

PROPOSED
LOCK+LOAD RETAINING WALL
2119 NW KILLARNEY LANE
LEE'S SUMMIT, MISSOURI 64081



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STATE OF MISSOURI

Matthew T. Jensen
MO No. PE-2022031142

GROUND

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Approved By: CBH
Horiz. Scale:
Vert. Scale:

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L+L RETAINING WALL
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Lee's Summit, Missouri 64081

COVER SHEET

1. General

- 1.1 The design presented herein is based on a PDF of the Construction Stake Plot Plan prepared by Henley Survey Co. provided on August 23, 2022 and Apxe Engineers, Inc. report dated September 20, 2021. Geotechnical information was not available at the time of this design. The Geotechnical Engineer should review the soil parameters used and provided alternate values, if applicable.
- 1.2 The design presented herein is prepared exclusively for Raintree Landscaping LLC and may only be used by Raintree Landscaping LLC and the authorized Contractor.
- 1.3 Alignment of the proposed segmental retaining wall shall be based on the wall layout on the wall site plan.
- 1.4 The Contractor shall verify the location of proposed and existing underground features prior to any grading or excavation.
- 1.5 Locations and elevations of panels, counterforts, reinforcement, and wall drain shall be periodically verified by a surveyor during and at completion of construction.

2. Materials

- 2.1 Panels and counterforts shall be Lock+Load panel and counterfort units complying with manufacturer's specifications and produced by an authorized licensee.
- 2.2 Geogrid shall be Solmax Miragrid. Minimum average roll value (MARV) of ultimate wide width tensile strength (ASTM D6637) shall be:
- | | |
|--------------|--------------|
| Miragrid 5XT | 4,700 lbs/ft |
|--------------|--------------|
- 2.3 All panels and counterforts shall be sound and free of cracks or any other defects that would not allow proper construction or affect the strength of the wall. All panels shall be free of imperfections when viewed from a distance of 10 feet.
- 2.4 All panels, counterforts, and geogrid shall be stored, handled, and installed according to manufacturers' specifications.
- 2.5 Panel and counterfort gravel fill, leveling pad, and wall drain material shall consist of free draining ASTM C33 No. 57/67 crushed rock, and be constructed to the dimensions provided on the Drawings.
- 2.6 Reinforced backfill shall consist of select granular backfill with a minimum friction angle of 34 degrees. Retained backfill shall consist of on-site soil with a minimum friction angle of 26 degrees. The gradation, plasticity, and friction angle of fill materials **MUST** be verified prior to and during construction.
- 2.7 The underdrain pipe shall be 4-inch perforated HDPE pipe with perforations sized to prevent migration of wall backfill. Discharge pipe shall be 4-inch non-perforated HDPE pipe.
- 2.8 Filter fabric shall be Mirafi 140N or approved equivalent.

3. Excavation and Subgrade Preparation

- 3.1 The excavation shall be carried to the extents necessary to place geogrid at the required lengths.
- 3.2 Temporary excavation slopes shall be graded in accordance with OSHA's guidelines.
- 3.3 Subgrade shall be excavated as required for placement of the leveling pad, wall drain, geogrid reinforcement, and wall backfill as shown on the Drawings or as directed by the Design Engineer.
- 3.4 Wall subgrade shall be verified by the Geotechnical Engineer.

4. Construction

- 4.1 Panels, counterforts, leveling pad, geogrid reinforcement, backfill, and wall drains shall be installed in accordance with the Drawings and the manufacturers' construction guidelines.
- 4.2 Backfill shall be placed in uniform lifts not to exceed 8 inches in compacted thickness and graded to nearly level. Select granular backfill shall be compacted to at least 95 percent of maximum modified Proctor density (ASTM D1557) within 2 percent of the optimum moisture content. Retained backfill shall be compacted to at least 95 percent of the maximum standard Proctor density (ASTM D698) within 2 percent of the optimum moisture content. ASTM C33 No. 57/67 crushed rock shall be vibratory compacted.
- 4.3 Materials placed as backfill in front of the wall or below the bottom of wall shall be compacted to at least 95 percent of the maximum standard Proctor density (ASTM D698) within 2 percent of the optimum moisture content.
- 4.4 Only light weight hand-operated compaction equipment shall be used within 3 feet behind the back of panels.
- 4.5 The first course of panels and counterforts shall be placed level on the leveling pad. All panels and counterforts shall be checked for proper elevations and levelness.
- 4.6 All underdrain pipes shall be graded at a minimum 2 percent continuous slope to discharge pipes.
- 4.7 All discharge pipes shall be installed at a minimum of 2 percent slope to daylight at maximum 40 feet on centers and at low points.
- 4.8 Geogrid shall be orientated with the highest strength axis perpendicular to the wall alignment.
- 4.9 Geogrid reinforcement shall be placed according to the Drawings and manufacturer's recommendations.
- 4.10 Geogrid reinforcement shall be laid horizontally on properly compacted level backfill. The geogrid must be pulled taut and anchored prior to backfill material placement on the geogrid.

- 4.11 Geogrid reinforcement will be continuous for their embedment length. Spliced connections will not be allowed in the high strength axis.
- 4.12 A 2-inch layer of compacted backfill shall be placed between two layers of geogrid in the overlapping areas.
- 4.13 Tracked construction equipment shall not be allowed to operate directly on geogrid. A minimum 6 inches of backfill must be placed prior to operations of vehicles over the geogrid. Turning of vehicles shall be prohibited to prevent displacing the backfill and damaging geogrid.
- 4.14 Any damage to the geogrid that affects the anticipated strength or life of the geogrid shall be removed and replaced.
- 4.15 No changes to the geogrid layout, length, type, or elevation shall be made without approval from the Design Engineer.

5. Drainage

- 5.1 The wall system and the surrounding areas must be kept relatively dry at all times during and after the construction as much as is feasible.
- 5.2 In no case should surface runoff be allowed to enter the wall construction areas or water be ponded around the wall during construction.
- 5.3 At the end of each construction day, the Contractor shall slope the last lift of backfill away from the wall face to direct runoff away from the wall.
- 5.4 Excavation slopes shall also be protected against erosion to reduce the potential for sloughing and slope failure.

6. Quality Assurance

- 6.1 The Owner shall retain a qualified engineer and testing agency to perform inspection and materials testing during construction.
- 6.2 The Owner shall specify the type and minimum frequency of material testing prior to the beginning of wall construction.
- 6.3 If conformance by the Design Engineer is required, the Wall Contractor shall notify the Design Engineer before initiating construction to coordinate on-site observation and inspection services, and associated fees.

7. Design Criteria

- 7.1 AASHTO ASD, 2002.

7.2 Design soil parameters:

Material Type	Friction Angle (degrees)	Cohesion (psf) *	Unit Weight (pcf)
Select Granular Backfill	34	0	135
On-site Soil	26	100	120

* Cohesion values were used in global stability analysis only.

7.3 Internal Stability

Criteria	Min. Factor of Safety
Overstress	1.5
Pullout	1.5

7.4 External Stability

Criteria	Min. Factor of Safety
Base Sliding	1.5
Overturning	2.0
Bearing	2.0

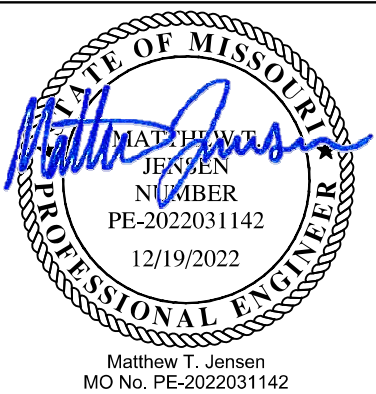
7.5 Facing Stability

Criteria	Min. Factor of Safety
Connection	1.5

- 7.6 Global Stability: Min. Factor of Safety = 1.3

8. Abbreviations

BG	Finished grade at bottom of wall
BW	Bottom of wall at top of leveling pad
DH	Design wall height
DIA	Diameter
EL	Elevation (ft)
EQU	Equivalent
MAX	Maximum
MIN	Minimum
MOD	Modified
NTS	Not to scale
OC	On centers
PPD	Per project documents
RL	Reinforcement length
STA	Station
STD	Standard
TG	Finished grade at top of wall
TW	Top of wall at top of panels
TYP	Typical



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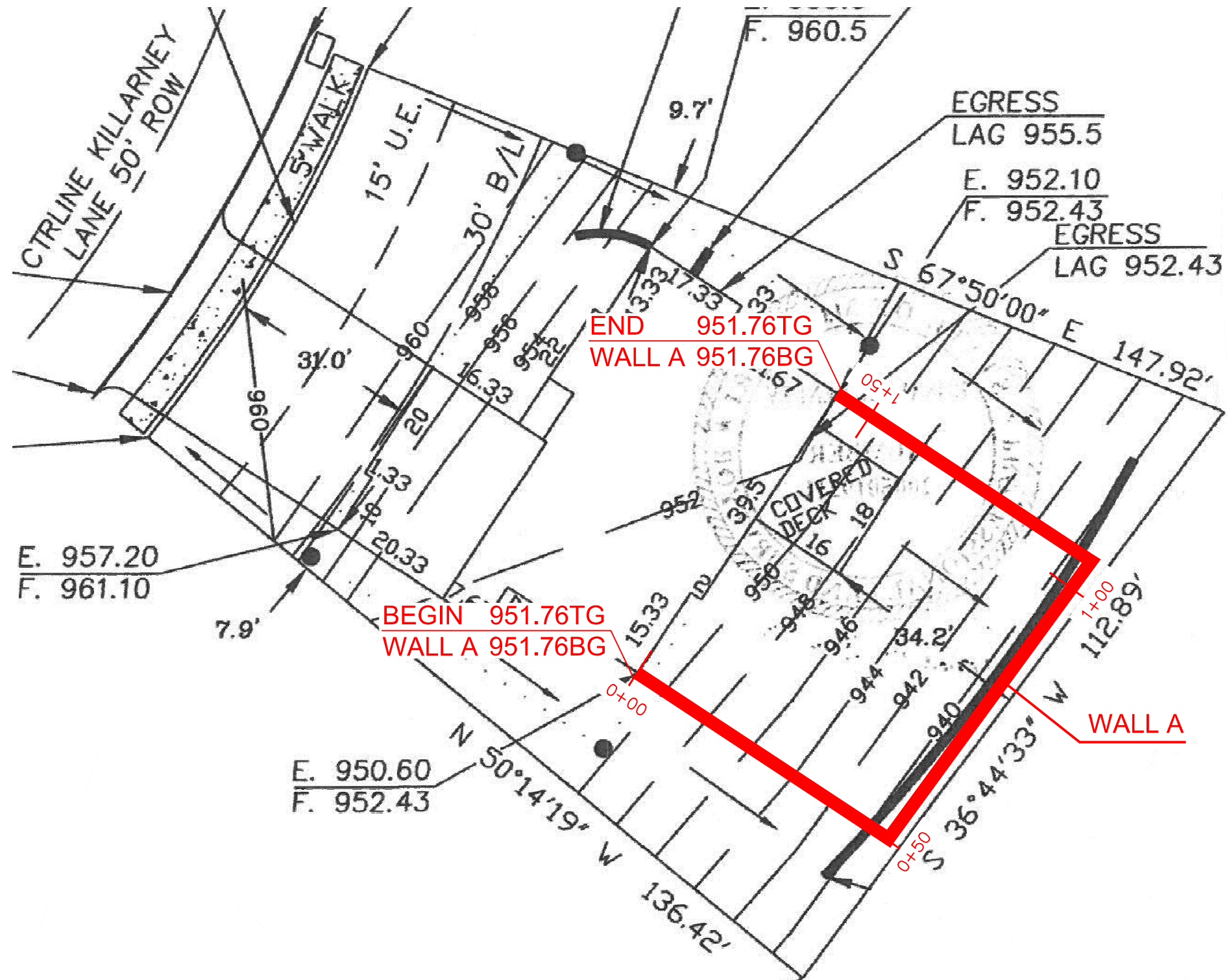
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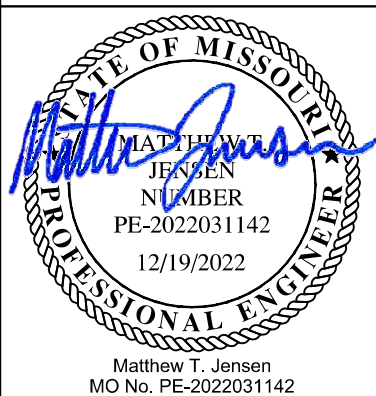
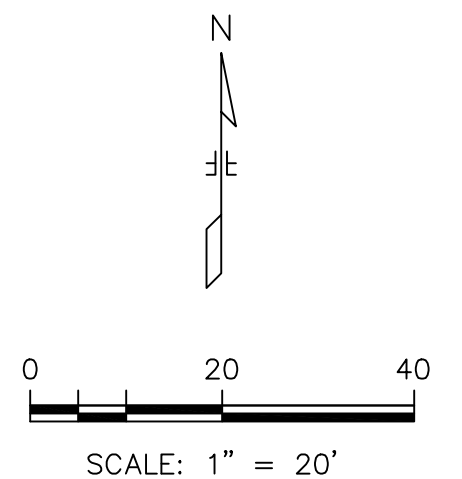
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GENERAL NOTES



NOTE: WALL LINE BASED ON SCANNED PDF IMAGE AND IS FOR INFORMATION ONLY.



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WALL A SITE PLAN

SHEET NUMBER
3 OF 6

A1 STA 0+00.00

BEGIN WALL

TW=951.76

TG=951.76

BG=951.76

BW=950.43

EL949.76

EL948.43

EL947.10

EL945.76

EL944.43

EL943.10

EL941.76

EL940.43

A2 STA 0+48.21

TW=951.76

TG=951.76

BG=939.00

BW=937.10

OUTSIDE CORNER

A3 STA 1+03.39

TW=951.76

TG=951.76

BG=939.00

BW=937.10

OUTSIDE CORNER

STA 1+30.00

TW=951.76

TG=951.76

BG=945.96

BW=945.10

EL949.76

EL948.43

EL947.10

EL945.76

EL944.43

EL943.10

EL941.76

EL940.43

EL939.10

EL937.76

RL=5'-0"

RL=8'-0"

RL=11'-0"

RL=8'-0"

RL=5'-0"

0+00 0+10 0+20 0+30 0+40 0+50 0+60 0+70 0+80 0+90 1+00 1+10 1+20 1+30

WALL A

STA 0+00.00 TO 1+30.00

STA 1+30.00

A4 STA 1+52.20

END WALL

TW=951.76

TG=951.76

BG=945.96

BW=945.10

EL949.76

EL948.43

EL947.10

EL945.76

EL944.43

EL943.10

TW=951.76

TG=951.76

BG=951.76

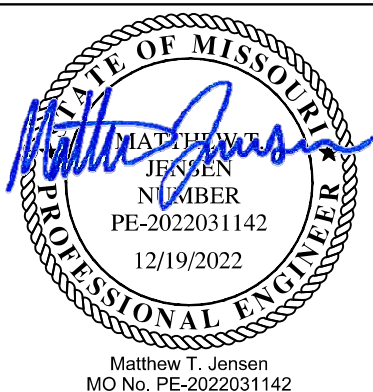
BW=950.43

RL=5'-0"

1+30 1+40 1+50

WALL A

STA 1+30.00 TO 1+52.20



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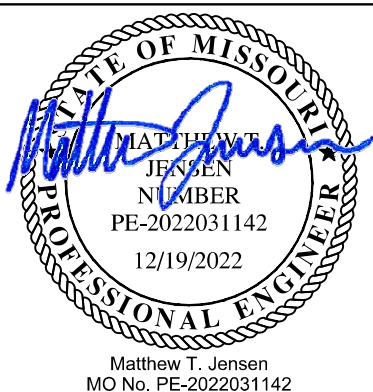
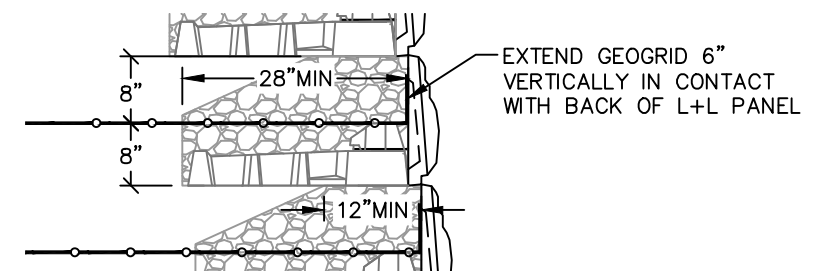
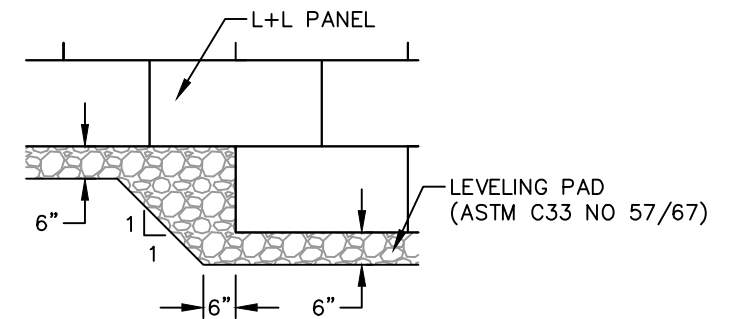
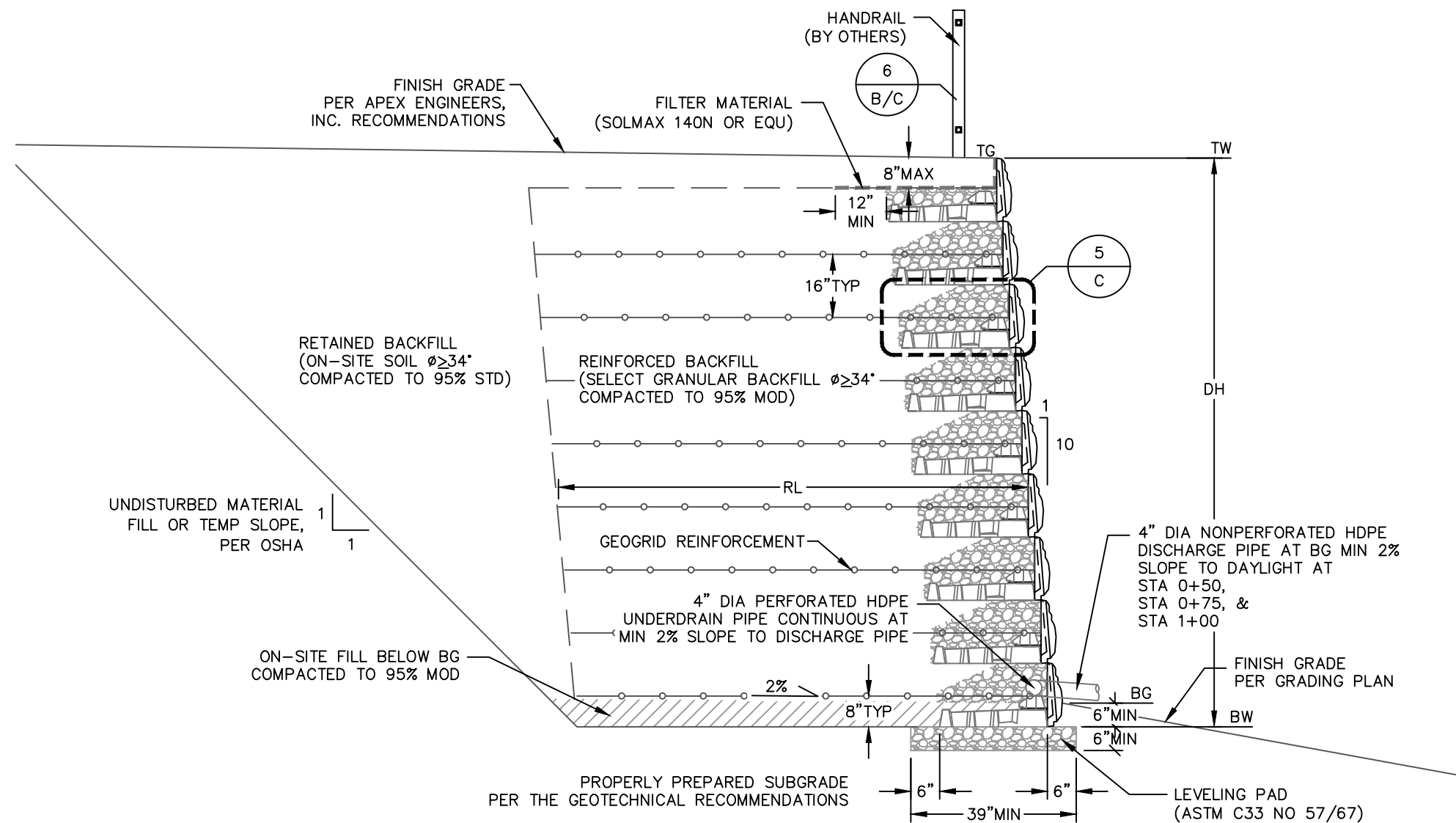
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WALL A ELEVATION

SHEET NUMBER
4 OF 6



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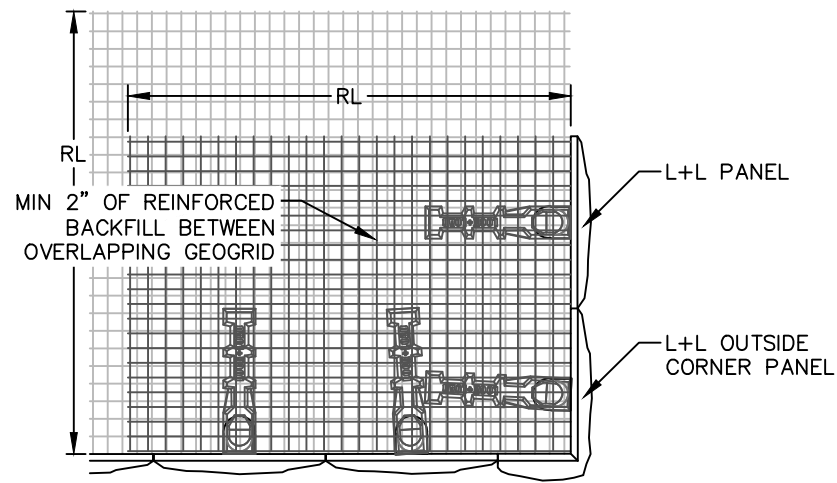
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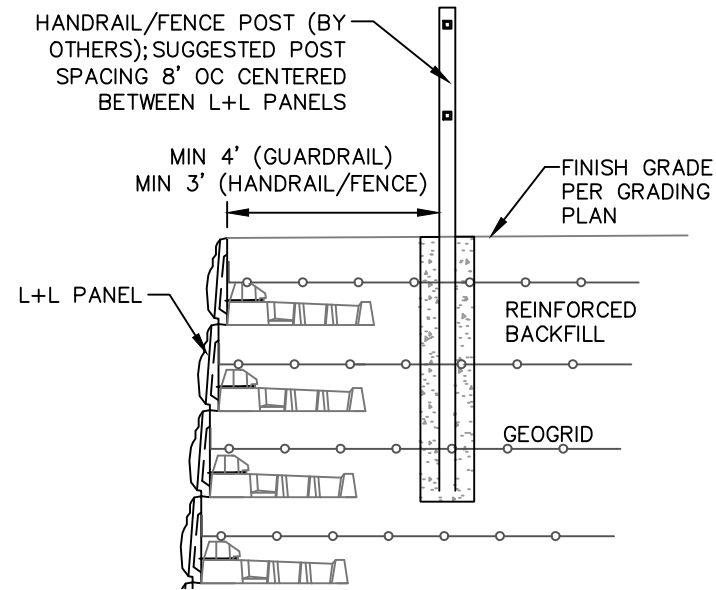
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TYPICAL SINGLE-TIER WALL SECTION AND
TYPICAL WALL DETAILS 01

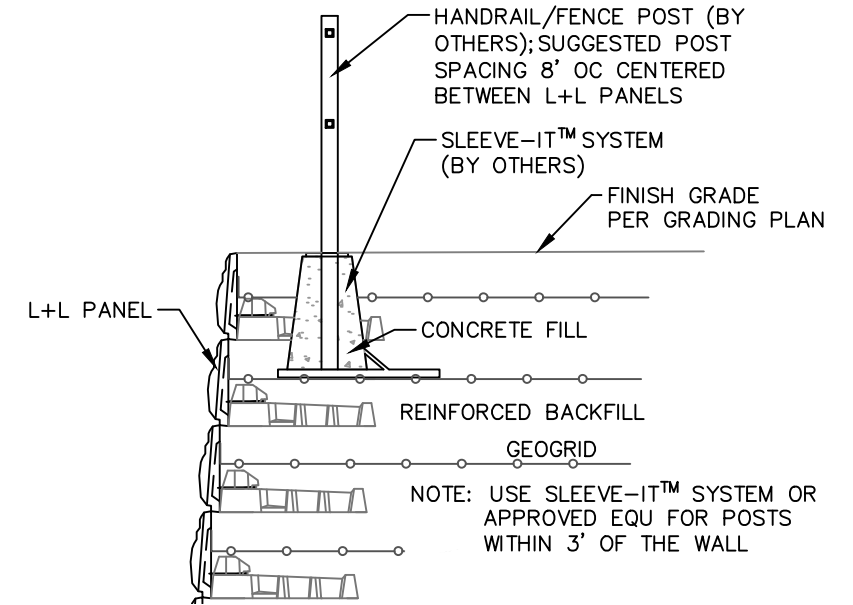
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5 OF 6



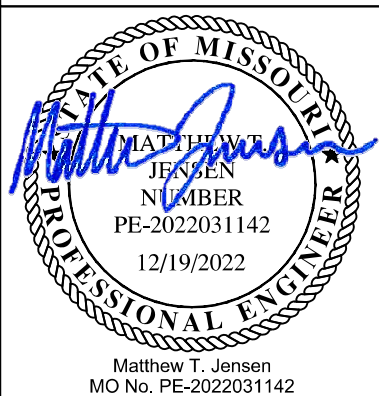
6 TYPICAL OUTSIDE CORNER DETAILS
A NTS



6 TYPICAL HANDRAIL/FENCE DETAILS
B NTS OPTION 1



6 TYPICAL HANDRAIL/FENCE DETAILS
C NTS OPTION 2



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TYPICAL WALL DETAILS 02