

DESIGN NOTES

Reference: Core States Group, TESC Clear and Grading Plan, Sheet 5, dated February 5, 2026

The following design assumptions were used:

- Internal angle of friction for reinforced soil = 32 degrees (design only - see Materials Note "F")
- Unit weight of reinforced soil = 125 pcf
- Maximum designed wall height = Single Tier = 8.0 feet
Two Tier = 17.0 feet
- Batter of wall = 1H : 10V
- Site-modified peak ground acceleration = 0.55 g (2021 IBC)
- Surcharges (Where applicable) = 2,500 psf Footing Strip Load (Where applicable)
250 psf Live Load (Where applicable)
Slope Surcharge (as depicted)

TECHNICAL SPECIFICATIONS FOR MECHANICALLY STABILIZED LOCK + LOAD RETAINING WALLS
GENERAL

- A. The work involves the supply and installation of soil reinforced retaining walls. The Concrete Panels and Counterforts will consist of Lock + Load Stone. Counterfort and Geogrid are the types of soil reinforcement. The work will include, but is not limited to:
- excavation to the grades shown on the civil drawings
 - supply and installation of geogrid reinforcement
 - supply and installation of drainage fill and piping
 - supply and installation of segmental Lock + Load Stones
 - supply and installation of retained and reinforced soil fill
- B. The walls shall be installed on undisturbed Native Soils or Structural Fill, as appropriate.

MATERIALS

- A. Concrete Panels and Counterforts are locked together to form a "Stone". The retaining walls have been designed on the basis of Lock + Load Retaining Wall "Stones". "Stones" are to be purchased from a licensed Lock + Load manufacturer. The Lock + Load trademark on each pallet identifies Lock + Load products.
- B. Information on the purchase of Lock + Load products can be obtained through:
- Pacific LOCK + LOAD, Inc.
Telephone: (503) 682-2868
Website: www.pacificlockload.com
- C. Geogrid: Structural geogrid reinforcement shall consist of Miragrid 5XT (as indicated on the Geogrid Schedule and/or Details) or an alternative approved by the Geotechnical Engineer.
- D. Drainage Fill: Drainage Fill placed around and above the perforated drainage pipe shall consist of round or angular 3/4-inch to 1-inch "clean" rock.
- E. Face Gravel: 3/4-inch to 1-inch clean crushed rock or approved equivalent by the Geotechnical Engineer.
- F. Reinforced and Retained Soil: Suitable granular material approved by the Geotechnical Engineer.
- G. Leveling Course: The Leveling Course shall consist of angular, crushed aggregate with maximum size of 3/4 inch. The Leveling Course Fill may be single size or may be well graded containing a maximum of 5% passing the No. 200 sieve.

EXECUTION

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. The Geotechnical Engineer should observe the excavation prior to the placement of the leveling material or fill soils.
- B. Over-excavation of deleterious soils or rock shall be replaced with material meeting the specifications described in Materials Section "G" above. The material shall be compacted to 95% of ASTM D1557 (Modified Proctor) and shall be at (or slightly above) the optimum moisture content.
- C. The first course of concrete Lock + Load "Stones" shall be placed on the Leveling Course, and the alignment and level shall be checked.
- D. "Stones" shall be placed with the top of the panel level and parallel to the wall face. The Counterfort Base shall be installed horizontal and perpendicular to the face of the retaining wall.
- E. Geogrid shall be oriented with the highest-strength axis perpendicular to the wall alignment.
- F. Geogrid reinforcement shall be placed at the levels and to the lengths shown on the drawings and shall begin at the back of the Lock + Load Panels.
- G. The geogrid shall be laid horizontally in the direction perpendicular to the face of the retaining wall. The geogrid shall be pulled taut, free of wrinkles, and anchored prior to backfill placement on the geogrid.
- H. The geogrid reinforcement shall be continuous throughout respective embedment lengths. Spliced connections between shorter pieces of geogrid are not permitted.
- I. The drainage pipe discharge points shall be connected to an approved system.
- J. Reinforced and Retained Backfill shall be placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid.

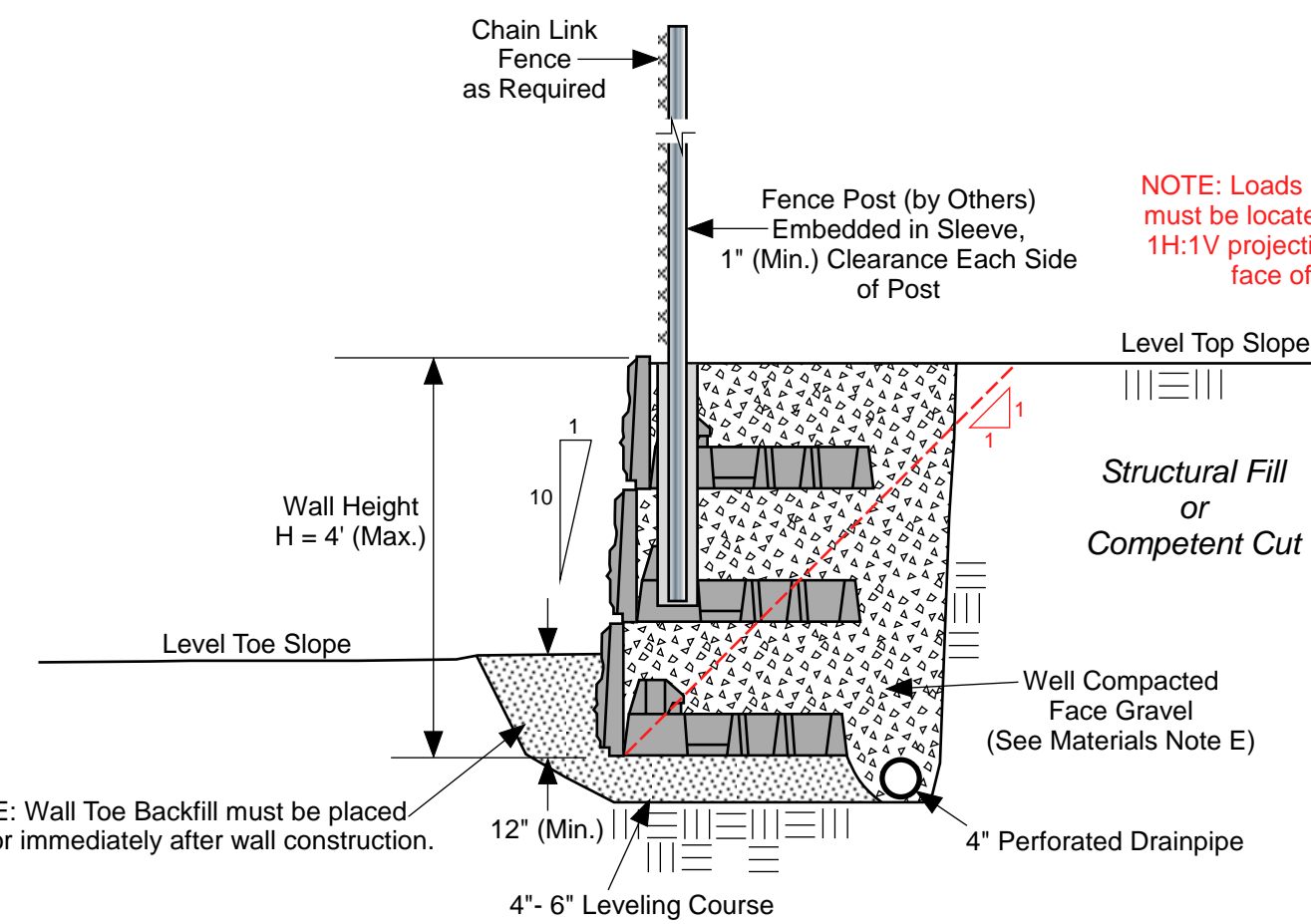
- K. Reinforced and Retained Backfill shall be placed and compacted in lifts not to exceed 8 inches where hand-compaction equipment is used and not more than 12 inches where heavy compaction equipment is used. Compaction should occur over the tail of the Counterfort prior to areas away from the retaining wall. Hand-operated vibratory plate compaction equipment (700 lb. to 1,000 lb.) shall be used to compact the face gravel at wall face.
- L. Reinforced and Retained Backfill shall be compacted to 95% of the maximum dry density as determined by ASTM D1557 (Modified Proctor) or equivalent. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be at (or slightly above) the optimum moisture content.
- M. Hand-operated compaction equipment (700 lb. to 1,000 lb.) shall be used within 16 inches of the front face of the concrete facing.
- N. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid.
- O. Rubber-tired equipment may pass over the geogrid reinforcement at speeds less than 5 mph. Sudden braking and sharp turning shall be avoided.
- P. At the end of each day of operation, the contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from the wall face. The contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

GEOTECHNICAL OBSERVATIONS & TESTING

- A. The Geotechnical Engineer shall be retained to provide observation and testing services during Lock + Load retaining wall construction. The Geotechnical Engineer shall be contacted, at least 48 hours prior to the start of wall construction and related grading activities, to observe Lock + Load wall installation on a full-time basis.
- B. Observations by the Geotechnical Engineer (or their representative) do not relieve the contractor of their responsibility to comply with the contract documents, including the notes, details, and specifications provided on these sheets.
- C. At a minimum, the Geotechnical Engineer shall be retained to observe and/or test the following: erosion control; excavation activities; subsurface drainage installation; soil bearing and subgrade/keyway competency; Lock + Load panel installation and wall batter; structural fill placement and compaction testing; and verification of proper geogrid strengths, lengths, and orientation.

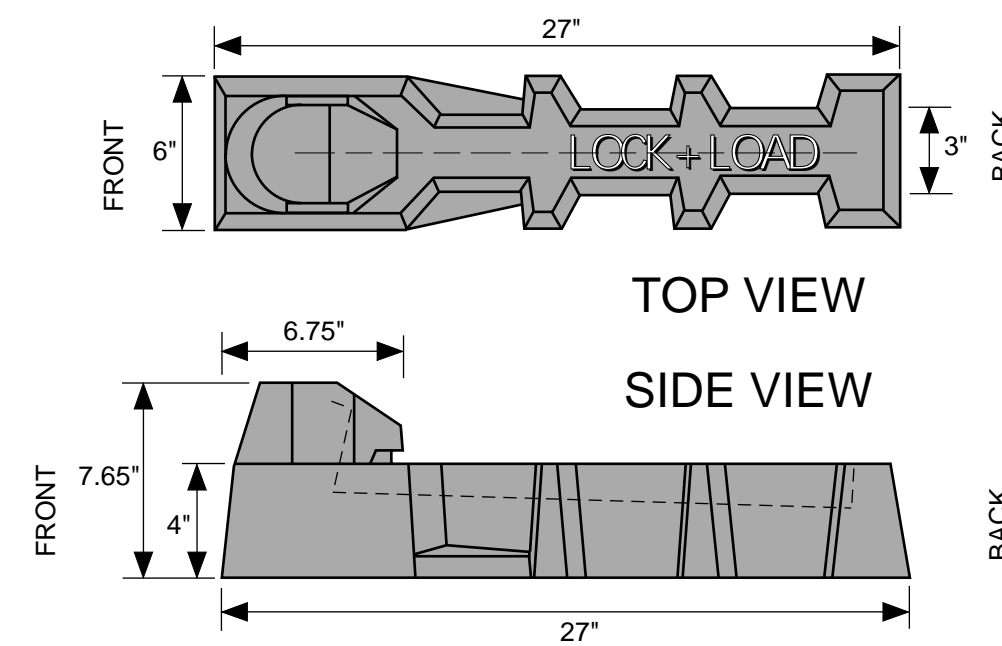
If a geotechnical report has been provided, submit it to the city for review.
(Structural Plans, Sheet W1)

NOTE: Wall Alignment and Heights To Be Established By Contractor / Surveyor.

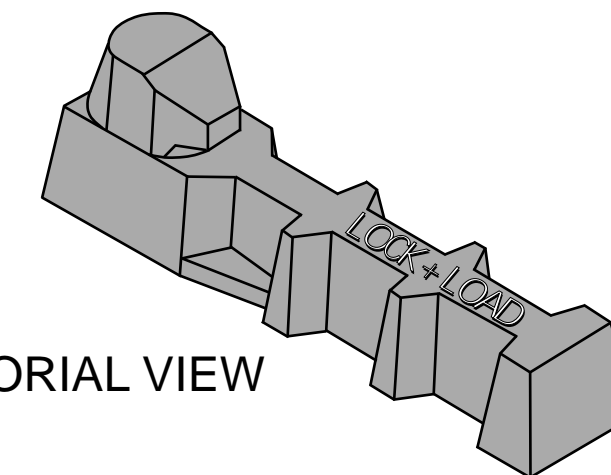


TYPICAL GRAVITY WALL (4' MAX. HEIGHT)

NOT - TO - SCALE



REINFORCEMENT BAR BENDING DETAIL



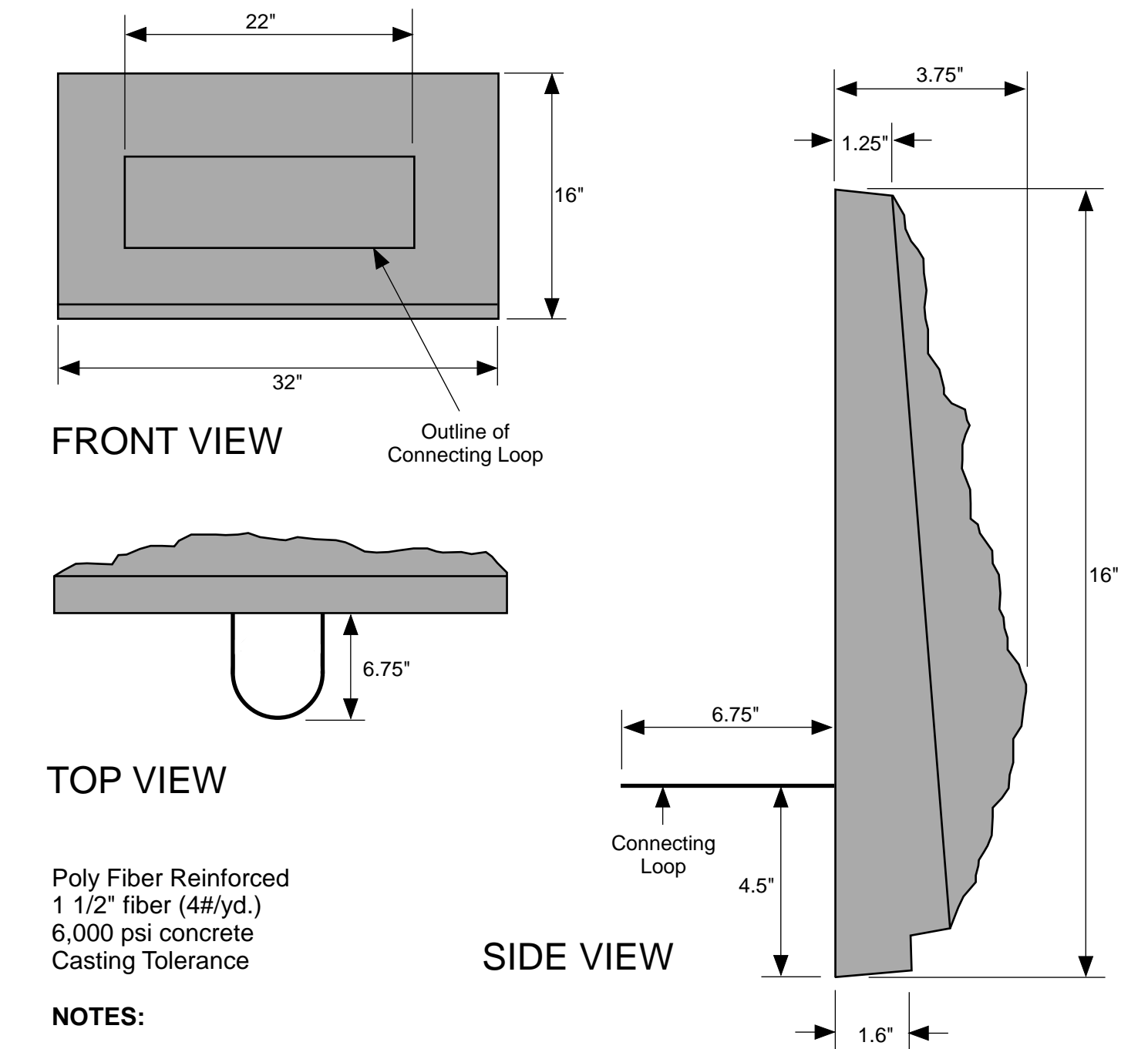
PICTORIAL VIEW

NOTES:

1. Installation to be completed in accordance with manufacturer's specifications.
2. Do not scale from drawings.

LOCK + LOAD COUNTERFORT

NOT - TO - SCALE



LOCK + LOAD PANEL

NOT - TO - SCALE

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Checked	CGH	Approved	HTW

No.	Date	Revision

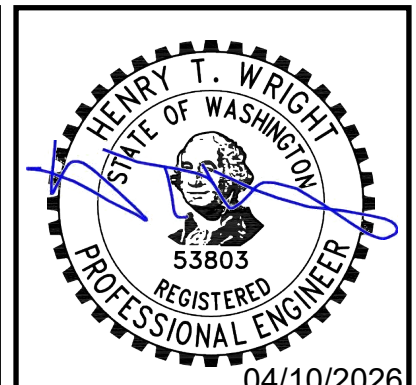


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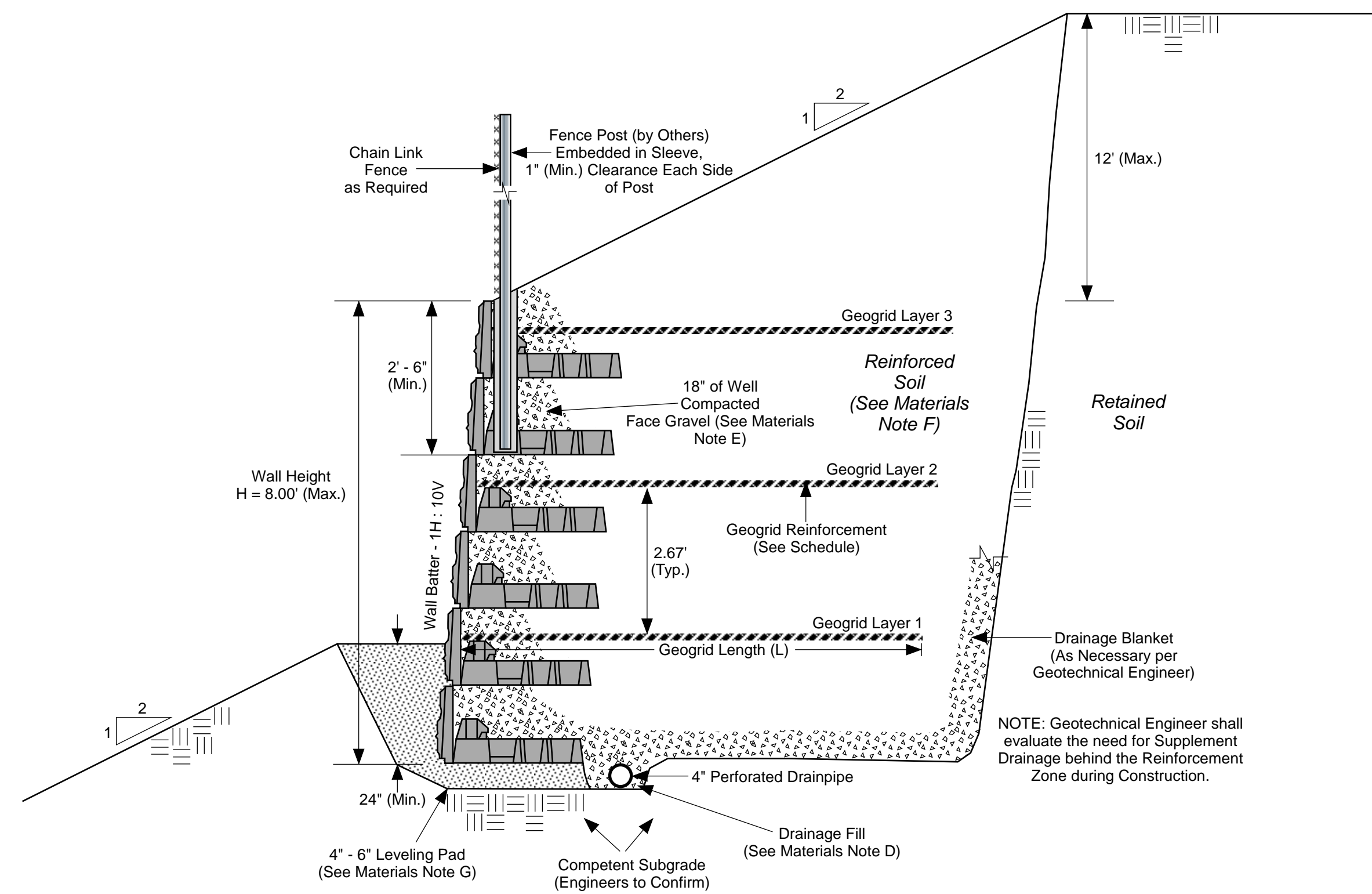
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Lock + Load Wall Design and Notes
NORMANDY HEIGHTS
Puyallup, Washington



Sheet No.

W1



SINGLE-TIER WALL CONDITION WITH TOP SLOPE

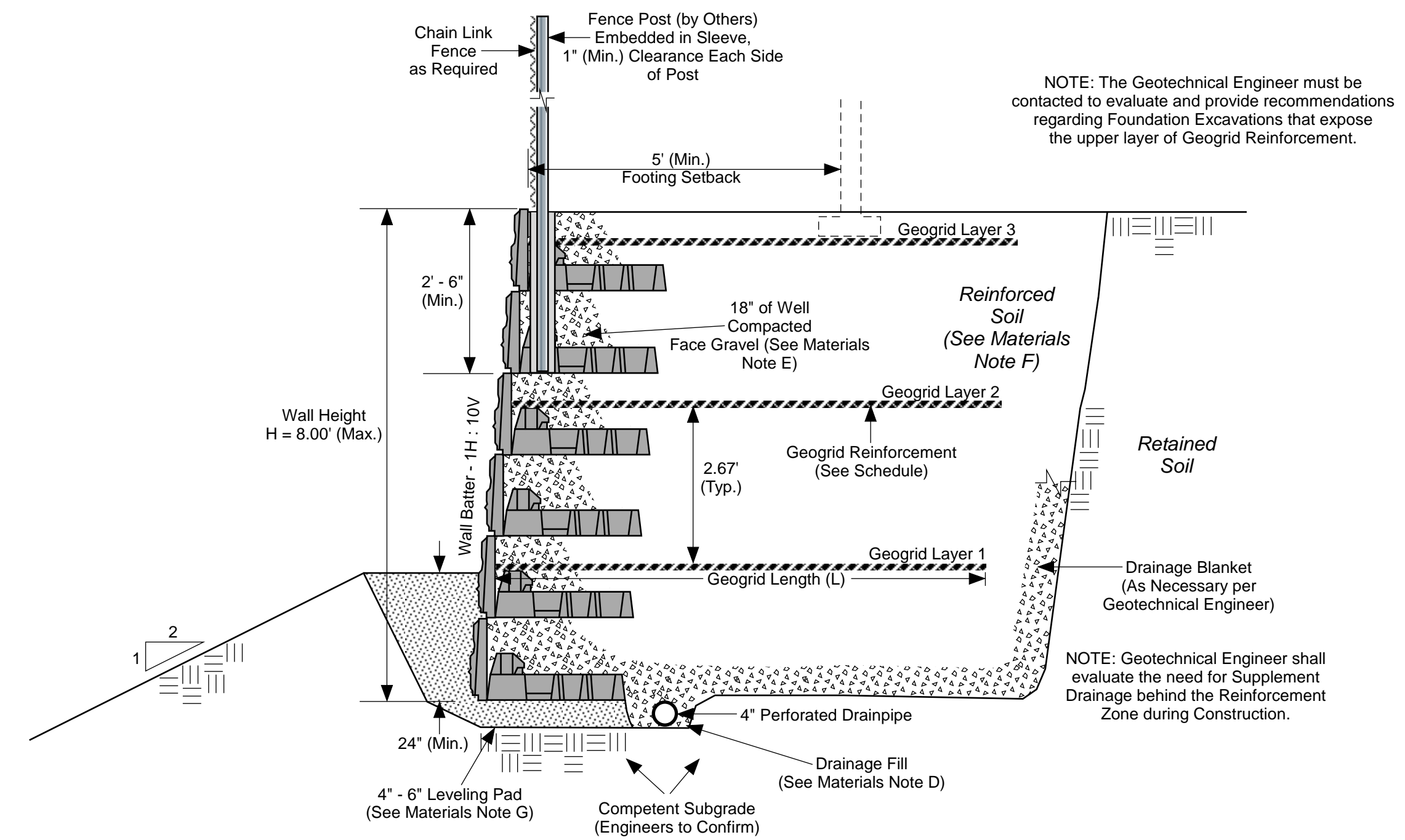
NOT - TO - SCALE

SINGLE-TIER WALL CONDITION WITH TOP SLOPE GEOGRID SCHEDULE

# of Panels	Wall Height (feet)	Geogrid Length (feet)	Layers		
			1	2	3
3	≤ 4.00	6.00	A	-	-
4	5.33	7.00	A	A	-
5	6.67	9.00	A	A	-
6	8.00	12.00	A	A	A

GEOGRID: A = Miragrid 5XT

NOTE: ESNW must evaluate any condition (prior to wall construction) where geogrid reinforcement can not be installed to the design lengths provided within these geogrid schedules.



SINGLE-TIER WALL CONDITION WITH FOUNDATION SURCHARGE

NOT - TO - SCALE

SINGLE-TIER WALL CONDITION WITH FOUNDATION SURCHARGE GEOGRID SCHEDULE

# of Panels	Wall Height (feet)	Geogrid Length (feet)	Layers		
			1	2	3
3	≤ 4.00	5.00	A	-	-
4	5.33	6.00	A	A	-
5	6.67	7.00	A	A	-
6	8.00	8.00	A	A	A

GEOGRID: A = Miragrid 5XT

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Lock + Load Wall Designs
NORMANDY HEIGHTS
Puyallup, Washington



Sheet No.

W2

GENERAL NOTES

- A. Rockery construction is a craft. The skill and experience of the builder will largely dictate the success of the construction. Ultimately, the responsibility for suitable rockery construction lies with the rockery contractor.
- B. A rockery is a protective system with respect to weathering and erosion processes on an exposed soil face.
- C. The degree of retention achieved is dependent largely on the size of rock used. Rockeries constructed using larger rocks tend to be more competent.

DESIGN NOTES

- A. Reference: Core States Group, TESC Clear and Grading Plan, Sheet 5, dated February 5, 2026
- B. The following design assumptions were used:
 - Internal angle of friction for retained soil = 32 degrees
 - Unit weight of retained soil = 125 pcf
 - Maximum total rockery height = 8.00 feet
 - Batter of rockery = 1H : 6V
 - Site-modified peak ground acceleration = 0.55 g (per 2021 IBC)
 - Surcharge (Where applicable) = 2H:1V Top Slope

CONSTRUCTION NOTES

- A. All rocks should be sound, angular to sub-angular ledge rock that is resistant to weathering.
- B. Top rock and base rock widths shall be consistent with the detail provided on this sheet and the Rock Schedule below. Intermediate rock sizes (between the base rock and top rock) shall be appropriately incremented with respect to the overall rockery height and the required (minimum) rock widths.

ROCK SCHEDULE		
Range of H (ft)	Min. Top Width (in)	Min. Base Width (in)
H ≤ 4.0	24	36
4.0 < H ≤ 6.0	30	48
6.0 < H ≤ 8.0	36	60

- C. The keyway shall comprise a shallow trench of not less than 12 inches in depth. The keyway subgrade should be slightly inclined back toward the soil cut face. The competency of the keyway shall be confirmed by the Geotechnical Engineer using a small-diameter steel rod.
- D. The first course of rock should be placed on firm and unyielding soil, or onto the previously installed layer of crushed rock. Full contact between the rock and soil (or crushed rock surface, at the option of the contractor) should occur.
- E. Rocks should be placed to avoid continuous joint planes in vertical or lateral directions. Each rock should bear on two or more rocks below it, with good flat-to-flat contact. Rocks should be placed so that there is some bearing between flat rock faces rather than in or on spaces between the underlying rocks. The upper plane of each rock between courses (the top surface of rock) should slope back toward the soil cut face and away from the face of the rockery.
- F. The long dimensions of the rocks should extend back toward the cut face to provide maximum stability.
- G. Filter drain rock shall consist of 2- to 4-inch diameter, clean, angular rock (e.g., quarry spalls). Alternative filter drain rock material may be considered upon approval by the Geotechnical Engineer. Minimum thickness of the filter drain rock shall be consistent with the detail provided on this sheet.
- H. The drainage pipe discharge points shall be connected to an approved system.
- I. The slopes above and below the rockery shall be consistent with the detail provided on this sheet. Steeper slope inclinations must be approved by the Geotechnical Engineer.
- J. The rockery batter should be inclined at approximately 1H:6V. The rockery shall not be inclined flatter than 1H:4V without approval from the Geotechnical Engineer.

FIELD QUALITY CONTROL

- A. The Geotechnical Engineer shall be notified to observe cuts for the rockery on a periodic or full-time basis, as appropriate. Additional flattening of cuts may be recommended by the Geotechnical Engineer depending on the soil and groundwater conditions observed. Where native cuts do not expose competent native soil, additional excavation activities, as well as addition of reinforcement and compacted structural fill, may be necessary.
- B. Quality assurance shall include observation of the rockery construction for general compliance with the design drawings and specifications. At a minimum, quality assurance inspections shall include observation, testing, and/or documentation of the subgrade and keyway, filter drain zone, rockery thickness, placement and configuration on the rocks, batter, and sloped conditions (if any) at the top and toe of the rockery.
- C. The Owner may elect to complete additional quality control measures with respect to rock quality. Such measures may include testing to determine the following rock characteristics: adsorption, expansive breakdown, soundness, unconfined compressive strength, and bulk specific gravity. Rock quality testing should be completed in accordance with applicable ASTM or AASHTO standards, where applicable.

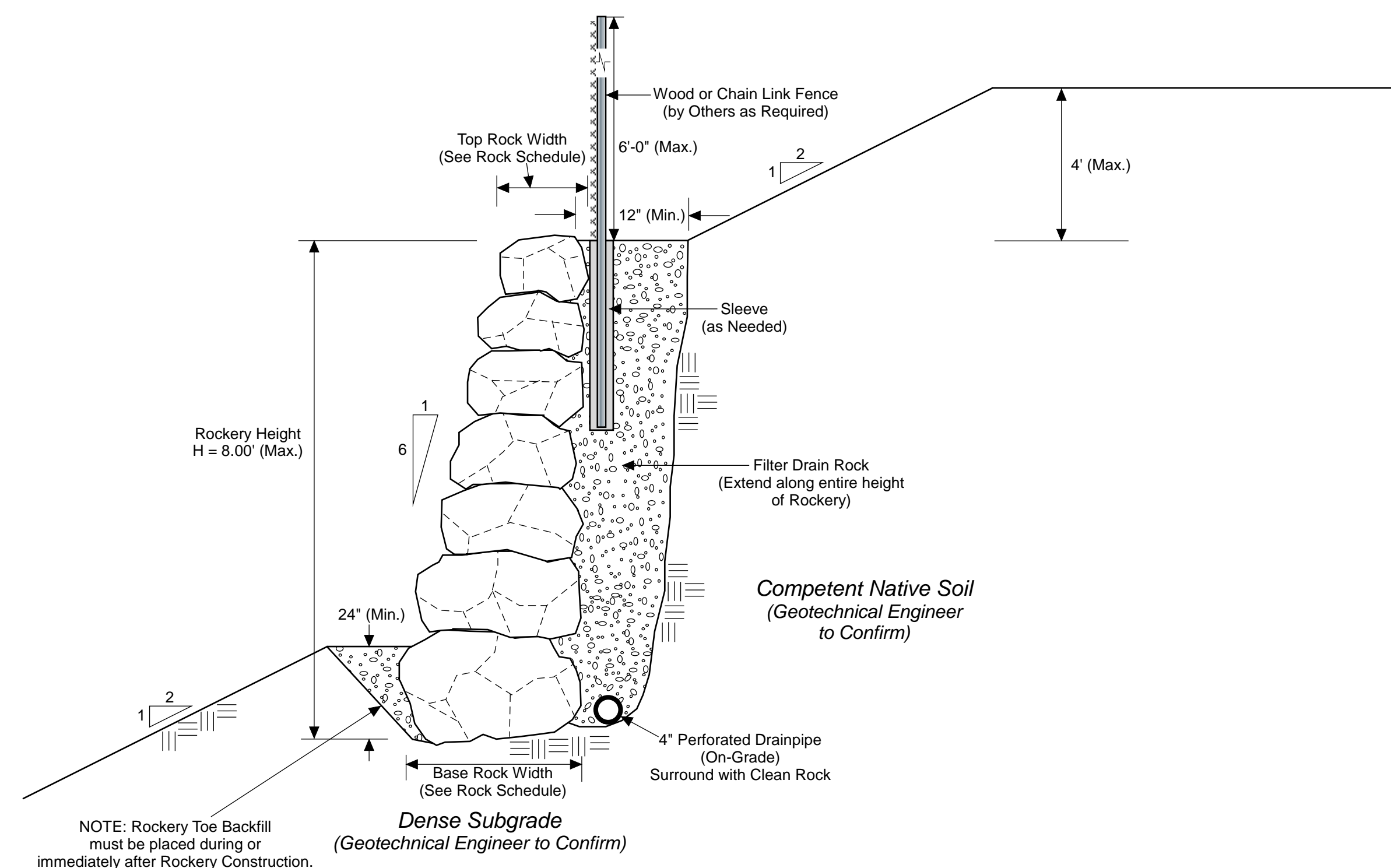
MAINTENANCE & SERVICE NOTES

- A. Rockeries should be considered maintenance items that will require periodic inspection and repair and should therefore be located such that a contractor can access the rockery if repairs become necessary.
- B. The Geotechnical Engineer should be contacted to re-evaluate the rockery if any of the following conditions occur once the rockery is constructed:
 - Excavations (even if temporary) within H feet of the back (top) of the rockery
 - Excavations (even if temporary) within 2/3 H feet of the front (toe) of the rockery
 - Excavations (even if temporary) that penetrate into the zone of influence of the front (toe) of the rockery, which is bounded by a 45-degree line extending from the rockery toe
 - Removal of soil from the subgrade in front of the rockery
 - Adding load or surcharge within H feet of the back (top) of the rockery, including any increase to the rockery height
 - Forcing, directing, or otherwise causing surface or subsurface water to flow behind the rockery

NOTES

1. Rockery alignment and heights to be established by Contractor / Surveyor.
2. Geotechnical Engineer to confirm Keyway stability, support characteristics, and overall stability prior to construction.

The Site Plan calls for the Lock + Load retaining wall system. Detail and describe where if any the rockery wall can and/or will be used.
(Structural Plans, Sheet W4)



NATIVE CUT ROCKERY DETAIL

NOT - TO - SCALE

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Rockery Design and Notes
NORMANDY HEIGHTS
Puyallup, Washington

Sheet No.
W4