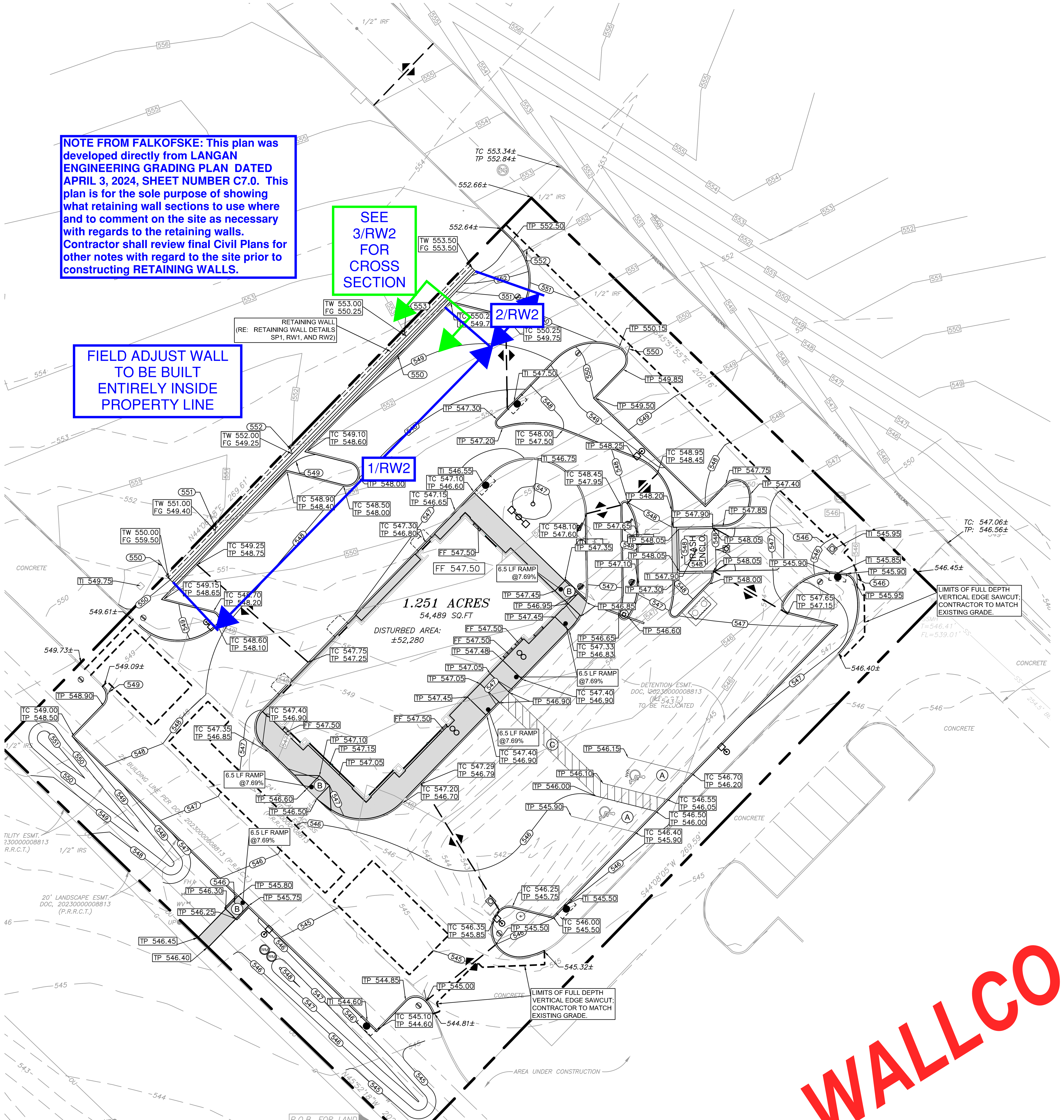

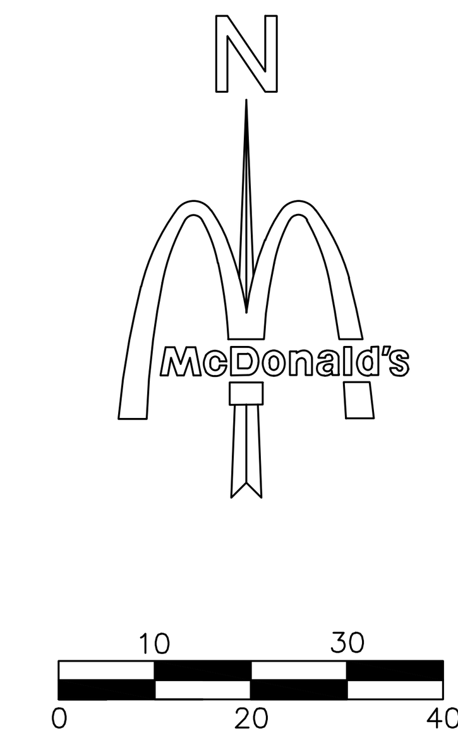

SCALE: 1" = 20'

WALLCO Retaining Walls, Inc.
AS-BUILTS

RECORD DRAWINGS

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DATE: 03-06-25 ENGINEER: Erik Garcia, P.E.

NO.	DATE	REVISION	BY
1	04-19-24	UPDATED CIVIL GRADING PLAN	BDB

	DATE	BY
DES.	02-23-24	BDB
DRN.	02-23-24	BDB
CHK.	02-23-24	EG

Falkofske Engineering, Inc.
Structural Engineering Consultants
Texas Registration F-4038
722 North Fielder Road
Arlington, Texas 76012
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FALKOFSKE ENGINEERING

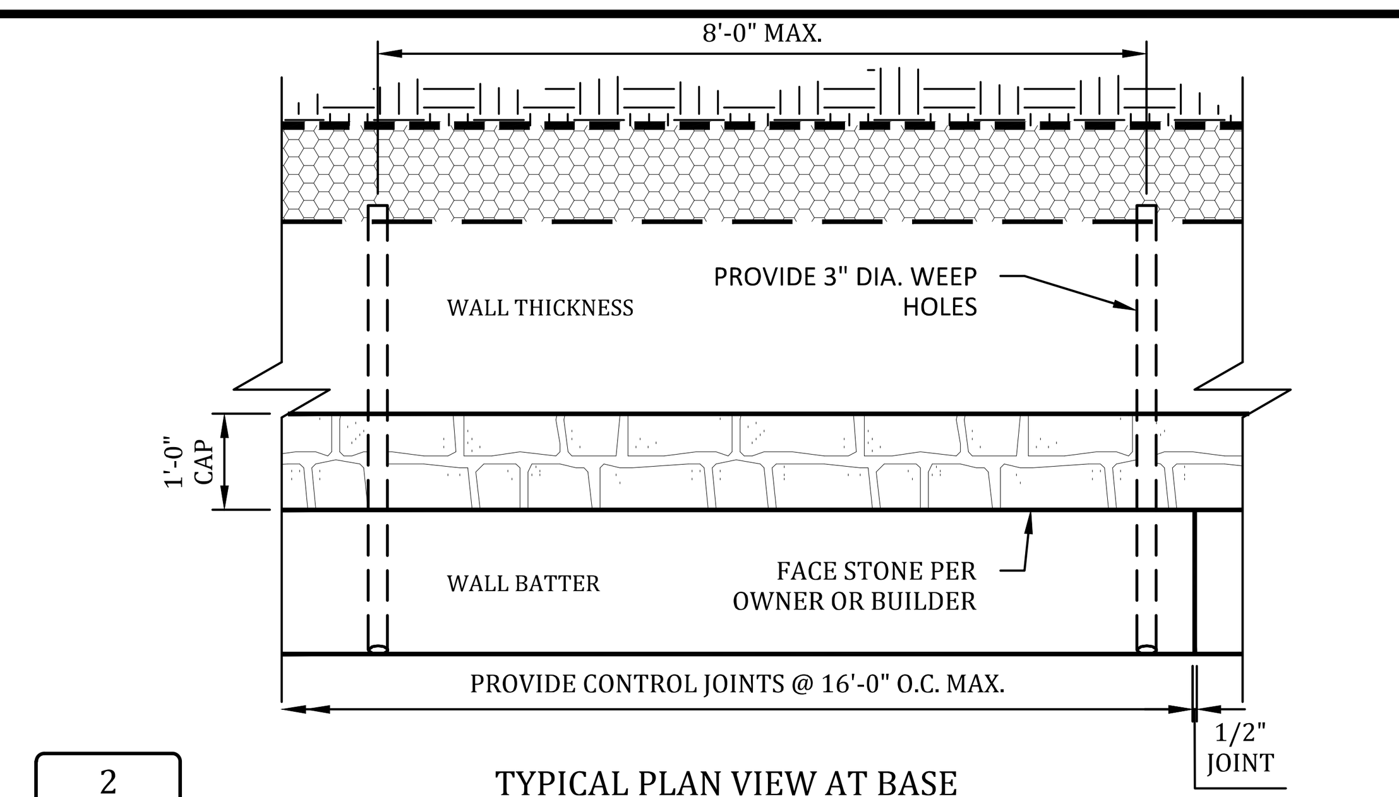
MASONRY RETAINING WALLS - SITE PLAN
MCDONALDS - ROCKWALL
SEC OF S.H. 205 AND F.M. 549
ROCKWALL, TEXAS

LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES
8951 CYPRESS WATERS BLVD, SUITE 150
DALLAS, TX 75019

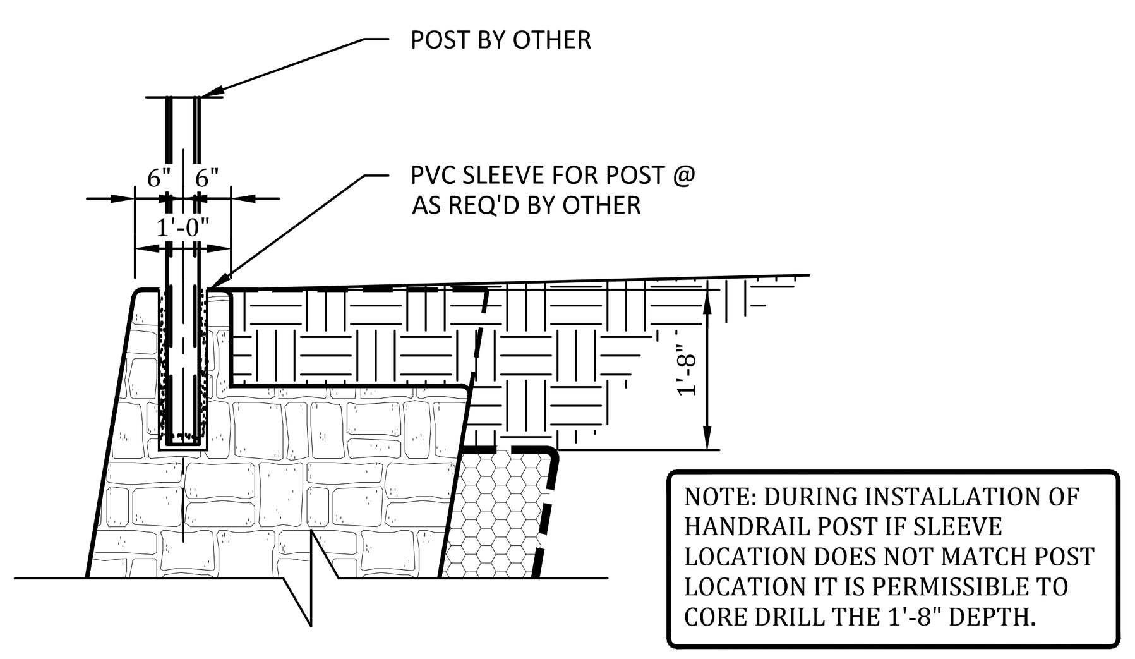
STATE OF TEXAS
ERIK GARCIA
147076
LICENSED PROFESSIONAL ENGINEER
04-19-2024

JOB NO. 184.24

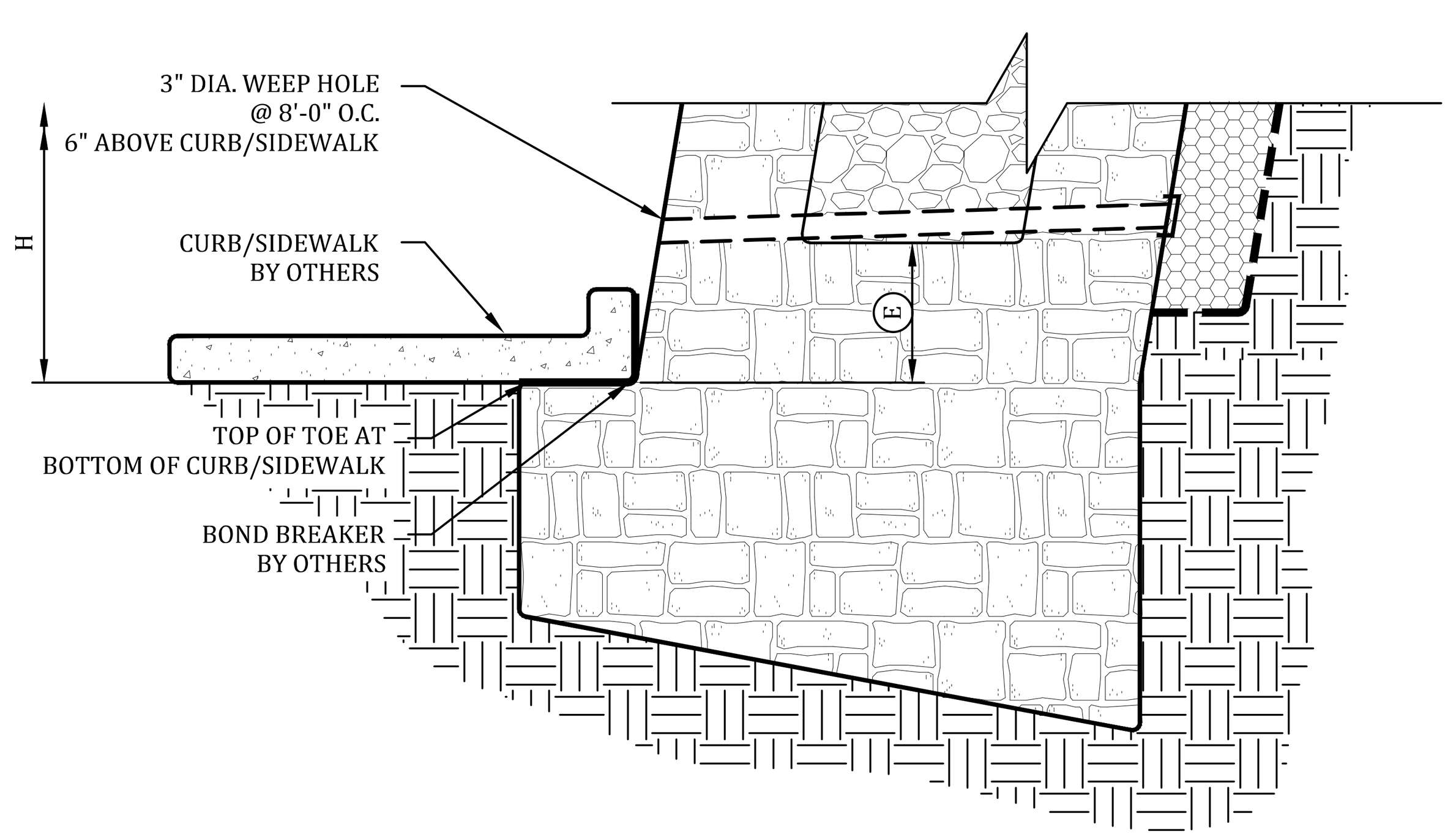
SP1



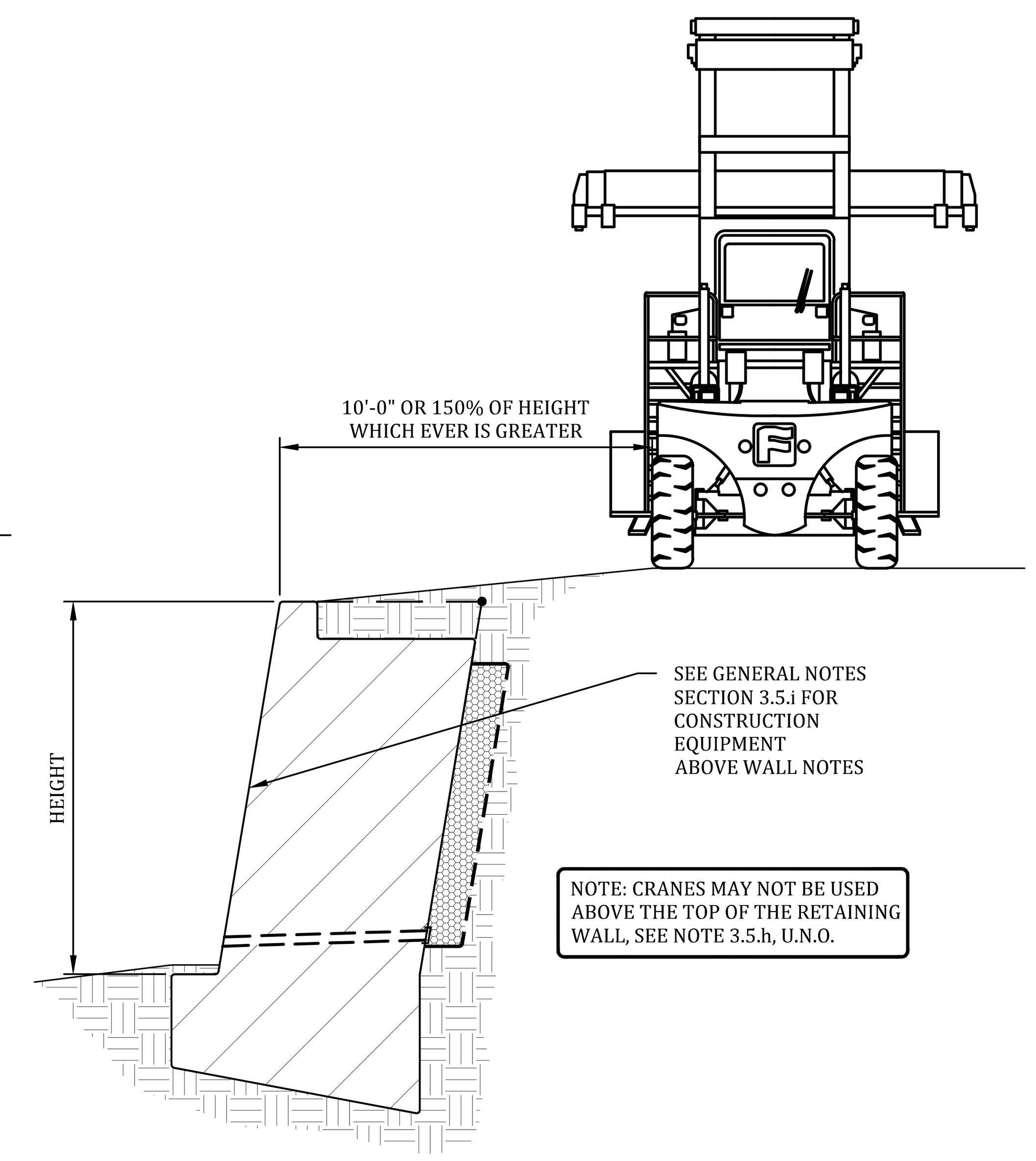
2 RW1 TYPICAL PLAN VIEW AT BASE N.T.S.



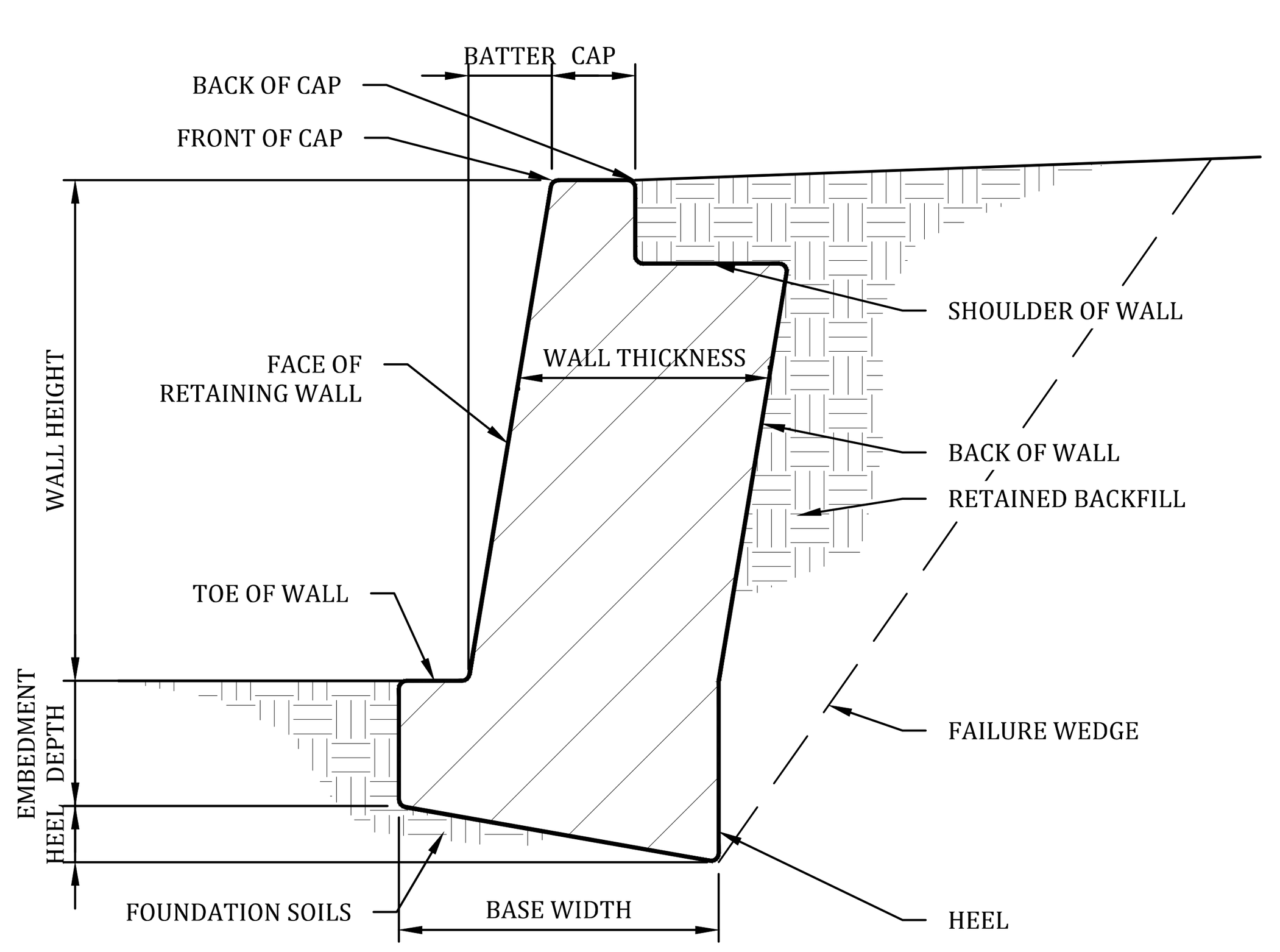
1 RW1 WALL SECTION W/ HANDRAIL POST CONTRACTOR OPTION N.T.S.



4 RW1 CROSS SECTION OF WALL WITH CURB/SIDEWALK AT BASE OF WALL N.T.S.



3 RW1 CONSTRUCTION EQUIPMENT ABOVE WALL - MINIMUM DISTANCE N.T.S.



LEGEND

GENERAL NOTES

1. Design

1.1. Design Codes

International Building Code, 2021 Edition

1.2. Geotechnical Report

Firm: Alpha Testing, Inc.
Report No. G232310 Dated: SEPTEMBER 11, 2023
Allowable Bearing Capacity 1500 psf

1.3. Design Parameters

Soil Parameters:

Soil Type*	Friction Angle	Cohesion (psf)	Unit Weight (pcf)
Retained Backfill (On site clay)	26 deg	0 psf	120 pcf
Foundation Soils (1500 psf)	26 deg	0 psf	120 pcf

*See materials below for a description of each Soil Type.

Factors of Safety:

External Stability

a.	Minimum Factor of Safety Against Base Sliding (Static Condition)	1.5
b.	Minimum Factor of Safety Against Overturning	2.0
c.	Minimum Factor of Safety Against Global Stability	1.5
d.	Minimum Factor of Safety for Bearing Capacity	3.0

Design Loading:

Lateral earth pressures are calculated using Coulombs Lateral Earth Pressure Theory. Designs have been performed to accept loading per the proposed loading conditions based on the Civil Grading Plans. A live loading of 250 psf has been used for all walls supporting areas subject to firelane loading.

Retaining walls should not have solid fence (such as wood fence) placed on top of wall other than that shown on these plans. Retaining walls shall not have additional surcharge placed above wall other than that shown on these plans. Retaining walls shall not have slope at base or top of wall that exceed that which is shown on these plans. The retaining walls noted above require special design.

2. Materials

2.1. Soil Types

2.1.a. Retained Backfill
- 2.1.a.a. On site clayey soils
- 2.1.a.b. Properly compacted on-site fill soils, verification by others.

2.1.b. Foundation Soils (Allowable Bearing = 1500 psf min.)
- 2.1.b.a. Bearing on Stiff Natural Undisturbed Clayey or Sandy Soils or Compacted and Tested Fill Soils.
- 2.1.b.b. Friction Angle between Base of Wall and Soil - 17°
- 2.1.b.c. Bearing in fill soils. Fill soils supporting the retaining walls have to be placed in accordance with the recommendations for the fill placement per the geotechnical report.

2.1.c. Drainage Material
- 2.1.c.a. Free draining granular backfill, clean, non-plastic, relatively well-graded.

2.2. Dimension Stone

2.2.a. Average Density of masonry wall varies from 135 pcf to 145 pcf.
2.2.b. Stone size varies from 4" to 18".
2.2.c. Face stone shall be coordinated between contractor and owner/developer.
2.2.d. Recycled concrete 4" to 18" may be used in place of dimension stone, contractors option. The recycled concrete shall be free of dirt and concrete dust such that mortar can bond the material together. It shall also be mostly free of rebar. Some rebar is acceptable as long as it does not prevent the material from being placed tightly together.

2.3. Rebar/Welded Wire Fabric (If Required)

2.3.a. All steel reinforcement shall be new billet steel conforming to ASTM a-615, Grade 60 with f_y = 60 ksi.
2.3.b. All reinforcement shall not have deleterious material on it.
2.3.c. All welded wire fabric shall have a minimum of f_y=65 ksi and be hot dip galvanized.

2.4. Drainage Materials

2.4.a. Weep pipes shall be PVC or corrugated HDPE pipe.
2.4.b. Drainage zone shall be separated from retained backfill by mirafi 140N filter fabric or approved equal.

2.5. Portland Cement Mortar for Retaining Wall Construction

The Portland cement used for construction of the masonry stone retaining walls shall be provided with the following proportions per cubic yard of concrete. The Portland Cement mortar supplier shall provide "batch tickets" clearly indicating the appropriate amount of materials are provided in each truck load. The batch tickets shall clearly indicate the amount batched, the date, the project name and shall be provided to Falkofske Engineering, Inc. for review, documentation, and file.

Contents	Amount per cubic yard	Specific Gravity	Volume (ft^3)
Type 1 Portland Cement:	451 lbs	3.15	2.29
Type F Fly Ash:	113 lbs	2.93	0.62
Fine Aggregate (sand):	2746 lbs	2.59	16.99
Potable Water:	367 lbs	44 Gallons	5.88
Sika Air (or equivalent):	(AS REQ'D) oz	4.5%	1.22
			27.0 Total

2.6. Portland Cement Mortar for Retaining Wall Construction (Hand Mixing)

It is acceptable to hand mix mortar on site. The hand mixed mortar shall be in accordance with TMS 402/602-16 Building Code Requirements and Specification for Masonry Structures on SC-1 Part 2.1. This is a proportion specification by volume, and is as follows:

1-part Portland Cement
$\frac{1}{4}$ to $\frac{1}{2}$ part lime (optional)
2-1/4 to 3 parts the sum of the separate volumes of cementitious materials - aggregate ratio measured in damp, loose conditions.

For instance, 1 cu. ft. of Portland Cement, $\frac{1}{2}$ cu. ft. of lime and (1.5 x 3) 4.5 cu. ft. of sand could be used to make Type S mortar. Falkofske Engineering, Inc. would recommend that boxes be built for sand so that the proportions can be easily controlled. For instance, a box made with 2 x 6 boards with an interior square dimension of 1'-5.5" would create a box of 1 cu. ft.

If the contractor does not want to use lime, the ratio would be 1-part Portland Cement to 3-parts sand.

3. Construction

3.1. Preparation Work

3.1.a. Prior to grading or excavation of the site, confirm the location of the retaining walls and all underground features, including utility location within the area of construction. Ensure surrounding structures are protected from effects of wall excavation, and construction.
3.1.b. Coordinate installation of underground utilities and other improvements with wall installation.

3.2. Excavation

3.2.a. If a mortared footing is over-excavated, then the dimension stone shall be placed mortared. If a dry stone footing is over excavated, then the dimension stone does not need to be mortared.
3.2.b. Fill over-excavated area in front of the wall footing with compacted on site soils before the wall construction exceeds 4 feet in height.
3.2.c. In area where the walls are installed in a cut, the required excavation shall extend horizontally to the extent of the width of the retaining wall. The wall may be built to the cut. If the wall is over cut, then soil shall either be compacted or the drainage zone may be widened.

3.3. Wall Construction

3.3.a. The wall shall be constructed to the dimensions as shown on these plans. Front leads, back leads, and string lines shall be set for each wall. Care shall be taken to install the mortar zones to the correct thickness, and to place drainage behind the wall as required.
3.3.b. Face of wall control joints shall be installed at a maximum of 16'-0" o.c. per these plans.
3.3.c. Weep pipes shall be placed at 8'-0" o.c. max.
3.3.d. Face rock type shall be coordinated between the architect, owner, and retaining wall contractor.
3.3.e. Top of the footing shall be left rough so that the stem of the wall has a good interface to mortar to. The top of the footing shall not be a full bed of mortar that is allowed to cure prior to constructing the stem of the wall.
3.3.f. It is intended that the wall mass (stem of wall) and the mortared zones be constructed concurrently and with the same dimension stone material, such that the mass of the wall will act as a single unit.

3.4. Retained Backfill Placement

3.4.a. Retained backfill shall be placed per the recommendations of the geotechnical engineer, but should not be less than 93% Standard Proctor Maximum Dry Density (ASTM D698).
3.4.b. Fill should be placed in maximum 8" thick compacted lifts.
3.4.c. Large compaction equipment (equipment heavier than 7,500 lb) shall remain a minimum of 1.5x the height of the wall away from the back of the wall for a period of 2 weeks from the time of construction.
3.4.d. After a period of 2 weeks from the time of construction large compaction equipment may be used behind the wall but shall stay a minimum of 10'-0" away from the back of the wall.
3.4.e. Soil placed with in 10'-0" of the back of the wall shall be placed using handheld compaction equipment.
3.4.f. If the wall is in a cut situation the wall may be built up to the cut. If the wall is overcut the drainage zone may be widened to the cut or compacted fill may be placed between the drainage zone and the cut.

3.5. Retaining Wall Performance, Maintenance and Other Comments

3.5.a. Control Joints are provided in the retaining wall to allow for minor movements due to settlement and shrink swell of the soils. Some cracking may occur in the face of the retaining wall. This cracking, if minor (less than 3/8"), may be cosmetically repaired as desired.
3.5.b. The retaining walls are designed to allow surface water to flow over the tops of the retaining walls. Care should be taken during and after construction to not allow water to pond behind the retaining walls, as this can have a negative impact on the stability of the retaining walls. Retaining walls are often constructed early in the site development phase. Water maintenance above the top of them is the general contractors responsibility prior to the site being finished. If necessary temporary swales, replacement of eroded soils, and other water maintenance items may be necessary to protect the retaining walls.
3.5.c. If downspouts are located near the back of the retaining wall they should either be plumbed through the retaining wall to drain below the wall or collected and tied into the storm sewer system. Perforated subsurface pipes shall not be used behind the retaining walls.
3.5.d. Positive drainage (sheet flow) over the top of the walls shall be maintained throughout the life of the structure. If swales are placed behind the wall they shall remain clean and free draining. If water is found to be ponding in the swale it shall be maintained to allow water to freely drain as soon as possible.
3.5.e. Any broken sprinklers behind the retaining wall shall be turned off and repaired as soon as possible.
3.5.f. Over time erosion below or above the retaining wall can occur. Eroded soils shall be replaced and maintained to protect and extend the life of the retaining walls.
3.5.g. Weep holes shall be maintained to be able to freely drain throughout the life of the retaining wall.
3.5.h. Cranes shall not be used above the retaining wall without approval from our office. Cranes apply very large loads to the retaining walls and require special design considerations.
3.5.i. Construction equipment used above retaining walls after they are finished can damaged the walls. Care shall be taken to protect the walls during site development. Below is a list of some considerations that should be made to protect the walls.
- 3.5.i.a. Examples of construction equipment that have been shown to cause damage include skytraks, telehandlers, concrete trucks, skid steers, excavators, and others.
- 3.5.i.b. Walls shall be a minimum of 2 weeks old prior to equipment use above wall.
- 3.5.i.c. Equipment shall not be used on wet/saturated soils above the wall where rutting occurs. This condition increases the likelihood of damage to the retaining walls.
- 3.5.i.d. Equipment maybe used when it is at least 10'-0" from the front of cap of walls or 150% of the wall height which ever is greater.
- 3.5.i.e. If equipment needs to be used closer than stated in item 3.5.i.d, our office shall be contacted to verify the wall can support the weight of the construction equipment. The construction equipment type and weights will need to be provided. Additionally, mats or plywood will need to be provided to protect the backfill and wall.

3.6. Cold Weather Construction of Retaining Walls

3.6.a. Construction Requirements for ambient air temperatures between 40°F and 32°:

- 3.6.a.a. Water and aggregates used in mortar shall not be heated above 140°F.
- 3.6.a.b. Mortar sand or mixing water shall be heated to produce mortar temperatures between 40°F and 120°F at the time of mixing.
- 3.6.a.c. Heat grout materials when the temperature of the materials is below 32°F.
- 3.6.a.d. Newly constructed masonry shall be completely covered with weather-resistive membrane for 24 hours after being completed.

3.6.b. Construction Requirements for ambient air temperatures between 32°F and 25°F:

- 3.6.b.a. The guidelines above for construction requirements for temperatures between 40°F and 32°F and the following shall be met.
- 3.6.b.b. The mortar temperature shall be maintained above freezing until used in masonry stone retaining wall.
- 3.6.b.c. Visible ice and snow shall be removed from the top surface of existing foundations and masonry to receive new construction. These surfaces shall be heated to above freezing, using methods that do not result in damage.

3.6.c. Construction Requirements for ambient air temperatures between 25°F and 20°F:

- 3.6.c.a. The guidelines above for construction requirements for temperatures between 40°F and 32°F, the construction guidelines for temperatures between 32°F and 25°F , and the following shall be met.
- 3.6.c.b. Masonry (raw stone) surfaces under construction shall be heated to 40°F.
- 3.6.c.c. Wind breaks or enclosures shall be provided when the wind velocity exceeds 15 miles per hour.
- 3.6.c.d. Newly constructed masonry shall be completely covered with weather-resistive insulating blankets, or equal protection, for 48 hours after being completed.

The above procedures are in compliance with The Masonry Society TMS 602 specifications for cold weather construction of masonry structures.

3.7. Hot Weather Construction of Retaining Walls

3.7.a. Above 100°F or above 90°F with a wind velocity greater than 8 mph:

3.7.a.a. Preparation (Hand Mixing or at Batch Plant)
- 3.7.a.a.a. Maintain sand piles in a damp loose condition.
- 3.7.a.a.b. Provide necessary conditions and equipment to produce mortar having a temperature below 120°F.

3.7.a.b. Construction
- 3.7.a.b.a. Maintain temperature of mortar below 120°F.
- 3.7.a.b.b. Maintain mortar consistency by re-tempering with cool water.
- 3.7.a.b.c. When hand mixing mortar use mortar within 2 hours of initial mixing.
- 3.7.a.b.d. When batch mixing and using retarder, mortar on site that is not in use, shall be covered with plastic sheeting to prevent moisture lost.

3.7.b. Above 115°F or above 105°F with a wind velocity greater than 8 mph:

3.7.b.a. Preparation (Hand Mixing or at Batch Plant)
- 3.7.b.a.a. Items noted above under section 3.7.a.a. shall be met in addition to the requirements below.
- 3.7.b.a.b. Shade materials and mixing equipment from direct sunlight.

3.7.b.b. Construction
- 3.7.b.b.a. Items noted above under section 3.7.a.b. shall be met in addition to the requirements below.
- 3.7.b.b.b. When hand mixing mortar cool mixing water shall be used. Ice may be added to the water, but complete melting must take place before mixing with other materials.

4. Construction Observations

4.1. Construction Observations by Falkofske Engineering, Inc.

4.1.a. Falkofske Engineering, Inc. will perform construction observation, but only as a means of verification of the contractors quality control performance.
4.1.b. Falkofske Engineering, Inc. will act as the Special Inspector for this project. Contractor shall contact Falkofske Engineering to set up inspections, at least 1 day before construction starts
4.1.c. All required materials testing shall be performed by an approved materials testing laboratory.
4.1.d. Falkofske Engineering, Inc. is not responsible for means, methods, and material furnished by the retaining wall contractor.

4.2. Construction Observations by Others

4.2.a. Construction observations are required by the city shall be coordinated by the contractor.

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8951 CYPRESS WATERS BLVD, SUITE 150
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STATE OF TEXAS
ERIK GARCIA
147076
LICENSED PROFESSIONAL ENGINEER
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JOB NO. 184.24

RW1

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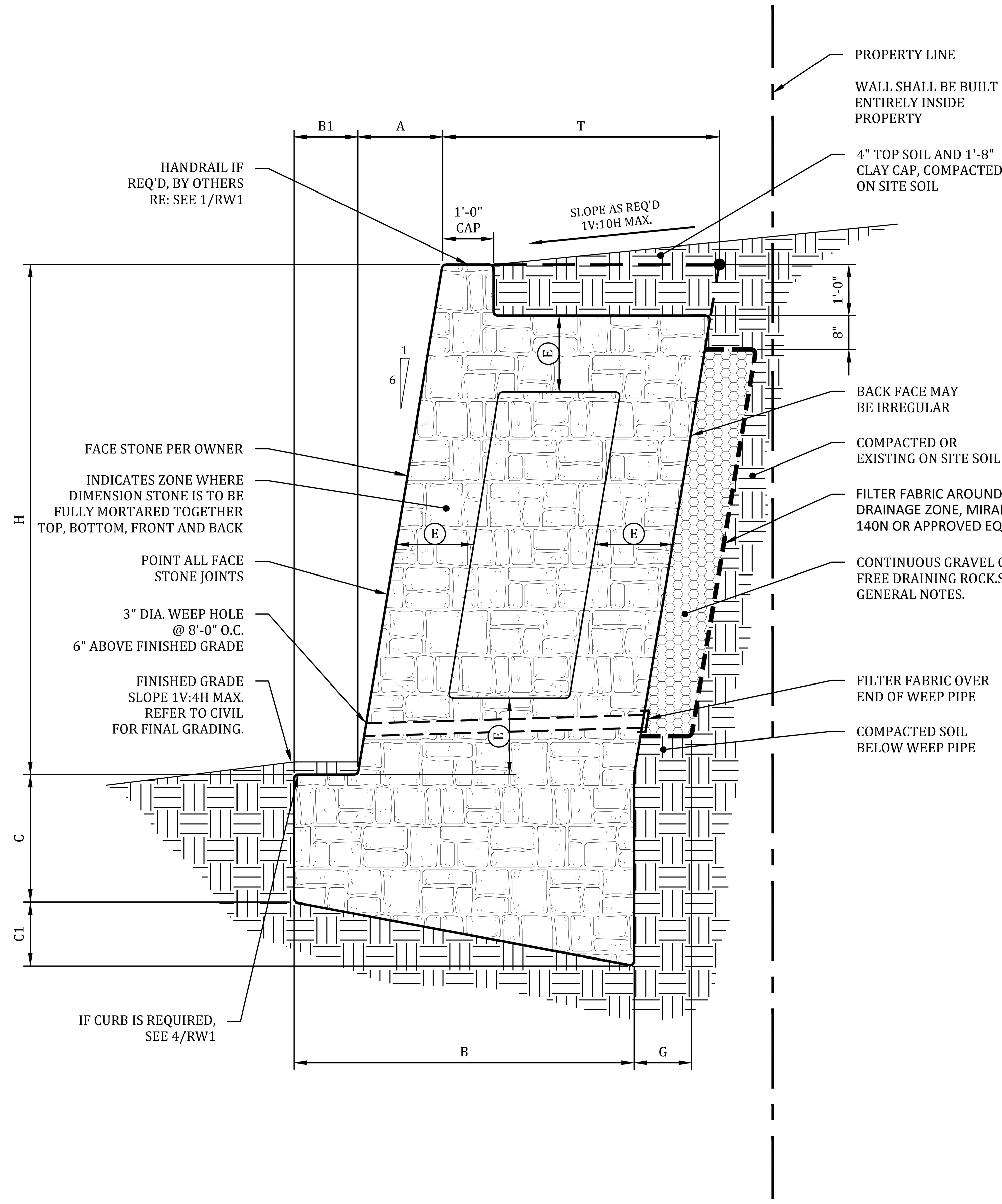
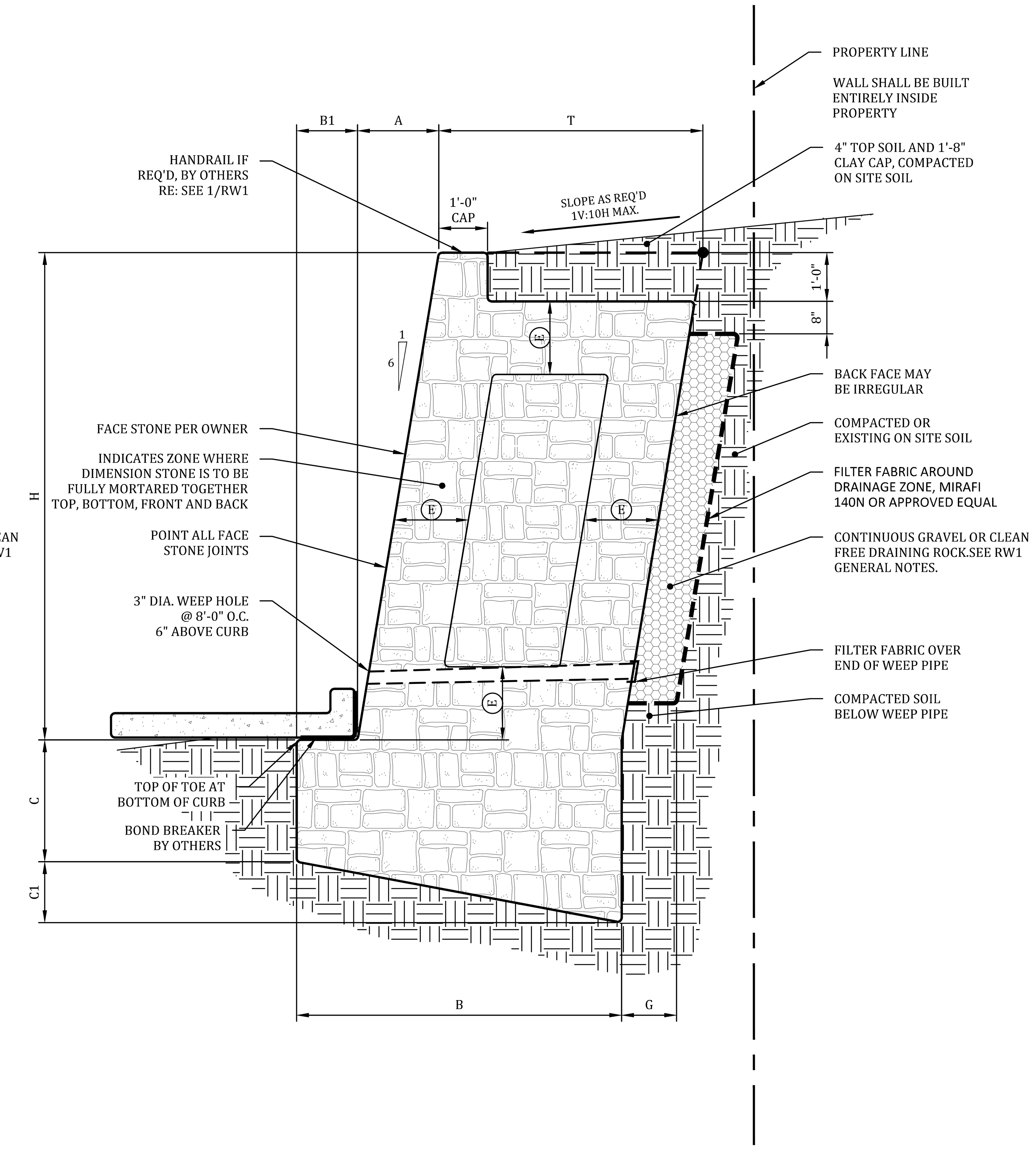




MASONRY WALL SCHEDULE 1500 PSF - BEARING CAPACITY (STIFF NATURAL UNDISTURBED SOILS OR COMPACTED AND TESTED SOILS, SEE GENERAL NOTES SHEET RW1)									
WALL HEIGHT H	BASE WIDTH B	WALL TOE B1	BASE DEPTH (TOE) C	BASE DEPTH (HEEL) C1	WALL BATTER A	FULLY MORTARED ZONE E	WALL THICKNESS T	DRAINAGE ZONE THICKNESS G	BEARING CAPACITY
1'-0"	1'-2"	0'-2"	1'-0"	0'-3"	0'-2"	FULLY MORTARED	1'-0"	1'-0"	1500 psf
2'-0"	1'-2"	0'-2"	1'-0"	0'-3"	0'-4"	FULLY MORTARED	1'-0"	1'-0"	
3'-0"	1'-8"	0'-3"	1'-0"	0'-4"	0'-6"	FULLY MORTARED	1'-5"	1'-0"	
4'-0"	2'-5"	0'-4"	1'-0"	0'-5"	0'-8"	FULLY MORTARED	2'-1"	1'-0"	
5'-0"	3'-0"	0'-5"	1'-3"	0'-6"	0'-10"	FULLY MORTARED	2'-7"	1'-0"	

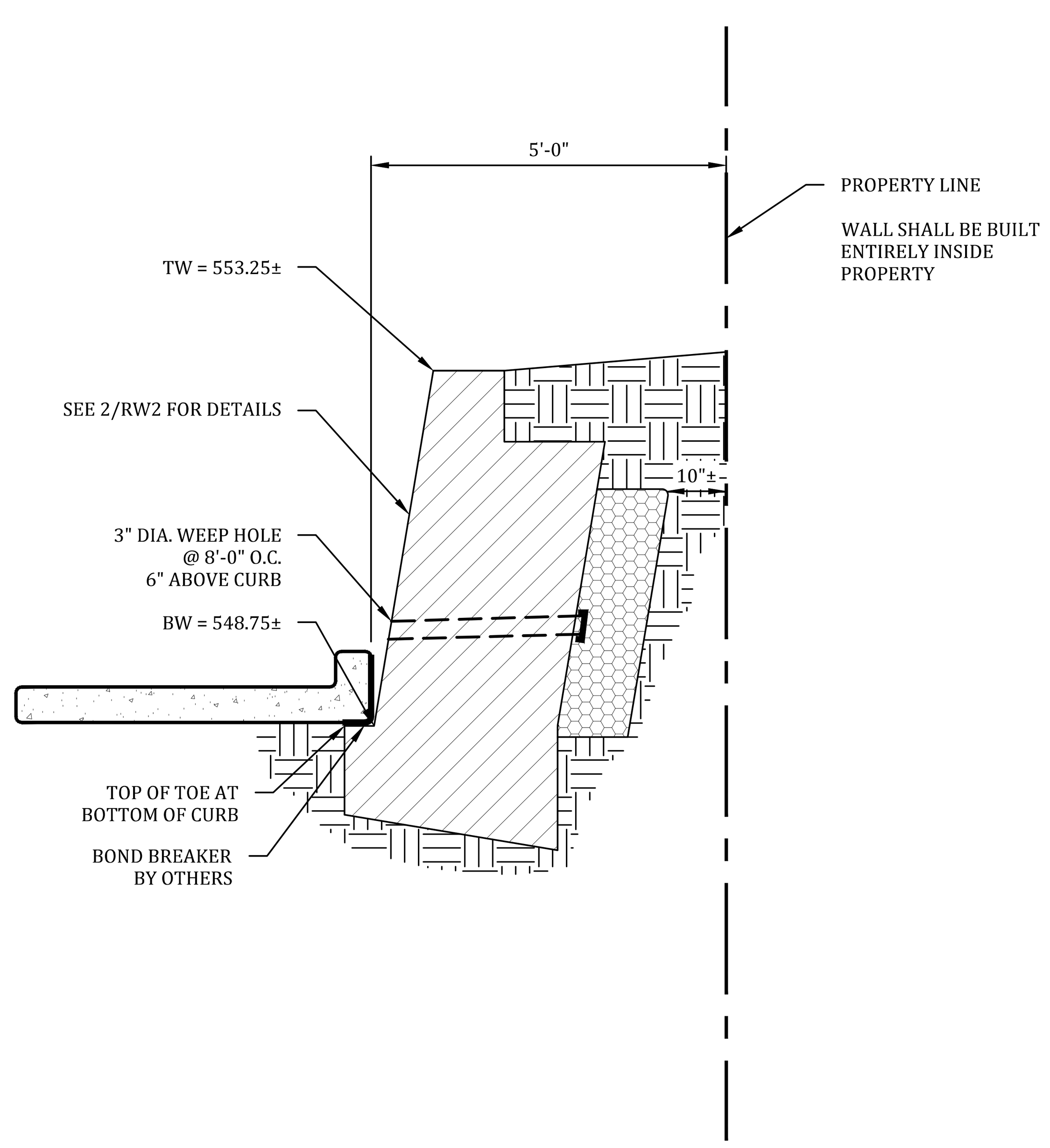
WALL DESIGN CRITERIA							
BEARING Q_a	TOP SLOPE β	BOTTOM SLOPE β_1	ACTIVE PRESSURE φ_a	PASSIVE PRESSURE φ_p	BASE FRICTION ANGLE δ	BACK OF WALL SLOPE α	SURCHARGE q
1500 psf	5.71°	14°	26°	26°	17°	99.46°	0 psf

USE THIS SCHEDULE FOR 2/RW2

MASONRY WALL SCHEDULE 1500 PSF - BEARING CAPACITY (STIFF NATURAL UNDISTURBED SOILS OR COMPACTED AND TESTED SOILS, SEE GENERAL NOTES SHEET RW1)									
WALL HEIGHT H	BASE WIDTH B	WALL TOE B1	BASE DEPTH (TOE) C	BASE DEPTH (HEEL) C1	WALL BATTER A	FULLY MORTARED ZONE E	WALL THICKNESS T	DRAINAGE ZONE THICKNESS G	BEARING CAPACITY
1'-0"	1'-2"	0'-2"	1'-0"	0'-3"	0'-2"	FULLY MORTARED	1'-0"	1'-0"	1500 psf
2'-0"	1'-2"	0'-2"	1'-0"	0'-3"	0'-4"	FULLY MORTARED	1'-0"	1'-0"	
3'-0"	1'-7"	0'-3"	1'-0"	0'-4"	0'-6"	FULLY MORTARED	1'-4"	1'-0"	
4'-0"	2'-3"	0'-4"	1'-0"	0'-5"	0'-8"	FULLY MORTARED	1'-11"	1'-0"	
5'-0"	2'-9"	0'-5"	1'-3"	0'-6"	0'-10"	FULLY MORTARED	2'-4"	1'-0"	

WALL DESIGN CRITERIA							
BEARING Q_a	TOP SLOPE β	BOTTOM SLOPE β_1	ACTIVE PRESSURE φ_a	PASSIVE PRESSURE φ_p	BASE FRICTION ANGLE δ	BACK OF WALL SLOPE α	SURCHARGE q
1500 psf	5.71°	7.13°	26°	26°	17°	99.46°	0 psf

USE THIS SCHEDULE FOR 1/RW2



3 / RW2 CROSS SECTION ½" = 1'=0"

2 / RW2 TYPICAL WALL SECTION - BEARING IN CLAYEY OR SANDY SOILS
1V:10H MAX SLOPE ABOVE WALL
1V:4H MAX SLOPE BELOW WALL
N.T.S.

1 / RW2 TYPICAL WALL SECTION - BEARING IN CLAYEY OR SANDY SOILS
1V:10H MAX SLOPE ABOVE WALL
1V:8H MAX SLOPE BELOW WALL
N.T.S.

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