

TOWN OF SOUTHBOROUGH



PLANNING BOARD

TOWN HOUSE · 17 COMMON STREET · SOUTHBOROUGH, MASSACHUSETTS 01772-1662
(508) 485-0710, ext. 3028 · FAX (508) 983-7752 · kquinn@southboroughma.com

March 15, 2023
Southborough Select Board
17 Common Street
Southborough, MA 01772

RE: St. Mark's Street Relocation at Marlborough Street Intersection
Planning Board Reports to Select Board under MGL c41 s81i

Dear Select Board:

The Planning Board under MGL c41 s81i has taken the opportunity to prepare two thorough reports reflecting the significant concerns with the proposed St. Mark's Street Relocation and St. Mark's Street Discontinuance. Those reports are separate documents and included with this communication.

It is the Planning Board's assertion (Vote 4-1) that the proposed conveyance and discontinuance, incorporated in Article #12 in the March 25th, 2023 Annual Town Warrant has significant deficiencies and many open, unanswered questions pertaining to the genesis of the portion of St. Mark's Street slated to be discontinued, the ever-changing square footage of the discontinuance, MGL and zoning laws and regulations of the Town of Southborough. The plans provided to the Town for both components of the relocation project are incomplete and fail to meet the standards that the Planning Board requires from any submission it receives. The Planning Board, in good faith, is unable to support Warrant Article #12.

Based on our review of this project and its significant impact on public assets, including water and public safety infrastructure, we have concerns on moving the intersection and discontinuing the road. These concerns are detailed further in the attached reports.

The total impact of the St. Mark's intersection project, should Town Meeting vote to complete it, needs be ascertained. The ramifications of the project and all it's moving parts, including disruption of land, deforestation, removal of historic stone walls, and potential addition of numerous impervious surfaces (parking lot, road, sidewalks, walkways, and pocket park) on the existing flooding conditions need to be clearly understood.

SOUTHBOROUGH PLANNING BOARD

Ultimately, boards and committees should have had a role in the review and permitting process of this road project and encourage the Select Board to include the Planning Board for all future plans related to road relocations and development of parks. We proudly uphold our charter to serve the Town and protect the interests and safety of the public.

Sincerely,



Meme Luttrell
Planning Board Chair

ml/ 2023.03.15-PB Ltr to SB-St. Mark's St Relocation-PB Review per MGLc41s81i-Report FINAL
2023.03.15-PB Ltr to SB-St. Mark's St Discontinuance-PB Review per MGLc41s81i-Report FINAL

cc: Planning Board
Select Board via Mark Purple, Town Administrator

TOWN OF SOUTHBOROUGH



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March 15, 2023

Select Board
Town of Southborough
17 Common Street
Southborough, MA 01772

RE: St. Mark's Street Relocation at Marlborough Street Intersection
Planning Board Review per MGL c41 s81i – Report and Recommendations

Dear Select Board:

Subject to Town Meeting approval the Select Board would like to complete a project to relocate a portion of St. Mark's Street at the intersection with Marlboro Road moving the intersection further to the south. The proposed relocation of the roadway will require discontinuing a portion of approximately 400'± of St Mark's Street and the construction of a new layout of a portion of St. Mark's Street of approximately 300'± in length. The road relocation was referred to the Planning Board for a report in accordance with MGL c41 sec81I. The Planning Board was provided a submission of Design Plans from the Roadways Improvement Project dated 06/2021, Truck Turning Exhibits, Design Basis Memo, and Drainage Calculations prepared by VHB, Inc., design engineers, and was also provided other prior Drainage Studies pertaining to the Library.

Mr. Greg Russell, VHB Project Manager, as representative for the Project attended several Planning Board meetings to discuss the project. In addition, the project submission was reviewed by Fuss & O'Neill (F&O), the Town's engineering peer review consultant, and a review letter was provided dated February 23, 2023. In turn, VHB provided a response to review comments letter dated March 7, 2023. Both letters are attached for reference.

Planning Board Findings and Recommendations

Upon the Planning Board's review of the project information, peer review comments and VHB responses, the Planning Board reports the following Findings and Recommendations:

1. In comparing the language in the Memorandum of Understanding (MOU), aka Memorandum of Purchase and Sale of Real Estate signed by the Select Board on 03.07.23, and the Draft Discontinuance Plan dated 02.16.23 submitted to the Planning Board by VHB on 02.27.23, as well as the revised draft dated 03.08.23 received on 03.13.23, the square footage describing the proposed areas to be conveyed referenced in paragraphs 2 and 3 of MOU are not the same as identified on the Draft Discontinuance Plans.

The exact square footage of the conveyances should be determined.

SOUTHBOROUGH PLANNING BOARD

2. The standard Town cross sections for roadways show a 50' wide right-of-way (ROW) and roads classified as a similar road type to St Mark's Street require a 50' ROW. The VHB design plans appear to show a 32' wide ROW and the Draft Discontinuance Plan shows the ROW being a 33.03' wide.

The Select Board should determine if the ROW of the relocated section of St. Mark's Street will meet the standard ROW width for Town roads. (Please note that VHB indicated that if they set a 50' ROW on the centerline of the proposed roadway, the area being transferred to St. Marks School would be reduced by approximately 1,300 square feet.)

3. Street trees have not been proposed for the relocated section of St. Mark's Street so as not to conflict with the anticipated proposed Park or St. Mark's parking lot projects. The Town routinely requires trees to be planted in the unpaved area of the ROW.

Once the layout of the Park and the St. Mark's School parking lot have been determined, street trees that won't interfere with those uses should be planted in the unpaved ROW area of the relocated portion of St Mark Street.

The ROW of the relocated portion of St Mark's Street should be wide enough for planting and growth of shade trees.

4. It is the Planning Board's understanding that there have been changes made to the Project during the construction that has already occurred but these changes have not been reflected on the Plans.

For example, the limit of work was changed excluding the retaining wall along Marlboro Road, VHB indicated this was done to reduce construction costs. F&O included this area in their review based on the Plans provided, see F&O comment #15.

Another example is the Utility Pole at Marlboro Road station 722+50 on the Plans, also included in F&O review, see F&O comment #16, however that is also no longer in the limits of work.

The plans should be updated to reflect all changes to reduce any misunderstanding with the contractor.

5. The Plans indicate that a depth of 4" of loam is proposed behind curbing which is a reduction from the 6" of well-compacted loam required, see F&O comment #4. (VHB indicated that this would likely result in an increase to construction cost.)

The Plans should be updated for construction to include 6" of well-compacted loam in the ROW not occupied by sidewalk.

6. The boundaries of the ROW of the relocated St Mark's Street are not proposed to be marked. Typically, granite or reinforced concrete bounds are required to mark boundaries, see F&O comment #6. (VHB indicated that this would be an additional construction cost.)

7. The visibility of the pedestrian warning signs at the proposed crosswalk on St. Marks Street could be enhanced by placing the signs on the side of the crosswalk closest to approaching traffic, see F&O comment #11.

The pedestrian warning signs should be moved as recommended by F&O to increase pedestrian safety.

SOUTHBOROUGH PLANNING BOARD

8. Finally, these questions and inconsistencies could have been addressed long ago had the Select Board and the DPW adhered to the requirements of MGL c41 sec 81i, which states, "...no public way shall be laid out, altered, relocated or discontinued, unless the proposed laying out, alteration, relocation or discontinuance has been referred to the planning board of such city or town..." and if the layout and relocation of St. Mark's Street was referred to the Planning Board prior to work commencing, or at the very least been referred to the Planning Board when promised in February of 2022. However, the street layout and relocation were referred to us two months before the 2023 Annual Town Meeting and as a consequence we are going into town meeting with many unanswered questions and inconsistencies on a project that is already contentious.

In the future, the Planning Board would recommend the Select Board refer projects sooner in the process which would not only lend itself to more collaboration and transparency on what could be controversial projects but also better vetted and complete projects being presented to the judicial body.

The Planning Board provides this report to the Select Board and respectfully requests consideration of the findings and recommendations for the St. Mark's Street Relocation Project to ensure the roadway is built to Southborough standards and the proper process is adhered to.

Thank you for your attention to this matter.

Sincerely,



Meme Luttrell
Planning Board Chair

cc: Planning Board
Select Board via Mark Purple, Town Administrator

Attachments:

Fuss & O'Neill Review Letter dated 02.23.23
VHB Response to Review Letter dated 03.07.23
MOU signed 03.07.23
VHB Draft Discontinuance Plan dated 02.16.23 (received 02.27.23)
VHB Draft Discontinuance Plan dated 03.08.23 (received 03.13.23)

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March 15, 2023

Select Board
Town of Southborough
17 Common Street
Southborough, MA 01772

RE: **St. Mark's Street Discontinuance** (Portion Related to St. Mark's Street Relocation)
2023 Annual Town Meeting Article 12 - St Mark's Street Discontinuance
Planning Board Review per MGL c41 s81i - Report and Recommendations

Dear Select Board:

Subject to Town Meeting approval the Select Board would like to complete a project to relocate a portion of St. Mark's Street at the intersection with Marlboro Road moving the intersection further to the south. As part of the proposed road relocation, the Select Board is seeking Town Meeting approval to discontinue a portion of St Mark's Street and convey said discontinued portion of St. Mark's Street to St. Mark's School.

The proposed relocation of the roadway will require discontinuing a portion of approximately 400'± of St Mark's Street. The proposed construction of the new layout of a portion of St. Mark's Street is approximately 300'± in length. The road Discontinuance was referred to the Planning Board for a report in accordance with MGL c41 sec81i.

The Planning Board was provided a Draft Discontinuance Plan dated 02.16.23 prepared by VHB, Inc., project design engineer, with revised draft version received on 02.27.23 and revised draft dated 03.08.23 received on 03.13.23.

Mr. Greg Russell, VHB Project Manager, as representative for the Project attended several Planning Board meetings beginning on 01.23.23 to discuss the project.

Planning Board Findings and Recommendations

Upon the Planning Board's review of the Draft Discontinuance Plan and related project information, the Planning Board reports the following Findings and Recommendations regarding the proposed Discontinuance:

SOUTHBOROUGH PLANNING BOARD

1. Originally St Mark's Street travelled north until it intersected with Marlboro Road. Sometime in the early to mid-2000's the road was re-routed to turn eastward at its intersection with Marlborough Road. It is unclear whether the original section of St. Mark's Street that travelled northerly was ever discontinued or if the new portion of St. Mark's Street that turned eastward for a more southerly intersection with Marlboro Road was ever accepted as a public way.

There should be an understanding of the status of the former alignment of St. Mark's Street and the newer alignment of St. Mark's Street that replaced the former alignment in the early 2000's in order to ensure the correct procedures were followed. If the newer section of St. Mark's Street was never accepted as a public way, should it be properly discontinued?

2. Previous warrant articles for road discontinuances have included a metes and bounds legal description of exactly what area is being discontinued.

A metes and bounds description of the portion of St. Mark's Street to be discontinued should be included in the warrant article. In addition, a complete Discontinuance Plan fully describing the boundary of the proposed discontinuance should represent the proposal.

3. The Discontinuance Plan is not stamped and signed.

Town Meeting should be presented with a Discontinuance Plan that is stamped and signed by a professional land surveyor.

4. It is unclear from the Discontinuance Plan if the stone wall (along with landscaping) that St. Mark's School built along the northern corner of St. Mark's Street on Town property and subject to the 2018 reciprocal license agreement, will be part of the conveyance to St. Mark's School.

The existing stone wall should be shown on the plan to clarify location. The Discontinuance Plan should show the exact boundary proposed and features such as the stonewall to indicate their location to see who will own after the parcels are conveyed.

5. If the stonewall along the northern corner of St. Mark's Street, which is subject to the 2018 license agreement, is intended to be conveyed to St. Mark's School, how does that effect the license agreement?

6. Finally, these questions and inconsistencies could have been addressed long ago had the Select Board and the DPW adhered to the requirements of MGL c41 sec 81i, which states, "...no public way shall be laid out, altered, relocated or discontinued, unless the proposed laying out, alteration, relocation or discontinuance has been referred to the planning board of such city or town..." and if the layout and relocation of St. Mark's Street was referred to the Planning Board prior to work commencing, or at the very least been referred to the Planning Board when promised in February of 2022. However, the street layout and relocation were referred to us two months before the 2023 Annual Town Meeting and as a consequence we are going into town meeting with many unanswered questions and inconsistencies on a project that is already contentious.

In the future, the Planning Board would recommend the Select Board refer projects sooner in the process which would not only lend itself to more collaboration and transparency on what could be controversial projects but also better vetted and complete projects being presented to the judicial body.

SOUTHBOROUGH PLANNING BOARD

The Planning Board provides this report to the Select Board and respectfully requests consideration of the findings and recommendations for the proposed discontinuance of the subject portion of St. Mark's Street to ensure the roadway is discontinued to Southborough standards and the proper process is adhered to.

Thank you for your attention to this matter.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Meme Luttrell', with a stylized flourish at the end.

Meme Luttrell
Planning Board Chair

cc: Planning Board
Select Board via Mark Purple, Town Administrator

Attachments:

MOU signed 03.07.23

VHB Draft Discontinuance Plan dated 02.16.23 (received 02.27.23)

VHB Draft Discontinuance Plan dated 03.08.23 (received 03.13.23)



FUSS & O'NEILL

February 23, 2023

Ms. Karina Quinn
Town Planner
Town of Southborough
17 Common Street
Southborough, MA 01772

RE: St Mark Intersection, Southborough, MA
Design Review
Fuss & O'Neill Reference No. 20060933.S14

Dear Ms. Quinn:

Fuss & O'Neill has conducted a review of the documents submitted by Vanasse Hangen Brustlin, Inc., relating to a realignment of St Marks Street entrance located along Marlboro Road. We offer the following peer review comments based on design compliance with the roadway, stormwater drainage, and utility design outlined in the Town of Southborough Subdivision of Land (Subdivision), Zoning Bylaw (Zoning), LID, and standard engineering practice.

Materials Reviewed, Prepared by Vanasse Hangen Brustlin, Inc., unless otherwise noted:

1. Letter addressed to Chair Luttrell, regarding a Request for Review under MGL Chapter 41, Section 81(I), at St Marks Street, Southborough, MA, dated January 13, 2023.
2. Site Plans titled, "Roadway Improvement Project," dated June 24, 2021, total 54 sheets.
3. Figures titled, "Entering Fire Truck – Figures 1 and 2," total 2 sheets.
4. Document titled, "Roadway Drainage Analysis."
5. Memorandum address to Town of Southborough, regarding St. Marks Street & Marlboro Road Intersection Improvements Design Basis Memorandum, dated 02/06/2023.

Town Regulations and General Design

1. Per Section 244-10 B(16) of the Subdivision, calculations were prepared by a registered engineer to substantiate proposed drain pipe sizes. Calculations for pipe sizing have been provided, however, they do not appear to have been stamped by a registered engineer.
2. Per Section 244-10 B(18) of the Subdivision, the location and species of street trees identified as existing or to be planted. Please provide information on the plans of any and each street tree along any roadway.

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Ms. Karina Quinn

February 23, 2023

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3. Per Section 244-16 B(1) of the Subdivision, drainage capacity shall be designed for a 50-year event. The Applicant has designed for the 10-year event.
4. Per Section 244-23 of the Subdivision Rules and Regulations, areas between the gutter or curb and the right-of-way property line on each side of the road not occupied by a sidewalk shall have 6-inches of well-compacted loam. The plans proposed 4-inches of loam.
5. Per Section 244-24 of the Subdivision Rules and Regulations, shade trees along streets shall be provided as outlined within this section. Proposed trees do not appear to be provided.
6. Per Section 244-26 E of the Subdivision Rules Regulations, granite bounds or reinforced concrete at least three (3) feet long and six (6) inches square in the cross-section shall be set under the supervision of a registered land surveyor with the top flush with the ground and with a drill hole or lead plug denoting the point at the intersection of subdivision boundaries with the right-of-way lines of existing and new streets and at all angle points and points of curvature or tangency in subdivision street right-of-way lines. Reinforced concrete bounds shall be required by the Planning Board at the corner points of the boundaries of the subdivision and at corners and the changes in direction of the boundaries of each lot. Please provide monuments as required for the new right-of-way associated with the realignment of St. Marks Street.
7. Per the table titled "Design Standards for Various Street Classifications" in the Subdivision Rules and Regulations, a road with a similar classification to St. Marks Street require a 50-foot right-of-way. The Applicant should provide a new right-of-way plan showing a minimum 50-foot right-of-way for the realignment of the street.
8. The numbering of structures between the drainage calculations and the site plans do not appear to match, which makes it difficult to review just the project area. However, in review of the calculations provided, it appears as if the pipes have been sized adequately for the 10-year storm event. However, per as stated in a comment above, drainage capacity shall be for a 50-year storm event.

Traffic Review

9. Layout:
 - Horizontal curvature of realigned St. Marks St meets applicable design standards.
 - Vertical curvature of realigned St. Marks St meets applicable design standards.
10. Traffic Safety:

Ms. Karina Quinn

February 23, 2023

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- Truck turning movements to and from St. Marks Street meet applicable design standards for encroachment.
11. Traffic Signage:
- Required traffic signage is provided in the design. The visibility of the pedestrian warning sign clusters (W11-2, W16-7pR/L) at the proposed new crosswalk on St. Marks Street could be enhanced by placing the signs on the side of the crosswalk closest to approaching traffic. Also, visibility could be increased by mounting signs on both sides of the post at each end of the crosswalk. The proposed design currently has just one of two posts displaying pedestrian warning signs on both sides of the post. See attached markup of Sheet 98 of 141 Traffic Plans.
12. Sight Distance:
- Stopping sight distances on St. Marks Street meet applicable design standards for the proposed new crosswalk and the proposed new intersection at Marlborough Rd.
13. The reviewer concurs with VHB's assessment that a MassDOT access permit is not required for the new intersection at St. Marks St and Marlborough Rd.
14. The reviewer finds the conclusions and findings presented in the memo entitled, 'St. Marks Street & Marlboro Road Intersection Improvements Design Basis Memorandum' to be reasonable and in accordance with applicable engineering standards.
15. Typical Sections
- A typical section should be provided for Marlboro Road Sta. 722+00 – 723+50 showing retaining wall.
 - The designer should evaluate the need for a guardrail barrier, Sta. 722+00 – 723+50, to protect vehicles from the vertical drop off the backside of the proposed retaining wall.
16. What is the disposition of utility pole #62? If it remains on the sidewalk, it appears to have neither adequate setback from the roadway nor adequate pedestrian passage clearance.

Fuss & O'Neill has not reviewed the design of either the proposed parks located to the south of St. Marks Street or the proposed parking lot located to the north of St. Marks Street. It is our understanding those projects will be submitted to the Planning Board for site plan review under a separate application.



Ms. Karina Quinn
February 23, 2023
Page 4

The above comments are based on plans, documentation, and calculations received at the time of review. Any revisions to the plans, documentation, and calculations will require further review.

Please feel free to contact us with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'James Black'.

James Black
Civil Engineer

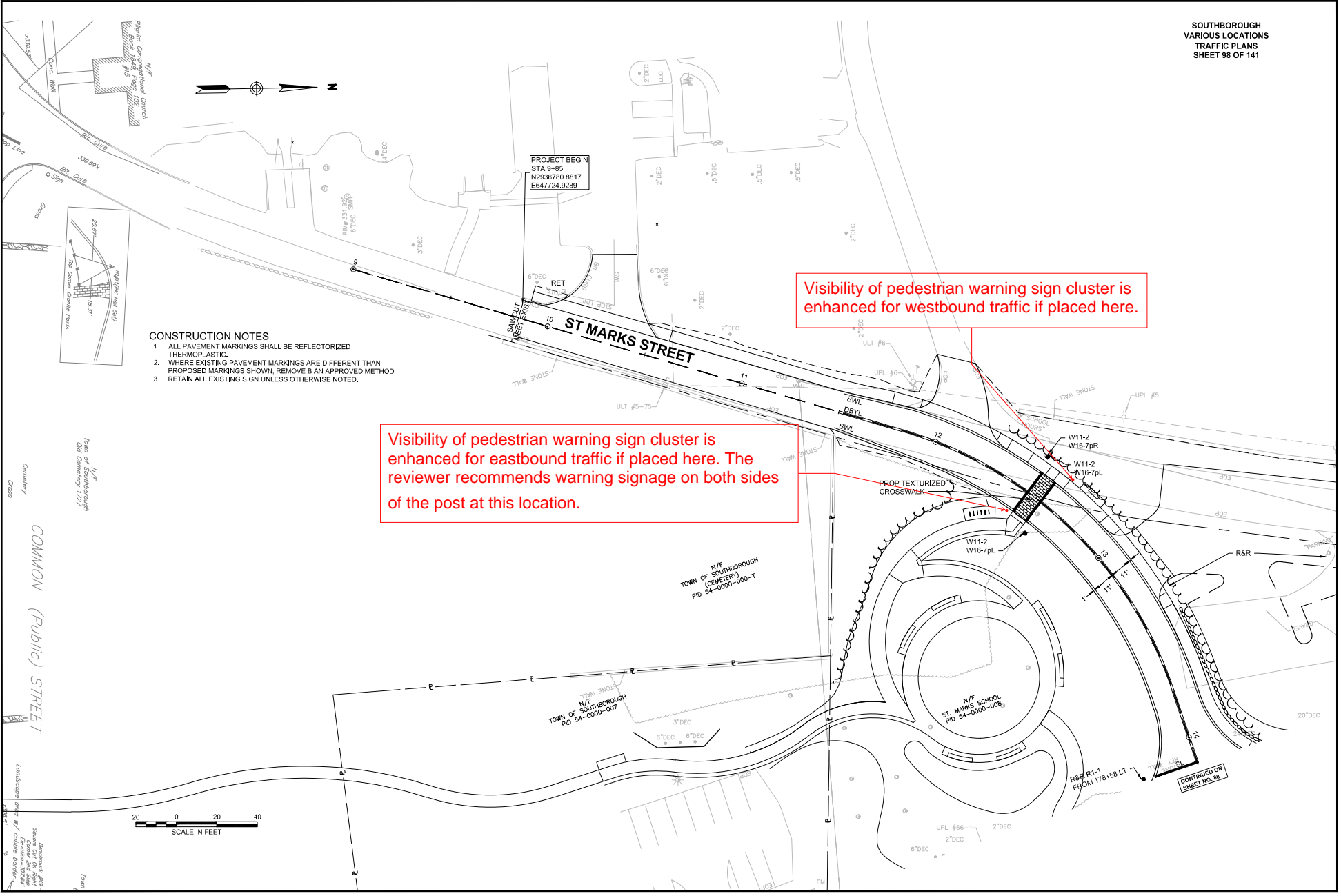
A handwritten signature in blue ink, appearing to read 'Aaron Keegan'.

Aaron Keegan, PE
Transportation Engineer

Reviewed by:

A handwritten signature in blue ink, appearing to read 'Aimee Bell'.

Aimee Bell
Senior Civil Engineer



- CONSTRUCTION NOTES**
1. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.
 2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
 3. RETAIN ALL EXISTING SIGN UNLESS OTHERWISE NOTED.

Visibility of pedestrian warning sign cluster is enhanced for westbound traffic if placed here.

Visibility of pedestrian warning sign cluster is enhanced for eastbound traffic if placed here. The reviewer recommends warning signage on both sides of the post at this location.



CONTINUED ON SHEET NO. 99



March 7, 2023

Ref: 14931.00

Ms. Karina Quinn
Town Planner
Town of Southborough
17 Common Street
Southborough, MA 01772

Re: St. Mark Intersection, Southborough, MA
Design Review
Fuss & O'Neill Reference No. 20060933.S14

Dear Ms. Quinn:

Below please find VHB's responses to the comments issued by Fuss & O'Neill on the St. Mark Street Intersection Improvement project:

Town Regulations and General Design

Comment 1. *Per Section 244-10 B(16) of the Subdivision, calculations were prepared by a registered engineer to substantiate proposed drain pipe sizes. Calculations for pipe sizing have been provided, however, they do not appear to have been stamped by a registered engineer.*

Response: Updated drainage calculations have been provided and stamped by a registered engineer.

Comment 2. *Per Section 244-10 B(18) of the Subdivision, the location and species of street trees identified as existing or to be planted. Please provide information on the plans of any and each street tree along any roadway.*

Response: Comment noted. The base plan was originally prepared to meet typical municipal roadway project standards with the assumption that the Town's subdivision requirements would not need to be met. If the project continues and goes through subdivision review, the base plan will be updated with the required information.

Comment 3. *"Per Section 244-16 B(1) of the Subdivision, drainage capacity shall be designed for a 50-year event. The Applicant has designed for the 10-year event."*

Response: Updated drainage calculations have been provided demonstrating that the installed drainage system satisfies the requirements of a 50-year event. Since this was originally design as a municipal roadway project, it was designed to meet a 10 year storm, per Exhibit 8-2 of MassDOT's Project Development & Design Guide (PDDG), which is attached. Per Exhibit 8-2, St. Mark's Street would typically be designed to carry a 2-5 year storm event, while Marlboro Road would be designed to a 10-year storm event.



Comment 4. *“Per Section 244-23 of the Subdivision Rules and Regulations, areas between the gutter or curb and the right-of-way property line on each side of the road not occupied by a sidewalk shall have 6-inches of well-compacted loam. The plans proposed 4-inched of loam.”*

Response: Since this was originally design as a municipal roadway project, 4” of loam borrow was proposed. If the project advances, the loam borrow can be increased to 6 inches but note that this will result in an increase to project construction costs to be borne by the Town.

Comment 5. *“Per Section 244-24 of the Subdivision Rules and Regulations, shade trees along streets shall be provided as outlined within this section. Proposed trees do not appear to be provided.”*

Response: Trees were proposed as part of the original park design; however, the trees have been removed from the Contract until the coordination between the Southborough Planning Board, Select Board and St. Mark’s Park Committee is complete. It is VHB’s understanding that the St. Mark’s Park Committee has endorsed a proposed plan for the parcel located between the proposed St. Mark’s Street and the Southborough Public Library. The Planning Board should coordinate with the Select Board and the St. Mark’s Park Committed following Town Meeting to develop a final plan to be implemented.

Comment 6. *“Per Section 244-26 E of the Subdivision Rules Regulations, granite bounds or reinforced concrete at least three (3) feet long and six (6) inches square in the cross-section shall be set under the supervision of a registered land surveyor with the top flush with the ground and with a drill hole or lead plug denoting the point at the intersection of subdivision boundaries with the right-of-way lines of existing and new streets and at all angle points and points of curvature or tangency in subdivision street right-of-way lines. Reinforced concrete bounds shall be required by the Planning Board at the corner points of the boundaries of the subdivision and at corners and the changes in direction of the boundaries of each lot. Please provide monuments as required for the new right-of-way associated with the realignment of St. Marks Street.”*

Response: If the project moves forward, bounds can be added to the contract but note that it will be an extra cost to be borne by the Town.

Comment 7. *“Per the table titled “Design Standards for Various Street Classifications” in the Subdivision Rules and Regulations, a road with a similar classification to St. Marks Street require a 50-foot right-of-way. The Applicant should provide a new right-of-way plan showing a minimum 50-foot right-of-way for the realignment of the street.”*

Response: If the project moves forward, a 50-foot right-of-way can be established for the new portion of St. Mark’s Street.

Comment 8. *“The numbering of structures between the drainage calculations and the site plans do not appear to match, which makes it difficult to review just the project area. However, in review of the calculations provided, it appears as if the pipes have been sized adequately for the 10-year storm event. However, per as stated in a comment above, drainage capacity shall be for a 50-year storm event.”*



Response: Updated drainage calculations have been provided demonstrating that the installed drainage system satisfies the requirements of a 50-year event.

Traffic Review

Comment 9. Layout:

› *"Horizontal curvature of realigned St. Marks St meets applicable design standards."*

Response: No response needed.

› *"Vertical curvature of realigned St. Marks St meets applicable design standards."*

Response: No response needed.

Comment 10. Traffic Safety:

› *"Truck turning movements to and from St. Marks Street meet applicable design standards for encroachment."*

Response: No response needed.

Comment 11. Traffic Signage:

› *"Required traffic signage is provided in the design. The visibility of the pedestrian warning sign clusters (W11-2, W16-7pR/L) at the proposed new crosswalk on St. Marks Street could be enhanced by placing the signs on the side of the crosswalk closest to approaching traffic. Also, visibility could be increased by mounting signs on both sides of the post at each end of the crosswalk. The proposed design currently has just one of two posts displaying pedestrian warning signs on both sides of the post. See attached markup of Sheet 98 of 141 Traffic Plans."*

Response: Signage will be retained as shown because they were located to provide maximum sight lines based on the curvature of the road and to avoid pedestrians being blocked by the sign. An additional sign will be added so that the warning sign is on both sides of the post in all locations.

Comment 12. Sight Distance:

› *"Stopping sight distances on St. Marks Street meet applicable design standards for the proposed new crosswalk and the proposed new intersection at Marlborough Rd."*

Response: No response needed.

Comment 13. *"The reviewer concurs with VHB's assessment that a MassDOT access permit is not required for the new intersection at St. Marks St and Marlborough Rd."*

Response: No response needed.



Comment 14. *"The reviewer finds the conclusions and findings presented in the memo entitled, 'St. Marks Street & Marlboro Road Intersection Improvements Design Basis Memorandum' to be reasonable and in accordance with applicable engineering standards."*

Response: No response needed.

Comment 15. **Typical Sections:**

› *"A typical section should be provided for Marlboro Road Sta. 722+00 – 723+50 showing retaining wall."*

Response: Prior to construction starting, the limit of work on Marlboro Road was moved to Station 719+75 due to the cost of construction. The retaining wall is outside of the new limit of work.

› *"The designer should evaluate the need for a guardrail barrier, Sta. 722+00 – 723+50, to protect vehicles from the vertical drop off the backside of the proposed retaining wall."*

Response: See response to comment above. The wall is no longer within the limit of work.

Comment 16. *"What is the disposition of utility pole #62? If it remains on the sidewalk, it appears to have neither adequate setback from the roadway nor adequate pedestrian passage clearance."*

Response: This section of sidewalk is no longer within the limit of work. Please note that the design plans did show the sidewalk being widened to provide an adequate path of travel around the utility pole. That being said, National Grid has relocated the utility poles in this location as part of an internal capital improvement project.

We hope that find the responses provided herein satisfactory. We are available to discuss further if helpful.

Sincerely,
VHB

A handwritten signature in blue ink, appearing to read "Gregory Russell".

Gregory Russell, PE, ENV SP
Project Manager

8.3.1 Design Storm Frequency

The designer must select a design frequency to calculate the peak rate of runoff. Typical values are 2, 5, 10, 50, and 100-year storm frequencies. As an example, a 50-year storm means there is a 1/50 (0.02) probability that the peak discharge from that storm will be equaled or exceeded once during a given year.

Exhibit 8-2 provides recommended design frequencies. The selected value for a project is based on an assessment of the likely damage from a given peak discharge and the initial construction and maintenance costs of the drainage facility. The designer should consider traffic interruptions, property damage, and possible loss of life. If the discharge from a greater design frequency can be accommodated, at a small additional cost, it should be considered.

Exhibit 8-2
Recommended Design Flood Frequency¹

Highway Functional Class	Urban/Rural	Type of Installation		
		Cross Culverts	Storm Drain System ²	Open Channels ³
Interstate/Freeway/Expressway	Both	50-yr	10-yr ⁴	50-yr
Arterial	Urban	50-yr	10-yr ⁴	50-yr
	Rural	50-yr	10-yr ⁴	50-yr
Collectors/Local	Urban	25-yr ⁵	5-yr	25-yr ⁵
	Rural	10 or 25-yr	2 or 5-yr	10 or 25-yr

1. The values in the table are typical ranges. The selected value for a project is based on an assessment of the likely damage of a given flow and the costs of the drainage facility.
2. This includes pavement drainage design.
3. This includes any culverts which pass under intersecting roads, driveways, or median crossings.
4. Use a 50-yr frequency at underpasses or depressed sections where ponded water can only be removed through the storm drain system.
5. The selected frequency depends on the anticipated watershed development and potential property damage.

Source: HEC #1, March, 1969. Design of Highway Pavements, pp. 12-5 to 12-6. Note: HEC #12 — Revised, March, 1984.

Note: 100-year requirements must be checked if the proposed highway is in an established regulatory floodway or floodplain, or resource area is defined by the April, 1983 revisions to Ch. 131 MGL, Section 40. See Section 10.1.2.

The DEP Storm Water Management Policy states that the 2-year and 10-year, 24-hour storms must be used in sizing peak discharge controls, if required. It also states that the 100-year, 24 hour storm must also be evaluated to demonstrate that there will not be increased flooding impacts offsite, if peak discharge controls are required. The emergency spillway for detention facilities should be designed for the 100-year storm. The *MassHighway Storm Water Handbook* and the *DEP Storm water Management Policy* should be consulted when determining whether peak discharge controls are required for a project.

Roadway Drainage Analysis

VHB designed the closed drainage system for the proposed improvements and realignment for the St Marks Street and Marlboro Rd intersection to improve stormwater drainage within the project area and changes in drainage pattern due to additional curbed roadway. The drainage analysis followed procedures in Chapter 8 of the 2006 MassDOT Project Development & Design Guide (PDDG).

Methodology

The following design criteria were used in the drainage analysis:

- The design storm is the 10% Annual Exceedance Probability (AEP) event (10-year storm).
- The 10-year storm, 5-minute duration rainfall intensity is 7.16 inches per hour in Southboro, MA (NOAA Atlas 14), as of 01/27/2023.
- The Rational Method was used to predict stormwater runoff.
- Marlboro Road's roadway classification based on its location is:
 - Urban minor arterial or rural major collector with speeds below 45 miles per hour
 - Per the MassDOT PDDG, the maximum allowable gutter spread for a road of this classification is the shoulder width plus three feet (six feet minimum)
- St Marks Street's roadway classification is:
 - Local road with low daily traffic
 - Per the MassDOT PDDG, the maximum allowable gutter spread for a road of this classification is half the a through traffic lane for the 2 or 5 YR runoff frequency.
- Minimum pipe size is 12-inch diameter.
- Minimum pipe velocity is typically 3 feet per second (fps) when the pipe is flowing 1/3 full.
- Maximum pipe velocity is typically 10 fps.

There are several instances where some of the above design criteria were unable to be achieved due to site and geometric constraints. These instances are described in later sections.

Gutter Spread Analysis

VHB used Bentley StormCAD Version V8i (StormCAD) to calculate the gutter spread at each proposed catch basin. Catch basins are proposed to achieve gutter spreads below the maximum allowable according to MassDOT PDDG Chapter 8 standards. See the attached Gutter Spread Analysis Results.

The table below identifies the catch basins that exceed the maximum allowable gutter spread for the 10YR storm.

Catch Basin Number	Allowable Gutter Spread (ft)	Actual Gutter Spread (ft)	Difference (ft)	Alignment
22	6	6.9	0.9	Marlboro RD
25	6.5	7.8 (2 YR)	1.3	St Marks St

In order to minimize flow into the St Marks St/ Marlboro Rd intersection and across the crosswalk, CB 25 is located as close to the intersection as practical. This area has a low longitudinal roadway slope (0.004ft/ft), which results in a spread at CB 25 that exceeds the allowable spread. CB-22 also does not meet the spread requirements due to the flow bypassed in the intersection area. CB-22 is proposed as an offset grate catch basin due to existing utility constraints.

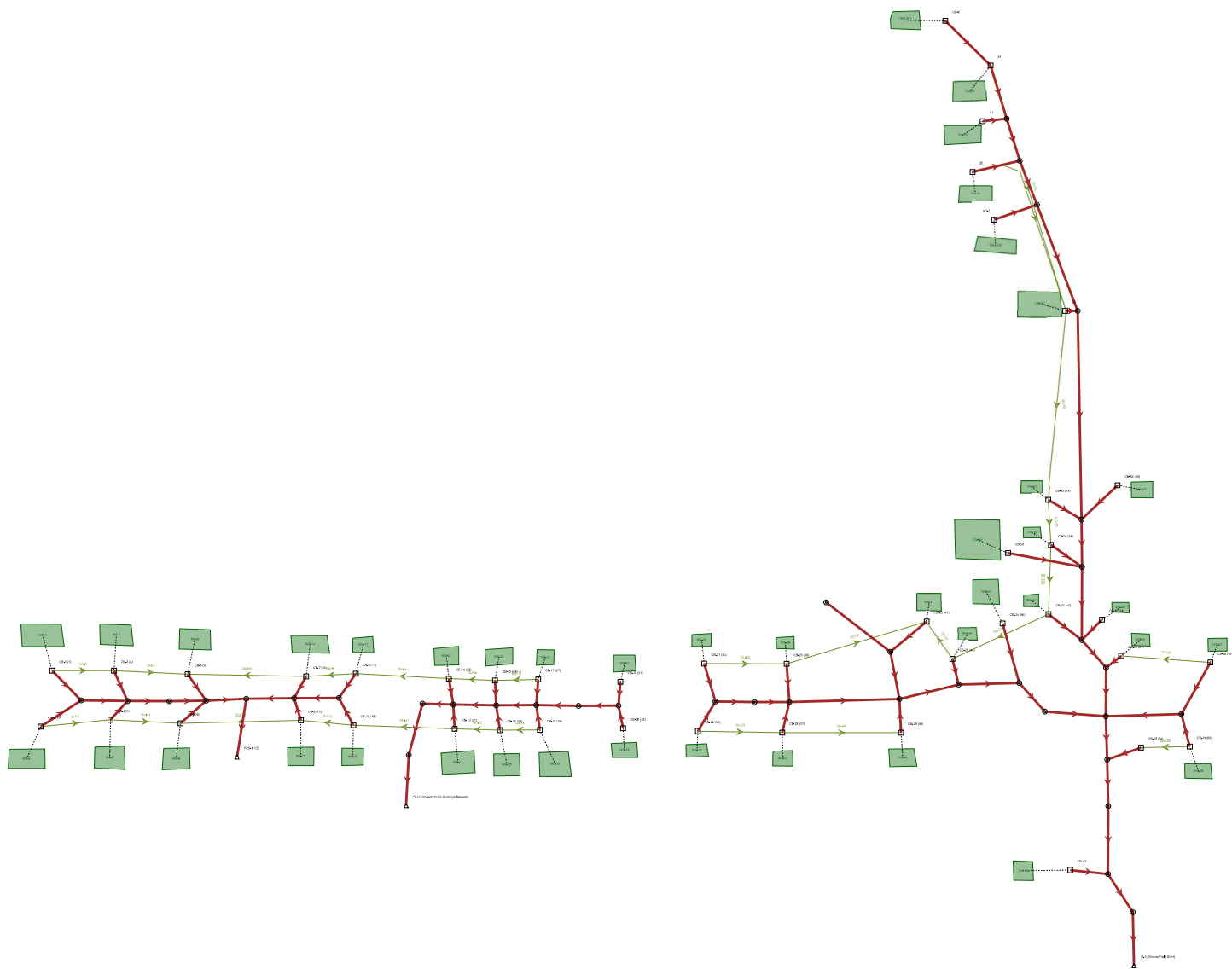
Hydraulic Grade Line Analysis

StormCAD was also used to establish pipe inverts, sizes, and material in the drainage system. These pipe characteristics were determined through evaluation of the Hydraulic Grade Line (HGL), pipe capacity, and velocity of stormwater in the proposed pipes. The analysis also included a determination of pipe materials based on the minimum cover allowed for pipe materials per MassDOT PDDG Chapter 8.

The recommended amount of freeboard between the HGL and the rim elevations of the proposed structures is 2 feet. The minimum allowable freeboard of the structures is 0.75 feet. All proposed pipes within the system as well as the existing system being tied into meet these minimum allowable freeboard requirements. Other existing systems in the area and outside of the project limits were analyzed and do not meet requirements in some locations with the current survey information. Additionally, all proposed pipes meet the minimum cover requirements. All proposed pipes are designed to maintain a minimum of 3 fps velocity when flowing at a depth of 1/3 full of the diameter, and not to exceed 10 fps during the 10-year storm. The 50-yr storm event was also evaluated in accordance with Section 244-16 B(1) from "Town of Southborough Subdivision of Land" and the results show there are no issues regarding pipe capacity or hydraulic grade line (HGL) within the project limits. See the attached HGL Analysis Results.

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signed by
Luke L.
Boucher, PE
Date:
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Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Drainage Area	Inlet C	Local CA (ft ²)	System Intensity (in/h)	Inlet	Longitudinal Slope (Inlet) (ft/ft)	Road Cross Slope (ft/ft)	Manning's n (Inlet)	Capture Efficiency (Calculated)	Flow (Captured) (cfs)	Carryover Rational Flow (cfs)	Flow (Total Bypassed) (cfs)	Bypass Target	Depth (Gutter) (in)	Spread / Top Width (ft)	Notes	
22	316.14	316.14	308.15	7,494.00	0.95	7,119.30	4.81	CBCI	0.03	0.02	0.013	69.7	0.83	0.4	0.36	CB-35 (57)	1.4	5.8	Allowable Spread 6	
24	322.25	322.25	318	3,787.00	0.95	3,597.65	1.808	CBCI	0.018	0.02	0.013	84.2	0.34	0	0.06	22	1	4.2	Allowable Spread 6	
25	321.05	321.05	317.09	9,081.00	0.95	8,626.95	4.81	CBCI	0.004	0.02	0.013	64.8	0.62	0	0.34	22	1.9	7.8	Allowable Spread 6.5 (For 2 YR)	
51	322.8	322.8	317.07	10,418.00	0.95	9,897.10	4.81	CBCI		0.02		100	1.1	0	0		2.2	9.1	Parking lot Drain	
CB-1 (1)	275.04	275.04	267.54	3,137.00	0.95	2,980.15	4.81	CBCI	0.018	0.02	0.013	87	0.29	0	0.04	CB-3 (4)	0.9	3.9		
CB-2 (2)	275.04	275.04	267.54	4,566.00	0.9	4,109.40	4.81	CBCI	0.018	0.02	0.013	82.2	0.38	0	0.08	CB-4 (5)	1.1	4.5		
CB-3 (4)	269.49	269.49	262	3,617.00	0.43	1,555.31	4.81	CBCI	0.03	0.02	0.013	94.9	0.21	0.04	0.01	CB-5 (8)	0.7	3.1		
CB-4 (5)	269.49	269.49	262	5,502.00	0.9	4,951.80	4.81	CBCI	0.03	0.02	0.013	80.2	0.51	0.08	0.13	CB-6 (9)	1.1	4.6		
CB-5 (8)	265	265	258.2	11,575.00	0.95	10,996.25	4.81	Double CBCI		0.02		100	1.38	0.15	0		2.1	8.9		
CB-6 (9)	265	265	258.2	7,717.00	0.92	7,099.64	4.81	Double CBCI		0.02		100	1.1	0.31	0		1.9	7.9		
CB-7 (14)	273.09	273.09	265.7	4,174.00	0.95	3,965.30	4.81	CBCI	0.039	0.02	0.013	80	0.57	0.27	0.14	CB-5 (8)	1.1	4.6		
CB-8 (15)	273.09	273.09	265.6	7,385.00	0.88	6,498.80	4.81	CBCI	0.039	0.02	0.013	77.6	0.64	0.1	0.19	CB-6 (9)	1.2	4.8		
CB-9 (17)	280.97	280.97	273.5	4,867.00	0.95	4,623.65	4.81	CBCI	0.02	0.02	0.013	71	0.67	0.43	0.27	CB-7 (14)	1.4	5.7		
CB-10 (18)	280.97	280.97	273.5	3,285.00	0.95	3,120.75	4.81	CBCI	0.02	0.02	0.013	80.4	0.43	0.19	0.1	CB-8 (15)	1.1	4.6		
CB-11 (22)	295.37	295.37	286.9	17,213.00	0.47	8,090.11	4.81	CBCI	0.056	0.02	0.013	70.7	1.03	0.56	0.43	CB-9 (17)	1.3	5.6		
CB-12 (21)	294.41	294.41	285.9	6,818.00	0.91	6,204.38	4.81	CBCI	0.056	0.02	0.013	79.1	0.7	0.2	0.19	CB-10 (18)	1.1	4.6		
CB-15 (24)	308.03	308.03	299.5	18,275.00	0.44	8,041.00	4.81	CBCI	0.047	0.02	0.013	66.9	1.14	0.8	0.56	CB-11 (22)	1.5	6.1		
CB-16 (25)	308.03	308.03	299.5	7,150.00	0.92	6,578.00	4.81	CBCI	0.047	0.02	0.013	77.8	0.69	0.15	0.2	CB-12 (21)	1.1	4.8		
CB-17 (27)	312.85	312.85	304.3	27,320.00	0.65	17,758.00	4.81	CBCI	0.022	0.02	0.013	59.4	1.17	0	0.8	CB-15 (24)	1.8	7.4		
CB-18 (28)	312.85	312.85	304.3	6,381.00	0.95	6,061.95	4.81	CBCI	0.022	0.02	0.013	77.2	0.52	0	0.15	CB-16 (25)	1.2	5		
CB-19 (31)	317.82	317.82	309.1	86,781.00	0.86	74,631.66	4.81	CBCI		0.02		100	8.31	0	0		14.9	62		
CB-20 (32)	317.67	317.67	309.1	4,464.00	0.94	4,196.16	4.81	CBCI		0.02		100	0.47	0	0		1.4	5.7		
CB-21 (34)	314.11	314.11	306.8	95,233.00	0.79	75,234.07	4.81	CBCI	0.034	0.02	0.013	40.4	3.38	0	4.99	CB-23 (38)	2.8	11.8		
CB-22 (33)	314.56	314.56	307.1	7,383.00	0.95	7,013.85	4.81	CBCI	0.034	0.02	0.013	77.6	0.61	0	0.17	CB-24 (37)	1.2	4.8		
CB-23 (38)	305.74	305.74	298.4	26,100.00	0.5	13,050.00	4.81	CBCI	0.034	0.02	0.013	44.2	2.85	4.99	3.6	CB-25 (41)	2.6	10.7		
CB-24 (37)	305.51	305.51	298.2	6,583.00	0.95	6,253.85	4.81	CBCI	0.034	0.02	0.013	75.8	0.66	0.17	0.21	CB-28 (42)	1.2	5		
CB-25 (41)	304.16	304.16	297	1,892.00	0.94	1,778.48	4.81	CBCI		0.02		100	4.46	4.26	0		5.1	21.1		
CB-28 (42)	304.3	304.3	297	6,814.00	0.95	6,473.30	4.81	CBCI		0.02		100	0.93	0.21	0		2	8.3		
CB-29 (44)	304.26	304.26	296.8	14,633.00	0.9	13,169.70	4.81	CBCI	0.005	0.02	0.013	57.5	0.9	0.09	0.66	CB-25 (41)	2.2	9		
CB-30 (60)	305.2	305.2	297.8	209,797.00	0.57	119,584.29	2.551	CBCI		0.02		100	7.06	0	0		10.8	45		
CB-31 (51)	305.3	305.3	298	25,934.00	0.83	21,525.22	4.584	CBCI	0.005	0.02	0.013	46.9	1.51	0.93	1.71		2.8	11.7		
CB-32 (48)	305.94	305.94	298.6	16,269.00	0.59	9,598.71	3.356	CBCI	0.013	0.02	0.013	72.3	0.54	0	0.21		1.4	5.7		
CB-33 (47)	305.97	305.97	298.7	3,591.00	0.95	3,411.45	4.81	CBCI	0.013	0.02	0.013	79.9	0.37	0.09	0.09	CB-29 (44)	1.2	4.8		
CB-34 (58)	307.82	307.82	299.5	3,061.00	0.95	2,907.95	4.81	CBCI	0.018	0.02	0.013	81.8	0.39	0.15	0.09	CB-33 (47)	1.1	4.5		
CB-35 (57)	311.38	311.38	303	3,059.00	0.95	2,906.05	4.81	CBCI	0.027	0.02	0.013	78.3	0.54	0.36	0.15	CB-34 (58)	1.2	4.8		
CB-36 (55)	310.96	310.96	302.69	37,005.00	0.55	20,352.75	2.557	DI	0.027	0.02	0.013	68.9	0.83	0	0.37		1.4	5.9		
CB-37 (54)	302.5	302.5	294.8	(N/A)	(N/A)	0	4.81	CBCI	0.059	0.02	0.013	100	0.12	0.12	0		0.5	2.1		
CB-38 (67)	310.58	310.58	303.3	27,738.00	0.74	20,526.12	4.81	CBCI	0.023	0.02	0.013	57.4	1.31	0	0.97	CB-31 (51)	1.9	7.8		
CB-39 (68)	310.64	310.64	303.3	5,476.00	0.95	5,202.20	4.81	CBCI	0.023	0.02	0.013	80	0.46	0	0.12	CB-37 (54)	1.1	4.6		
CB-42	284.7	284.7	281.7	29,555.00	0.95	28,077.25	4.81			0.02		100	3.13	0	0		(N/A)	0		
CB-50	305.5	305.5	0	69,032.00	0.432	29,794.21	4.81			0.02		100	3.32	0	0		(N/A)	0		Southernmost CB in Library Parking Lot
UD-1	323.6	323.1	321	17,027.00	0.9	15,324.30	1.82			0.02		100	0.65	0	0		(N/A)	0		Rain Garden Cleanout
UD-2	320	320.5	314.4	36,950.00	0.413	15,252.96	1.82			0.02		100	0.64	0	0		(N/A)	0		Playground Cleanout

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Drainage Area	Inlet C	Local CA (ft ²)	System Intensity (in/h)	Inlet	Longitudinal Slope (Inlet) (ft/ft)	Road Cross Slope (ft/ft)	Manning's n (Inlet)	Capture Efficiency (Calculated)	Flow (Captured) (cfs)	Carryover Rational Flow (cfs)	Flow (Total Bypassed) (cfs)	Bypass Target	Depth (Gutter) (in)	Spread / Top Width (ft)	Notes	
22	316.14	316.14	308.15	7,494.00	0.95	7,119.30	7.16	CBCI	0.03	0.02	0.013	61.9	1.18	0.72	0.73	CB-35 (57)	1.7	6.9	Allowable Spread 6	
24	322.25	322.25	318	3,787.00	0.95	3,597.65	2.704	CBCI	0.018	0.02	0.013	78	0.46	0	0.13	22	1.2	4.9	Allowable Spread 6	
25	321.05	321.05	317.09	9,081.00	0.95	8,626.95	7.16	CBCI	0.004	0.02	0.013	76.5	1.09	0	0.34	22	2.2	9.1	Allowable Spread 6.5 (For 2 YR)	
51	322.8	322.8	317.07	10,418.00	0.95	9,897.10	7.16	CBCI		0.02		100	1.64	0	0		2.7	11.5	Parking lot Drain	
CB-1 (1)	275.04	275.04	267.54	3,137.00	0.95	2,980.15	7.16	CBCI	0.018	0.02	0.013	81	0.4	0	0.09	CB-3 (4)	1.1	4.6		
CB-2 (2)	275.04	275.04	267.54	4,566.00	0.9	4,109.40	7.16	CBCI	0.018	0.02	0.013	75.8	0.52	0	0.16	CB-4 (5)	1.2	5.2		
CB-3 (4)	269.49	269.49	262	3,617.00	0.43	1,555.31	7.16	CBCI	0.03	0.02	0.013	89.1	0.31	0.09	0.04	CB-5 (8)	0.9	3.7		
CB-4 (5)	269.49	269.49	262	5,502.00	0.9	4,951.80	7.16	CBCI	0.03	0.02	0.013	72.9	0.72	0.16	0.27	CB-6 (9)	1.3	5.4		
CB-5 (8)	265	265	258.2	11,575.00	0.95	10,996.25	7.16	Double CBCI		0.02		100	2.26	0.44	0		2.8	11.8		
CB-6 (9)	265	265	258.2	7,717.00	0.92	7,099.64	7.16	Double CBCI		0.02		100	1.86	0.68	0		2.5	10.6		
CB-7 (14)	273.09	273.09	265.7	4,174.00	0.95	3,965.30	7.16	CBCI	0.039	0.02	0.013	69.8	0.92	0.66	0.4	CB-5 (8)	1.4	5.7		
CB-8 (15)	273.09	273.09	265.6	7,385.00	0.88	6,498.80	7.16	CBCI	0.039	0.02	0.013	69.4	0.93	0.27	0.41	CB-6 (9)	1.4	5.8		
CB-9 (17)	280.97	280.97	273.5	4,867.00	0.95	4,623.65	7.16	CBCI	0.02	0.02	0.013	61.3	1.04	0.93	0.66	CB-7 (14)	1.7	7.1		
CB-10 (18)	280.97	280.97	273.5	3,285.00	0.95	3,120.75	7.16	CBCI	0.02	0.02	0.013	71.2	0.67	0.42	0.27	CB-8 (15)	1.4	5.7		
CB-11 (22)	295.37	295.37	286.9	17,213.00	0.47	8,090.11	7.16	CBCI	0.056	0.02	0.013	62	1.52	1.11	0.93	CB-9 (17)	1.6	6.8		
CB-12 (21)	294.41	294.41	285.9	6,818.00	0.91	6,204.38	7.16	CBCI	0.056	0.02	0.013	70.9	1.02	0.41	0.42	CB-10 (18)	1.3	5.5		
CB-15 (24)	308.03	308.03	299.5	18,275.00	0.44	8,041.00	7.16	CBCI	0.047	0.02	0.013	59.1	1.6	1.38	1.11	CB-11 (22)	1.7	7.3		
CB-16 (25)	308.03	308.03	299.5	7,150.00	0.92	6,578.00	7.16	CBCI	0.047	0.02	0.013	70.3	0.97	0.3	0.41	CB-12 (21)	1.4	5.6		
CB-17 (27)	312.85	312.85	304.3	27,320.00	0.65	17,758.00	7.16	CBCI	0.022	0.02	0.013	53.1	1.56	0	1.38	CB-15 (24)	2.1	8.6		
CB-18 (28)	312.85	312.85	304.3	6,381.00	0.95	6,061.95	7.16	CBCI	0.022	0.02	0.013	70.6	0.71	0	0.3	CB-16 (25)	1.4	5.8		
CB-19 (31)	317.82	317.82	309.1	86,781.00	0.86	74,631.66	7.16	CBCI		0.02		100	12.37	0	0		32.7	136.1		
CB-20 (32)	317.67	317.67	309.1	4,464.00	0.94	4,196.16	7.16	CBCI		0.02		100	0.7	0	0		1.7	7		
CB-21 (34)	314.11	314.11	306.8	95,233.00	0.79	75,234.07	7.16	CBCI	0.034	0.02	0.013	33.6	4.19	0	8.28	CB-23 (38)	3.3	13.7		
CB-22 (33)	314.56	314.56	307.1	7,383.00	0.95	7,013.85	7.16	CBCI	0.034	0.02	0.013	71	0.82	0	0.34	CB-24 (37)	1.3	5.6		
CB-23 (38)	305.74	305.74	298.4	26,100.00	0.5	13,050.00	7.16	CBCI	0.034	0.02	0.013	36.5	3.81	8.28	6.63	CB-25 (41)	3.1	12.8		
CB-24 (37)	305.51	305.51	298.2	6,583.00	0.95	6,253.85	7.16	CBCI	0.034	0.02	0.013	68.1	0.94	0.34	0.44	CB-28 (42)	1.4	6		
CB-25 (41)	304.16	304.16	297	1,892.00	0.94	1,778.48	7.16	CBCI		0.02		100	8.1	7.8	0		14.1	58.9		
CB-28 (42)	304.3	304.3	297	6,814.00	0.95	6,473.30	7.16	CBCI		0.02		100	1.51	0.44	0		2.6	10.9		
CB-29 (44)	304.26	304.26	296.8	14,633.00	0.9	13,169.70	7.16	CBCI	0.005	0.02	0.013	51	1.22	0.22	1.18	CB-25 (41)	2.5	10.5		
CB-30 (60)	305.2	305.2	297.8	209,797.00	0.57	119,584.29	3.804	CBCI		0.02		100	10.53	0	0		23.7	98.9		
CB-31 (51)	305.3	305.3	298	25,934.00	0.83	21,525.22	6.827	CBCI	0.005	0.02	0.013	41	2.04	1.58	2.94		3.3	13.8		
CB-32 (48)	305.94	305.94	298.6	16,269.00	0.59	9,598.71	5.014	CBCI	0.013	0.02	0.013	65.7	0.73	0	0.38		1.6	6.7		
CB-33 (47)	305.97	305.97	298.7	3,591.00	0.95	3,411.45	7.16	CBCI	0.013	0.02	0.013	71.7	0.56	0.21	0.22	CB-29 (44)	1.4	5.8		
CB-34 (58)	307.82	307.82	299.5	3,061.00	0.95	2,907.95	7.16	CBCI	0.018	0.02	0.013	73.4	0.58	0.31	0.21	CB-33 (47)	1.3	5.5		
CB-35 (57)	311.38	311.38	303	3,059.00	0.95	2,906.05	7.16	CBCI	0.027	0.02	0.013	70.9	0.76	0.59	0.31	CB-34 (58)	1.4	5.7		
CB-36 (55)	310.96	310.96	302.69	37,005.00	0.55	20,352.75	3.812	DI	0.027	0.02	0.013	62.3	1.12	0	0.68		1.7	6.9		
CB-37 (54)	302.5	302.5	294.8	(N/A)	(N/A)	0	7.16	CBCI	0.059	0.02	0.013	97.1	0.22	0.23	0.01		0.7	2.7		
CB-38 (67)	310.58	310.58	303.3	27,738.00	0.74	20,526.12	7.16	CBCI	0.023	0.02	0.013	51.2	1.74	0	1.66	CB-31 (51)	2.2	9		
CB-39 (68)	310.64	310.64	303.3	5,476.00	0.95	5,202.20	7.16	CBCI	0.023	0.02	0.013	73.4	0.63	0	0.23	CB-37 (54)	1.3	5.4		
CB-42	284.7	284.7	281.7	29,555.00	0.95	28,077.25	7.16			0.02		100	4.65	0	0		(N/A)	0		
CB-50	305.5	305.5	0	69,032.00	0.432	29,794.21	7.16			0.02		100	4.94	0	0		(N/A)	0		Southernmost CB in Library Parking Lot
UD-1	323.6	323.1	321	17,027.00	0.9	15,324.30	2.72			0.02		100	0.96	0	0		(N/A)	0		Rain Garden Cleanout
UD-2	320	320.5	314.4	36,950.00	0.413	15,252.96	2.72			0.02		100	0.96	0	0		(N/A)	0		Playground Cleanout

Label	Start Node	Stop Node	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Capacity / Design (%)	Depth (Normal) / Rise (%)	Notes	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-2	CB-2 (3)	MH-1 (3)	6	271.5	271.3	0.053	12	0.011	0.52	5.57	0.2	7.69	6.7	17.5		275.04	275.13	271.8	271.5
CO-3	MH-1 (3)	MH-2 (6)	245	271.1	265.7	0.022	12	0.013	0.91	5.04	0.48	5.29	17.2	28.1		275.13	269.62	271.5	266.18
CO-1	CB-1 (1)	MH-1 (3)	18	271.5	271.3	0.011	12	0.013	0.4	3.11	0.22	3.76	10.7	22		275.04	275.13	271.76	271.52
CO-6	MH-2 (6)	MH-3 (7)	163	265.6	262.6	0.018	12	0.013	1.84	5.74	1.18	4.83	38.2	42.8		269.62	266.05	266.18	263.78
CO-4	CB-3 (4)	MH-2 (6)	15	266	265.7	0.02	12	0.013	0.31	3.57	0.48	5.04	6.2	16.9		269.49	269.62	266.23	266.18
CO-5	CB-4 (5)	MH-2 (6)	5	266	265.7	0.06	12	0.013	0.72	6.71	0.48	8.73	8.2	19.4		269.49	269.62	266.35	266.18
CO-7	MH-3 (7)	MH-4 (10)	184	262.6	262	0.003	12	0.013	1.79	2.28	1.32	2.03	88	72.8		266.05	265.3	263.78	263.32
CO-9	MH-4 (10)	CB-6 (9)	8	262.2	262	0.025	15	0.013	1.86	1.51	1.12	10.21	18.2	(N/A)		265.3	265	263.32	263.32
CO-10	MH-4 (10)	MH-5 (11)	93	261.9	261.3	0.006	15	0.013	5.1	4.16	1.44	5.19	98.3	80.5		265.3	266.34	263.32	262.74
CO-8	CB-5 (8)	MH-4 (10)	15	262.2	262	0.013	15	0.013	2.26	5.33	1.32	7.46	30.3	37.7		265	265.3	263.32	263.32
CO-11	MH-5 (11)	FES-1 (12)	30	261.2	261.1	0.003	15	0.013	7.89	6.43	1.11	3.73	211.5	(N/A)		266.34	261.1	262.74	262.21
CO-12	MH-6 (13)	MH-5 (11)	122	265.4	261.3	0.037	15	0.013	3.38	8.61	1.44	12.42	27.2	35.6		272.87	265.34	265.14	262.74
CO-13	CB-7 (14)	MH-6 (13)	18	267.9	269.4	0.017	12	0.013	0.92	4.57	0.31	4.6	19.9	30.3		273.09	272.87	270.1	269.71
CO-14	CB-8 (15)	MH-6 (13)	6	269.6	269.4	0.033	12	0.013	0.93	5.88	0.29	6.5	14.4	25.6		273.09	272.87	270.01	269.69
CO-15	MH-7 (16)	MH-6 (13)	288	276.4	269.4	0.024	12	0.013	1.7	6.22	0.38	5.55	30.6	37.9		280.81	272.87	276.95	269.78
CO-16	CB-9 (17)	MH-7 (16)	25	277.5	277	0.02	12	0.013	1.04	5.05	0.31	5.04	20.6	30.8		280.97	280.81	277.93	277.31
CO-17	CB-10 (18)	MH-7 (16)	15	277.5	277	0.033	12	0.013	0.67	5.33	0.22	6.5	20.2	21.6		280.97	280.81	277.84	277.22
CO-19	MH-8 (19)	MH-10 (EX)	16	283.4	283.2	0.012	24	0.013	18.55	8.8	1.37	25.29	73.4	63.6		286.79	285.62	284.95	284.57
CO-18	MH-9 (20)	MH-8 (19)	135	289.6	283.4	0.046	18	0.013	18.74	14.25	1.55	22.51	83.3	69.7		294.77	286.79	291.06	284.95
CO-65	MH-10 (EX)	O-2 (Connects to Ex Drainage Network)	122	278.8	269.9	0.073	24	0.013	18.52	17.05	0.76	61.1	30.3	37.8		285.62	269.9	280.35	270.66
CO-20	CB-11 (22)	MH-9 (20)	18	290.9	290.2	0.039	12	0.013	1.52	7.14	0.86	7.03	21.6	31.6		295.37	294.77	291.42	291.06
CO-21	CB-12 (23)	MH-9 (20)	7	289.9	289.7	0.029	12	0.013	1.02	1.3	1.36	6.02	17	27.8		294.41	294.77	291.06	291.06
CO-22	MH-11 (23)	MH-9 (20)	286	303.2	290.2	0.045	18	0.013	16.77	13.9	0.97	22.39	74.9	64.6		308.07	294.77	304.64	291.17
CO-23	CB-15 (24)	MH-11 (23)	13	305.5	303.3	0.015	12	0.013	1.6	2.04	1.34	4.42	36.3	41.6		308.03	308.07	304.66	304.64
CO-24	CB-16 (25)	MH-11 (23)	8	305.5	303.3	0.05	12	0.013	0.97	1.34	1.34	5.83	17.3	28.1		308.03	308.07	304.64	304.64
CO-25	MH-12 (26)	MH-11 (23)	295	308	303.3	0.016	18	0.013	14.88	8.42	1.4	13.26	112.2	(N/A)		312.97	308.07	310.65	304.7
CO-26	CB-17 (27)	MH-12 (26)	13	308.3	308.1	0.015	12	0.013	1.56	1.99	2.55	4.42	35.4	41.1		312.85	312.97	310.65	310.65
CO-27	CB-18 (28)	MH-12 (26)	9	308.3	308.1	0.022	12	0.013	0.71	0.9	2.55	5.31	13.3	24.7		312.85	312.97	310.66	310.65
CO-28	MH-13 (29)	MH-12 (26)	118	311	308.1	0.025	15	0.013	12.82	10.44	2.55	10.13	126.6	(N/A)		315.54	312.97	315.3	310.65
CO-29	MH-14 (30)	MH-13 (29)	151	312.9	311	0.013	12	0.013	12.93	16.47	4.3	4	323.6	(N/A)		317.97	315.54	315.2	315.1
CO-30	CB-19 (31)	MH-14 (30)	13	313.1	313	0.008	12	0.013	12.37	15.74	4.97	3.12	395.7	(N/A)		317.82	317.97	319.54	317.97
CO-31	CB-20 (32)	MH-14 (30)	9	313.1	313	0.011	12	0.013	0.7	0.89	4.97	3.76	18.5	29.1		317.67	317.97	317.97	317.97
CO-32	CB-21 (34)	MH-15 (35)	22	310.8	310.5	0.014	12	0.013	4.19	6.04	0.83	4.16	100.7	82.6		314.11	314.02	311.66	311.33
CO-34	MH-15 (35)	MH-16 (36)	67	310.3	308.6	0.025	12	0.013	5	8.15	0.73	5.67	88	72.8		314.02	311.85	311.22	309.33
CO-33	CB-22 (33)	MH-15 (35)	14	311.1	310.5	0.043	12	0.013	0.82	6.2	0.72	7.38	11.2	22.6		314.56	314.02	311.48	311.22
CO-35	MH-16 (36)	MH-17 (39)	193	308.5	302.1	0.033	12	0.013	4.96	9.1	3.5	6.49	65.4	65.5		311.85	305.6	305.41	305.6
CO-38	MH-17 (39)	MH-18 (40A)	92	301.9	300.7	0.013	12	0.013	9.45	12.03	3.93	4.07	232.3	(N/A)		305.6	304.63	311.1	304.63
CO-36	CB-23 (38)	MH-17 (39)	16	302.4	302.1	0.019	12	0.013	3.81	4.86	3.5	4.88	78.2	66.6		305.74	305.6	305.78	305.6
CO-37	CB-24 (37)	MH-17 (39)	10	302.2	302.1	0.01	12	0.013	0.94	1.19	3.5	3.56	26.3	35		305.51	305.6	305.61	305.6
CO-44	MH-18 (40A)	MH-21 (43)	29	300.6	300.5	0.003	15	0.013	18.61	15.17	3.88	3.79	490.7	(N/A)		304.63	304.38	306.79	304.38
CO-39	MH-19 (40)	MH-18 (40A)	12	300.8	300.7	0.008	12	0.013	8.09	10.3	3.93	3.25	248.7	(N/A)		304.95	304.63	305.25	304.63
CO-40	CB-25 (41)	MH-19 (40)	21	301	300.9	0.005	12	0.013	8.11	10.32	4.05	2.46	329.7	(N/A)		304.16	304.95	305.04	304.95
CO-41	MH-20 (EX)	MH-19 (40)	89	304.6	301.9	0.03	12	0.013	0	0	3.05	6.21	0	(N/A)		309	304.95	304.95	304.95
CO-43	CB-28 (42)	MH-18 (40A)	6	301	300.7	0.05	12	0.013	1.51	1.92	3.93	7.97	19	29.5		304.3	304.63	304.64	304.63
CO-46	MH-21 (43)	MH-22 (45)	131	300.4	299.8	0.005	15	0.013	19.76	16.1	5.45	4.37	451.9	(N/A)		304.38	305.25	317.5	305.25
CO-45	CB-29 (44)	MH-21 (43)	9	300.8	300.5	0.033	12	0.013	1.23	1.56	3.88	6.5	18.9	29.5		304.26	304.38	304.39	304.38
CO-47	MH-22 (45)	MH-23 (46)	36	299.7	299.5	0.006	15	0.013	21.46	17.48	5.7	4.83	186.4	65.5		305.25	305.2	309.17	305.2
CO-49	MH-23 (46)	MH-24 (52)	51	299.4	299	0.008	15	0.013	21.44	17.47	1.36	5.72	374.8	(N/A)		305.2	305.52	305.98	300.36
CO-48	CB-30 (60)	MH-22 (45)	30	301.8	301	0.027	12	0.013	10.53	13.4	4.25	5.82	180.9	(N/A)		305.2	305.25	307.87	305.25
CO-60	MH-24 (52)	MH-29 (53)	30	298.7	296.7	0.067	30	0.013	23.68	17.38	1.66	105.9	22.4	32.1		305.52	301.7	300.36	298.36
CO-50	MH-25 (50)	MH-24 (52)	28	300.5	298.7	0.064	18	0.013	7.9	13.14	1.66	26.63	29.7	37.3		305.52	305.52	301.59	300.36
CO-52	MH-25 (50)	MH-26 (49)	13	300.8	300.5	0.023	18	0.013	7.12	4.03	1.03	15.96	44.6	(N/A)		305.52	306.05	302.11	301.83
CO-51	CB-31 (51)	MH-25 (50)	7	302	301.9	0.014	12	0.013	2.04	5.37	0.52	4.26	48	48.8		305.3	305.52	302.61	302.42
CO-53	MH-26 (49)	CB-32 (48)	3	302.6	302.5	0.033	12	0.013	0.73	0.93	0.36	6.5	11.3	(N/A)		306.05	305.94	303.05	302.96
CO-54	CB-33 (47)	MH-26 (49)	32	302.7	302.5	0.006	12	0.013	0.57	2.81	0.31	2.82	20.3	30.6		305.97	306.05	303.01	302.81
CO-69	MH-29 (53)	MH-31 (62)	118	296.7	289.9	0.058	30	0.013	23.75	16.51	0.85	98.46	24.1	33.4		301.7	294.85	298.36	290.75
CO-61	CB-37 (54)	MH-29 (53)	16	296.8	296.4	0.025	12	0.013	0.22	3.48	0.14	5.63	3.9	13.6		302.5	301.7	298.99	298.54
CO-62	MH-30 (66)	MH-24 (52)	272	307	302.2	0.018	12	0.013	2.86	6.03	0.5	4.73	48.9	48.9		310.46	305.52	307.66	302.7
CO-63	CB-38 (67)	MH-30 (66)	22	307.3	307.1	0.009	12	0.013	1.74	4.35	0.51	3.4	51.3	50.7		310.58	310.46	307.86	307.61
CO-64	CB-39 (68)	MH-30 (66)	10	307.3	307.1	0.02	12	0.013	0.63	4.38	0.56	5.04	12.6	24		310.64	310.46	307.63	307.66
CO-71	MH-31 (62)	MH-32 (63)	196	289.9	279.4	0.054	30	0.013	23.71	16.07	1.72	94.93	25	34.1		294.85	284.31	291.56	281.12
CO-73	MH-32 (63)	MH-33 (EX DMH South of Woodard Driveway)	38	279.4	277.2	0.058	30	0.013	25.36	16.84	1.01	98.69	25.7	34.6		284.31	290.18	281.12	278.21
CO-74	MH-33 (EX DMH South of Woodard Driveway)	O-3 (Choate Field DMH)	187	277.2	268.7	0.045	30	0.013	25.35	15.43	0.92	87.44	29	36.9		290.18	297	278.92	269.62

Label	Start Node	Stop Node	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Depth (Normal) / Rise (%)	Notes	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-2	CB-2 (3)	MH-1 (3)	6	271.5	271.3	0.051	12	0.011	0.66	5.97	0.23	7.69	8.5	19.7		275.04	275.13	271.84	271.53
CO-3	MH-1 (3)	MH-2 (6)	245	271.1	265.7	0.022	12	0.013	1.16	5.4	0.56	5.29	22	31.8		275.13	269.62	271.55	266.26
CO-1	CB-1 (1)	MH-1 (3)	18	271.5	271.3	0.011	12	0.013	0.51	3.84	0.25	3.76	13.6	24.9		275.04	275.13	271.8	271.55
CO-6	MH-2 (6)	MH-3 (7)	163	265.6	262.6	0.018	12	0.013	2.4	6.15	2.76	4.83	49.7	69.8		269.62	266.05	266.26	265.36
CO-4	CB-3 (4)	MH-2 (6)	15	266	265.7	0.02	12	0.013	0.43	3.91	0.56	5.04	8.5	19.7		269.49	269.62	266.27	266.26
CO-5	CB-4 (5)	MH-2 (6)	5	266	265.7	0.06	12	0.013	0.93	7.25	0.56	8.73	10.7	22.1		269.49	269.62	266.41	265.26
CO-7	MH-3 (7)	MH-4 (10)	184	262.6	262	0.003	12	0.013	2.34	2.98	2.56	2.03	115	(N/A)		266.05	265.3	265.36	264.56
CO-9	MH-4 (10)	CB-6 (9)	8	262.2	262	0.025	15	0.013	2.8	2.28	2.36	10.21	27.4	(N/A)		265.3	265	264.58	264.56
CO-10	MH-4 (10)	MH-5 (11)	93	261.9	261.3	0.006	15	0.013	7.52	6.13	2	5.19	145	(N/A)		265.3	266.34	264.56	263.3
CO-8	CB-5 (8)	MH-4 (10)	15	262.2	262	0.013	15	0.013	3.37	2.75	2.56	7.46	45.2	47.2		265	265.3	264.6	264.56
CO-11	MH-5 (11)	FES-1 (12)	30	261.2	261.1	0.003	15	0.013	11.58	9.44	1.21	3.73	310.5	(N/A)		266.34	261.1	263.3	262.31
CO-12	MH-6 (13)	MH-5 (11)	122	265.4	261.3	0.037	15	0.013	4.7	9.42	2	12.42	37.8	42.6		272.87	266.34	269.28	263.3
CO-13	CB-7 (14)	MH-6 (13)	18	269.7	269.4	0.017	12	0.013	1.31	5.04	0.37	4.6	28.4	36.5		273.09	272.87	270.18	269.77
CO-14	CB-8 (15)	MH-6 (13)	6	269.6	269.4	0.033	12	0.013	1.25	6.4	0.34	6.5	19.2	29.7		273.09	272.87	270.18	269.74
CO-15	MH-7 (16)	MH-6 (13)	288	276.4	269.4	0.024	12	0.013	2.35	6.78	0.45	5.55	42.4	45.4		280.81	272.87	277.06	269.85
CO-16	CB-9 (17)	MH-7 (16)	25	277.5	277	0.02	12	0.013	1.44	5.93	0.37	5.04	28.6	36.6		280.97	280.81	278.01	277.37
CO-17	CB-10 (18)	MH-7 (16)	15	277.5	277	0.033	12	0.013	0.93	5.87	0.26	6.5	14.2	25.5		280.97	280.81	277.9	277.26
CO-19	MH-8 (19)	MH-10 (EX)	16	283.4	283.2	0.012	24	0.013	25.24	9.18	1.68	25.29	99.8	81.8		286.79	285.62	285.17	284.88
CO-18	MH-9 (20)	MH-8 (19)	135	289.6	283.4	0.046	18	0.013	25.48	14.42	1.77	22.51	113.2	(N/A)		294.77	286.79	293.11	285.17
CO-65	MH-10 (EX)	O-2 (Connects to Ex Drainage Network)	122	278.8	269.9	0.073	24	0.013	25.19	18.51	0.91	61.1	41.2	44.7		285.62	269.9	280.57	270.81
CO-20	CB-11 (22)	MH-9 (20)	18	290.9	290.2	0.039	12	0.013	2.02	2.57	2.91	7.03	28.8	36.7		295.37	294.77	293.17	293.11
CO-21	CB-12 (23)	MH-9 (20)	7	289.9	289.7	0.029	12	0.013	1.35	1.72	3.41	6.02	22.5	32.3		294.41	294.77	293.12	293.11
CO-22	MH-10 (23)	MH-9 (20)	286	303.2	290.2	0.045	18	0.013	22.86	12.93	2.91	22.39	102.1	84		308.07	294.77	306.66	293.11
CO-23	CB-15 (24)	MH-11 (23)	13	303.5	303.3	0.015	12	0.013	2.07	2.64	3.36	4.42	46.9	48.2		308.03	308.07	306.67	306.66
CO-24	CB-16 (25)	MH-12 (26)	8	303.5	303.3	0.025	8	0.013	1.26	1.61	3.26	6.63	22.4	32.2		308.03	308.07	306.67	306.66
CO-25	MH-12 (26)	MH-11 (23)	295	308	303.3	0.016	18	0.013	20.19	11.43	3.36	13.26	152.3	(N/A)		312.97	308.07	317.56	306.66
CO-26	CB-17 (27)	MH-12 (26)	13	308.3	308.1	0.015	12	0.013	1.95	2.48	4.87	4.42	44	46.4		312.85	312.97	313.01	312.97
CO-27	CB-18 (28)	MH-12 (26)	9	308.3	308.1	0.022	12	0.013	0.9	1.14	4.87	5.31	16.9	27.8		312.85	312.97	312.98	312.97
CO-28	MH-13 (29)	MH-12 (26)	118	311	308.1	0.025	15	0.013	17.56	14.31	4.87	10.13	179.4	(N/A)		315.54	312.97	321.69	312.97
CO-29	MH-14 (30)	MH-13 (29)	151	312.9	311	0.013	12	0.013	17.97	21.5	4.54	4.42	352.3	(N/A)		317.97	315.54	321.69	315.54
CO-30	CB-19 (31)	MH-14 (30)	13	313.1	313	0.008	12	0.013	16.86	21.46	4.97	3.12	539.4	(N/A)		317.82	317.97	320.88	317.97
CO-31	CB-20 (32)	MH-14 (30)	9	313.1	313	0.011	12	0.013	0.95	1.21	4.97	3.76	25.2	34.3		317.67	317.97	317.98	317.97
CO-32	CB-21 (34)	MH-15 (35)	22	310.8	310.5	0.014	12	0.013	4.9	6.24	2.1	4.16	117.9	(N/A)		314.11	314.02	313.02	312.6
CO-34	MH-15 (35)	MH-16 (36)	67	310.3	308.6	0.025	12	0.013	5.88	7.49	2.17	5.67	103.7	85.7		314.02	311.85	312.6	310.77
CO-33	CB-22 (33)	MH-15 (35)	14	311.1	310.5	0.043	12	0.013	1.04	1.39	2.1	7.38	14.1	25.4		314.56	314.02	312.61	312.6
CO-35	MH-16 (36)	MH-17 (39)	193	308.5	302.1	0.03	12	0.013	8.93	7.49	3.5	6.49	89.9	76.1		311.85	305.6	310.77	305.6
CO-38	MH-17 (39)	MH-18 (40A)	92	301.9	300.7	0.013	12	0.013	11.25	14.33	3.93	4.07	276.6	(N/A)		305.6	304.63	313.81	304.63
CO-36	CB-23 (38)	MH-17 (39)	16	302.4	302.1	0.019	12	0.013	4.61	5.87	3.5	4.88	94.5	77.5		305.74	305.6	305.87	305.6
CO-37	CB-24 (37)	MH-17 (39)	10	302.2	302.1	0.01	12	0.013	1.22	1.55	3.5	3.56	34.2	40.3		305.51	305.6	305.61	305.6
CO-44	MH-18 (40A)	MH-21 (43)	29	300.6	300.5	0.003	15	0.013	25.31	20.62	3.88	3.79	667.2	(N/A)		304.63	304.38	308.83	304.38
CO-39	MH-19 (40)	MH-18 (40A)	12	300.8	300.7	0.008	12	0.013	12.66	16.13	3.93	3.25	389.4	(N/A)		304.95	304.63	306.15	304.63
CO-40	CB-25 (41)	MH-19 (40)	21	301	300.9	0.005	12	0.013	12.68	16.15	4.05	2.46	515.8	(N/A)		304.16	304.95	307.61	304.95
CO-41	MH-20 (EX)	MH-19 (40)	89	304.6	301.9	0.03	12	0.013	0	0	3.05	6.21	0	(N/A)		309	304.95	304.95	304.95
CO-43	CB-28 (42)	MH-18 (40A)	6	301	300.7	0.05	12	0.013	2.2	2.8	3.93	7.97	27.6	35.9		304.3	304.63	304.65	304.63
CO-46	MH-21 (43)	MH-22 (45)	131	300.4	299.8	0.005	15	0.013	26.76	21.81	5.45	4.37	612.2	(N/A)		304.38	305.25	327.74	305.25
CO-45	CB-29 (44)	MH-21 (43)	9	300.8	300.5	0.033	12	0.013	1.58	2.01	3.88	6.5	24.2	33.5		304.26	304.38	304.4	304.38
CO-47	MH-22 (45)	MH-23 (46)	36	299.7	299.5	0.006	15	0.013	29.29	23.87	5.7	4.81	608.5	(N/A)		305.25	305.2	312.6	305.2
CO-49	MH-23 (46)	MH-24 (52)	51	299.4	299	0.008	15	0.013	29.28	23.86	1.63	5.72	511.8	(N/A)		305.2	305.52	311.1	300.63
CO-48	CB-30 (60)	MH-22 (45)	30	301.8	301	0.027	12	0.013	14.33	18.25	4.25	5.82	246.4	(N/A)		305.2	305.25	310.11	305.25
CO-60	MH-24 (52)	MH-29 (53)	30	298.7	296.7	0.067	30	0.013	31.97	18.9	1.93	105.9	30.2	37.7		305.52	301.7	300.63	298.63
CO-50	MH-25 (50)	MH-24 (52)	28	300.8	298.7	0.064	18	0.013	10.52	14.18	1.93	26.63	39.5	43.7		305.52	305.52	301.75	300.63
CO-52	MH-25 (50)	MH-26 (49)	13	300.8	300.5	0.023	18	0.013	9.53	5.39	1.19	15.96	59.7	(N/A)		305.52	305.05	302.27	301.99
CO-51	CB-31 (51)	MH-25 (50)	7	302	301.9	0.014	12	0.013	2.57	5.68	0.6	4.26	60.5	56.1		305.3	305.52	302.69	302.5
CO-53	MH-26 (49)	CB-32 (48)	3	302.6	302.5	0.033	12	0.013	0.92	1.17	0.4	6.5	14.1	(N/A)		306.05	305.94	303.11	303
CO-54	CB-33 (47)	MH-26 (49)	32	302.7	302.5	0.006	12	0.013	0.8	3.09	0.37	2.82	28.4	36.5		305.97	306.05	303.07	302.87
CO-69	MH-29 (53)	MH-31 (62)	118	296.7	289.9	0.058	30	0.013	32.09	17.93	1.01	98.46	32.6	39.3		301.7	294.85	298.63	290.91
CO-61	CB-37 (54)	MH-29 (53)	16	296.8	296.4	0.025	12	0.013	0.34	3.97	0.17	5.63	6.1	16.7		302.5	301.7	298.04	296.57
CO-62	MH-30 (66)	MH-24 (52)	272	307	302.2	0.018	12	0.013	2.95	6.36	0.57	4.73	62.4	57.2		310.46	305.52	307.74	302.77
CO-63	CB-38 (67)	MH-30 (66)	22	307.3	307.1	0.009	12	0.013	2.17	4.58	0.64	3.4	63.8	58.8		310.58	310.46	307.93	307.74
CO-64	CB-39 (68)	MH-30 (66)	10	307.3	307.1	0.02	12	0.013	0.8	4.69	0.64	5.04	15.9	27		310.64	310.46	307.67	307.74
CO-71	MH-31 (62)	MH-32 (63)	196	289.9	279.4	0.054	30	0.013	32.05	17.46	1.99	94.93	33.8	40		294.85	284.31	291.83	281.39
CO-73	MH-32 (63)	MH-33 (EX DMH South of Woodard Driveway)	38	279.4	277.2	0.058	30	0.013	34.3	18.29	1.22	98.69	34.8	40.7		284.31	290.18	281.39	278.42
CO-74	MH-33 (EX DMH South of Woodard Driveway)	O-3 (Choate Field DMH)	187	277.2	268.7	0.045	30	0.013	34.29	16.73	1.09	87.44	39.2	43.5		290.18	297	279.19	269.79

AMS

2023 MAR -8 P 4: 50

MEMORANDUM OF PURCHASE AND SALE OF REAL ESTATE

This 7th day of March, 2023

This Agreement is made between the **TOWN OF SOUTHBOROUGH**, a Massachusetts Municipal Corporation, acting by and through its Select Board, with an address of 17 Common Street, Southborough, Massachusetts (the "Town" or "Southborough"), and **THE TRUSTEES OF ST. MARK'S SCHOOL OF SOUTHBOROUGH, INC.**, a Massachusetts non-profit educational corporation, with an address of 25 Marlboro Road, Southborough, Massachusetts (the "School"), for the purpose of purchasing and selling the parcels of land as more fully defined below.

WHEREAS, the School desires to perform and construct certain improvements upon an approximately 16,134 square foot portion of the Town's current property consisting of a public road layout located at the northern area of the intersection of St. Mark's Street and Marlborough Road (Route 85) (the "Town Property"), said improvements to include the construction of a parking area and completion of landscaping improvements;

WHEREAS, the Town desires to perform certain road and park improvements on an approximately 31,357 square foot portion of land currently owned by the School located at the intersection of St. Mark's Street and Marlborough Road (the "School Property");

WHEREAS, the parties have agreed to convey, to each other the two above-described parcels of property, said parcels being depicted on the plan of land, entitled Southborough History Walk Property Plan, a copy of which is attached hereto as Exhibit A (the "Plan");

WHEREAS, the parties have executed a reciprocal license to do work on each other's properties (the "License"), said License to be supplanted by the terms hereof;

WHEREAS, the Town is a governmental entity and is therefore subject to the provisions of G.L. c. 30B, as may be applicable; and

WHEREAS, the Town proposes to obtain permission from the Southborough Town Meeting to both convey the Town Property to the School and to accept the School Property from the School, as described herein, said Town Meeting to occur in the Spring of 2023; and

NOW THEREFORE, for good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, and for the mutual promises set forth herein, the parties agree as follows:

1. **Consideration:**

The Town and the School agree that the consideration for the Town Property is the School Property, and that the consideration for the School Property is the Town Property.

2. **Town Meeting Contingency:**

The parties agree that the proposed conveyances of the parcels described herein are contingent upon the Town obtaining approval of the Town of Southborough Annual Town Meeting for: (i) the conveyance of the Town Property and acceptance of the School Property, and (ii) discontinuance of the portion of St. Mark's Street encumbering the Town Property (collectively, the "Approval"), said Approval to be obtained at the Spring Annual Town Meeting in 2023, or such other Town Meeting as may be designated by the parties. In the event that the Approval is not obtained by December 31, 2023, then this Agreement shall be null and void without any force and effect, provided however that such failure to obtain the Approval shall be subject to the applicable provisions of Section 5.

The parties further agree that the proposed conveyances are contingent upon the parties' execution of mutually acceptable Purchase and Sale Agreements for the two transactions contemplated herein, such agreements to be executed within sixty (60) days from the Town Meeting approval contemplated above. In the event that said Purchase and Sale Agreements are not entered into within said time period, then this agreement shall be null and void without any force and effect.

3. **Planning Board Contingency:**

The parties agree that, notwithstanding the applicability of the so-called Dover Amendment (G.L. c. 40A, §3), the proposed conveyances of the parcels described herein are contingent upon the School obtaining any required approval of the Town of Southborough Planning Board, and any other required Board or Commission, required to construct the School's proposed project on the Town Property (the "Planning Board Approval"). Planning Board Approval shall not be deemed to have been obtained if the Planning Board Approval is the subject of an appeal or contains conditions unacceptable to the School. In the event that any required Planning Board Approval is not obtained, then this Agreement shall be null and void without any force and effect, provided however that such failure to obtain the Planning Board Approval shall not affect the validity and enforceability of the License terms contained herein. To facilitate the provisions of this paragraph, the School shall apply for any required Planning Board (or other municipal) approval or, alternatively, provide notice that such approval is not required, by no later than sixty (60) days following the Approval, and shall diligently pursue such application upon filing.

4. **School Board Contingency:**

The parties agree that the proposed conveyances of the parcels described herein are contingent upon the School obtaining approval of its board of directors (the "School Approval"). In the event that the School Approval is not obtained, then this Agreement shall be null and void without any force and effect, provided however that such failure to obtain the School Approval shall not affect the validity and enforceability of the License.

5. **License:**

Upon the execution of this Agreement, the parties' previously executed reciprocal License shall terminate and be of no further force and effect and the parties shall cease any construction activities until such time as the conveyances contemplated herein are completed. Upon such conveyances, the parties agree that they shall both be permitted to do incidental work on the other party's property to complete the projects contemplated herein. In the event that the aforesaid conveyances do not take place, the Town shall retain a license to enter on the School Property and complete any grading or landscaping restoration activities as the parties may agree is necessary with respect to previous work done by the Town.

6. **Title Deed:**

The Town Property and the School Property are to be conveyed by a good and sufficient quitclaim deed running to the School or the Town, as the case may be, and said deed shall convey a good, clear, record and marketable title thereto, free from encumbrances, except

- (a) Provisions of existing building and zoning laws; and
- (b) Easements, restrictions and reservations of record, if any, so long as the same do not prohibit or materially interfere with the use of the Town Property or the School Property, as the case may be. If either party is not satisfied with the title to the Town Property or the School Property, as the case may be, then the other party may terminate this Agreement at any time prior to the Closing (as defined herein) in which case this Agreement shall be null and void without any force and effect provided however that such failure to obtain the Approval shall not affect the validity and enforceability of the License terms contained herein.

7. **Parties to bear their own cost of construction:**

The parties agree that, upon conveyance, as contemplated herein, the School shall bear all of the expenses for construction and work on the Town Property, and the Town shall bear all of the expenses for construction and work on the School Property, provided however that each party understands that there may be incidental work on each other's Properties.

8. **Time for Performance; Delivery of Deed:**

Such deeds are to be delivered no later than thirty days following the certification of the Approval or the Planning Board Approval, whichever is later, or the next day on which the Worcester District Registry of Deeds is open for recording (the "Closing"). Time is of the essence with respect to all date and time periods in this Agreement.

9. **Acceptance and Recording of Deed:**

The acceptance and recording of the deeds by the parties shall be deemed to be a full performance and discharge of every agreement and obligation herein contained or expressed, except such as are, by the terms hereof, to be performed after the delivery of the deed. Upon the closing, as aforesaid, the license terms contained herein shall be deemed null and void, provided however, that, pursuant to the terms hereof, the parties shall retain the right to enter onto each other's property to facilitate the work that is described above.

10. **Compliance with G.L. c. 30B:**

The Town has declared or will declare that the Town Property is surplus by a vote of its Select Board. In all circumstance, the exchange of the subject properties shall be compliant with G.L. c. 30B or be exempt therefrom. If this transaction fails to comply with G.L. c. 30B for any reason, then either party may terminate this Agreement by written notice to the other prior to the Closing in which case this Agreement shall be null and void without any force and effect provided however that such failure to obtain the Approval shall not affect the validity and enforceability of any remaining License terms contained herein.

11. **Cooperation:**

The Town and the School agree to cooperate with each other to effectuate the purchase and sale of the Town Property and School Property including but not limited to, providing, executing, registering and filing any and all instruments or authorizations that may be reasonably requested by the other.

12. **Payment of Recording Fees:**

The Town and the School shall each pay their respective recording and administrative fees. Both parties acknowledge that pursuant to G.L. c. 64D sec. 1 no deed stamp tax shall be due at the Closing.

13. **AS-IS:**

The Town and the School each acknowledge that they have inspected the Town Property and the School Property, as the case may be, and that they are satisfied with the results of the inspection. The Town and the School each acknowledge and agree to purchase the Town Property and the School Property, as the case may be, in "as is" condition and with "all faults" as of the date of this Agreement. Except as otherwise provided in this Agreement, neither party has made any representation or warranty as to the condition of the Town Property or the School Property, as the case may be, or any fixtures, appurtenances or utilities and expressly disclaims any liability for the condition of the same.


14. **Default:**

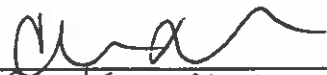
In the event of a default by either party under this Agreement, the only remedy available to the non-defaulting party is to terminate this Agreement in which case this Agreement shall be null and void without any force and effect provided however that such termination shall not affect the validity and enforceability of the License terms contained herein.

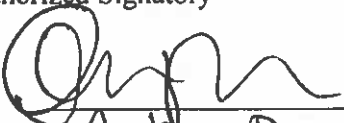
15. **Miscellaneous:**


This Agreement is a binding contract that may be executed in counterparts, each of which shall be deemed an original, but both of which together shall constitute one in the same instrument. Signatures to this Agreement transmitted by electronic mail in portable document format (.pdf), or by any other electronic means intended to preserve the original graphic and pictorial appearance of a document, will have the same force and effect as physical execution and delivery of the paper document bearing the original signature.

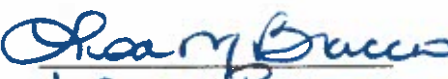
TOWN OF SOUTHBOROUGH
by and through its Select Board

By: 
Name: KATHRYN M. COOK
Authorized Signatory

By: 
Name: Chelsea Malinowski
Authorized Signatory

By: 
Name: Andrew Derrington
Authorized Signatory

By: 
Name: SAM STEVENS
Authorized Signatory

By: 
Name: LEAH M. BRACCIO
Authorized Signatory

TRUSTEES OF ST MARKS SCHOOL OF SOUTHBOROUGH, INC.
by and through its Board of Trustees

By: 

Name: Michael B. Moore Board of Trustees, President
Authorized Signatory

By: 

Name: Nicholas S. Everett Board of Trustees, Facilities Committee Chair
Authorized Signatory

By: 

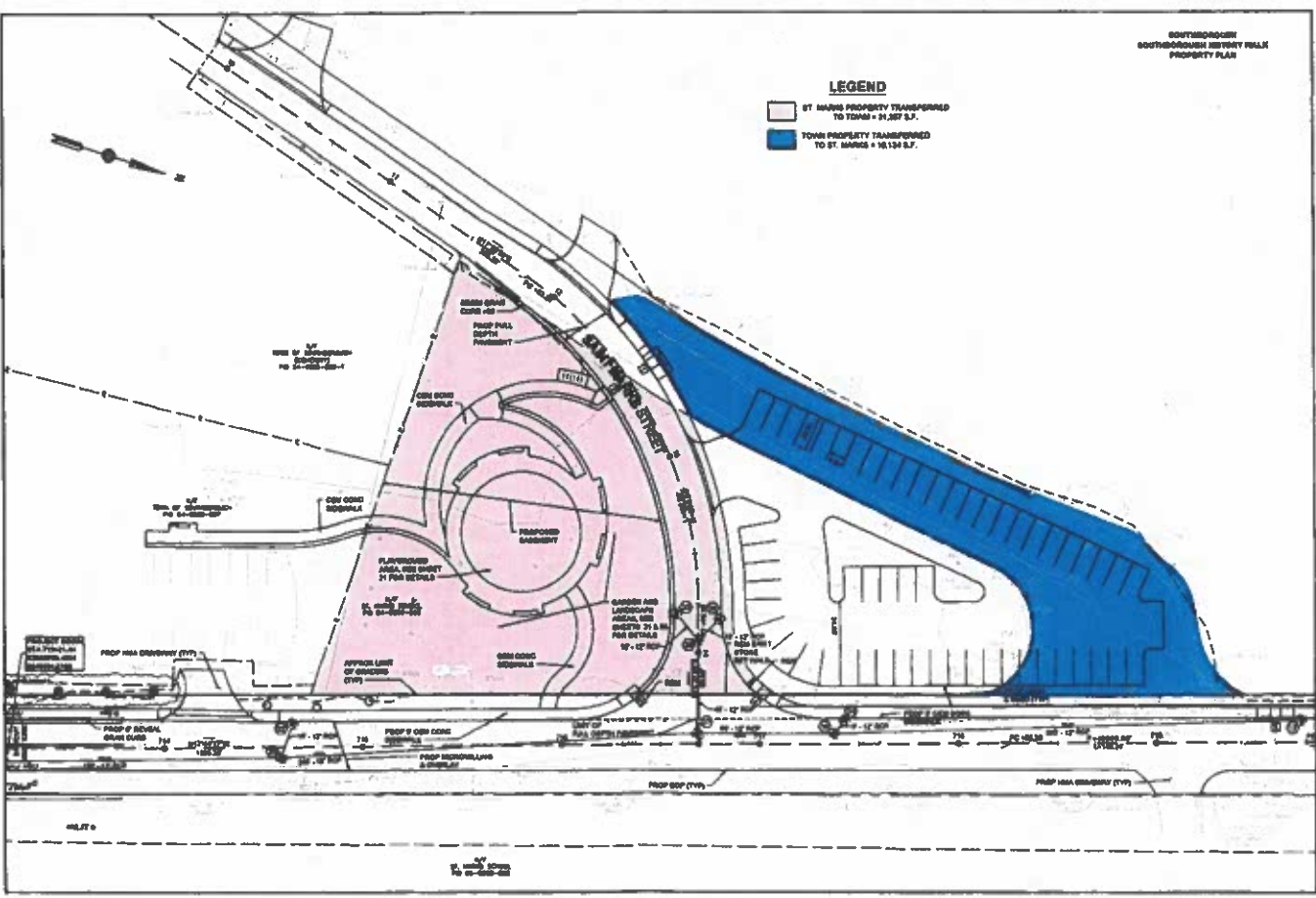
Name: Robert Kuklewicz, Chief Financial & Operations Officer
Authorized Signatory

SOUTHBOURNE
SOUTHBOURNE HISTORY HILLS
PROPERTY PLAN

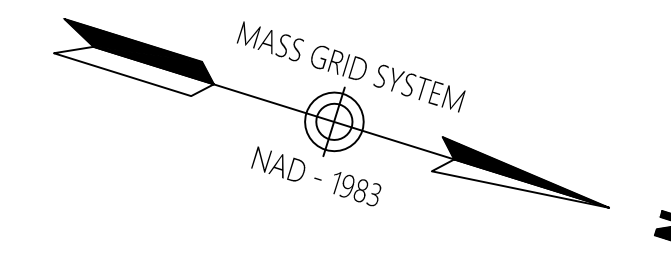
LEGEND

- ST. MARKS PROPERTY TRANSFERRED TO TOWN + 21,287 S.F.
- TOWN PROPERTY TRANSFERRED TO ST. MARKS + 16,134 S.F.

EXHIBIT A



DATE: 04/20/2010 11:00 AM



RESERVED FOR REGISTRY USE ONLY

APPROVAL NOT REQUIRED UNDER
THE SUBDIVISION CONTROL LAW
SOUTHBOROUGH PLANNING BOARD

DATE: _____

PROPOSED ST. MARKS STREET
AREA=8,875.49 S.F.
(0.204 ACRES)

REMAINING AREA A
25528.31 S.F. (0.586 ACRES)

REMAINING AREA B
13551.40 S.F. (0.311 ACRES)

LOCATION OF ST. MARK STREET
TO BE DISCONTINUED
AREA=16,621 S.F. (0.382 ACRES)

PROPOSED LOT LINE

EXISTING LOCATION OF
ST. MARK STREET TO REMAIN

MARLBORO (PUBLIC - 49.5' WIDE) ROAD

General Notes

1. THE RIGHT-OF-WAY AND PROPERTY LINES WERE DETERMINED FROM AN ON THE GROUND SURVEY, BY VHB, AND FROM PLANS AND DEEDS OF RECORD.
2. THE PURPOSE OF THIS PLAN IS TO SHOW THE AREA OF DISCONTINUANCE AND RE-ALIGNMENT OF ST. MARK STREET.
3. REMAINING AREA A TO BE CONVEYED TO TOWN OF SOUTHBOROUGH.
4. REMAINING AREA B TO BE RETAINED BY ST. MARKS SCHOOL.
5. AREA OF DISCONTINUANCE TO BE CONVEYED TO ST. MARKS SCHOOL.
6. AREA OF ST. MARKS STREET NOT DISCONTINUED TO REMAIN WITH TOWN OF SOUTHBOROUGH.
7. HORIZONTAL DATUM IS BASED ON MASS GRID SYSTEM, NAD-1983.

Certification

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS.

DATE _____ PROFESSIONAL LAND SURVEYOR _____

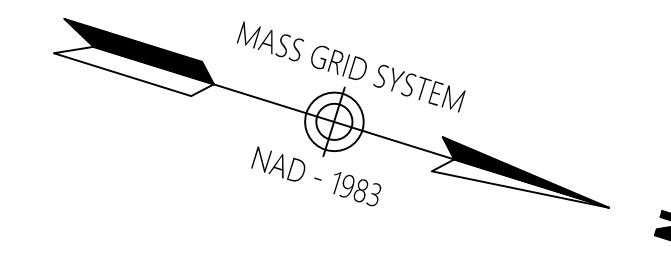


DISCONTINUANCE PLAN
IN
SOUTHBOROUGH
MASSACHUSETTS

PREPARED FOR: THE TOWN OF SOUTHBOROUGH

PREPARED BY: VHB, Inc.
Engineers | Scientists | Planners | Designers
101 Walnut Street, P.O. Box 9151
Watertown, MA 02471-9151
(617) 924-1770

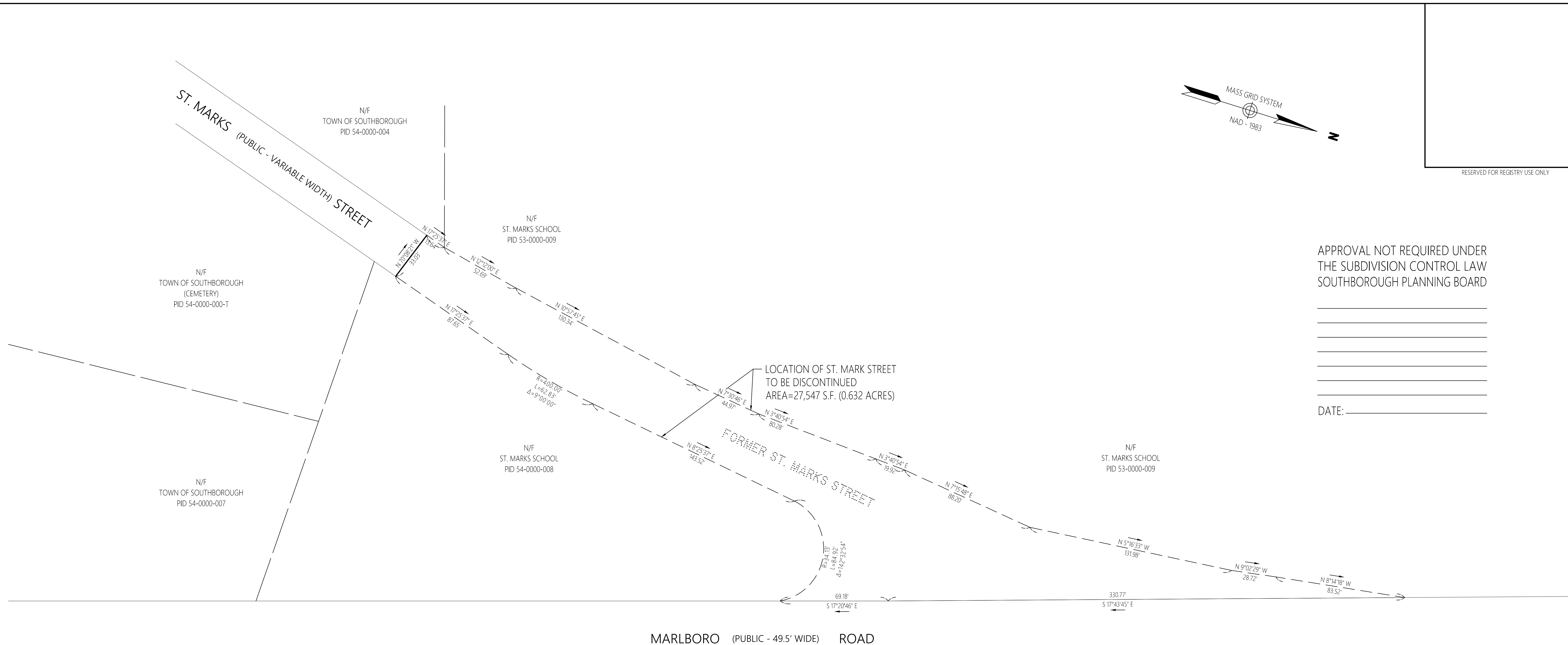
SCALE: 1 INCH = 30 FEET DATE: FEBRUARY 16, 2023



RESERVED FOR REGISTRY USE ONLY

APPROVAL NOT REQUIRED UNDER
THE SUBDIVISION CONTROL LAW
SOUTHBOROUGH PLANNING BOARD

DATE: _____



General Notes

1. THE RIGHT-OF-WAY AND PROPERTY LINES WERE DETERMINED FROM AN ON THE GROUND SURVEY, BY VHB, AND FROM PLANS AND DEEDS OF RECORD.
2. THE PURPOSE OF THIS PLAN IS TO SHOW THE AREA OF ST. MARKS STREET TO BE DISCONTINUED.
3. HORIZONTAL DATUM IS BASED ON MASS GRID SYSTEM, NAD-1983.

Certification

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS.

DATE _____ PROFESSIONAL LAND SURVEYOR _____



DISCONTINUANCE PLAN
IN
SOUTHBOROUGH
MASSACHUSETTS

PREPARED FOR: THE TOWN OF SOUTHBOROUGH

PREPARED BY: VHB, Inc.
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101 Walnut Street, P.O. Box 9151
Watertown, MA 02471-9151
(617) 924-1770

SCALE: 1 INCH = 30 FEET DATE: MARCH 8, 2023