

Technical Brief

1043 Highland Village Trail

Mableton, Georgia 30126 · Project No. 07339

PE-Sealed Cast-in-Place Concrete Retaining Wall System

This Technical Brief documents the structural engineering and construction specifications for the cast-in-place reinforced concrete retaining wall system at 1043 Highland Village Trail, Mableton, Georgia. The system consists of two walls — Wall #1 (285 linear feet, maximum height 10'-10") and Wall #2 (21 linear feet, maximum height 4'-10") — engineered to manage an extreme grade change across the 0.399-acre site.

All structural retaining wall drawings were prepared and PE-sealed by Yong C. Shao, PE, Georgia Registration No. 26340 (X&Y; Engineering Consultants, LLC, Lawrenceville, GA). Construction was issued for permit on March 28, 2024, in accordance with the International Building Code 2018 Edition, Cobb County Construction Ordinances, and ACI 318-14 Building Code Requirements for Structural Concrete.

This brief covers the complete geotechnical design parameters, factors of safety, reinforcing steel schedule for all five design sections (S-1 through S-5), cast-in-place concrete specification, rebar detailing requirements per ACI 315 and ACI 318, drainage provisions, and all contractor construction notes of record.

|                |                  |                           |                   |
|----------------|------------------|---------------------------|-------------------|
| 285 LF         | 10'-10"          | 2,148 SF                  | 4,000 PSI         |
| Wall #1 Length | Max. Wall Height | Total Face Area (Wall #1) | Concrete Strength |

|         |                         |      |                       |              |                 |
|---------|-------------------------|------|-----------------------|--------------|-----------------|
| PE SEAL | Yong C. Shao, GA #26340 | CODE | IBC 2018 + ACI 318-14 | JURISDICTION | Cobb County, GA |
|---------|-------------------------|------|-----------------------|--------------|-----------------|

PROJECT IDENTIFICATION

|                     |                                                 |                 |                                                  |
|---------------------|-------------------------------------------------|-----------------|--------------------------------------------------|
| PROJECT             | 1043 Highland Village Trail, Mableton, GA 30126 | PROJECT NO.     | 07339                                            |
| STRUCTURAL ENGINEER | X&Y Engineering Consultants, LLC                | PE SEAL         | Yong C. Shao, PE — Georgia #26340                |
| ENGINEER ADDRESS    | 2227 Gracehaven Way, Lawrenceville, GA 30043    | ISSUED          | March 28, 2024 — For Construction                |
| APPLICABLE CODES    | IBC 2018 · Cobb County Ordinances · ACI 318-14  | CIVIL REFERENCE | JDM Consultants Grading Plan, 2/25/2024          |
| OWNER / GC          | Ducere Construction Services, Inc.              | GC LICENSES     | GA GCCO006711 · FL CBC1263793 · NASCLA 404696491 |
| 24-HR CONTACT (GC)  | Korey Akinbami, (678) 508-6254                  | JURISDICTION    | Unincorporated Cobb County, Georgia              |

SCOPE OF WORK — TWO-WALL SYSTEM

|                                            | WALL #1                                                         | WALL #2                                     |
|--------------------------------------------|-----------------------------------------------------------------|---------------------------------------------|
| Wall Type                                  | Cast-in-place reinforced concrete — CUT & FILL section          | Cast-in-place reinforced concrete — FILL    |
| Total Length                               | 285 linear feet (along front face)                              | 21 linear feet (along front face)           |
| Max. Height (above finish grade)           | 10'-10"                                                         | 4'-10"                                      |
| Total Vertical Face Area (incl. embedment) | 2,148 SF                                                        | 71 SF                                       |
| Elevation Range                            | EL. 885.6' (footing) to EL. 906.6' (top)                        | EL. 892.5' (footing) to EL. 898.9' (top)    |
| Station Range                              | STA 0+00 to STA 2+85; turns at STA 0+24, 0+60, 1+17, 1+35, 2+07 | STA 0+00 to STA 0+21; turn at STA 0+07      |
| Connection Point                           | Ties into building wall — STA 0+00                              | Ties into front porch foundation — STA 0+00 |
| Design Sections                            | 5 sections: S-1 through S-5 (varying footing widths and slopes) | 1 section: S-5 (W=2'-10")                   |

GEOTECHNICAL DESIGN PARAMETERS

| PARAMETER                                           | RETAINED SOIL             | FOUNDATION SOIL               |
|-----------------------------------------------------|---------------------------|-------------------------------|
| Soil Unit Weight                                    | 120 PCF                   | 120 PCF                       |
| Effective Internal Friction Angle (°)               | 30 degrees                | 30 degrees                    |
| Effective Cohesion (c')                             | 0 PSF                     | 0 PSF                         |
| Equivalent Active Fluid Pressure                    | 40 PCF                    | —                             |
| Equivalent Passive Fluid Pressure                   | —                         | 360 PCF                       |
| Slide Coefficient (μ)                               | —                         | 0.45                          |
| Surcharge                                           | 0 PSF (no traffic access) | —                             |
| Max. Allowable Bearing Capacity                     | —                         | 2,500 PSF (design)            |
| Min. Bearing Capacity (footing on undisturbed soil) | —                         | 3,000 PSF (field requirement) |

NOTE: All design parameters are assumed values per PE design. Contractor must verify soil parameters in the field before pouring concrete. Any discrepancy must be reported to Yong C. Shao, PE (GA #26340) prior to proceeding.

FACTORS OF SAFETY — STABILITY REQUIREMENTS

| FAILURE MODE     | MINIMUM F.O.S. | DESIGN BASIS                                                         |
|------------------|----------------|----------------------------------------------------------------------|
| Overturning      | 1.5            | Moment equilibrium — retained soil load vs. wall/footing self-weight |
| Sliding          | 1.5            | Passive resistance + base friction vs. active horizontal pressure    |
| Bearing Capacity | 2.0            | Maximum footing stress vs. allowable bearing capacity (2,500 PSF)    |

WALL DIMENSION & REINFORCING STEEL SCHEDULE

| SECTION | HEIGHT (H) | W<br>Footing | B<br>Toe | T<br>Wall | C<br>Heel | E<br>Embed | VERT. "V" BAR | PERP. "P" BAR    |
|---------|------------|--------------|----------|-----------|-----------|------------|---------------|------------------|
| S-1     | 12'-4"     | 7'-6"        | 2'-6"    | 1'-0"     | 4'-0"     | 1'-6"      | #5 @ 6" O.C.  | #4 @ 8" O.C. T&B |
| S-2     | 8'-4"      | 4'-9"        | 1'-6"    | 1'-0"     | 2'-3"     | 1'-0"      | #5 @ 12" O.C. | #4 @ 12" O.C.    |
| S-3     | 9'-9"      | 5'-9"        | 1'-6"    | 1'-0"     | 3'-3"     | 1'-0"      | #4 @ 6" O.C.  | #4 @ 6" O.C.     |
| S-4     | 7'-0"      | 3'-10"       | 1'-3"    | 0'-10"    | 1'-9"     | 1'-0"      | #4 @ 12" O.C. | #4 @ 12" O.C.    |
| S-5     | 5'-0"      | 2'-10"       | 1'-0"    | 0'-10"    | 1'-0"     | 1'-0"      | #4 @ 12" O.C. | #4 @ 12" O.C.    |

CAST-IN-PLACE CONCRETE SPECIFICATION

| PARAMETER                 | SPECIFICATION                                                                                                                                                                                       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Design Standards          | ACI 301 — Specifications for Structural Concrete; ACI 318 — Building Code Requirements for Reinforced Concrete; ACI 318R-11 — Building Code Requirements and Specifications for Structural Concrete |
| Min. Compressive Strength | 4,000 PSI at 28 days — wall and footing                                                                                                                                                             |
| Air Entrainment           | 5% ± 1.5% at placement                                                                                                                                                                              |
| Slump at Placement        | 5" ± 1"                                                                                                                                                                                             |
| Vertical Control Joints   | Max. 25' O.C. — Greenstreak Profile Style #714 water stop (or equal); 50% horizontal reinforcement discontinued at joint; 3/4" dia. steel pins at joint                                             |
| Consolidation             | Mechanical vibrating or spading immediately after placing — ensures concrete free of honeycombing                                                                                                   |
| Curing                    | Wet-cured minimum 4 days; 30% solids curing agent applied after wet cure removal                                                                                                                    |
| Footing Bearing           | Bottom of footing shall bear on original undisturbed soil — min. 3,000 PSF allowable bearing capacity                                                                                               |
| Backfill                  | Free of organics; compacted to min. 95% max. dry density per ASTM D-698 (Standard Proctor)                                                                                                          |
| Free-Drain Aggregate      | 12" minimum at back of wall — all sections                                                                                                                                                          |
| Weep Holes                | 4" dia. PVC @ 8' O.C. — prevents hydrostatic pressure buildup                                                                                                                                       |
| Key                       | 2"x2" key at footing/wall interface — all sections (see SW-3.0)                                                                                                                                     |

CONCRETE REINFORCEMENT SPECIFICATION

| PARAMETER                  | SPECIFICATION                                                                               |
|----------------------------|---------------------------------------------------------------------------------------------|
| Steel Grade                | ASTM A615, Grade 60 — all reinforcing steel                                                 |
| Detailing Standard         | ACI 315 — Manual of Standard Practice; CRSI Manual of Standard Practice (latest edition)    |
| Fabrication                | Cold bent to shapes and dimensions shown on drawings; no bending after embedded in concrete |
| Surface Condition          | Free from loose rust, scale, dirt, oil, or deleterious coatings that reduce bond            |
| Lap Splice Lengths         | #4 Bar — 29" minimum; #5 Bar — 36" minimum                                                  |
| Horizontal Bars            | #4 @ 18" O.C. typical; top horizontal rebar within 6"-12" from top of wall — all sections   |
| Cover — Earth Cast         | 3" clear minimum                                                                            |
| Cover — Formed/Exposed     | 2" clear minimum                                                                            |
| Cover — Interior/Unexposed | 3/4" clear minimum                                                                          |
| Corner Reinforcing         | Rebar at corner/bend — same size as horizontal wall reinforcement (see SW-4.0)              |
| Footing Dowels             | Match vertical bar size and spacing; standard 90° hooks                                     |

CONTRACTOR CONSTRUCTION NOTES (OF RECORD)

1. All design and construction shall conform to IBC 2018 Edition.
2. GC shall verify all dimensions and site conditions; notify engineer of record (Yong C. Shao, PE, GA #26340) of any discrepancies before proceeding.

3. Contractor shall follow proposed grades per civil site plans in front of and behind the wall. Changes in grade affect structural integrity — notify engineer before construction.
4. GC is responsible for means, methods, techniques, sequences, and procedures to comply with drawings and specifications.
5. Footing shall bear on original undisturbed soils only — no footing on disturbed material without written authorization from EOR.
6. Wall #1 transitions from fill to cut configuration at approximately STA 0+60 — verify exact transition station with engineer before forming.
7. No traffic surcharge assumed in design. If construction equipment operates within H distance of wall (H = wall height), notify EOR immediately for load evaluation.
8. Provide positive drainage away from wall at all times — contractor responsible for temporary drainage during construction.
9. All wall turns are per documented survey angles: 115°, 122°, 150°, 123°, 89° at respective stations along Wall #1.
10. Concrete shall not be placed during freezing temperatures without an engineer-approved cold weather protection plan on file.

PERMIT DRAWING INDEX — PROJECT NO. 07339

| SHEET  | TITLE                                                                                                                     | SCALE    | DATE      |
|--------|---------------------------------------------------------------------------------------------------------------------------|----------|-----------|
| SW-1.0 | Cover Page & Wall Locations — Plan view; scope of work; applicable codes                                                  | As Shown | 3/28/2024 |
| SW-2.0 | Overall Wall Profiles & Construction Notes — Wall #1 and #2 profiles; geotechnical parameters; concrete and masonry specs | As Shown | 3/28/2024 |
| SW-2.1 | Wall #1 Front Face Elevation Views (Enlarged) — STA 0+00 to 1+17                                                          | 1"=10'   | 3/28/2024 |
| SW-2.2 | Wall #1 Front Face Elevation (Cont.) + Wall #2 Front Face Elevation                                                       | 1"=10'   | 3/28/2024 |
| SW-3.0 | Typical Cross Sections — Fill wall and cut wall; steel schedule (S1–S5)                                                   | 1/2"=1'  | 3/25/2024 |
| SW-4.0 | Typical Details — Corner reinforcing, control joint, construction joint, stepped footing                                  | NTS      | 3/28/2024 |

ENGINEER OF RECORD: Yong C. Shao, PE — Georgia Registration No. 26340 · X&Y; Engineering Consultants, LLC · 2227 Gracehaven Way, Lawrenceville, GA 30043 · (770) 331-5534 · xyconsulting@gmail.com

All structural retaining wall drawings are PE-sealed and issued for construction. Field conditions deviating from design parameters require written authorization from the EOR before proceeding.