    - **Note provided.**
13. If removal & grading is proposed in wetland W3 as shown, wetland permitting should be provided to City.
    - **Work to avoid wetland to Southwest of project area.**
14. Existing sanitary stub to be abandoned per City Standards.
    - **Provided.**
15. Curb head cutting not allowed for new approaches. Curb shall be removed & repoured with a driveway curb section per City Standards.
    - **Provided.**

C1.1

16. City sidewalk plan indicates Saylesville ROW is a priority area. Sidewalk shall be provide along Saylesville Rd frontage.
    - **Provided.**
17. Provide curb ramp across Saylesville Road & River Road at intersection.
    - **Provided.**
18. Confirm with City that 8" asphalt path is desired improvement along River Road.
    - **Path replaced with concrete sidewalk.**
19. Private sidewalk appears to dead end in front of Unit 12.
    - **Sidewalk layout per discussions with staff at staff meeting.**
20. Retaining wall & sidewalk shown within AT&T easement on Unit 1.
    - **Retaining wall and sidewalk moved out of easement.**
21. Show sidewalk extension south to existing sidewalk along Rapids Trail.
    - **Sidewalk extension shown.**
22. Curb ramp across Rapid Trail shall be shifted south to direct ped traffic directly across road.
    - **Curb ramp placement is currently dictated by existing curb head opening.**

C2.0

23. Provide plan and profile for private drive.
    - **Plan and profile provided.**
24. Include utilities in plan and profile.
    - **Utilities provided.**

C2.1

25. P-1, provide 24" of engineered soil. Very elevations of underdrains & soil layers in detail.
    - **24" of engineered soil provided.**
26. P-1 underdrain at proposed asphalt path-Provide adequate cover to move pipe out of path cross section.
    - **Underdrain reduced to 2.5". Adequate cover provided.**

C3.0

27. Add inlet protection along Rapids Trail south of the project
    - **Inlet protection provided.**
28. Update dates throughout sheet (Late season stabilization notes, construction sequence, etc) to reflect accurate dates.
    - **Dates updated.**

C4.0

29. Confirm City – Public vs private sanitary system
    - **Sanitary sewer will be private per staff meeting.**
30. As noted on plan, gas line is present in the terrace of Rapids Trail.
    - Confirm hydrant location relative to gas line.
    - Sanitary & water services for Unit 1 to cross gas line
    - P1 underdrain crosses gas line
    - **Caution labeling has been added to plan set.**
31. Include City curb detail
    - **City Curb detail included on C6.0.**

SMWP

General

32. While there are outstanding issues with their calculations that don't meet the current standard of practice, the largest issue is the lack of on-site investigation of soil conditions to support infiltration design. The stormwater management system is heavily dependent on infiltration, but the design is based on assumptions.
    - **Please see Geotechnical Exploration and Site Feasibility Evaluation report included in the revise Appendix 1.**
33. The majority of the site discharge to the south onto currently undeveloped land. These lands continue to flow south until it reaches developed land. Assuming this site addresses the details below for rate control, there will still be an increase in the frequence of runoff events and the volume of runoff that the site discharges, as these parameters are not specifically regulated by the City's post-construction stormwater ordinance. As lands to the south continue to develop, a safe passage for River Road Villas flows should be incorporated.
    - **Comment Noted.**

Infiltration Assessment and Design:

34. No on-site infiltration assessment has been completed to determine the site's suitability for infiltration or design infiltration rates.
    - A design infiltration rate of 0.15 inches/hour has been assigned in HydroCAD which is not supported by field investigations, doesn't match any of the standard rates by texture published in WDNR CPS 1002, and doesn't match the value used in WinSLAMM
    - A design infiltration rate of 0.5 inches/hour has been assigned in WinSLAMM, which is not supported by field investigations, and doesn't match the value used in HydroCAD
    - **Please see Geotechnical Exploration and Site Feasibility Evaluation report included in the revise Appendix 1**
35. The SWMP claims compliance with infiltration standards through allocation of 2% or more of the site for infiltration; however, these calculations appear to be based on the total footprint of the storage area of the two proposed on-site basins, while the measurement of infiltration area is to be taken from the horizontal surface of the infiltration facility. Using these measurements, the infiltration facilities are only approximately 1.2% of the total site area.
    - **Please see infiltration analysis provided in revised Appendix 5.**
36. Stormwater quality treatment and rate control performance rely, at least in part, upon assigned infiltration rates. These rates must be confirmed through an on-site soil assessment before any approval recommendation will be provided for this site stormwater management plan.
    - **Please see Geotechnical Exploration and Site Feasibility Evaluation report included in the revise Appendix 1.**
37. Accounting for comments identified in the following section on Stormwater Quality Treatment (WinSLAMM modeling) it appears that the site will achieve approximately 74% of pre-development infiltration rates, which nearly meets the City requirement of 75% for sites of this density.
    - **Please see infiltration analysis provided in revised Appendix 5.**

Stormwater Quality Treatment:

38. Several revisions need to be made to the WinSLAMM model. Correcting for the issues itemized below (assuming an infiltration rate of 0.13 in/hr) indicates that the site will achieve only approximately 62% TSS reduction. If the filter strip is discounted, TSS reduction drops to 49%.
    - **Please see the revised treatment analysis provided in Appendix 4.**
39. The assigned native soil infiltration rate needs to be verified through on-site testing as described previously.
    - **Please see Geotechnical Exploration and Site Feasibility Evaluation report included in the revise Appendix 1.**
40. The porosity of engineered soil needs to be set to 27% in accordance with WDNR modeling guidance.
    - **The engineered soil porosity has been revised to 27%. Please see revised**

treatment analysis.

41. The infiltration rate assigned to the side of each infiltration BMP needs to be set to zero (or 0.001) in accordance with WDNR modeling guidance.
    - **The side infiltration has been revised to 0.001.**
42. The effective infiltration area for each BMP needs to be modeled as a water surface in accordance with WDNR modeling guidance.
    - **The effective infiltration area has been set to water surface in the infiltration analysis model to avoid double counting infiltration. The effective infiltration area is modeled as greenspace in the treatment model to more accurately quantify TSS load.**
43. All roof and sidewalk areas are modeled as disconnected. This condition will need to be confirmed through calculations and exhibits. WinSLAMM standard land use for duplexes indicates that typically 27% of roof area is connected and 100% of sidewalk area is connected.
    - **Disconnection of rooftops from two-family residential dwellings may be assumed provided the runoff has a flow length of at least 20 feet over a pervious area. This is in accordance with WDNR's guidance document 3800-2025-20 (B.53). Additionally, disconnection of other impervious surfaces (i.e. patio/sidewalks) may be assumed in accordance with B.54.**
44. Landscaped areas are all modeled as sandy soil texture; however, WinSLAMM help files indicate that HSG B soils should be modeled as silty soil texture.
    - **The models have been adjusted to silty soil texture.**
45. The detail for the biofilter on plan sheet C2.1 indicates 24" of engineered soil; however, elevations shown indicate the layer is only 18" deep total and only 6" covering the drain tile. To be compliant with WDNR pre-treatment standards, the engineered soil layer needs to be 18" thick above the crown of the 6-inch drain tile.
    - **Site grading presents a challenge in achieving positive discharge for the drain tile and managing high water levels within the shallow basin, due to the tie-in elevations and the generally flat topography in this area of the site. The drain tile has been placed at the bottom of the basin with an invert elevation of 820.75 to allow gravity flow to the existing downstream 18-inch CMP, which has an invert elevation of 820.73. The engineered soil profile has been maximizing to a depth of 15 inches, slightly less than the 18-inch depth recommended in the Technical Standard. Additionally, a clay liner will be required within the basin due to the presence of shallow groundwater in relation to the basin bottom. Recognizing that the Technical Standard serves as a guidance document rather than a rule, and that site constraints may occasionally necessitate minor deviations from ideal conditions, we respectfully request that the slightly reduced depth of 15 inches be accepted for this portion of the site.**
46. Subwatershed UD-1 is shown as draining to a filter strip:

a) Regardless of connectivity discussions above, impervious area located in close proximity to a filter strip should not be modeled as disconnected as the presence of the filter strip is what effectively disconnects the impervious area. Treating the impervious as disconnected double counts the effectiveness of the filter strip.
b) This BMP will need to be identified on plans and protected via an easement or other provision.
c) Inspection and maintenance procedure for the filter strip will need to be added to the stormwater management long term maintenance agreement.
d) The infiltration rate for the filter strip is set to 0.15 inch/hr. This not only needs to be confirmed via a field investigation, based on comparison to other modeling values, this would appear to be intended to be the 'static' infiltration rate. The observed infiltration rate will need to be divided by 50% to determine the 'dynamic' infiltration rate which is to be applied to this type of BM
    - **The filter strip has been removed as a BMP.**

Stormwater Peak Discharge Rate Control:

30) Peak discharge rate control for this site has been evaluated from the perspective of the site as a whole; however, under existing and proposed conditions discharges leave the site in three directions (northeast, east, and south) discharging to discretely different stormwater systems. Accounting for comments itemized below, it appears that the site does not achieve peak discharge rate control for flows in any direction. The site plan needs to be revised to show rate control is achieved to City standards for all three directions.
    - **The small portion of the site (0.440 acres under existing conditions and 0.378**

acres under proposed conditions) drains to the storm sewer system in Rapids Trail, identified as Link 4L in both models. This area was previously accounted for in the approved Stormwater Management Plans for the River's Crossing II and III Additions, both developed by Bielinski. Stormwater runoff from this portion of the site is conveyed to and treated within an existing stormwater basin that was designed to provide the required water quality and quantity control. Accordingly, this area (Link 4L) has been excluded from the current analysis. The area draining to River Road is also minimal, consisting of approximately 0.038 acres under existing conditions, with discharge under proposed conditions restricted through a 2.5-inch restrictor orifice on the undrain system. Due to site elevation constraints, the only feasible outlet for the underdrain is the existing 18-inch CMP at River Road. The peak discharge from the underdrain to this culvert is about 0.29 cfs during the 100-year storm event, which is minimal compared to the existing peak discharge rate of 0.14 cfs. Recognizing these small and previously accounted for drainage areas, we respectfully request that peak discharge rate control for this development be evaluated based on the overall site area, excluding the limited portion draining to Rapids Trail that is already included in the previously approved SWMPs for River's Crossing.

31) Additionally, there are several issues associated in the HydroCAD modeling which need to be addressed:
32) Application of Runoff Curve Numbers.
    a) The pre-development site has been assessed using an RCN value corresponding to row crops. Review of historic aerial photos show no evidence of row crops on the site, rather it appears that the site is seasonably mowed and perhaps harvested/baled. An appropriate RCN value simulating grassland is more appropriate (it is noted that time-of-concentration calculations were completed assuming grass conditions).
        - **The CN values have been changed to grassland**
    b) Proposed conditions curve numbers are applied using a weighted curve number calculation method. Connected impervious areas should be modeled separately for unconnected impervious and pervious areas.
        - **Connected impervious areas have been separated from the unconnected impervious areas. Please see revised calculations.**
    c) The effective infiltration area for each BMP needs to be modeled as a water surface in accordance with WDNR modeling guidance and an RCN value of 100 applied.
        - **Effective infiltration areas have been adjusted to have an CN value of 100.**
33) Times of Concentration. It is observed that existing conditions times-of-concentration for subcatchments E-1 and E-2 (the larger portions of the site) are 13.2 mins and 10.0 mins, respectively. Under proposed conditions these values have been calculated to increase to 19.4 mins and 14.6 mins, respectively, which is highly unlikely. These calculations will need to be revisited. For a site this size, directly connected impervious areas should be assigned a minimum tc value of 6 minutes.
        - **Tcs have been adjusted accordingly.**

34) Simulation of sub-surface storage. Void storage below the basin bottom should not be used to model peak rates in HydroCAD per guidance which can be found here: https://www.hydrocad.net/raingarden.htm
        - **An infiltration rate of 3.6 inches/hour is applied to the engineered soil and stone storage layers. However, based on the soil boring logs, the controlling factor at RG1, RG2, and RG3 locations will be the infiltration rate of the in-situ soils (approximately 0.50 inch/hour), rather than the higher rate associated with the engineered soil. In this configuration, the voids within the engineered soil and stone layers function as part of the basin's storage volume, since they are located upstream of the effective outlet control, which is the in-situ soil infiltration rate.**
35) Basin P-1
    a) Construction plans show the outlet pipe to have a flared end section (apron) and so it should be modeled as having an entrance coefficient of 0.5 (Basin P-1)
        - **The CN values have been changed to grassland.**

b) The elevation of the broad-crested weir overflow is modeled at elevation 824.0; however, review of the proposed grading plan indicates that the pond is entirely contained to an elevation above 825.0. The side slope of the overflow is shown to be 0.2; however, construction plans show the side slope to be 4:1 (0.25).
    - **Please see revised grading plans.**
c) Infiltration appears to be modeled as conductivity; but it should be modeled as constant velocity (with appropriate static infiltration rate determined through field testing).
    - **In HydroCAD, modeling infiltration based on hydraulic conductivity is generally more accurate than using a constant velocity. The conductivity method applies Darcy's Law to reflect actual hydraulic head conditions, whereas a constant velocity approach significantly oversimplifies the infiltration process. Hydraulic Conductivity Method (more accurate): The hydraulic conductivity method uses Darcy's Law to calculate exfiltration, making it a more dynamic and realistic approach. As the water level in the storage facility rises, the hydraulic head increases, resulting in a higher infiltration rate. Conversely, as the water level drops, the rate proportionally decreases. This method is the preferred approach for modeling underground storage systems, rain gardens, biofiltration basins, and any application where the hydraulic head changes over time. Constant Velocity Method (less accurate): Infiltration modeled with a constant velocity assumes a fixed rate, independent of hydraulic head or soil saturation conditions. This simplification often results in an "overly conservative" estimate, as it cannot simulate the higher initial infiltration rates associated with unsaturated soils or respond to changes in hydraulic head. The constant velocity method is best suited for preliminary assessments or situations where detailed geotechnical data is unavailable. Given that the hydraulic conductivity method is widely used and provides more realistic and accurate infiltration results, we respectfully request that this method be accepted for use in this design**

36) Basin P-2
a) The elevation of the broad-crested weir overflow is modeled at elevation 827.5; however, review of the proposed grading plan indicates that the pond is entirely contained to an elevation above 828.0. The side slope of the overflow is shown to be 0.2; however, construction plans show the side slope to be 4:1 (0.25)
    - **Please see revised grading plans.**
b) Infiltration appears to be modeled as conductivity; but it should be modeled as constant velocity (with appropriate static infiltration rate determined through field testing).
    - **See previous response for 35c**

Storm Sewer Design:

37) The storm sewer design appears to be based on collection and capture of the 10-yr design event. The City's stormwater management ordinance requires management of peak discharge rates for storms up to and including the 100-yr rainfall event. Either stormwater calculations need to be revised to show that bypass of runoff in excess of storm sewer capacity does not violate rate control (see other comments) or the storm sewer design needs to be revised to demonstrate capacity to collect and convey 100-yr peak runoff rates.
    - **Storm sewer calculations provided for both 10 year and 100 year events. The 100-year storm is fully contained within the system.**

Long Term Maintenance Agreement:

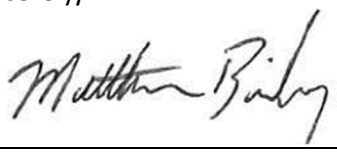
38) The LTMA should be revised to require an as-built survey at the time of substantial project completion, including requirements for testing for infiltration rates to ensure the BMPs function as required to meet stormwater management performance documented in the stormwater management plan.
    - **Please see revised swma.**
39) Language regarding potential failure of BMPs to infiltration should be expanded upon to require potential reconstruction of either BMP including removal/replacement of soils within the basin and revegetation if initial restoration attempts through deep tilling do not produce results in a suitable time frame (perhaps 3 months).

- **Please see revised swma.**

40) An inspection and maintenance procedure for the filter strip will need to be added to the stormwater management long term maintenance agreement.
    - **Filter strip removed as BMP**

Please feel free to contact me with any questions, comments or to further discuss the plans.

Sincerely,



Matthew Bailey, P.E.
Trio Engineering