



## R.W. Gillespie & Associates, Inc.

Geotechnical Engineering • Environmental Consulting • Materials Testing Services

21 January 2021

Nell (Helen) Donaldson, Planning and Urban Development Division  
City of Portland  
389 Congress Street  
Portland, Maine 04103

VIA EMAIL: [hcd@portlandmaine.gov](mailto:hcd@portlandmaine.gov)

Subject: Geotechnical Engineering Review of Gilman Street Temporary Support of  
Excavation Design  
Maine Medical Center Hospital Expansion  
Portland, Maine  
RWG&A Project No. 0557-031

Dear Ms. Donaldson:

R.W. Gillespie & Associates, Inc. (RWG&A) is pleased to present a summary of our geotechnical engineering review of a section of the planned temporary support of excavation (SOE) system at the Gilman Street right-of-way boundary. The review was limited to the 24-foot long section of the SOE system abutting the right-of-way near the southwest corner of Maine Medical Center's planned building. The following paragraphs summarize our understanding of the proposed temporary excavation support and review of construction and design information provided to RWG&A.

We understand that Maine Medical Center would like to expedite the City's review to avoid delays in utilizing specialty construction equipment at the site needed to install soldier piles. The matters raised in this letter could be addressed during and after the soldier pile installation process and before tiebacks are installed into the Gilman Street right-of-way.

### ***Proposed Project***

Maine Medical Center's contractor proposes temporary excavation support to facilitate the construction of the proposed hospital expansion building that will have enclosed, below-grade spaces adjacent to Gilman Street. The temporary SOE system location is near the southwest corner of the planned building. Earthwork Engineering, Inc. of Hollis, New Hampshire, prepared the design on behalf of Keller North America (Keller). Keller is a specialty contractor retained by the project's General Contractor, Turner Construction Company (Turner). Simpson Gumpertz & Heger, Inc. (SGH), the project's geotechnical engineering consultant, is responsible for the review of the temporary SOE system design submittal. The project delegates the SOE system's design along Gilman Street to the contractor. Technical specification Section 315001-SOE, *Temporary Support of Excavation – Performance Based*, provides requirements for designing and constructing the SOE system.

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RWG&A's understanding of the proposed SOE system is based on communications with City representatives, a review of the documents that Turner provided via the City, and communications with Turner. A list of the technical review source documents RWG&A used is attached to this letter. The Earthwork Engineering, Inc. design drawings illustrate a soldier pile and lagging wall about 66 feet long parallel to the planned building's southwest corner, including the subject 24-foot long section at the Gilman Street right-of-way boundary.

Sheet 1 indicates the temporary SOE system will be extended northward in the future; the drawing indicates the SOE system design for the extension will be submitted separately. It's understood that excavation behind the subject section would not occur until the Gilman Street temporary SOE system is in place. The future structure does not rely on the temporary SOE system for long-term lateral support of the building foundation walls. The excavation support system is needed until the building's foundation wall is in place and backfilled, which the Contractor estimates will take about six months to complete.

SOE wall systems typically deflect toward the excavation due to the unbalance earth and groundwater pressures across the wall. The deflection can cause ground movement and settlement behind the wall. Technical specification Section 315000, *Temporary Support of Excavation – Performance Based*, stipulates that the maximum allowable deflection of the SOE system wall is 1 inch. The maximum tolerable movement is limited to protect property behind the SOE system wall.

At the planned SOE system wall alignment, ground surface pitches down toward the north from about elevation 57 feet to 53 feet. The excavation's bottom will be at elevation 32 feet, which corresponds to an excavation depth of 21 to 25 feet below the adjacent grade. The design calls for the use of tiebacks to laterally brace the walls. The tiebacks would pitch downward from about elevation 48 feet at the right-of-way at an angle of about 20 degrees from horizontal and extend a horizontal distance of about 61 feet below the Gilman Street right-of-way.

Based on the enclosed sketch titled *Section at Gilman St. Looking South Look South, Tieback 9 & 10*, the tiebacks would pass about 5 feet below an electrical duct bank, about 9 feet below a 6-inch waterline, about 5 to 7 feet below the bottom of SMH-8 and SMH-13533, and about 16 feet below a 4-inch natural gas pipeline at the west side of Gilman Street. The Contractor proposes to abandon four grouted soil tiebacks and four steel, H-shaped soldier piles in-place after the excavation between the SOE system and building foundation walls is backfilled. The H-piles are about 24 inches square in plan dimensions and would be surrounded by "flo fill" which we understand is a low-strength concrete. The sketch indicates that the "flo fill" and soldier piles would be removed to a depth 6 feet below the final grade after completion of foundation work.

## **GEOTECHNICAL ENGINEERING REVIEW**

The purpose of RWG&A's review was to assist the City in reviewing the following:

- Potential short-term effects of the proposed excavation support system(s) on the City's property and underground utilities,

- Potential long-term effects on the City's street maintenance/reconstruction,
- Geotechnical engineering aspects of the proposed temporary excavation support system.

RWG&A's responsibilities were limited to verifying that the SOE system design and documents were prepared using normal practice for professional engineers carrying out similar work. RWG&A's services exclude technical review to ensure that errors or omissions have not been made by Maine Medical Center's consultant(s) or constructor(s) or that the design conforms with any contractual requirement. The following is a summary of RWG&A's review comments; RWG&A recommendations are *italicized*. It is understood that the City's planners and engineers will also review the technical information provided and prepare additional comments as appropriate.

**Potential Short-term Effects on the City's property and Underground Utilities:** Construction of the temporary excavation support system will involve installing the soldier piles within pre-drilled cased holes. This proposed installation method would produce de minimus offsite ground vibrations, lateral movement, and vertical movement near the planned excavation limits. Provided that underground utilities are protected from excessive movement and repairs are not needed, the proposed excavation support system construction should not significantly disrupt utility service or use of streets.

Section 31500 states that the Contractor is responsible for installing the temporary SOE systems without damaging existing active utilities, buildings, structures, and site improvements adjacent to the excavation. The Contractor's Engineer is responsible for evaluating the impacts to adjacent structures, utilities, roadways, and other site improvements due to installation and anticipated movements of the temporary SOE system. Section 315000 also requires the Contractor to monitor the SOE system for movements.

The specifications state that the limiting wall movement is 1.0 inches. The limiting wall movement is the maximum amount of movement before mitigation to address the wall movement is needed. As indicated in Keller North America's enclosed email to Turner, the wall has been designed to the maximum 2-inch lateral deflection criteria. Calculated design movements are about 0.3 to 0.5 inches depending on the stage of SOE system construction. Most settlement behind a SOE system wall occurs within a horizontal distance equivalent to one to three times the excavation depth. For this project, the settlement would be expected within about 25 to 50 feet of the SOE system wall. It's anticipated that maximum settlement would be a fraction of the actual horizontal wall movement but could approach the horizontal wall movement amount.

*RWG&A suggests that the designer describe the range of anticipated settlements and expected variation with distance behind the excavation. This information would help assess and compare construction monitoring data to anticipated movements.*

*RWG&A recommends that monitoring points at the ground surface be established within the City's right-of-way, including City-owned utilities such as utility structures. The contractor's*

*monitoring program should include recording visual observations of the ground surface behind and in front of the wall for evidence of subsurface movement expressed at ground surface, including the formation of cracks, areas of subsidence or heave, and eroded soil deposits.*

*MMC project representatives should notify the City immediately of any suspect or actual damage on or below City property. Monitoring reports with an assessment of the data should be provided to the City.*

*RWG&A recommends that pre- and post-construction camera surveys of City-designated utilities be conducted with results of the surveys provided to the City.*

**Potential Long-term Effects on the City's Street Maintenance/Reconstruction:** Keller North America indicated that the tiebacks and soldier piles will be abandoned in-place and do not anticipate any potential long-term effects. However, based on RWG&A's review of the proposed temporary excavation support design, abandoned components might conflict or interfere with street or utility maintenance/reconstruction where excavations extend below the tiebacks' level. For example, if driven sheet, supported excavations are needed to install or replace the sanitary sewer, the tieback might conflict with sheet installation if not accounted for in advance. Cutting of steel strands might be needed if they are encountered in excavations.

*RWG&A recommends that horizontal and vertical surveys abandoned tieback and soldier pile information be conducted with the results of the surveys provided to the City.*

### **Geotechnical Engineering Aspects of the Proposed Temporary Excavation Support System**

Experience Requirements: Section 315000, Part 1.09 requires that the SOE system be designed by a qualified professional engineer registered in the state of Maine. Paul A. Deterling, P.E., principal design engineer with Earthwork Engineering, Inc., is the temporary SOE system engineer of record, is a Maine-licensed professional engineer, and is experienced in design and monitoring of support systems according to the resume provided.

Global Stability: Keller North America indicated that they have looked at the complete site geotechnical conditions and concluded that there will be no issues with the excavation's global stability. Details of the assessment were unavailable for RWG&A's review, and expects SGH has reviewed the global and local stability aspects of the design.

*MMC's designers should affirm they have reviewed global and local stability and that the design provides adequate resistance to failure.*

Basis of Contractor Design: The technical specifications require the Contractor to accept responsibility for their design. It is understood that SGH specified and/or approved the soil properties and subsurface conditions used in the SOE system design. We noted that the subject design resubmittal for the SOE system design was revised to exclude clay layers per the SGH's direction. Boring B-16-5 was drilled near planned pile 10, and the boring log documents the presence of clay deposits at the wall alignment. The Interpretive Geologic Profile F in the project's geotechnical data report shows stiff to medium clay deposits at the subject alignment. It

appears that the initial SOE system design accounted for the presence of clay deposits, and we would concur with that approach.

*If there is uncertainty about subsurface conditions among the design and construction professional engineers involved, it is reasonable to design based on the more conservative approach (i.e., the one that provides greater protection against failure or excessive ground movement within the City's right-of-way and to its infrastructure). SGH has stated this two-analysis approach was used in the SOE system design between soldier piles 1 and 6. The addition of deeper tiebacks or soldier piles, if needed, would not be a significant short- or long-term effect on the right-of-way beyond comments provided herein.*

*A copy of the MMC designer-approved temporary excavation support design package should be provided to the City for informational purposes.*

*Sheet 2 of 3, Soldier Pile and Lagging with Tieback Anchors, Elevation, Details and Testing, includes a table of soldier pile and tieback schedule of types and dimensions. The soldier pile length at locations 9 and 10 listed in the table is 30 feet compared to the 32 feet in the design calculations. The designer should verify the design lengths on the table.*

*A copy of the MMC designer-approved temporary excavation support design package should be provided to the City for informational purposes.*

Anchor Tieback Limits: The sketch prepared by Turner indicates that the Gilman Street right-of-way is 60 feet wide. The design calls tieback 65 feet long installed at a 20-degree downward angle. Based on the length and angle, the tiebacks would extend a horizontal distance of about 61 feet. It appears from the wale-to-pile connection detail that about 1 foot of the tieback would be located on the project side of the boundary, which would locate the end of the tieback very close to the Gilman Street westerly right-of-way boundary. If there are deviations from the design tieback lengths and inclinations, or in soldier pile positions, it is conceivable that the tieback might extend outside of the right-of-way and into the abutter's property.

*MMC should affirm that survey, construction, and design modifications are in place to assure that the tieback system will not extend beyond the westerly right-of-way boundary. The contractor should indicate how location, length, and angle control will be maintained and verified during installation.*

Load Testing of Anchors: The SOE system design specifies load testing of all installed anchors to verify and establish their load-carrying capacity. All anchors would be tested at load increments of 25, 50, 75, 100, and 133 percent of the maximum design load. RWG&A does not take exception to the specified performance and load testing program.

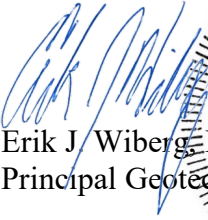
*RWG&A recommends that a third-party engineer observe tieback anchor performance and proof testing, in addition to Parade Office's geotechnical engineer as specified.*

**Closure**

This geotechnical engineering review has been prepared for specific application to Temporary Support of Excavation Design for the Maine Medical Center Hospital Expansion project in Portland, Maine, and the exclusive use of the City of Portland. This service has been completed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. If any changes are made in the nature and/or design of the temporary SOE system, this letter's conclusions and recommendations should be reviewed by RWG&A.

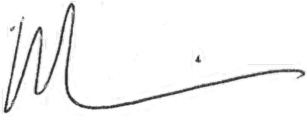
We trust that the preceding meets the project's current needs. Please do not hesitate to contact us with any questions.

Sincerely,  
R. W. GILLESPIE & ASSOCIATES, INC.

  
Erik J. Wiberg, P.E.  
Principal Geotechnical Engineer



STATE OF MAINE  
ERIK J. WIBERG  
No. 9173  
LICENSED PROFESSIONAL ENGINEER

  
Marc R. Grenier, P.E.  
Senior Geotechnical Engineer

EJW:sf

**Attachments**

Sketch titled *Section at Gilman St. Looking South Look South, Tieback 9 & 10* prepared by Turner.

Letter from Turner to Maine Medical Center dated 14 January 2021.

Email from Keller North America (Hayward Baker, Inc.) to Turner dated 15 January 2021; 10:34 AM (note: attached).

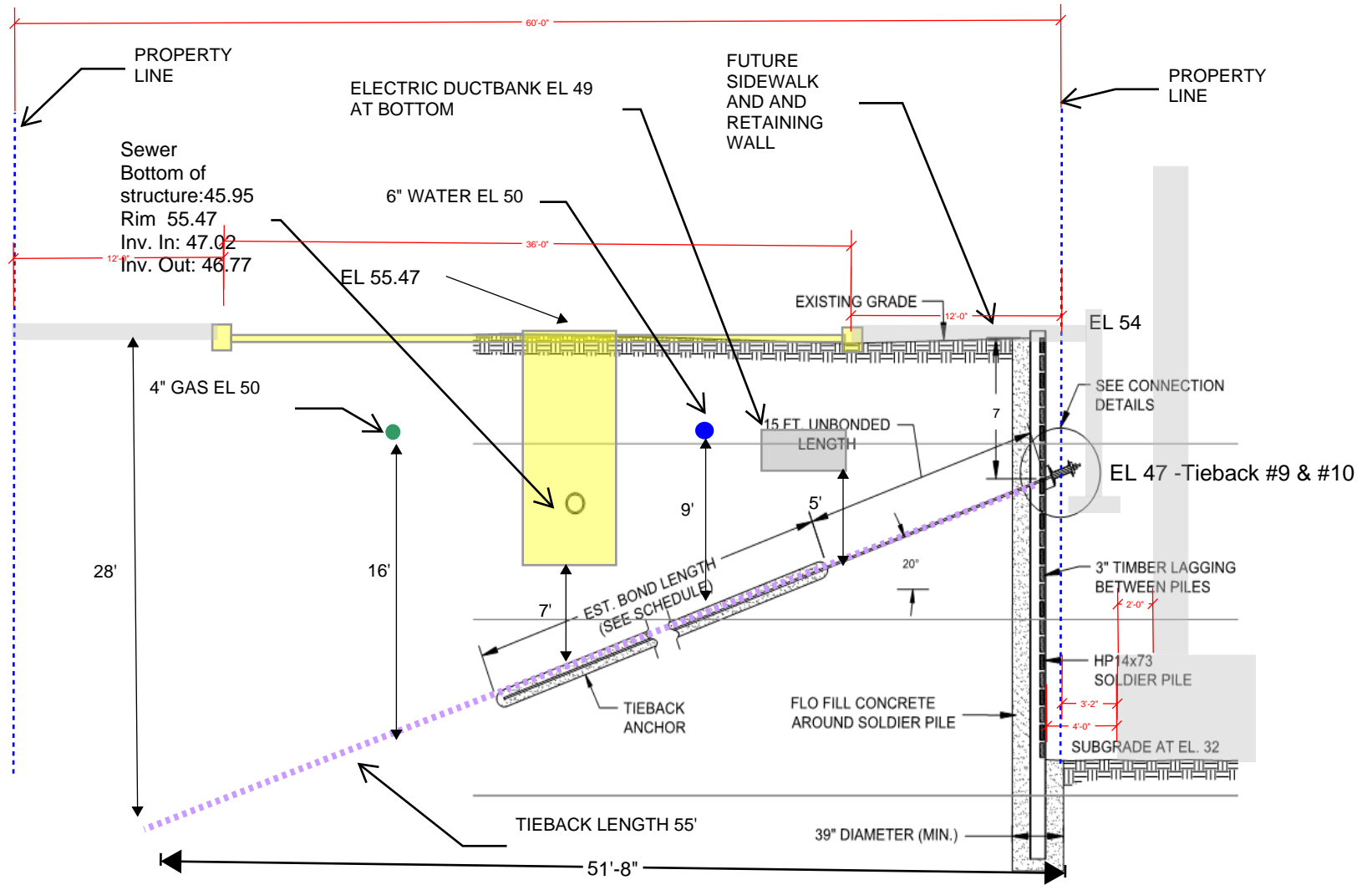
# R.W. Gillespie & Associates, Inc.

## Technical Review Source Documents

- Letter from Turner to Main Medical Center dated 14 January 2021 describing the planned temporary SOE system on Gilman Street.
- Letter dated 31 December 2020 from Earthwork Engineering, Inc. to Hayward Baker, Inc., Turner's SOE system specialty contractor, concerning Temporary SOE Design Submittal (No. CS315001-SOE-0002-1) with three SOE system design drawings and design calculations report (91 pages).

The letter was prepared in response to Simpson, Gumpertz, and Heger, Inc.'s (SGH) submittal review comments. The drawings included in the letter are all dated 11 December 2020, revised 31 December 2020:

- Sheet 1 of 3, *Soldier Pile and Lagging with Tieback Anchors, Plan and General Notes*,
- Sheet 2 of 3, *Soldier Pile and Lagging with Tieback Anchors, Elevation, Details and Testing*,
- Sheet 3 of 3, *Soldier Pile and Lagging with Tieback Anchors, Elevation, Design Sections*.
- Drawing SE00-001, *General Notes, Congress St. Bldg. Permanent Support of Excavation*, prepared by SGH, dated 18 December 2018, revised 11 May 2020.
- Technical specification Section 315001-SOE, *Temporary Support of Excavation – Performance Based*, revised 14 May 2020.
- Report titled *Additional Explorations and Geotechnical Services, Proposed Medical Office Building, Congress Street, Portland, Maine*, prepared by S.W. Cole Engineering, Inc. dated 20 December 2019.
- Sketch titled *Section at Gilman St. Looking South Look South, Tieback 9 & 10* prepared by Turner illustrating a profile of the SOE system.
- Resume of Paul A. Deterling, P.E. of Earthwork Engineering, Inc.
- Email from Keller North America (Hayward Baker, Inc.) to Turner dated 15 January 2021; 10:34 AM. The email included responses to the City's request for additional information.
- Email from Simpson Gumpertz & Heger, Inc. to Turner dated 20 January 2021; 5:01 PM (note: attached). The email addressed the subsurface conditions design approach.
- Drawing No. SBC-ASB-C03-02, Plan & Profile: Gillman Street/Congress Street Enabling Work ASB, dated 02 December 2019, marked "Record Drawing of As-Built Conditions" annotated with as-built utility information near the building's southwest corner.
- Sheet Number C11-01, *Utility Plan*, dated 02 October 2020, annotated with utility and SOE system information near the building's southwest corner.



### GENERAL NOTES

THESE PLANS DETAIL THE TEMPORARY EXCAVATION SUPPORT SYSTEM TO BE INSTALLED AT THE SOUTHWEST CORNER OF THE NEW CONGRESS STREET BUILDING AT THE MAINE MEDICAL CENTER IN PORTLAND, MAINE. THE EXCAVATION SUPPORT SYSTEM HAS BEEN DESIGNED FOR A MAXIMUM VERTICAL SURCHARGE OF 300 PSF APPLIED AT THE TOP OF THE SUPPORT WALL.

### INSTALLATION PROCEDURE

1. THE AREA ALONG THE SOLDIER PILE ALIGNMENT SHALL BE CLEARED OF ALL EXISTING UTILITIES AND OTHER OBSTRUCTIONS PRIOR TO PILE INSTALLATION. THE AREA AT PILE 1 TO BE GRADED TO ELEV. +65 AND SLOPED DOWN TO PILE 6 AT ELEV. 57.
2. THE SOLDIER PILES SHALL THEN BE INSTALLED AT THE LOCATIONS SHOWN IN PLAN. THE PILES SHALL BE INSTALLED WITHIN PREDRILLED CASED HOLES WHICH SHALL BE ADVANCED DOWN TO THE LENGTH GIVEN IN THE SOLDIER PILE SCHEDULE. THE PILES SHALL BE SET WITHIN THE DRILL SHAFT IN THE CORRECT ORIENTATION AND THEN BACKFILLED WITH FLO FILL CONCRETE UP TO EXISTING GRADE.
3. AFTER THE SOLDIER PILES HAVE BEEN INSTALLED MAKE THE INITIAL EXCAVATION ALONG THE SOLDIER PILE WALL TO 5 FEET BELOW GRADE FOR INSTALLATION OF TIMBER LAGGING BETWEEN PILES. THE HEIGHT OF UNSUPPORTED SOIL FACE MAY NEED TO BE REDUCED FROM 5 FEET BASED ON ACTUAL SOIL CONDITIONS TO MAINTAIN A STABLE SOIL FACE. TIMBER LAGGING WILL BE EITHER TUCKED BEHIND THE PILE FLANGES OR ATTACHED TO THE FLANGES WITH WELDED THREADED ROD (SEE DETAIL ON DRWG. 2 OF 3). LAGGING WILL BE SPACED WITH LOUVERS TO PERMIT FREE DRAINAGE. ALL VOIDS BEHIND THE LAGGING WILL BE TIGHTLY BACK PACKED WITH ON-SITE GRANULAR MATERIAL. TIMBER LAGGING TO BE INSTALLED IMMEDIATELY AFTER EXCAVATION IS MADE.
4. THE GENERAL EXCAVATION SHALL CONTINUE IN LIFTS WITH LAGGING INSTALLED BETWEEN THE PILES AS DESCRIBED ABOVE DOWN TO TWO FEET BELOW EACH BRACING LEVEL FOR INSTALLATION OF THE TIEBACK ANCHORS AND WALES, AS DETAILED. TIEBACKS SHALL BE INSTALLED AT THE DEPTH AND ANGLE GIVEN IN THE SOLDIER PILE SCHEDULE. THE TIEBACK TENDON AND REGROUT TUBE SHALL BE INSTALLED THE FULL LENGTH WITHOUT DIFFICULTY. PLACE GROUT BY TREMIE METHODS TO THE FACE OF EXCAVATION. TIEBACKS SHALL BE REGROUTED AT LEAST ONCE. AFTER THE TIEBACKS HAVE BEEN INSTALLED THEY SHALL BE TESTED FOLLOWING THE "TIEBACK TESTING PROCEDURE" GIVEN ON DRAWING 2 OF 3. TIEBACK TEST REPORTS TO BE PROVIDED TO EARTHWORK ENGINEERING FOR REVIEW.
5. AFTER THE STRUCTURE IS INSTALLED AND BACKFILL HAS BEEN PLACED UP TO WITHIN 2 FEET OF THE BRACING LEVEL THE WALE AND BRACING CAN BE REMOVED. IN ADDITION, THE TIEBACKS SHALL BE DETENTIONED AND THE DOUBLE CHANNEL WALS REMOVED.

THE LATERAL MOVEMENT OF THE SYSTEM SHALL BE MONITORED DURING CONSTRUCTION. MONITORING POINTS SHALL BE LOCATED EVERY 16 FEET ALONG THE EXCAVATION SUPPORT (MAX.) AND READINGS TAKEN 2 TO 3 TIMES PER WEEK DURING ACTIVE EXCAVATION WORK. AFTER THE EXCAVATION REACHES SUBGRADE THE READINGS SHALL BE TAKEN WEEKLY. MONITORING DATA SHALL BE PROVIDED TO EARTHWORK ENGINEERING FOR REVIEW AS IT IS OBTAINED.

## SECTION AT GILMAN ST LOOKING SOUTH TIEBACK 9 & 10

NOTE: Tiebacks will be de-tensioned and soldier piles and lagging will be removed to 6' below grade after completion of foundation work.



January 14, 2021

Dominic Gagnon  
Vice President of Facilities  
Maine Medical Center  
22 Bramhall Street, Portland, Maine 04102

Subject: Maine Congress St. Building Easement for Temporary Support of Excavation (SOE) System – Gilman St

As part of the construction of the new Congress St Building for MMC a temporary SOE system is required to perform excavation work from street level ( varies from El 43 to El 58) to the bottom of excavation at elevation 32. Due to the location of the foundation elements along Gilman Street approximately 200 lf of this temporary SOE system is required to be installed within the Right of Way (ROW) along Gilman Street. Following is a description of the temporary SOE system, installation, and removal.

The temporary SOE system has been engineered and stamped by a professional engineer employed by the installing contractor Keller North America. The system is comprised of driven soldier piles, wood lagging and tiebacks where required by engineered calculations. The system requires the installation of approximately 200 lf of soldier piles and lagging and 13 tiebacks along Gilman St. in order to reach the required depths of excavation at the northern end of the foundation (Building column lines C through E). Soldier piles and lagging will be installed approximately 3' into the Gilman St ROW with 13 tiebacks extending 42'-52' below grade under Gilman St. Soldier piles from building line F to E will be set in drilled shafts backfilled with flow fill. The remaining soldier piles will be driven every 7'-8' along the length of the system. All utility companies will be notified prior to the installation of tiebacks. In addition, we will provide a video file of the length of sewer line from SMH 8 to SMH 6. Temporary SOE will be monitored for movement in accordance with the project specifications.

We are scheduled to excavate to elevation 32 (Bottom of Excavation) in July/August 2021 and perform foundation backfilling operations from November 2021 through January 2022. Upon completion of the Congress St Building foundation installation and during backfill operations, the temporary tiebacks will be de-tensioned and the soldier piles and lagging will be cut off and removed to a depth of 4' below grade.

The Temporary SOE consists of three phases; Phase 1 - SW Corner which extends from the new secant wall to building column line E on Gilman St.; Phase 2 – Gilman/Congress continues from column line E on Gilman St to column line 11.5 on Congress St.; Phase 3 – East End continues along column line 11.5 returning south to the new secant wall.

The portions of Phase 1 and Phase 2 along Gilman St require the easement from the city for the ROW at Gilman St. Phase 2 along Congress Street is still in the design /engineering phase. I have included the draft documents for review.

Attached please find the following documents related to the installation of the Temporary SOE system along Gilman St and Congress St:

1. Keller North America Response to City of Portland email dated 1/15/21.
2. Simpson Gumpertz and Heger Specification Section 315001 – Temporary Support of Excavation – Performance Based.
3. Simpson Gumpertz and Heger Drawing SE00-1 – General Notes Rev 7 dated 5/11/20.
4. SW Cole Geotechnical Report 16-1136 S Addendum NO.1 dated 12/20/19.
5. Earthwork Engineering Inc. Temporary SOE Design Submittal (No CS315001-SOE-0002-1) dated 12/31/20. (Phase 1)
6. Earthwork Engineering, Inc. Paul A Deterling, PE – Resume.
7. Temporary SOE Gilman St / Congress St Draft w/mark ups (Phase 2)

Please feel free to call me with any questions or if you require any additional information.

Sincerely,

Patrick Carroll  
Senior Project Manager  
Turner Construction Company

## Carroll, Patrick H - (BOS)

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**From:** Higgins, Seamus <SOHiggins@keller-na.com>  
**Sent:** Friday, January 15, 2021 10:34 AM  
**To:** Carroll, Patrick H - (BOS)  
**Subject:** FW: follow up on 3rd party geotech review DRAFT  
**Attachments:** Deterling Resume.pdf

Pat,

See our responses below in red

Dominic,

One of our on-call consultants, RW Gillespie & Associates, has agreed to serve as a third party for the geotech review for the tiebacks under Gilman. For reference, their evaluation, based on conversation with DPW, will include reviews for:

- Potential short-term effects of the proposed excavation support system(s) on the City's property and underground utilities, **We do not anticipate any potential short term effects.**
- Potential long-term effects on the City's street maintenance/reconstruction, **We do not anticipate any potential long term effects.**
- Geotechnical aspects of the proposed temporary excavation support system. **Please present them with SW Coles Geotechnical report and our temp SOE design calculations for this design.**

In this vein, they have taken an initial look at the plans and materials that your team provided, discussed with DPW, and are asking for additional information from your team in order to complete the review, specifically the following:

- Report of geotechnical evaluation for the proposed project and subject wall, including data obtained as part of the subsurface investigation and geotechnical testing program used as a basis for temporary excavation support evaluations. **Please present them with SW Coles Geotechnical report and our temp SOE design calculations for this design.**
- A description of the temporary SOE's service-life duration and all components that will be abandoned in place within the City's right-of-way, including but not limited to tiebacks, soldier piles, flo-fill concrete, lagging, etc., if any. The information should indicate explicitly where and what materials will be abandoned in the right-of-way. **The temporary SOE will be utilized to permit excavation for the new foundation. The system will be in place for approximately 6 months before backfilling is completed. When the temp SOE is no longer needed we will detension the tiebacks at the Waller and remove the lagging & steel beams below the finished subgrade.**
- A description of long-term conditions after temporary support is no longer needed and their effects on City

property (e.g., restoration of conditions below easement, materials to be abandoned in place, settlements, groundwater lowering, etc.) **As stated above we do not anticipate any potential long term effects from the Temp SOE. The soldier piles and tiebacks will be abandoned in place.**

- A description of how the subject SOE wall will be integrated with the planned temporary SOE north of pile 10. The information provided should include open excavation controls that will be used in the area of pile 10 to prevent adverse soil movement near pile 10 before the next section of SOE wall is constructed. Pile 10 to 11 is connected by timber lagging..

**The drilled in piles and driven piles will be installed prior to the start of excavation work. As the excavation is made the timber lagging will be installed between piles 10 to 11 in the same manner as other areas and at the same time. No special procedures are required in this area.**

- Plans and cross-sections showing limits of construction, type of tiebacks, any backfill requirements, excavation limits, mean high water level, design high water level, and drawdown conditions to prevent the heave and instability of the excavation bottom, if applicable. **Please provide temporary SOE design drawings and calculations. The design groundwater level was set at elev. +53, as per Note 5C on Contract Drawing SE00-01. Information on general groundwater conditions can be taken from the project geotechnical report. The excavation is being made into a dense glacial till and there are no issues with heave or bottom instability.**

- The geotechnical basis used to determine anchor lengths (e.g., bonded and unbonded zone length and bond stress). Results of global stability analyses of representative section(s) of the SOE. It is anticipated that global stability analyses would include evaluations of failure by bottom heave, sliding, and ground mass rotation (i.e., circular arc). **The tieback anchor bond lengths and unbonded lengths are calculated in the temporary SOE design submittal along with the design bond stress. We have looked at the complete site geotechnical conditions and we have concluded that there will be no issues with general stability of the excavation into the dense glacial till.**

- Technical design and performance requirements used in temporary SOE design, construction, and performance monitoring. It is expected that the document(s) would address the following:

- Minimum experience requirements for the excavation support designer and specialty contractor, including personnel, who will oversee and perform design, construction, and monitoring, **Turner can respond in part here as I'm sure they have well vetted the Keller company and its capabilities, however I have attached the resume for the excavation support designer.**

- Magnitude, location, dimensions, and direction of external loads due to construction equipment, snow, and traffic surcharges,

**We have included construction surcharge loading, as per Note 5c on Contract Drawing SE00-01, in our design at all locations.**

- Limits and requirements of drainage features beneath, behind, above, or through the temporary wall, **The soldier pile and lagging system is a free draining system as installed and no special drainage features are required.**

- Minimum factors of safety for potential failure mechanisms such as overall stability, pullout failure of the anchor, rupture of the anchor tendon, lateral wall capacity, etc.,

**The temporary SOE system has been designed with a factor of safety of 1.50.**

- Geotechnical design parameters such as friction angle, cohesion, and unit weight of the soils used in design, mean high and low water levels, design water levels, and drawdown conditions, design life for the structure and corrosion protection requirements,. **The geotechnical design parameters for the soil and groundwater conditions at the site are taken from Notes 5A and 5C on Contract Drawing SE00-01. The design life of the temporary SOE system is approximately 6 months and therefore no long term corrosion protection is required.**

- The permissible range of variation in groundwater levels and methods of groundwater level measurement, outside and below the excavation, **Turner Responsibility**

- All testing requirements and acceptance criteria for ground anchors (note: Provided on drawings. No further information needed),

**All tieback anchors will be tested to verify design capacity. Testing will be done in accordance with requirement of PTI.**

- Construction monitoring requirements including City-owned utilities. It's anticipated that the monitoring program would include recording visual observations of the ground surface behind and in front of the wall for evidence of subsurface movement expressed at ground surface, including the formation of cracks, areas of subsidence or heave, and eroded soil deposits, **Turner Responsibility**

- Tolerable horizontal and vertical movements of the temporary excavation support wall, existing City utilities, roadways, adjacent surfaces, and methods of measuring these movements, **The temporary SOE system installed along Gilman and Congress Streets has been designed to the maximum 2" lateral deflection criteria. We do not anticipate the lateral deflection of the system will have any effect on nearby utilities or structures. Turner will be carrying out the monitoring of this temporary SOE wall to confirm the deflection criteria is met.**

I'm hoping that your geotech has much of this on hand already, and it's simply a matter of passing some of the background work on. If not, by all means let us know if a follow up conversation with DPW & Gillespie would be helpful. We are well aware that you want to keep this moving.

Thanks, Dominic.

Nell

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Nell Donaldson

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