

**From:** [Jeffrey Walsh](#)  
**To:** [Nathaniel E. Mahonen](#)  
**Cc:** [w211141@nf.bohlereng.com](mailto:w211141@nf.bohlereng.com); [Andrew Steiner](#); [John Kucich](#)  
**Subject:** RE: Sutton- Unified Building 2 &3 // UG Infiltration System Modifications  
**Date:** Friday, February 03, 2023 11:46:42 AM  
**Attachments:** [image001.png](#)

---

**EXTERNAL:** Use caution with attachments and links.

---

Good morning Nathan,

I reviewed the latest information pertaining to the use of Geostorage systems at UG2e and UG3c and have no issues with the use of those systems or the supporting documentation. Thank you for considering my earlier comments.

I assume that you will now be making a formal request to the Sutton Planning Department for approval this change and that plans from Geostorage will be part that request.

Best wishes,

Jeff

**JEFFREY M. WALSH, P.E.**  
*Principal*

**GRAVES ENGINEERING, INC.**

100 GROVE ST | WORCESTER, MA 01605  
T 508-856-0321 ext 109 | F 508-856-0357  
[www.gravesengineering.com](http://www.gravesengineering.com)

---

**From:** Nathaniel E. Mahonen <[nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)>  
**Sent:** Wednesday, January 25, 2023 7:10 PM  
**To:** Jeffrey Walsh <[JWalsh@gravesengineering.com](mailto:JWalsh@gravesengineering.com)>  
**Cc:** [w211141@nf.bohlereng.com](mailto:w211141@nf.bohlereng.com); [asteiner@bohlereng.com](mailto:asteiner@bohlereng.com); [John Kucich <jkucich@bohlereng.com>](mailto:John Kucich <jkucich@bohlereng.com>)  
**Subject:** RE: Sutton- Unified Building 2 &3 // UG Infiltration System Modifications

Good Evening Jeff,

Thank you again for connecting with us a few weeks back regarding the use of the alternative Geo-Storage underground stormwater management systems. We've coordinated with the contractor as well as the manufacturer and are providing additional information to address your comments. I want to point out that the footprints have been altered slightly from what was previously submitted. These changes were done after further communication with the manufacturer and contractor to lessen construction costs and improve the systems overall hydraulics. Please see below and attached and let me know if you have any questions. I'd be happy to jump on a call to discuss this further once you've had a chance to review.

### **Stamped Plans**

- Please find a signed and sealed copy of the revised “Construction Sketch 5” prepared by Bohler.
- Prior to construction, a full set of stamped plans and calculations for the chamber walls and reinforced concrete roof will be provided by the manufacturer. Per the manufacturer, the design will follow FHWA IBS Bridge Standards.

### **Water Quality (WQV)**

- Per conversations with the manufacturer, the “open area” of the Geo-Storage systems have been sized to provide the same (or greater) water quality volume that was provided in the isolator rows of the previously approved underground stormwater management areas. Non-woven geotextile fabric will be installed at the bottom and 2-feet up the side walls providing an equivalent to the previously approved isolator rows. It is worth noting that this volume has been provided above the sand filter that will be constructed in the bottom of both systems.
- The geotextile fabric that lines the systems floor and side walls has the same specifications as the geotextile fabric utilized within the isolator rows for the approved Stormtech systems, (AASHTO M288 Class 2 Non-Woven Geotextile), essentially allowing the open area to function similar to the isolator row but with the weir type condition at the top of the fabric.
- Both systems have an outlet control structure with a low orifice that is above the WQV elevation so that the WQV is contained in the system and will not bypass prior to treatment. This allows the pipes for both systems to be set at the bottom of the systems for ease of maintenance.

### **Stone Utilized During Construction**

- The stone that will be utilized within the Geo-Storage System is the same that is specified in approved Stormtech systems. The contractor has noted that the stone that comes from the onsite plant will be clean, but as a secondary measure they are proposing to set up a pump and wash the stone once it is loaded into a truck on an as needed basis.

### **Suggested Alterations & Maintenance**

- We reviewed the alternative concrete bottom and gabion baskets at the system inlet that you suggested with the manufacturer. However, per conversations with the manufacturer these modifications have not been implemented as it will alter the hydraulics of the systems causing them to not function properly. The characteristics of the system allow for ease of maintenance including inspection crews having direct access to the “open areas” of the Geo-Storage System through the surface manholes. If sediment or debris needs to be removed jet-vacs and vacuum trucks have access to the open area from the surface. The non-woven geotextile fabric that is installed at the bottom of the system above the sand filter serves as a visual identifier to distinguish the limits of sediment that should be removed. The geotextile fabric at the bottom of the system can also be removed and replaced as part of the maintenance should it be necessary. Please refer to the enclosed revised Operations and Maintenance Plan.

Thanks.

Nathan

**Nathaniel E. Mahonen, P.E.**

Chief Engineer

352 Turnpike Road

Southborough, MA 01772

o 508-480-9900 / c 978-660-8945 / [nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)

[www.BohlerEngineering.com](http://www.BohlerEngineering.com)



*Confidentiality Note: This e-mail, and any attachment to it, contains confidential information intended only for the use of the designated recipients, which information may also be privileged. If the reader of this e-mail is not the intended recipient, the document has been received in error and any use, review, dissemination, distribution, disclosure or copying of this message is strictly prohibited. If you have received this e-mail in error, please notify the sender via reply e-mail and immediately delete this e-mail from your system.*

---

**From:** Jeffrey Walsh <[JWalsh@gravesengineering.com](mailto:JWalsh@gravesengineering.com)>

**Sent:** Monday, January 9, 2023 9:38 AM

**To:** Nathaniel E. Mahonen <[nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)>

**Cc:** [w211141@nf.bohlereng.com](mailto:w211141@nf.bohlereng.com); Andrew Steiner <[asteiner@bohlereng.com](mailto:asteiner@bohlereng.com)>

**Subject:** RE: Sutton- Unified Building 2 &3 // UG Infiltration System Modifications

**EXTERNAL:** Use caution with attachments and links.

Good morning Nathan,

Let's go with tomorrow (01/10) at 9:30 AM. I'll be here for your call.

Best wishes,

Jeff

**JEFFREY M. WALSH, P.E.**

*Principal*

**GRAVES ENGINEERING, INC.**

100 GROVE ST | WORCESTER, MA 01605

T 508-856-0321 ext 109 | F 508-856-0357

[www.gravesengineering.com](http://www.gravesengineering.com)

---

**From:** Nathaniel E. Mahonen <[nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)>

**Sent:** Monday, January 9, 2023 9:35 AM

**To:** Jeffrey Walsh <[JWalsh@gravesengineering.com](mailto:JWalsh@gravesengineering.com)>

**Cc:** [w211141@nf.bohlereng.com](mailto:w211141@nf.bohlereng.com); Andrew Steiner <[asteiner@bohlereng.com](mailto:asteiner@bohlereng.com)>

**Subject:** RE: Sutton- Unified Building 2 &3 // UG Infiltration System Modifications

Good morning Jeff,

Sorry I missed your call at the end of last week. Do you have some time Tuesday or Wednesday for a call to discuss your comments? I've put some times below that work on our end.

- Tomorrow (1/10): 9:30 to 10:00, 2:30 to 5
- Wednesday (1/11): 11 – 1 pm

Thanks

**Nathaniel E. Mahonen, P.E.**

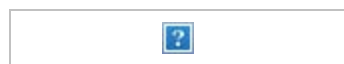
Chief Engineer

352 Turnpike Road

Southborough, MA 01772

o 508-480-9900 / c 978-660-8945 / [nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)

[www.BohlerEngineering.com](http://www.BohlerEngineering.com)



*Confidentiality Note: This e-mail, and any attachment to it, contains confidential information intended only for the use of the designated recipients, which information may also be privileged. If the reader of this e-mail is not the intended recipient, the document has been received in error and any use, review, dissemination, distribution, disclosure or copying of this message is strictly prohibited. If you have received this e-mail in error, please notify the sender via reply e-mail and immediately delete this e-mail from your system.*

---

**From:** Nathaniel E. Mahonen <[nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)>

**Sent:** Tuesday, January 3, 2023 2:57 PM

**To:** Jeffrey Walsh <[JWalsh@gravesengineering.com](mailto:JWalsh@gravesengineering.com)>

**Cc:** [w211141@nf.bohlereng.com](mailto:w211141@nf.bohlereng.com)

**Subject:** RE: Sutton- Unified Building 2 &3 // UG Infiltration System Modifications

Good afternoon Jeff,

Happy new year and I hope you enjoyed the holidays. I am following up to see if there are any additional comments beyond the couple we spoke about a couple weeks ago.

Thanks

Nathan

**Nathaniel E. Mahonen, P.E.**

Chief Engineer

352 Turnpike Road

Southborough, MA 01772

o 508-480-9900 / c 978-660-8945 / [nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)

[www.BohlerEngineering.com](http://www.BohlerEngineering.com)



*Confidentiality Note: This e-mail, and any attachment to it, contains confidential information intended only for the use of the designated recipients, which information may also be privileged. If the reader of this e-mail is not the intended recipient, the document has been received in error and any use, review, dissemination, distribution, disclosure or copying of this message is strictly prohibited. If you have received this e-mail in error, please notify the sender via reply e-mail and immediately delete this e-mail from your system.*

---

**From:** Jeffrey Walsh <[JWalsh@gravesengineering.com](mailto:JWalsh@gravesengineering.com)>  
**Sent:** Wednesday, December 21, 2022 8:48 AM  
**To:** Nathaniel E. Mahonen <[nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)>  
**Cc:** [w211141@nf.bohlereng.com](mailto:w211141@nf.bohlereng.com); John Kucich <[jkucich@bohlereng.com](mailto:jkucich@bohlereng.com)>  
**Subject:** RE: Sutton- Unified Building 2 &3 // UG Infiltration System Modifications

**EXTERNAL:** Use caution with attachments and links.

Good morning Nathan,

Received your email and voicemail. I will take a look and get back to you – late today or tomorrow.

Jeff

**JEFFREY M. WALSH, P.E.**  
*Principal*

**GRAVES ENGINEERING, INC.**  
100 GROVE ST | WORCESTER, MA 01605  
T 508-856-0321 ext 109 | F 508-856-0357  
[www.gravesengineering.com](http://www.gravesengineering.com)

---

**From:** Nathaniel E. Mahonen <[nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)>  
**Sent:** Tuesday, December 20, 2022 2:24 PM  
**To:** Jeffrey Walsh <[JWalsh@gravesengineering.com](mailto:JWalsh@gravesengineering.com)>  
**Cc:** [w211141@nf.bohlereng.com](mailto:w211141@nf.bohlereng.com); John Kucich <[jkucich@bohlereng.com](mailto:jkucich@bohlereng.com)>  
**Subject:** Sutton- Unified Building 2 &3 // UG Infiltration System Modifications

Good morning Jeff,

The developer is proposing an alternate product for the underground infiltration systems behind building #3 (basin UG3c) and to the south side of building #2 (basin UG2e). They are proposing to switch from the previously approved Stormtech MC-3500/MC-4500 chamber systems to a “GeoStorage” system. To our knowledge you don’t see many of the types of systems around here but they are very beneficial where you have larger systems and a lot of blast rock, which is the case for this site. The one other system we’re aware of offhand is the rather large one that was installed at [University Station](#) in Westwood for reference. The link below will download a pdf of (1) Construction Sketch 5 which shows the changes to these two systems and associated piping; (2) preliminary plans from the manufacturer that provides a cross-section view of the system; and (3) updated HydroCAD calculations with the alternate system. The system is equivalent to the Stormtech chambers relative

to compliance with the stormwater standards as outlined below:

- The two systems are in the same general location as the previous design.
- The bottom of the two systems are at the same elevation as, or slightly higher than, the previous design to maintain offsets to ground water.
- Both systems drain to design point #2. As outlined in the revised HydroCAD calculations the post development peak rates at design point #2 are at or below the pre-development rates.
- The previous design for UG2e provided 13,736 CF of storage below the lowest outlet for recharge and water quality volume. The revised system design provides 16,594 CF or an increase of 2,858 CF. Refer to HydroCAD calcs and stage storage tables outlining the volume retained in the system.
- The previous design for UG3c provided 82,472 CF of storage below the lowest outlet for recharge and water quality volume. The revised system design provides 81,012 CF or a minor decrease of 1,460 CF. Refer to HydroCAD calcs and stage storage tables outlining the volume retained in the system.
- The two systems combined provide an increase of 1,398 CF of recharge and water quality volume.
- The open area of each system will be lined with geotextile fabric up to the elevation of the lowest outlet of the system and a sand filter will be constructed at the bottom of each area. This will provide pre-treatment prior to infiltration in lieu of the previously proposed isolator rows. The sand filter and upstream catch basins will provide the required 44% TSS removal prior to infiltration and the systems as a whole will provide in excess of 80% TSS removal.

[Download all files](#)

Note that the details from the manufacturer are not 100% final at this time and will need modifications for site specifics (e.g. does not include sand filter), however, we wanted to get your initial review and any comments prior to getting updated drawings from them. I'll call shortly as well to discuss the changes and overall approach. If we don't connect please feel free to give my cell a call (978-660-8945) with any questions or need for additional information.

Thank you in advance for your time in reviewing the proposed changes.

Nathan

**Nathaniel E. Mahonen, P.E.**

Chief Engineer

352 Turnpike Road

Southborough, MA 01772

o 508-480-9900 / c 978-660-8945 / [nmahonen@bohlereng.com](mailto:nmahonen@bohlereng.com)

[www.BohlerEngineering.com](http://www.BohlerEngineering.com)



*Confidentiality Note: This e-mail, and any attachment to it, contains confidential information intended only for the use of the designated recipients, which information may also be privileged. If the reader of this e-mail is not the intended recipient, the document has been received in error and any use, review, dissemination, distribution, disclosure or copying of this message is strictly prohibited. If you have received this e-mail in error, please notify the sender via reply e-mail and immediately delete this e-mail from your system.*