

Factor of Safety Calculations

DESIGN CRITERIA

- F_v = vertical component of active force
- F_h = horizontal component of active force
- F_a = total active exerted by soil on wall
- F_r = frictional resistance to sliding
- λ = unit weight of soil = 120lb/ft³
- α = angle of repose = 40°
- H = height of wall = 8 ft max
- K_a = Rankine coefficient = 0.2197
- W_f = weight of block per linear ft = 1616 lb/ft
- Y_r = resultant force location- $H(0.333)=2.67$

CALCULATIONS FOR SLIDING

Calculate sliding factor of safety

FS must be > 1.5

$W_f = 2054 \text{ lb/ft}$

4 Block Section- Tallest Wall- 8' H

$F_r = W_f + F_v \tan \alpha$

$= 2054 + 42.6$

$= 2097 \text{ lb/ft}$

$F_a = 0.5 \lambda KaH = 0.5(120) 0.22 (8)$

$F_h = F_a \cos \alpha = 80.9 \text{ lb/ft}$

$F_v = F_a \sin \alpha = 50.8 \text{ lb/ft}$

$F_a = 0.5 \lambda KaH = 105.6 \text{ lb/ft}$

Therefore $F.S. = F_r / F_h = 2097 / 80.9 = 25.9 > 1.5$

CALCULATIONS FOR OVERTURNING

Calculate factor of safety against Overturning

FS must be > 2.0

$W_f = 2054 \text{ lb/ft}$

4 Block Section

$F.S. = M_r / M_o$ where

M_r = Force Moment resisting Overturning

M_o = Force Moment driving/causing Overturning

$M_r = W_f [1 + (0.5)H \tan 90^\circ - B] + F_v [2 + (0.333)H \tan 90^\circ - B]$

$= 2054 [1 + 0.5(8)(0.017)] + 50.8 [2 + 0.333(8)(0.017)]$

$= 2194 + 104 = 2298$

$M_o = F_h Y_r = 80.9 \times 2.67 = 217$

Therefore $F.S. = M_r / M_o = 2298 / 217 = 10.6 > 2.0$

Wall Sections:

0+100 - 0+390 Bottom Wall

0+130 - 0+167.5 Top Wall

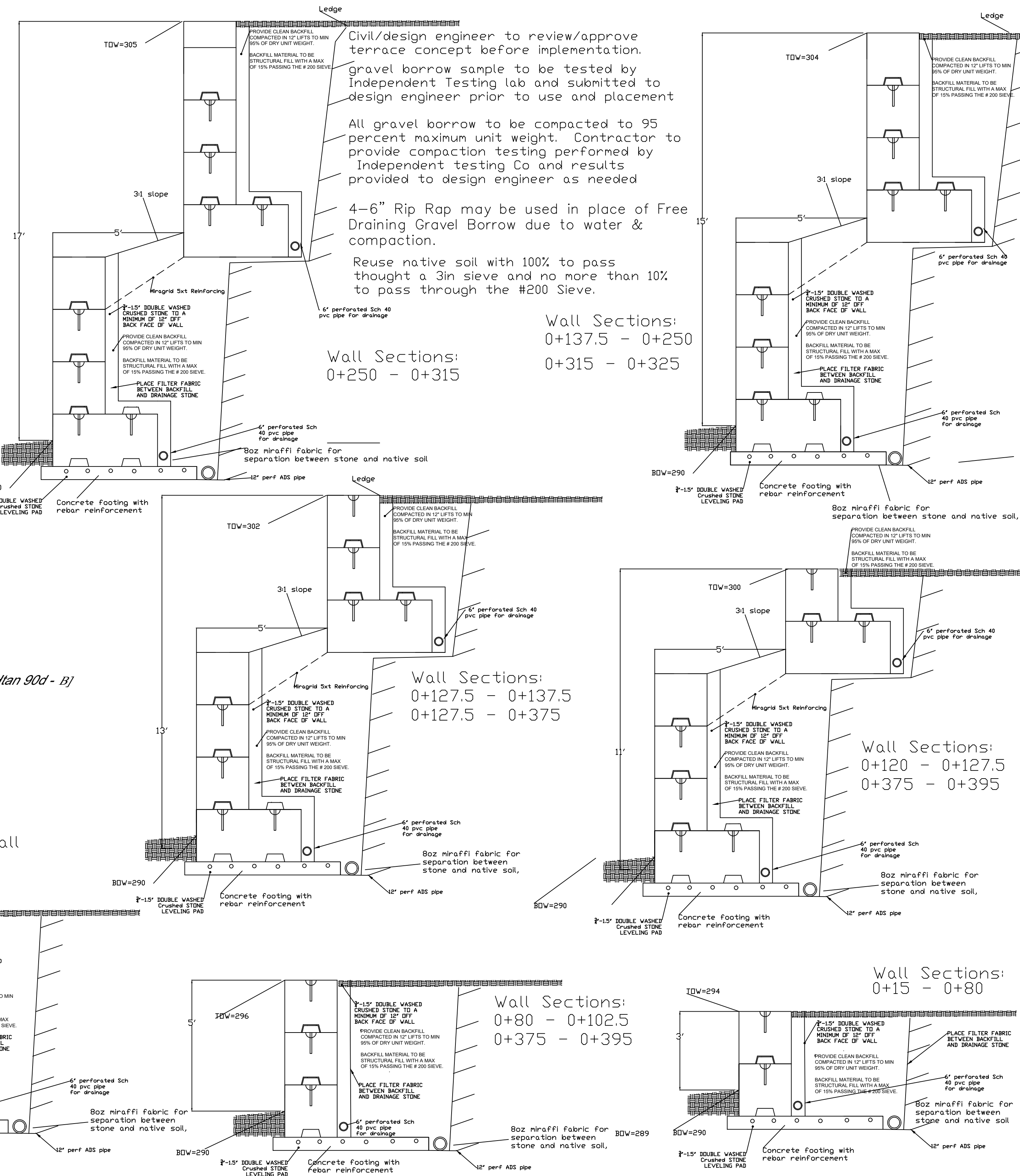
Civil/design engineer to review/approve terrace concept before implementation.

gravel borrow sample to be tested by Independent Testing lab and submitted to design engineer prior to use and placement

All gravel borrow to be compacted to 95 percent maximum unit weight. Contractor to provide compaction testing performed by Independent testing Co and results provided to design engineer as needed

4-6" Rip Rap may be used in place of Free Draining Gravel Borrow due to water & compaction.

Reuse native soil with 100% to pass thought a 3in sieve and no more than 10% to pass through the #200 Sieve.



Compatible with top of wall swale 4-6" rip rap. Remove porous concrete.

11/2/23	WALL DESIGN	MMS

APPLICANT:
Bob Baker
515 West Central Street
Franklin MA

OWNER:
Proposed Large Block Retaining Wall System

PROJECT TITLE:
Proposed Retaining Wall Cross Section/Profile

PLAN TITLE:
DATE: Nov 2, 2023

SCALE: NTS

DRAWN BY: MMS	CHECKED BY: MMS	APPROVED BY: MMS
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MARK SANTORA, P.E. INC.
Civil & Environmental Engineering
123 Old Westboro Road
North Grafton, MA 01536
Phone (508) 839-5113

SHEET:
1 OF 2

Factor of Safety Calculations

DESIGN CRITERIA

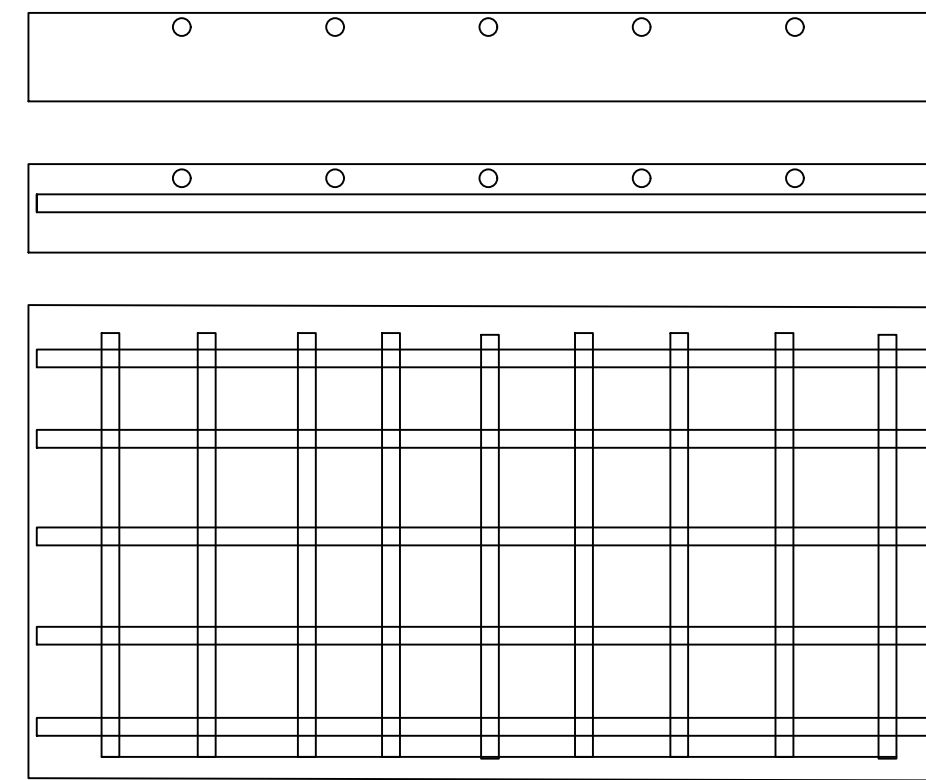
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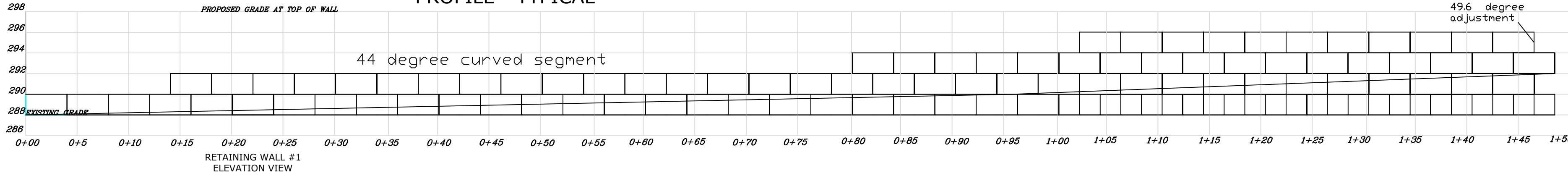
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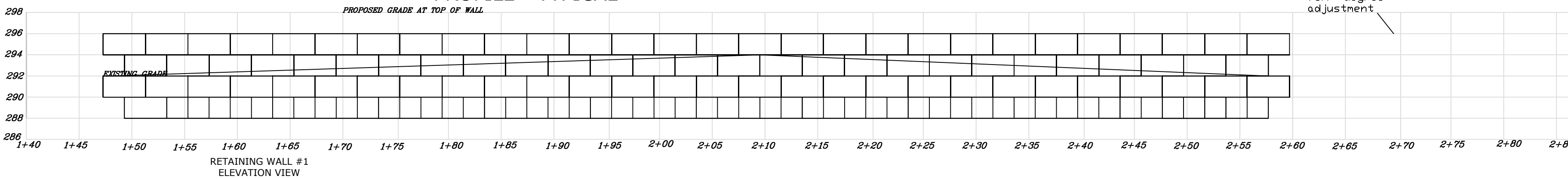


Rebar Reinforced Footing

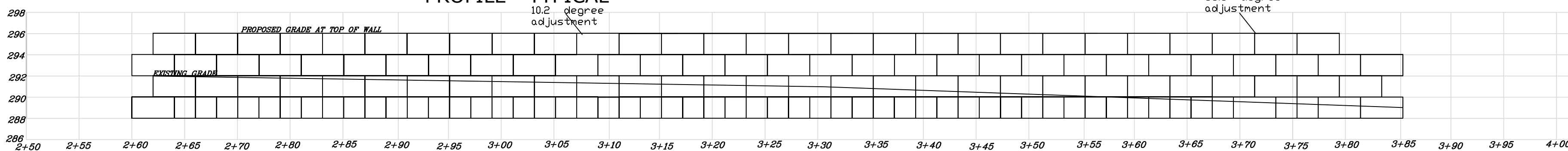
RETAINING WALL PROFILE - TYPICAL



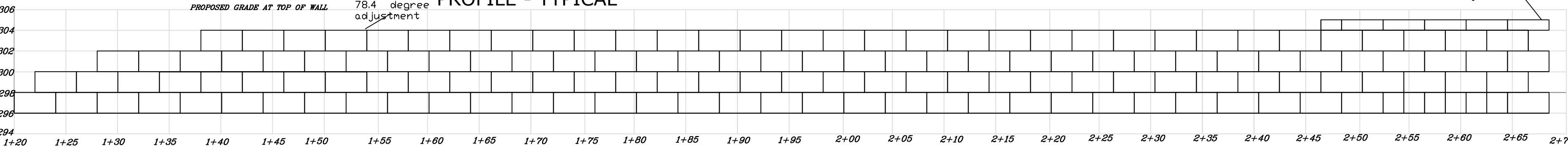
RETAINING WALL PROFILE - TYPICAL



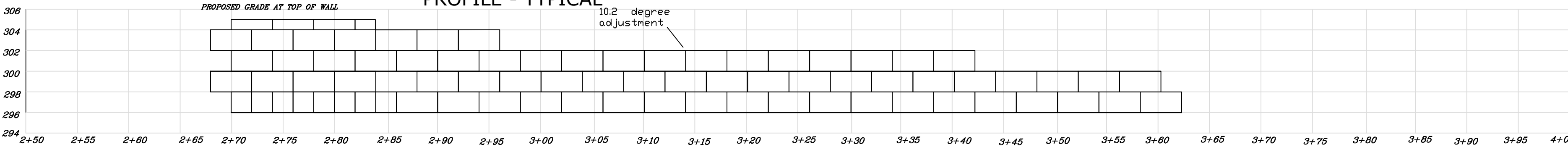
RETAINING WALL PROFILE - TYPICAL



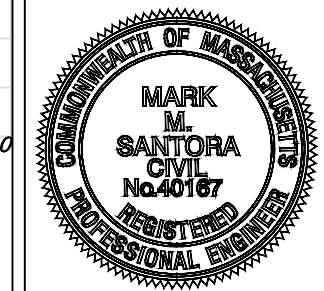
RETAINING UPPER WALL PROFILE - TYPICAL



RETAINING UPPER WALL PROFILE - TYPICAL



11/7/23	WALL DESIGN	MMS
DATE	REVISIONS	APPV'D



APPLICANT:
Bob Baker
 515 West Central Street
 Franklin MA

Owner:

PROJECT TITLE:
Proposed Large Block Retaining Wall System

PLAN TITLE:
Proposed Retaining Wall Cross Section/Profile

DATE: Sep 7, 2023

SCALE: NTS

DRAWN BY: MMS	CHECKED BY: MMS	APPROVED BY: MMS
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