

GENERAL NOTES

1. Design

1.1. Design Codes

International Building Code, 2015 Edition

1.2. Geotechnical Report

Firm: REED ENGINEERING GROUP, L.T.D.
 Report No. 23087 Dated: September 18, 2019
 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 freeline 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

- a. Retained Backfill
 - a.a. On site clayey soils
 - a.b. Properly compacted on-site fill soils, verification by others.
- b. Foundation Soils (Allowable Bearing = 1500 psf min)
 - b.a. Bearing on Stiff Natural Undisturbed Clayey or Sandy Soils or Compacted and Tested Fill Soils
 - b.b. Friction Angle between Base of Wall and Soil - 17 deg
 - b.c. Bearing in fill soils. Fill soils supporting the retaining walls shall be placed in accordance with the recommendations for the fill placement per the geotechnical report.
- c. Drainage Material
 - c.a. Free draining granular backfill, clean, non-plastic, relatively well-graded.

2.2. Dimension Stone

- a. Average Density of masonry wall varies from 135pcf to 145pcf.
- b. Stone size varies from 4" to 18".
- c. Face stone shall be coordinated between contractor and owner/developer.
- d. Recycled concrete 4" to 18" may be used in place of dimension stone, contractors option.

2.3. Rebar/Welded Wire Fabric (If Required)

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

2.4. Drainage Materials

- a. Weep pipes shall be PVC or corrugated HDPE pipe.
- 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 mortar 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 that 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 |

Note: the portland cement mortar supplier material weights may vary slightly based on the specific gravity of the materials used.

Concrete retarders may be used at the discretion of the masonry wall contractor. A greater amount of retarder is typically used during hot periods and a less amount of retarder is typically used during cool weather.

Please note that the above proportions will provide a portland cement mortar with a compressive strength of about fc = 2500 psi. Falkofske Engineering, Inc. does not require any concrete testing provided the above proportions are verified by way of the "batch tickets".

3. Construction

3.1 Preparation Work

- 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.
- b. Coordinate installation of underground utilities and other improvements with wall installation.

3.2 Excavation

- 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.
- 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.
- c. In areas 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

- 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 the correct thickness, and to place drainage behind the wall as required.
- b. Control joints shall be installed at a maximum of 16'-0" o.c. per these plans.
- c. Weep pipes shall be placed at 8'-0" o.c. max.
- d. Face rock type shall be coordinated between the architect, owner, and retaining wall contractor.

3.4 Retained Backfill Placement

- 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).
- b. Fill should be placed in maximum 8" thick compacted lifts.
- 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.
- 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 5'-0" away from the back of the wall.
- e. Soil placed with in 5'-0" of the back of the wall shall be placed using handheld compaction equipment.
- 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.

3.6 Retaining Wall Performance, Maintenance, and Other Comments

- 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.
- 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.
- 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.
- d. Positive drainage 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 fixed to allow water to freely drain as soon as possible.
- e. Any broken sprinklers behind the retaining wall shall be turned off and repaired as soon as possible.

3.7 Cold Weather Construction of Retaining Walls

Construction Requirements for temperatures between 40°F and 32°F:

- a. Water and aggregates used in mortar shall not be heated above 140°F.
- b. Mortar sand or mixing water shall be heated to produce mortar temperatures between 40°F and 120°F at the time of mixing.

Construction Requirements for temperatures between 32°F and 25°F:

- a. The guidelines above for construction requirements for temperatures between 40°F and 32°F and the following shall be met.
- b. The mortar temperature shall be maintained above freezing until used in masonry stone retaining wall.
- 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 above freezing, using methods that do not result in damage.
- d. Newly constructed masonry shall be completely covered with weather-resistive membrane for 48 hours after being completed.

Construction Requirements for temperatures between 25°F and 20°F:

- 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.
- b. Masonry (raw stone) surfaces under construction shall be heated to 40°F.
- c. Wind breaks or enclosures shall be provided when the wind velocity exceeds 15 miles per hour.
- 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 comes from sections 2104.3.2.1, 2104.3.2.2, 2104.3.2.3, 2104.3.3.3, and 2104.3.3.4 of the International Building Code, and is in compliance with Masonry Standards Joint Committee recommendations for cold weather construction of masonry structures.

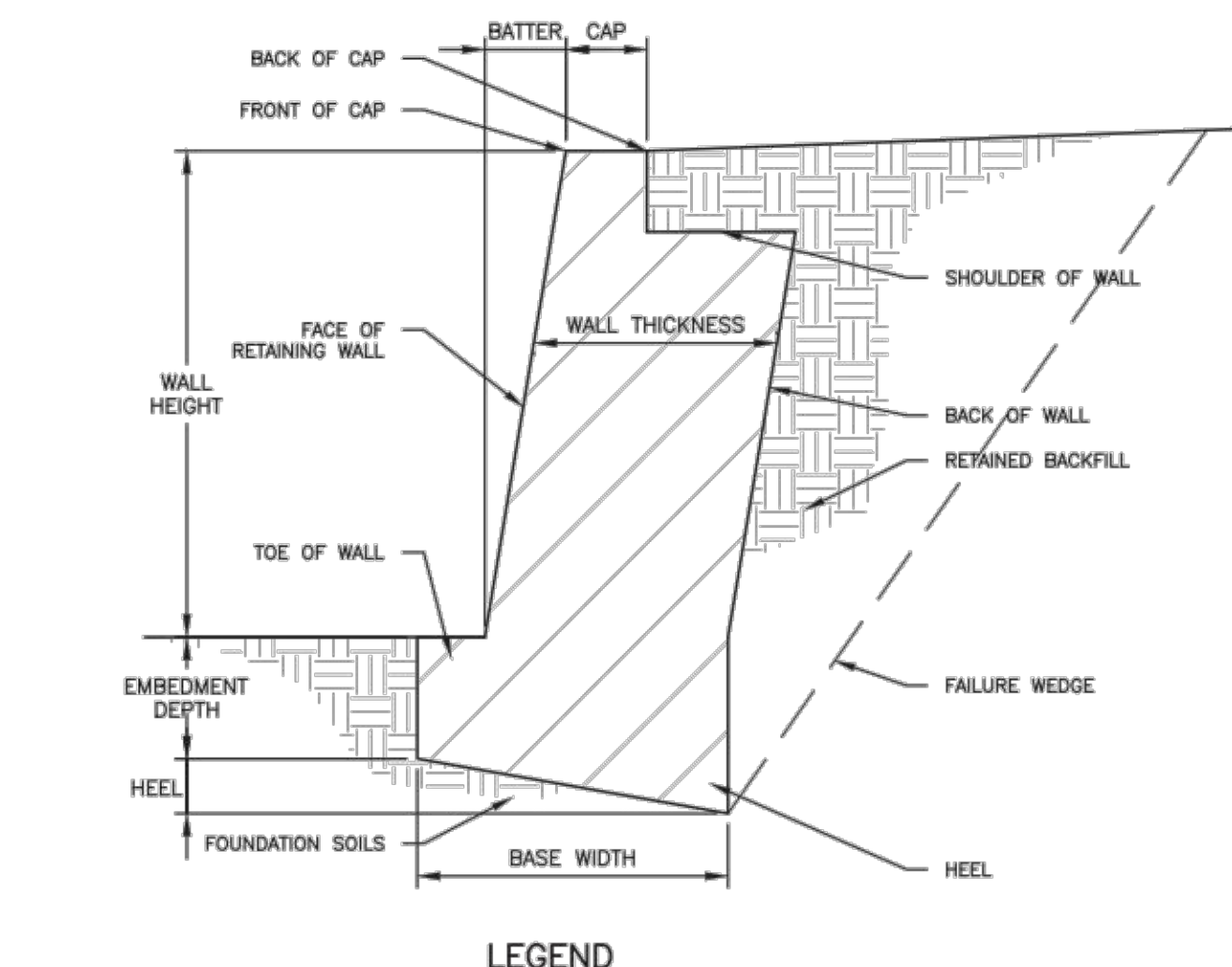
4. Construction Observations

4.1 Construction Observations by Falkofske Engineering, Inc.

- a. Falkofske Engineering, Inc. will perform construction observation, but only as a means of verification of the contractors quality control performance.
- 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.
- c. All required materials testing shall be performed by an approved materials testing laboratory.
- d. Falkofske Engineering, Inc. is not responsible for means, methods, and material furnished by the retaining wall contractor.

4.2 Construction Observations by Others

- a. Construction observations as required by the city shall be coordinated by the contractor.



| DATE | BY | NO. | DATE | REVISION | BY |
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| 08-25-20 | JAU | | | | |
| 08-25-20 | EJC | | | | |
| 08-25-20 | JAU | | | | |

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The use of these plans and specifications shall be restricted to the project for which they were prepared. Any other use, in whole or in part, is prohibited without the written consent of Falkofske Engineering, Inc.

MASONRY RETAINING WALLS - NOTES & STANDARD DETAILS
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