



100 GROVE ST. | WORCESTER, MA 01605

June 3, 2021

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**Subject: Village at Grafton Woods
8 Pine Street, Grafton, Massachusetts
Site Plan and Special Permit Review**

Dear Chris:

We received the following documents on May 5, 2021:

- Plans entitled Village at Grafton Woods, Town of Grafton, Massachusetts dated February 26, 2021 and revised April 30, 2021, prepared by Tighe & Bond for GSX-ODG, LLC. (23 sheets)
- Bound document entitled Village at Grafton Woods, 8 Pine Street, Plan Approval Review – Peer Review Response to Comments dated April 30, 2021, prepared by Tighe & Bond.

On behalf of the Grafton Planning Board, Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' and supporting documents' conformance with applicable Grafton Zoning By-Law amended through October 21, 2019; Massachusetts Department of Environmental Protection (MassDEP) Stormwater Handbook and standard engineering practices.

This letter is a follow-up to our previous review letter, dated April 6, 2021. For clarity, comments from our previous letter are *italicized* and our comments to the design engineer's responses are depicted in **bold**. Previous comment numbering has been maintained.

Subsequent to our April 6, 2021 review letter to the Planning Board, GEI was requested to review and comment on the documents' conformance with applicable Regulations for the Administration of the Grafton Wetlands Protection Bylaw (aka Grafton Wetland Regulations) and Town of Grafton Conservation Commission Regulations Governing Stormwater Management on behalf of the Grafton Conservation Commission. Please see "Additional Comments" near the end of this letter.

Our comments follow:

Zoning By-Law

1. *GEI has no issues with compliance with the Grafton Zoning By-Law except as noted in the following six comments.*
GEI has no issues relative to compliance with the Grafton Zoning By-Law.
2. *The approximate locations of driveways, buildings and parking areas within two hundred feet of the property lines need to be shown on the plans. More specifically, the Idexx Laboratories building needs to be shown as does the entire intersection of the MBTA Commuter Rail driveway at Pine Street. (§1.3.3.3.d.11)*

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Acknowledged. The revisions were made on Sheet C-100.

3. *The lot coverage calculations need to show the percentage of pavement. (§1.3.3.3.d.15)*

Acknowledged. The revisions were made on Sheet G-003.

4. *Once the design of the parking garage is advanced to the point that the number of parking spaces is determined, the Parking Calculation Table on Sheet G-003 needs to be updated to demonstrate compliance with the parking space requirements. By way of Note 1 in the Parking Calculation Table, GEI recognizes that the design engineer's intent is to provide the required number of parking spaces. (§1.3.3.3.d.16 & §1.3.3.3.d.19)*

Acknowledged. The revisions were made on Sheet G-003. GEI has no issues with the proposed numbers of residential and retail parking spaces.

5. *Calculations need to be provided to show the volume of earth material to be removed or filled on the property. (§1.3.3.3.d.17)*

Acknowledged. The revisions were made on Sheet G-003.

6. *The plans need to address how dust will be controlled during construction. (§1.3.3.3.d.29)*

Acknowledged. The revisions were made on Sheet G-003.

7. *The plans should include a sheet with a vehicle turning template for the Grafton Fire Department's largest vehicle (Tower 1) superimposed to demonstrate vehicle maneuverability around the buildings. Of particular concern is maneuverability around the eastern-most building corner; the inside curb radius is 20 feet, the outside curb radius is 40.5 feet, and the building corner and guard rail will be impediments to maneuverability. (§13.7.C.4.z.v)*

A supplemental sheet (in Attachment B) was included in the bound document entitled Village at Grafton Woods, 8 Pine Street, Plan Approval Review – Peer Review Response to Comments dated April 30, 2021. Figure 1 shows that the fire truck should be able to maneuver around the easternmost building corner if a rear tire of the fire truck mounts the curb. GEI defers to the Fire Department if the modeled turning maneuver is acceptable. GEI recommends that the Planning Board include a condition in its decision that allows the Fire Department to test the constructed accessway and, if necessary, require modifications to address access deficiencies prior to the issuance of an occupancy permit.

Hydrology & MassDEP Stormwater Management

8. *Due to the hydrology comments contained herein, revisions will be necessary. Please consider this as a preliminary review of the hydrology computations.*

Acknowledged. A revised report with hydrology computations was provided.

9. *In the post-development hydrology during the 100-year storm event, Pond 3P, 5P, 6P and 14P (subsurface infiltration systems) exceed the storage range from fourteen to eighty feet.*

Acknowledged. The plans and post-development computations were revised and are in order.

10. *In the post-development hydrology during the 100-year storm event, Pond CB4 has a peak elevation that is roughly two-and-a-half feet above the grate/rim elevation. On Sheet C-106, if this catch basin is designed to surcharge, then the surcharged water needs to be contained around the catch basin.*

Acknowledged. The hydrologic model was revised to avoid surcharging in CB-4 during the 100-year storm event.

11. *In the post-development hydrology modelling, Pond 6P (Subsurface Infiltration System 4) should be routed through Pond DMH-6, as shown on the site plans. The plans and the hydrology modeling need to coordinate with each other.*

Acknowledged. The routing was revised to reflect the site plans.

12. *In the post-development hydrology for Pond 3P: Subsurface Infiltration System 2, the primary outlet is shown to be a twelve-inch culvert with an invert elevation of 431.00 feet whereas on Sheet C-506 the construction detail shows a fifteen-inch culvert with an invert elevation of 429.7 feet. The plans and the modeling need to coordinate with each other.*

Acknowledged. The site plans and hydrologic modeling were revised to coordinate with each other.

13. *In the post-development hydrology Pond 5P: Subsurface Infiltration System 3, the primary outlet is shown to be a twelve-inch round culvert whereas on Sheet C-507 the construction detail shows a fifteen-inch round culvert. The plans and the modeling need to coordinate with each other.*

Acknowledged. The site plans and hydrologic modeling were revised to coordinate with each other (proposed 24" pipe).

14. *In the post-development hydrology Pond 6P: Subsurface Infiltration System 4, the primary outlet is shown to be a twelve-inch round culvert whereas on Sheet C-106 the outlet manhole (DMH-17) shows an outlet as a fifteen-inch round culvert. The plans and the modeling need to coordinate with each other.*

Acknowledged. The site plans and hydrologic modeling were revised to coordinate with each other (proposed 24" pipe).

15. *In the post-development hydrology Pond 12P: Infiltration/Detention Basin, the emergency spillway was modeled as a ten foot long by six-foot breadth broad-crested weir whereas on Sheet C-106, the spillway scales to be fifteen feet long by eight feet in breadth. The plans and the modeling need to coordinate with each other.*

Acknowledged. The hydrologic modeling was revised to reflect the site plans (proposed 15 ft. x 8 ft.).

16. *In the post-development hydrology Pond 12P: Infiltration/Detention Basin, the emergency spillway was modeled as elevation 410.75 feet whereas on Sheet C-106 the emergency spillway is shown to be as elevation 410.50 feet. Furthermore, there needs to be one foot of freeboard between spillway elevation and the top of the berm elevation.*

Acknowledged. The revision was made on Sheet C-106 utilizing an elevation of 410.75 feet for the spillway, and an elevation of 411.75 for the top of the berm, which provides 1.0 foot of freeboard.

17. *For Ponds 3P, 5P, 6P and 14P (subsurface infiltration systems) there are sharp-crested rectangular weirs modelled with a length of 0.5 feet whereas on Sheet C-506 the construction detail for the infiltration system outlet structure has the effective length of the weir across the entire diameter of the manhole structure. The plans and the modeling need to coordinate with each other.*

Acknowledged. The hydrologic modeling was revised to reflect the site plans (proposed 4.0 feet).

18. For ponds 3P, 5P, 6P and 14P (subsurface infiltration systems) the size of the systems are shown incorrectly on the plans. For example, on Sheet C-105 Infiltration System 1 is scaled to be twenty-four feet wide by one hundred twenty-six feet long (24'x126') whereas in the hydrology calculations the proper sizing for the MC-4500 system is thirty-seven and fifty-eight feet wide and forty-three and thirty-four feet long (37.58'x43.34'). The plans and the modeling need to coordinate with each other.

Acknowledged. The hydrologic modeling was revised to reasonably model the proposed sizes of the subsurface infiltration systems. Although the modeled footprints of Stormwater Infiltration Systems 1, 2, and 3 are different than shown on the plans, the number of chambers and total area of the systems are in order.

19. Compliance with MassDEP Stormwater Handbook appears to be reasonable except as noted in the following five comments.

Acknowledged.

20. Soil testing needs to be performed at the proposed locations of the stormwater infiltration facilities to demonstrate that the required groundwater offset will be achieved and that the subsurface conditions are suitable for infiltration.

Sheet C-100 was revised to include groundwater readings at various borings. Groundwater was measured at depths of five feet to 12.5 feet below the ground surface for those borings 20 feet deep or deeper. Groundwater was not encountered for borings less than ten feet deep. Data at boring TB-1 indicates that the groundwater is higher than the bottom of (subsurface) Infiltration System 1 and data at boring TB-7 indicates that the groundwater is higher than the bottom of (subsurface) Infiltration System 3. Considering the depth of the subsurface infiltration BMP's below the existing ground surface, GEI recommends that soil testing be performed at the infiltration BMP's, including the open basin, during permitting rather than prior to the start of construction.

21. The Stormceptor sizing report for the water quality units shows sizing calculations for three water quality units but four units are shown on the plans. The water quality units need to be labeled to coordinate with the sizing report (e.g. WQU 1, WQU 2, etc.) and a sizing calculation for the fourth water quality unit needs to be provided.

Acknowledged. The site plans were revised to depict five proposed water quality units (Sheets C-105 and C-106). The Stormceptor sizing information was submitted and is in order.

22. In the total suspended solids (TSS) removal calculation worksheet, the pre-treatment shows a proprietary treatment device that has a remove rate of 52%. It appears that this proprietary treatment device is intended to be the oil/grit separator. According to the MassDEP Stormwater Handbook a removal rate of 25% is more appropriate.

Acknowledged. The revised information was provided in Attachment E for the treatment train containing the oil/grit separator.

23. In the TSS removal calculations worksheets, Treatment Train 1 and Treatment Train 2 both credit 10% TSS removal for monthly street sweeping, however the operation and maintenance plan does not support the 10% removal credit (only quarterly street sweeping).

Acknowledged. The revised information was provided in Attachment E utilizing a street sweeping removal credit of 5%.

24. In the TSS removal calculations worksheet for Treatment Train 2, it appears that this worksheet refers to the southern parking area to wetland. There needs to be a minimum of 80% TSS removed prior to discharging towards the wetland.

Acknowledged. Per information submitted by the design engineer, the treatment train consists of paved parking below the retail area parking deck and the discharge is considered *de minimus*; GEI concurs. However, the tributary area to catch basins CB-1, CB-2 and CB-3 will also achieve 66% TSS removal but is not considered *de minimus* because of the flow rate. Nevertheless, part of the project is considered re-development and there is an improvement compared to existing conditions.

General Engineering Comments

25. There needs to be additional spot elevations at the handicap accessible parking spaces to demonstrate compliance with the Massachusetts Architectural Access Board (MAAB) requirements.

Acknowledged. The revisions were made on Sheets C-105 and C106.

26. On Sheet C-107, the sewer pipe has no slope between the building face and sewer manhole (SMH) 1.

Acknowledged. The revision was made on Sheet C107.

27. On Sheet C-107, the label for SMH 2 shows one of the inlet inverts to be lower than the outlet invert. The outlet needs to be the lowest invert.

Acknowledged. The revision was made on Sheet C107.

28. On Sheet C-108, the reconfigured sewer system layout originating in Pine Street shows a change in flow direction of greater than ninety degrees. This is a problematic configuration that can result in excessive clogging. The change in direction needs to be limited to ninety degrees.

Acknowledged. The revisions were made on Sheet C-108.

29. On Sheet C-108, the elevations of the reconfigured sewer layout between Pine Street and SMH 9 need to be revised. The proposed invert elevations of SMH 6 are too low.

Acknowledged. The sewer elevations were satisfactorily revised. GEI understands that the Grafton Sewer Department will also review the proposed sewer improvements.

30. Sheet C-106 has erosion control barriers only proximate to the wetlands. Erosion control barriers need to be provided at all down-gradient sides of the work on Sheet C-105 and C-106.

GEI could not find symbols or lines for the proposed erosion control barriers on Sheets C-105 and C-106. It appears that the AutoCAD layer for erosion control barriers was accidentally turned off.

31. On Sheet C-106, DMH-14 needs to include the rim elevation for the structure.

Acknowledged. The revisions were made on Sheet C-106.

32. On Sheet C-504, there is a construction detail for "typical drain line and sewer trench section" that show the pipes to be bedded on sand or gravel borrow. The construction detail should specify that the storm drain line is to be bedded in gravel or stone. GEI understands that the sewer pipe should be bedded in stone, but defers to the Grafton Sewer Department.

Acknowledged. The revision was made on Sheet C-504.

33. *On Sheet C-507, the construction detail for Stormwater Infiltration System 4 needs to include information (e.g. elevations) associated with the outlet manhole (DMH-17).*
Acknowledged. The revisions were made on Sheet C-507.

General Comments

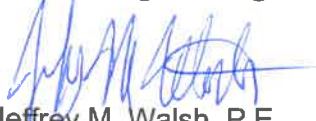
34. *The plans need to address how snow storage associated with the upper decks of the parking garages will be addressed.*
Acknowledged. Sheet C-103 was revised to show two snow storage areas.
35. GEI did not review for compliance with Grafton Stormwater Regulations or Wetland Regulations. Per my discussion with the Grafton Conservation Agent, GEI will proceed with such a review once we received revised plans and a revised stormwater management report.
GEI will review the revised documents on behalf of the Grafton Conservation Commission. Please see comments below.
36. GEI understands that the Grafton Sewer Department and the Grafton Water District will review the plans relative to their respective utilities.
No further comment necessary.
37. *GEI did not review the architectural plans.*
No further comment necessary.

Additional Comments; June 3, 2021:

38. **Pertinent elevations (e.g. bottom of stone, bottom of chambers) need to be provided on the plans for the subsurface stormwater infiltration systems.**
39. **Proposed SMH 6 should be labelled as a drop manhole. GEI defers to the Grafton Sewer Department whether interior or exterior drops are required; in either case a construction detail should be added to the plans.**
40. **Groundwater mounding calculations will need to be provided for any stormwater infiltration BMP that has less than four feet of groundwater offset and will attenuate the peak discharge from a 10-year or more intense storm event.**
41. **GEI has no issues relative to compliance with the Regulations for the Administration of the Grafton Wetlands Protection Bylaw except as noted in Comments #20 (Grafton Wetland Regulations §V.B.3.m) and #42.**
42. **The top of the berm at the open infiltration basin will only be 3.5 feet wide at elevation 411.75 (the 411-foot contours are eight feet apart and the slopes are 3H:1V). The needs to be wide enough for maintenance equipment. (Grafton Wetland Regulations §V.B.5.h.ii)**
43. **GEI has no issues relative to compliance with the Town of Grafton Conservation Commission Regulations Governing Stormwater Management except as noted in Comment #20 (Stormwater Management Regulations §6.A).**

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Graves Engineering, Inc.



Jeffrey M. Walsh, P.E.
Principal

cc: Jean E. Christy, P.E.; Tighe & Bond