

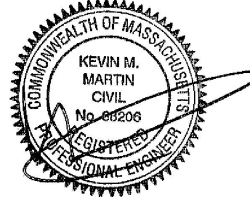
KEVIN M. MARTIN, P.E.
KMM GEOTECHNICAL CONSULTANTS, LLC

7 Marshall Road
Hampstead, NH 03841
603-489-5556 (p)/ 603-489-5558 (f)/781-718-4084(m)
kevinmartinpe@aol.com

MEMORANDUM

TO: Dale Development, LLC
360 Washington Street
Rye, NH 01864

FROM: Kevin M. Martin, P.E.
Geotechnical Engineer



DATE: March 12, 2026

**RE: PRELIMINARY GEOTECHNICAL SUMMARY
PROPOSED RESIDENTIAL DEVELOPMENT
ROCKY HILL COMMUNITY - 287 ELM STREET
AMESBURY, MASSACHUSETTS**

This memorandum serves as a Preliminary Geotechnical Summary Report for the referenced project. The contents of this memorandum are subject to the attached ***Limitations***.

SITE & PROJECT DESCRIPTION

The majority of the site includes undeveloped land. Some residential structures along Elm Street will be razed to accommodate the project. KMM has no knowledge of past use, construction and/or development on the property except what is visible or shown on the *Site Plan*. The *Site Plan* shows varying grades between elevation ≈ 50 -65 ft possessing gradual contour. Shallow wetlands are delineated throughout the site. The wetlands appear to drain south towards the PowWow River.

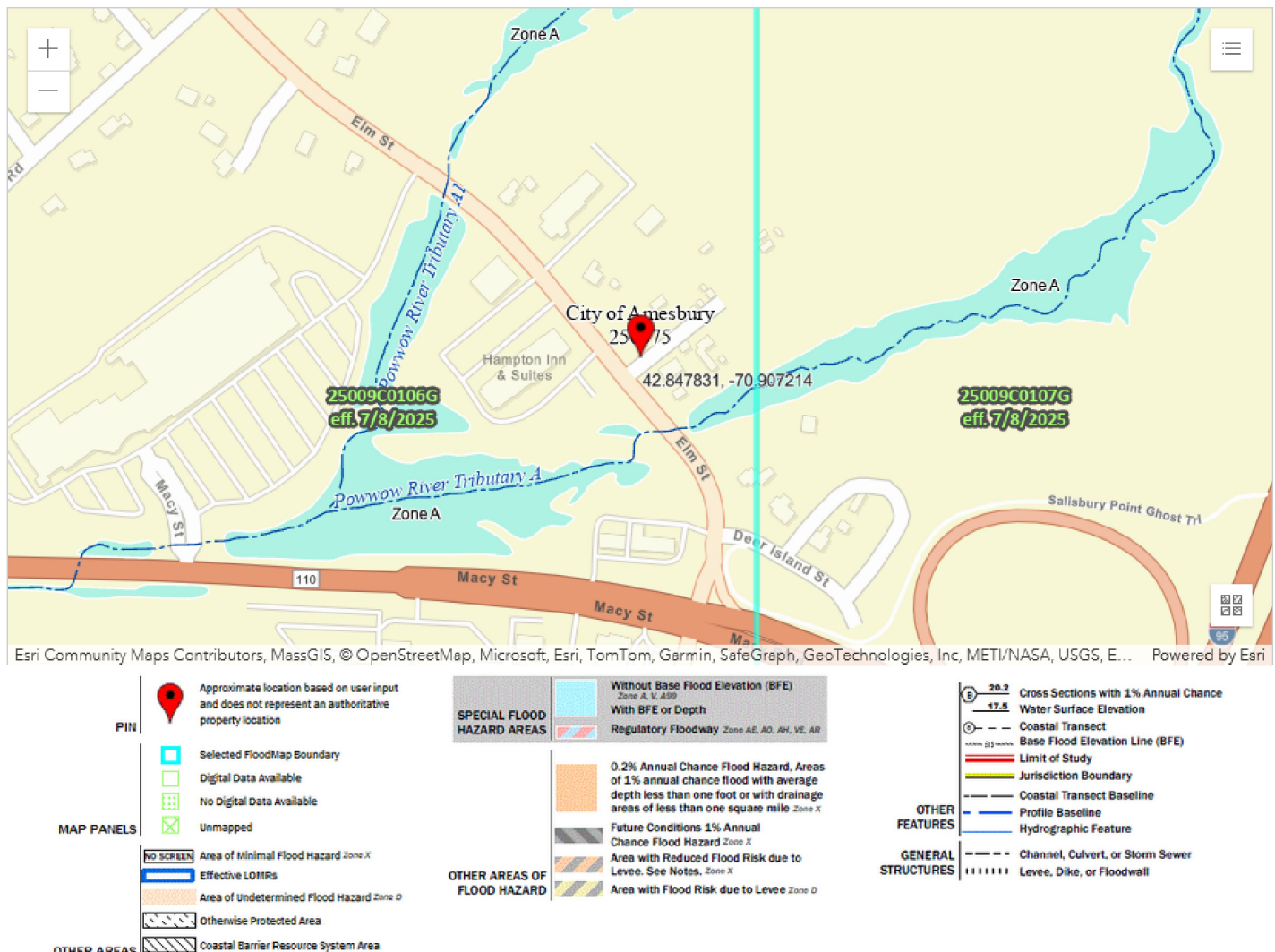
The project includes a residential development separated into a North & South Neighborhood. There will be a community center and a primary access drive. Most buildings appear to be 1-2-3-4 family structures. There are some 3-story apartment buildings to the rear.

The purpose of this study is to review the subgrade conditions and provide a preliminary geotechnical evaluation related to foundation design and construction as required by the *Massachusetts State Building Code*. This report does not include an environmental assessment relative to oil, gasoline, solid waste and/or other hazardous materials. The environmental conditions of the property should be addressed by others as necessary. This study also does not include review of site design or construction issues such as infiltration systems, dry wells, retaining walls, excavation support, steepened slopes, underground utilities, crane pads, detention ponds, septic systems, wetland crossings, protection of surrounding buildings or other site and/or temporary design unless specifically addressed herein.



This study is consider preliminary and serves to address geotechnical concerns for the project. The study is based on *Test Pit Logs* (by Millennium Engineering) for site design purposes. There were no specific geotechnical explorations completed at this time. The intent is to complete a Geotechnical Report as the project progresses.

MEI completed about 85 *Test Pit Logs* throughout the site. These Logs were reviewed as they pertain to geotechnical evaluation.



The site borders tributary streams that flow towards the PowWow River. The wetlands are associated with this tributary flow.



USGS QUAD

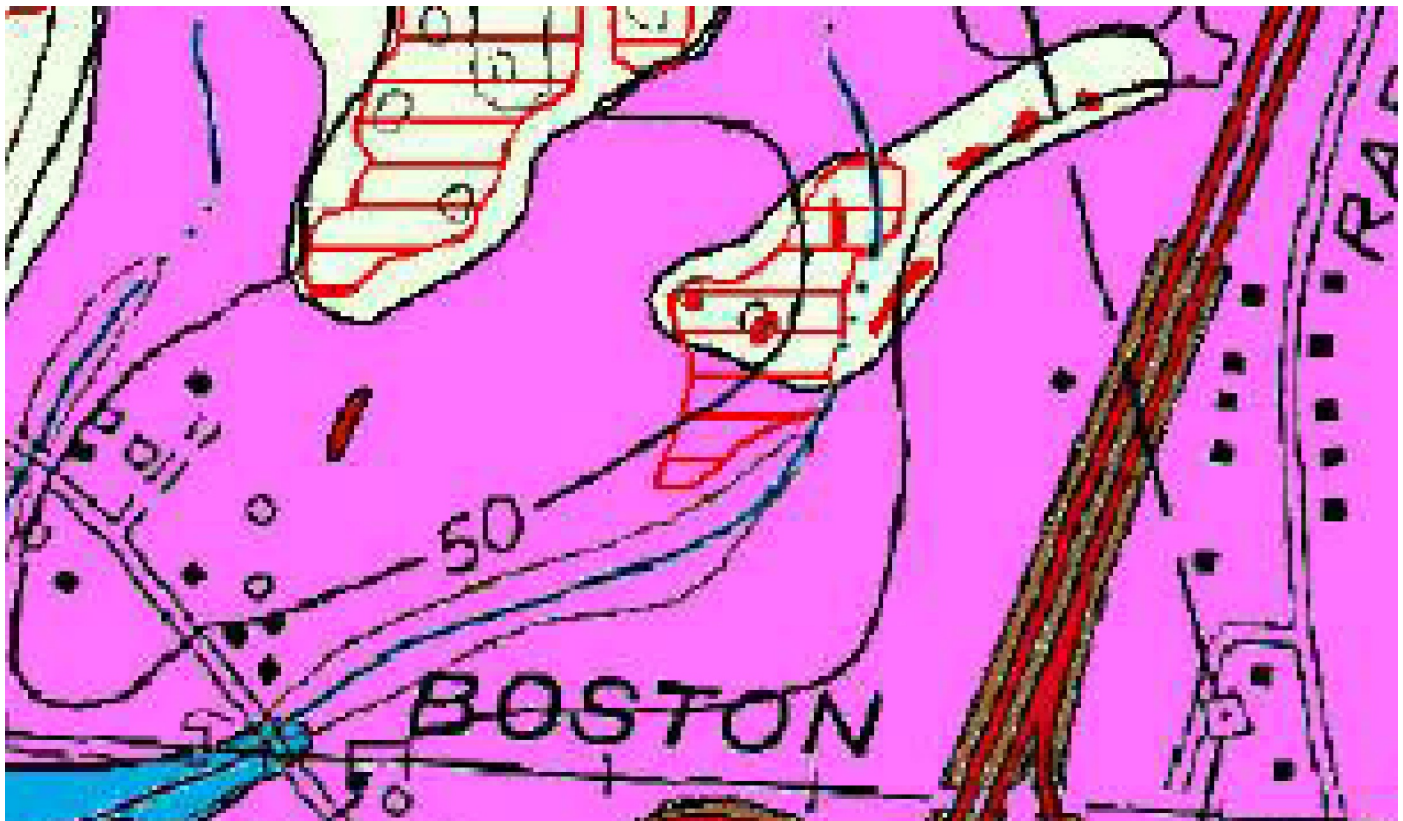
SUBSURFACE CONDITIONS

The subsurface conditions below (1) surface Organic laden soils include (2) Glacial soils (3) then Bedrock refusal.

There are surface Organic laden soils typical of an undeveloped site. These include a surface Topsoil or Forest Mat with underlying Subsoil. These are identified as the "A" & "B" Horizons on the *Test Pit Logs*. There appears about ≈ 2 ft of collective organic laden soils across the site. The Subsoil consists of a rust brown, silty Sand with trace gravel, roots and loam as leached from the surface.

The overburden includes stable Glacial soils. These are identified per USDA Classification as Loamy Sand or Fine Loamy Sand. These classifications translate into Sand and/or silty Sand with variable gravel. The Glacial soils are expected to be stable and compact.

Test bore refusal, presumably Bedrock, was encountered at depths of $\approx 1-7$ ft (or deeper) being generally shallower to the rear. The consistent depth to refusal would suggest Bedrock. Bedrock in the area is characteristically hard and of sound quality.



USGS SURFICIAL GEOLOGIC MAP - NEWBURYPORT WEST - 2018



Marine regressive deposits—Sand and minor gravel deposited along former, higher shorelines in northeastern Massachusetts by waves and currents, and by wind action on beaches and spits. These deposits are shown where they overlie glaciomarine fine deposits. Regressive beach and nearshore deposits are composed of moderately sorted, very coarse to fine sand, commonly laminated. Coarser layers may contain some fine gravel particles; finer layers may contain some very fine sand and silt. Regressive beach and nearshore deposits are rarely more than a few feet thick. Regressive spit deposits are 10 to 30 ft thick



Bedrock outcrops and areas of abundant outcrop or shallow bedrock—Solid color shows extent of individual bedrock outcrops; horizontal-line pattern indicates areas of shallow bedrock or areas where small outcrops are too numerous to map individually; in areas of shallow bedrock, surficial materials are less than 5 to 10 ft thick. These units were not mapped consistently among all quadrangles; see note at beginning of appendix 1 for information on bedrock outcrop mapping by quadrangle

The *USGS Surficial Geologic Map* indicates post Glacial Marine Regressive soils with shallow Bedrock to the rear. These conditions appear consistent with the study.

Relatively shallow groundwater was encountered through the site. This is to be expected given the shallow wetlands that intersect the site. The wetlands appear to drain south (to the front) towards the Pow Wow River. It should be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, utilities and other factors differing from the time of the measurements.

Loamy Fine Sand

Loose; single grained/structureless; non-cohesive; mixed medium to mostly fine-grained clean sand content; dry matrix; non-sticky;

Loamy Sand

Friable to firm; moderately compact matrix; massive to subangular platy structure of moderate grade; mixed fine-to-medium grained mineral content; crudely stratified; dry matrix; non-sticky; non-plastic; well graded; approximately 10-15% sub-angular to sub-rounded gravel and 05-10% sub-rounded to angular cobble content

PRELIMINARY GEOTECHNICAL EVALUATION

Based on this review, we provide the following preliminary geotechnical evaluation.

- The subgrade conditions should be favorable for supporting the proposed buildings on a conventional spread footing foundation. There were no areas of expansive fill, soft clay or other poor to marginal subgrade. The Organic laden soils shall be stripped from building areas accordingly. Structural Fill shall conform to *Specification* (Table 1).
- Most of the site appears to be elevated a few feet. This will assist with groundwater concerns. The shallow elevation will be accommodated with perimeter slopes and small retaining walls. Earthen slopes shall be no steeper than 2H:1V for dry slope with negligible surcharge. Wet slopes shall be flattened to no less than 3H:1V. Erosion control shall be applied accordingly.
- There may be some bedrock impact with foundation and utilities. Localized bedrock is generally addressed with rock hammers. Explosive blasting is not expected to be necessary unless there are large quantities of bedrock.
- The subgrade should ultimately be stable, dewatered, compact and protected from frost throughout construction. Bearing subgrades that become weakened or disturbed due to wet conditions will be rendered unsuitable for structural support. The Contractor shall ultimately be responsible for the means and methods of temporary groundwater control, subgrade protection and site stability during construction. An Engineer from KMM should be scheduled to review the foundation subgrade conditions and preparation during construction.

CLOSURE

This study was completed for Preliminary Geotechnical review. The foundation design shall be completed in accordance with the *Massachusetts State Building Code*.

We trust the contents of this memorandum are responsive to your needs at this time. Should you have any questions or require additional assistance, please do not hesitate to contact our office.

Amesbury287ElmStreet.wpd

LIMITATIONS

Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.
2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.
3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.
5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by KMM Geotechnical Consultants, LLC.

Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of Dale Development, LLC in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
8. This report has been prepared for this project by KMM Geotechnical Consultants, LLC. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to preliminary geotechnical design considerations only.

TABLE 1

287 Elm Street
Amesbury, MA

Recommended Soil Gradation & Compaction Specifications

Gravel Base Fill

(Select CRUSHED GRAVEL borrow)

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3 inch	100
3/4 inch	50-90
No. 4	30-70
No. 200	2-8

NOTES:

For minimum 6 inches below concrete floor level slab (heated)

For 12 inch base below exterior concrete slabs exposed to frost

Shall have less than 12% fines (No. 200 sieve) based on the Sand fraction

Structural Fill

(Gravelly SAND)

SIEVE SIZE	PERCENT PASSING BY WEIGHT
5 inch	100
3/4 inch	50-100
No. 4	20-80
No. 200	0-10

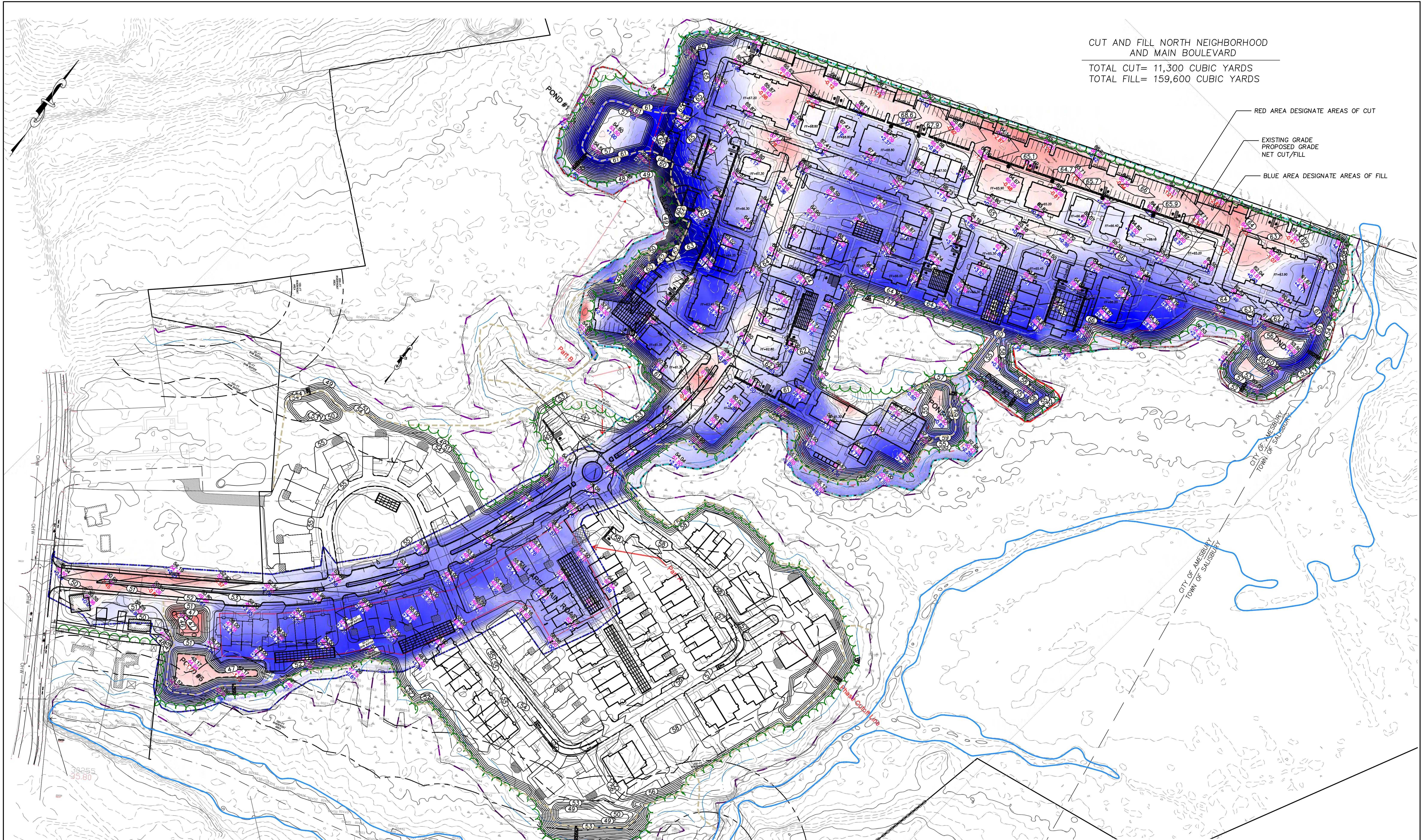
NOTES:

For use below building foundations for structural bearing support

For use behind unbalanced walls or retaining walls

A 3/4-inch crushed stone may be used for Structural Fill in wet conditions

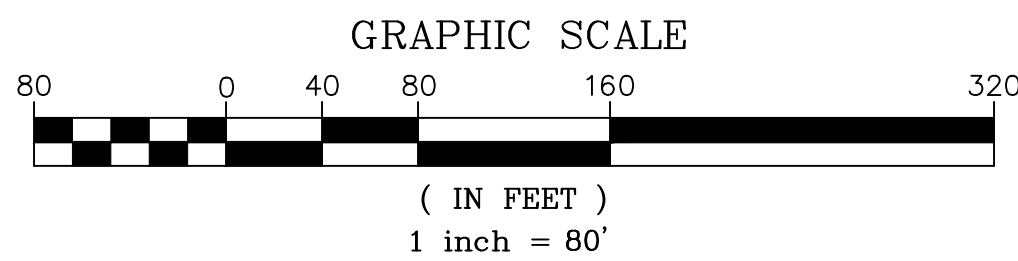
Structural Fill placed beneath the foundation should include the *Footing Zone of Influence* which is defined as that area extending laterally one foot from the edge of the footing then outward and downward at a 1H:1V splay. Structural Fill should be placed in loose lifts not exceeding 12 inches for heavy vibratory rollers and 8 inches for vibratory plate compactors. All the fill on the project should be compacted to at least 95 percent of maximum dry density as determined by the Modified Proctor Test (ASTM-D1557). The fill shall be compacted within ± 2 of the optimum moisture content. The adequacy of the compaction efforts should be verified by field density testing which is also a requirement of the *Massachusetts State Building Code*.



CUT AND FILL NORTH NEIGHBORHOOD
AND MAIN BOULEVARD
TOTAL CUT= 11,300 CUBIC YARDS
TOTAL FILL= 159,600 CUBIC YARDS

- RED AREA DESIGNATE AREAS OF CUT
- EXISTING GRADE
PROPOSED GRADE
NET CUT/FILL
- BLUE AREA DESIGNATE AREAS OF FILL

*CUT/FILL CALCULATIONS PROVIDED
BY FRANK DELUCIA & SONS



PREPARED FOR
DALE DEVELOPMENT, LLC
360 WASHINGTON STREET
RYE, NH 03870

NO.	DATE	DESCRIPTION	BY
2	3/34/26	PEER REVIEW UPDATE	S.B.S.
1	12/22/25	PLANNING BOARD UPDATE	J.T.M.

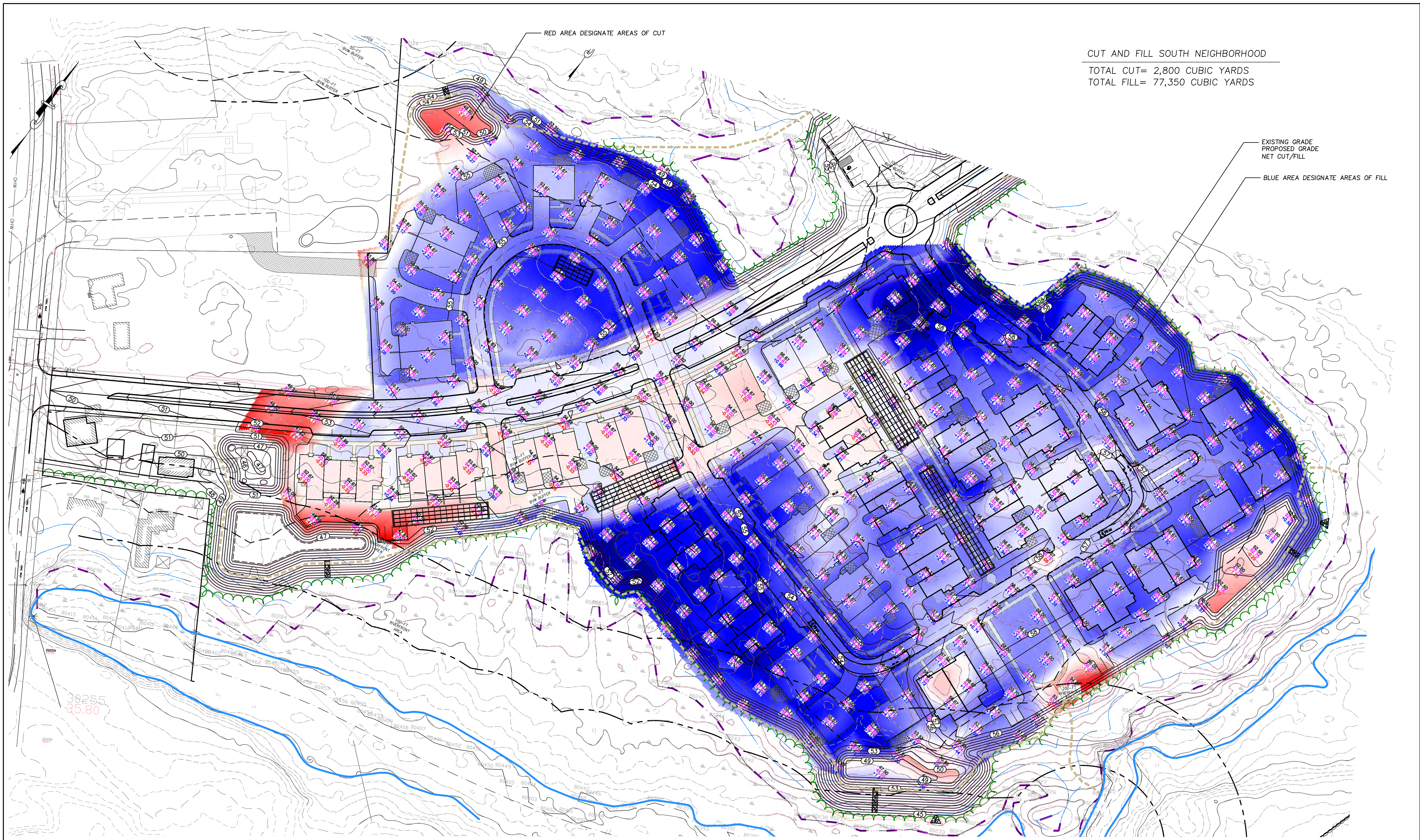


MILLENNIUM ENGINEERING, INC.
ENGINEERING AND LAND SURVEYING
62 ELM ST. SALISBURY, MA 01952 (978) 463-8980
13 HAMPTON RD. EXETER, NH 03833 (603) 778-0528

DATE: AUG. 11, 2025
CALC. BY: J.T.M.
CHKD. BY: S.B.S.
PROJECT: M244407

ROCKY HILL MBTA COMMUNITY
IN
AMESBURY, MA
AT
ELM STREET

**CUT & FILL
MAIN ROAD
&
NORTH**
FIGURE 1.1



*CUT/FILL CALCULATIONS PROVIDED
BY FRANK DELUCIA & SONS

GRAPHIC SCALE
50 0 50 100 200
(IN FEET)
1 inch = 50'

PREPARED FOR
DALE DEVELOPMENT, LLC
360 WASHINGTON STREET
RYE, NH 03870

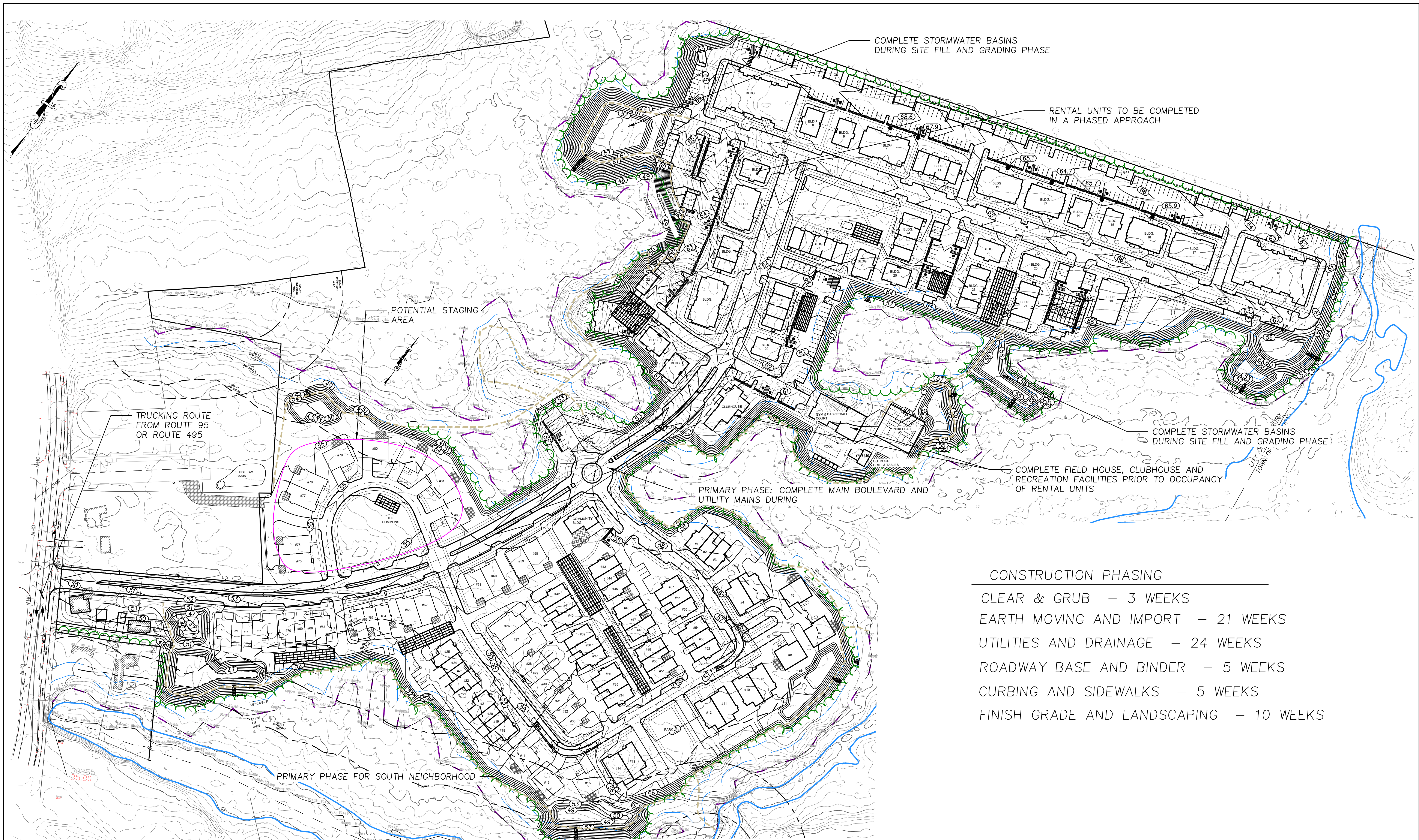
2	3/34/26	PEER REVIEW UPDATE	S.B.S.
1	12/22/25	PLANNING BOARD UPDATE	J.T.M.
NO.	DATE	DESCRIPTION	BY

MEI MILLENNIUM ENGINEERING, INC.
ENGINEERING AND LAND SURVEYING
62 ELM ST. SALISBURY, MA 01952 (978) 463-8980
13 HAMPTON RD. EXETER, NH 03833 (603) 778-0528

ROCKY HILL MBTA COMMUNITY
IN
AMESBURY, MA
AT
ELM STREET

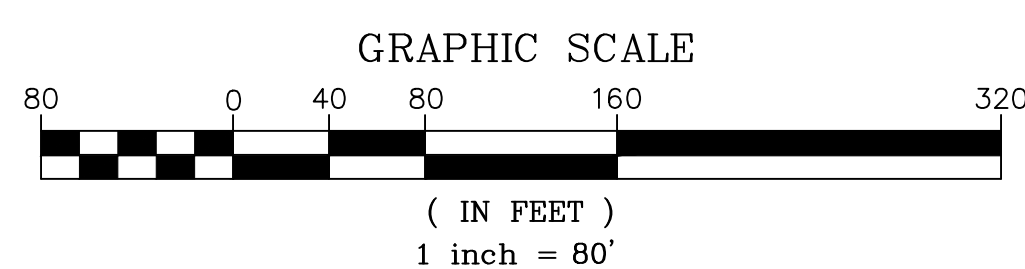
CUT & FILL
SOUTH

FIGURE 1.2



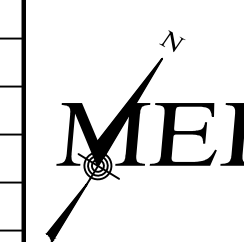
CONSTRUCTION PHASING

CLEAR & GRUB – 3 WEEKS
EARTH MOVING AND IMPORT – 21 WEEKS
UTILITIES AND DRAINAGE – 24 WEEKS
ROADWAY BASE AND BINDER – 5 WEEKS
CURBING AND SIDEWALKS – 5 WEEKS
FINISH GRADE AND LANDSCAPING – 10 WEEKS



PREPARED FOR

DALE DEVELOPMENT, LLC
360 WASHINGTON STREET
RYE, NH 03870



MILLENNIUM ENGINEERING, INC.
ENGINEERING AND LAND SURVEYING
62 ELM ST. SALISBURY, MA 01952 (978) 463-8980
13 HAMPTON RD. EXETER, NH 03833 (603) 778-0528

ROCKY HILL MBTA COMMUNITY
IN
AMESBURY, MA

AT
ELM STREET

**CONSTRUCTION
PHASING**

FIGURE 2.0

2	3/34/26	PEER REVIEW UPDATE	S.B.S.
1	12/22/25	PLANNING BOARD UPDATE	J.T.M.
NO.	DATE	DESCRIPTION	BY

DATE: AUG. 11, 2025	CALC. BY: J.T.M.	PROJECT: M244407
CHKD. BY: S.B.S.		