StrataSlope System

A Reinforced Soil Slope System using Strata Soil Reinforcement Products

Strata Systems, Inc.

380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION	
Strata Slope System	
Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA
Global GeoSolutions

C:\Users\cartl\OneDrive\Strata Systems\2015 Strata CAD Details\StrataSlope ReinforcedSlopeSystem.dwg, 3/1/2015 10:05:47 PM, Adobe PDF

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforced Soil Slope (RSS) system with geogrid reinforcement. Slope angle shall be less than or equal to 70 degrees as measured from horizontal plane.

B. Face Fill and Reinforced Backfill.

C. Welded-Wire Facing Form

D. Geotextile, Drainage Composite, Drainage Pipe, Drainage Fill, and miscellaneous materials to construct RSS System.

1.2 RELATED SECTIONS

A. Document 00300 - Information Available to Bidders: Geotechnical Report; Bore hole locations and findings of subsurface materials.

B. Section 01400 - Testing and Inspection Services.

C. Section 02200 - Site Preparation.

D. Section 02300 - Earthwork; Excavation and subgrade preparation.

E. Section 02310 - Grading.

F. Section 02315 - Excavation.

G. Section 02316 - Fill and Backfill.

H. Section 02920 - Lawns and Grasses; Ground cover at finished grade.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO)
1. AASHTO M288 - Standard Specification for Geotextiles.
2. AASHTO M252 - Standard Specification for Polyethylene Drainage Pipe.
3. AASHTO M294 - Standard Specification for Polyethylene Drainage Pipe.

B. ASTM, International
1. ASTM A 82 - Standard Specification for Steel Wire.
2. ASTM A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A 185 - Standard Specification for Steel Welded.
4. ASTM A 641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
5. ASTM A 740 - Standard Specification for Hardware Cloth (Woven or Welded Galvanized Steel Wire Fabric)
6. ASTM D 422 - Gradation of Soils.
7. ASTM D 424 - Atterberg Limits of Soils.
8. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
9. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
10. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
11. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
12. ASTM D 2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
13. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
14. ASTM D 3034 - Standard Specification for PVC Pipe and Fittings.
15. ASTM D3080 - Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions.
16. ASTM D 4354 - Standard Practice of Sampling Geosynthetics for Testing.
17. ASTM D 4595 - Standard Test Method of Tensile Properties of Geotextiles by the Wide Width Strip Method.
18. ASTM D4603 - Standard Test Method for Determining Inherent Viscosity of Poly(Ethylene Terephthalate) (PET) by Glass Capillary Viscometer.
19. ASTM D 4716 - Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
20. ASTM D 4759 - Standard Practice for Determining the Specification Conformance of Geosynthetics.
21. ASTM D 4767 - Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils.
22. ASTM D 4972 - Standard Test Method for pH of Soils.
23. ASTM D 5262 - Standard Test Method for Evaluating the Unconfined Tension Creep Behavior of Geosynthetics.
24. ASTM D 5818 - Standard Practice for Obtaining Samples of Geosynthetics from a Test Section for Assessment of Installation Damage.
25. ASTM D 6637 - Determining Tensile Properties of Geogrids by the Single or Multi-Rib Test Method.
26. ASTM D 6706 - Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil.
27. ASTM D 6992 - Standard Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time -Temperature Superposition Using the Stepped Isothermal Method.
28. ASTM D7409 - Standard Test Method for Carboxyl End Group Content of Polyethylene Terephthalate (PET) Yarns.

C. Geosynthetic Research Institute (GRI)
1. GRI-GG7 - Carboxyl End Group Content of PET Yarns.
2. GRI-GG8 - Determination of the Number Average Molecular Weight of PET Yarns Based on a Relative Viscosity Value.

D. National Highway Institute (NHI) / Federal Highway Administration
1. NHI-00-024 and NHI-00-025 - Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines.

1.4 Design Requirements

A. Design Requirements: Design reinforced soil slope system in conformance with the design guidelines of NHI-00-024 and NHI-00-025.

B. Design shall be prepared by a professional engineer registered in the state in which the project is located.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Manufacturer's certification that the system components meet the requirements of this specification.

C. Mill certification from the polyester fiber manufacturer certifying the molecular weight exceeds 25,000 g/m when determined in accordance with GRI-GG7, and carboxyl end group count less than 30 when tested in accordance with GRI-GG8.
1. Molecular weight and carboxyl end group test shall be conducted and reported by a GAI-LAP certified laboratory. Test reports shall identify the PET fiber manufacturer, PET fiber type, and PET fiber lot or merge number. Test report shall be dated no more than 1 year older than date of submittal.
2. Manufacturer shall maintain an accredited quality management system, such ISO 9001:2008 or similar.
3. Geogrid manufacturer shall provide sufficient documentation that demonstrates the PET fiber mill certification applies to the specific geogrid production lot(s) delivered to the project.

D. A set of detailed design plans sealed by a registered professional engineer licensed in the state of the project. The plans shall include plan and elevation views of each structure, cross sections and all details, dimensions and quantities necessary for construction.

E. Samples: Two samples of each component including:
1. Geogrid: Nominal 6 inch by 10 inch (150 mm by 250 mm) of each type required.
2. Geotextile, Erosion Control Blanket, and Drainage Composite: 4 inch by 6 inch (100 mm by 150 mm) pieces.

Strata Systems, Inc.

380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

Strata Slope System

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA Global GeoSolutions

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: RSS system components manufactured by licensees or by companies approved and authorized by the component supplier.

B. Installer Qualifications: Firm with documented experience of at least five projects of similar construction and scope. Include brief description of each project and name and phone number of owner's representative knowledgeable in each listed project.

C. RSS System Engineer: Firm with documented experience of at least five projects of similar construction and scope. Include brief description of each project and name and phone number of owner's representative knowledgeable in each listed project.

D. Owner shall provide soil testing and quality assurance inspection during earthwork and slope construction operations. Installer shall provide any quality control testing or inspection not provided by the Owner. Owner's quality assurance program does not relieve the installer of responsibility for quality control and slope performance.

E. Pre-Construction Meeting: Prior to construction of reinforced soil slopes, conduct a meeting at the site with the material suppliers, reinforced soil slope installer, and the Contractor to review the reinforced soil slope requirements. Notify the Owner and the Architect at least 3 days in advance of the time of the meeting.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Prevent excessive mud, fluid concrete, epoxy, or other deleterious materials from coming in contact with system components.

C. Polymeric Materials: During storage, geosynthetic rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical property values of the geosynthetic.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

A. Do not place or compact fill material during wet or freezing weather that prevents achievement of specified compaction requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Geogrid: StrataGrid and MicroGrid: Strata Systems, Inc., 380 Dahlonega Road, Suite 200, Cumming, Georgia, 30040. Tel: (770) 888-6688, Toll Free: (800) 680-7750. Fax: (770) 888-6680. Web Site: . E-mail: .

B. Substitutions: Not permitted.

2.2 MATERIALS

A. System Description: Reinforced Soil Slope (RSS) system consists of a mechanically stabilized engineered backfill reinforced with StrataGrid or MicroGrid polyester soil reinforcement products.

B. Geogrid: StrataGrid shall provide the following minimum properties:
1. StrataGrid Tensile Requirements
   a. Allowable Tensile Strength (Ta) shall be defined as Tult / RF. Where RF = RFCR x RFD x RFID. Reduction Factor for Creep (RFCR), Reduction Factor for Durability (RFD), and Reduction Factor for Installation Damage (RFID).
   b. Ultimate Tensile Strength (Tult) shall be the minimum average roll value (MARV) as tested per ASTM D 6637.
   c. Reduction Factor for Creep (RFCR) shall be based on 75-year design life determined in accordance with ASTM D 5262 or ASTM D 6992. Reduction Factor for Creep (RFCR) shall not be less than 1.5.
   d. Reduction Factor for Installation Damage (RFID) shall be based on reinforced backfill type designated above or reinforced backfill gradation as indicated in the approved shop drawings or specifications. Installation damage testing and material sampling shall be in conformance with ASTM D 6637 and ASTM D 5818. Reduction Factor for Installation Damage (RFID) shall not be less than 1.05.
   e. Reduction Factor for Durability (RFD) shall be based on polyester fiber testing. Polyester fiber shall have a molecular weight ≥ 25,000 g/m per GRI-GG8 and a carboxyl end group (CEG) number ≤ 30 per GRI- GG7. Reduction Factor for Durability (RFD) shall not be less than 1.10.

2. Soil Interaction Coefficient (Ci) value shall be determined from short-term effective stress pullout test per ASTM D 6706 over the range of normal stresses encountered. The minimum Ci value shall not be less than 0.7, determined as follows:

$$Ci = \frac{F}{2L\sigma N \tan(\varphi)}$$

   a. F = Pullout force per ASTM D 6706, lb/ft (kN/m).
   b. L = Geosynthetic embedment length during test, ft (m).
   c. σN = Effective normal stress, psf (kPa).
   d. φ = Effective soil friction angle, degrees.

C. Intermediate or Slope Face Wrap Geogrid: MicroGrid or StrataGrid, as indicated in the approved shop drawings, shall provide the following minimum tensile properties:
1. Intermediate or Slope Face Wrap Geogrid Tensile Requirements
   a. Allowable Tensile Strength (Ta) shall be defined as Tult / RF. Where RF = RFCR x RFD x RFID. Reduction Factor for Creep (RFCR), Reduction Factor for Durability (RFD), and Reduction Factor for Installation Damage (RFID).
   b. Ultimate Tensile Strength (Tult) shall be the minimum average roll value (MARV) as tested per ASTM D 6637 or ASTM D 4595.
   c. Reduction Factor for Creep (RFCR) shall be based on 75-year design life determined in accordance with ASTM D 5262 or ASTM D 6992. Reduction Factor for Creep (RFCR) shall not be less than 1.5.
   d. Reduction Factor for Installation Damage (RFID) shall be based on reinforced backfill type designated above or reinforced backfill gradation as indicated in the approved shop drawings or specifications. Installation damage testing and material sampling shall be in conformance with ASTM D 6637 and ASTM D 5818. Reduction Factor for Installation Damage (RFID) shall not be less than 1.05.
   e. Reduction Factor for Durability (RFD) shall be based on polyester fiber testing. Polyester fiber shall have a molecular weight ≥ 25,000 g/m per GRI-GG8 and a carboxyl end group (CEG) number ≤ 30 per GRI- GG7. Reduction Factor for Durability (RFD) shall not be less than 1.10.

D. Drainage Fill: Free-draining, coarse-grained soil placed within subsurface drainage systems.
1. 100 percent passing a 1-inch (25 mm) sieve.
2. 50 to 75 percent passing a 3/4-inch (19 mm) sieve.
3. 0 to 60 percent passing a No. 4 sieve (4.75 mm).
4. 0 to 50 percent passing a No. 40 sieve (0.425 mm).
5. 0 to 5 percent passing a No. 200 sieve (0.075 mm).

E. Reinforced Backfill: Granular fill with a pH range of 3 to 9, when tested in accordance with AASHTO T 289 and graded as follows:
1. 100 percent passing a 2-inch (50 mm) sieve.
2. 20 to 100 percent passing a No. 4 sieve (4.75 mm).
3. 0 to 60 percent passing a No. 40 sieve (0.425 mm).
4. 0 to 50 percent passing a No. 200 sieve (0.075 mm).
5. PI ≤ 15
6. LL ≤ 30

F. Stone facing fill for 9x2 Hot-Dip Galvanzied Wire form shall consist of 3 inch (75mm) max. to 2.5 inch (64mm) min. crushed aggregate.

G. Geotextile: Non-woven geotextile, AASHTO M288, Class 2 or Class 3 as indicated in the approved shop drawings.

H. Drainage composite: StrataDrain 30-2 - polyethylene drainage net with 4 oz/sy (136 g/m2) polypropylene non-woven geotextile bonded on both sides.
1. Minimum Allowable Transmissivity of Core Net: Not less than 9 gallon per minute per foot of width (3 x10-4 square meters per second) when tested in accordance with ASTM D 4716 at a hydraulic gradient equal to one.

I. Solid and Perforated or Slotted Drainage Pipe, where indicated in the approved shop drawings, shall be PVC pipe manufactured in accordance with ASTM D 3034 or polyethylene pipe meeting AASHTO M252 or M294.

J. Welded-Wire Facing Forms: Steel welded wire mesh facing form, bent 90 degrees at long center line to form "L" shaped unit; vertical section as face to retain fill, and horizontal leg extending into fill; diagonal steel struts supporting top edge of vertical leg. Facing forms and struts shall be black wire steel or as indicated in the approved shop drawings.
1. Black Steel Forms - 4.0 inches by 4.0 inches (100 mm by 100 mm) or Galvanized 9 inches by 2 inches.
   a. Wire Mesh Facing Unit: Black in accordance with ASTM A 82 and ASTM A 185 or Galvanzied in accordance with ASTM A82, A182, and A123.
   b. Wire Strut Type: Black in accordance with ASTM A 82 or galvanized per ASTM A641.
   c. Wire Mesh Spacing: 4.0 inches by 4.0 inches or 9 inches by 2 inches (vertical x horizontal wires) as indicated on the approved drawings.
   d. Wire Mesh Size: W4.0 or W4.5 x W3.0 per the approved drawings.
   e. Wire Strut Size: W4.0 or W4.5 per the approved drawings.
2. Tie wire or cable ties to connect vertical wires of adjacent facing units.

Strata Systems, Inc.

380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

Strata Slope System

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA Global GeoSolutions

PART 3 EXECUTION

3.1 PREPARATION

A. Do not begin installation until excavation, foundation preparation and leveling pad have been completed, properly prepared, and inspected per project specifications.

B. If subgrade preparation is the responsibility of another installer, notify Architect / Owner's Geotechnical Engineer of unsatisfactory preparation. Do not begin work until unsatisfactory conditions have been rectified as directed by the Owner's Geotechnical Engineer.

C. Excavation:
1. Excavate the subgrade vertically to the plan elevation and horizontally to the extent of the geogrid lengths.
2. Remove soils not meeting required strength and replace with approved materials by the Owner's Geotechnical Engineer.
3. Protect excavated materials to be used for backfilling the reinforcement zone from the weather.

D. Foundation Preparation:
1. In absence of specified ground improvement requirements in the plans and contract documents, the foundation for the reinforced fill and retained backfill shall be graded level for the entire area of the base of such backfills, plus an additional 12 inches on all sides, or to the limits shown in the shop drawings.
2. If structure is to be position on native soils, the top one (1) foot of native soil shall meet the requirements of the reinforced backfill material.
3. The contractor shall perform proof-rolling to evaluate the subgrade soils on which the structure will be constructed. Proof rolling shall be performed on the entire areas at the following locations:
   a. At the bottom of over excavation and recompaction/replacement zones.
   b. At the base of all structures.
   c. At the top of native soils that have been scarified, moisture-conditioned, and recompacted (if different from the bottom of over excavation and recompaction/replacement zones).
4. Proof-rolling shall be done immediately after subgrade compaction while the moisture content of the subgrade is at the moisture content that was used to achieve the required compaction.
   a. Proof-rolling shall be performed with a pneumatic-tired tandem axle roller with at least three wheels on each axle, a gross weight of 25 tons (50 kips), a minimum tire pressure of 75 pounds per square inch, and a minimum rolling width of 75 inches. A Caterpillar PS-300B (or PF-300B), Ingersoll-Rand PT-240R, BOMAG BW24R, Dynapac CP271, or equipment with equivalent capabilities shall be used for proof-rolling.
   b. Proof-rolling equipment shall be operated at a speed between 1.5 and 3 miles per hour, or slower as required by the Engineer to permit measurements of deformations, ruts and/or pumping.
   c. Proof-rolling shall be carried out in two directions at right angles to each other with no more than 24 inches (600mm) between tire tracks of adjacent passes. Operate proof-roller in a pattern that readily allows recording of deformation data and complete coverage of the subgrade.
   d. Proof-rolling shall be carried out in two directions at right angles to each other with no more than 24 inches (600mm) between tire tracks of adjacent passes. Operate proof-roller in a pattern that readily allows recording of deformation data and complete coverage of the subgrade.
   e. The following actions shall be taken based on results of proof-rolling, or as directed by the Engineer:
      1) Rutting less than ¼-inch - Acceptable.
      2) Rutting greater than ¼-inch and less than 1 ½ inches - Scarify and recompact.
      3) Rutting greater than 1 ½ inches - The compacted area shall be removed and reconstructed.
      4) Pumping (deformation that rebounds, or materials that are squeezed out of a wheel's path) greater than one (1) inch - Area shall be remediated as directed by the Engineer.
1. Over-excavated areas of the subgrade shall be filled in maximum loose lifts of 10 inches (250 mm) and shall be compacted to a minimum of 95 percent Standard Proctor Dry Density with -1% to +2% of optimum moisture content in accordance with ASTM D 698, or more stringent criteria if directed by the Engineer.
2. Owner's Geotechnical Engineer will inspect the subgrade soil for the reinforced fill and retained backfill zone to ensure proper bearing strength in accordance with the specified Field Quality Control provisions.
3. Contractor shall be responsible for maintaining the condition of approved proof-rolled soils throughout the duration of the structure construction. Construction shall not commence until the foundation/subgrade has been approved by the Engineer.

3.2 CONSTRUCTION

A. Construct reinforced soil slope system in accordance with the approved shop drawings and Construction and Quality Control Manual supplied by the manufacturer.

B. Welded-Wire Facing Form Installation:
1. Place the first course of wire mesh facing forms with the horizontal legs resting on the foundation material.
2. Verify that the first row of facing forms is level from end to end and from front-to-back.
3. Overlap or butt the adjacent facing units, as indicated in the approved shop drawings. Tie together vertical wires of adjacent facing units as required to maintain alignment and prevent escape of backfill material.
4. Use a string line or equivalent to align straight sections.
5. Place subsequent courses of facing forms on previous courses, at a setback, if any, as shown on shop drawings.
6. Align subsequent courses of facing forms using a string line or other suitable method that is independent of the final position of the underlying course of facing forms.

C. Geogrid placement:
1. Geogrid shall be buried (or covered) within one (1) week of placement.
2. Unroll the geogrid and cut to the length indicated in the approved shop drawings.
3. Place geogrid on level and compacted reinforced fill at locations indicated in the approved shop drawings.
4. Primary strength direction of the structural geogrid shall be placed perpendicular to the wall.
5. Unroll and place slope face wrap geogrid parallel to the slope face unless otherwise shown on shop drawings. Slope face wrap geogrids may be cut to the required width prior to unrolling.
6. Extend the geogrid and any required erosion control or geotextile beyond the slope face by the amount required for the wrapped face and for anchorage at the top of the wrap, as detailed in the approved shop drawings.
7. Wrap the backfill as indicated on the approved shop drawings.
8. When the structural geogrid is used as the slope face wrap geogrid, place the structural geogrid across the horizontal leg and up the inside of the facing form. Drape the anchorage length of the structural geogrid over the top of the facing form. Place geotextile and/or erosion control blanket inside the wire facing form anchored into the fill top and bottom as indicated in the approved shop drawings.
9. When using slope face wrap geogrid, place the slope face wrap geogrid, geotextile and/or the erosion control blanket inside the wire facing form anchored into the fill top and bottom as indicated in the approved shop drawings. Place the structural geogrid over the horizontal leg of the facing units and face wrap materials. The edge of structural geogrids shall be positioned immediately behind vertical face of the unit.
10. After placement of geogrid and any required face wrap, place six (minimum) wire support struts on approximately 24-inch (600-mm) centers connecting the upper horizontal wire on the face of facing form to the transverse wire at the rear of the facing form. Place one of the support struts at each end of the facing unit between the outer two vertical wires.
11. Prior to fill placement, pull the structural geogrid taut to remove slack. Stake or pin the geogrid near the end to maintain alignment and to prevent development of slack during backfill placement.
12. The top portion of the face wrap geogrid shall be pulled taut and secured (stake or pin) prior to placement of next wire form and backfill. Face wrap geogrid shall be taut without wrinkles or slack.
13. Place and compact the face fill and reinforced backfill in accordance with the project specifications and approved shop drawings.
14. Adjacent embedment lengths of structural geogrid shall abut to provide 100% coverage at elevations requiring geogrid reinforcement, as indicated in the approved shop drawings.
15. Overlap ends of adjacent sections of slope face wrap geogrid a minimum of 3 inches (75 mm). No fill is required between 3-inch (75-mm) overlap of slope face wrap geogrid.
16. Place a minimum of 3 inches (75 mm) of fill between overlapping layers of structural geogrid where overlapping occurs behind curves and corners of a wall.
17. Construction vehicles shall not be operated directly on the geogrid. A minimum of 6 inches (150 mm) of fill cover over the geogrid is required for operation of construction vehicles in the reinforced zone.
18. Turning of vehicles should be avoided to prevent dislocation or damage to the geogrid and the facing units.
19. Primary geogrid may be overlapped or connected mechanically to form splices in the primary strength direction. The splice method must develop 150% of the Ta of the reinforcement layer. The minimum overlap length shall be 3 feet (1m). Splices shall not be used within 6 feet (1.8m) of either end of the reinforcement layer or within 6 feet (1.8m) of finished grade. No overlapping is required between adjacent rolls. Splice requirements shall be as detailed in the approved shop drawings.
20. Overlap splice shall not be utilized with slope face wrap geogrid.

Strata Systems, Inc.

380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

Strata Slope System

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA Global GeoSolutions

D. Reinforced backfill:
   1. Place the reinforced backfill material in maximum compacted lifts of 9 inches (226 mm) and compact to a minimum Standard Proctor Dry Density of 95 percent within -1 to +2 percent of optimum moisture content, per ASTM D 698.
   2. Use only walk-behind compaction equipment within 3 feet (1 meter) of the facing units. Use a minimum of 3 passes to compact this zone.
   3. Required level of compaction shall be achieved throughout the entire reinforced backfill zone, as measured from the back of the facing unit to the end of geogrid reinforcement. Reinforced fill zone limits shall be as indicated on the approved shop drawings.
   4. Smooth and level the backfill as indicated so that the geogrid lays flat. Grade shall not slope towards facing units.
   5. Separate reinforced fill from the adjacent soil with geotextile, as indicated in the approved shop drawings

3.3 FIELD QUALITY CONTROL

A. Quality Assurance: Testing and Inspection will be provided by the Owners Testing Agency as specified in Section 01400 Testing and Inspection Services. Notify the Architect / Owner's Geotechnical Engineer 72 hours in advance of testing.

B. Quality Control: Testing and Inspection shall be provided by an independent laboratory provided by the Contractor and acceptable to the Architect / Owner's Geotechnical Engineer.

C. The reinforced backfill shall be sampled and tested by the Contractor for acceptance and quality control in accordance with the following:
   1. Gradation Test - ASTM D 422
      a. One test per 2,000 cubic yards at job site
      b. Change in appearance or behavior of backfill
      c. Change in borrow source
   2. Plasticity Index - ASTM D 424
      a. One test per 2,000 cubic yards at job site
      b. Change in appearance or behavior of backfill
      c. Change in borrow source
   3. Soil pH - ASTM D 4972
      a. One test per 2,000 cubic yards at job site
      b. Change in appearance or behavior of backfill
      c. Change in borrow source
   4. Field Density Testes - ASTM D 1556, D 2167, or D 2922 as appropriate for material tested and Moisture Test - ASTM D 3017
      a. Compaction control testing of the reinforced backfill should be performed on a regular basis during the entire construction project. Conduct compaction control test (Density and Moisture) at a minimum rate of
         1) One test within the reinforced backfill zone per every 5 ft (1.5 m) of vertical height for every 100 ft (30 m) of length, approximately every 500 square feet (45 square meters) of vertical face area.
         2) One test per 2,000 cubic yards at job site
         3) The higher frequency of testing shall be required.
   5. Internal effective friction angle - ASTM D 3080
      a. One test per material change
      b. One test per change in borrow source
      c. New test shall be required for each source regardless of whether the USCS designation changes or not.
   6. Proctor and Optimum Moisture by ASTM D 698
      a. One test per material change
      b. One test per change in borrow source
      c. New test shall be required for each source regardless of whether the USCS designation changes or not.

D. The retained backfill shall be sampled and tested by the Contractor for acceptance and quality control in accordance with the following:
   1. Gradation Test - ASTM D 422
      a. One test per 5,000 cubic yards at job site
      b. Change in appearance or behavior of backfill
      c. Change in borrow source
   2. Plasticity Index - ASTM D 424
      a. One test per 5,000 cubic yards at job site
      b. Change in appearance or behavior of backfill
      c. Change in borrow source
   3. Field Density Testes - ASTM D 1556, D 2167, or D 2922 as appropriate for material tested and Moisture Test - ASTM D 3017
      a. Compaction control testing of the reinforced backfill should be performed on a regular basis during the entire construction project. Conduct compaction control test (Density and Moisture) at a minimum rate of
         1) One test within the reinforced backfill zone per every 7 ft (2.1 m) of vertical height for every 150 ft (45.7 m) of length, approximately every 1050 square feet (97.5 square meters) of vertical face area.
         2) One test per 5,000 cubic yards at job site
         3) The higher frequency of testing shall be required.
   4. Internal effective friction angle - ASTM D 3080
      a. One test per material change
      b. One test per change in borrow source
      c. New test shall be required for each source regardless of whether the USCS designation changes or not.
   5. Proctor and Optimum Moisture by ASTM D 698
      a. One test per material change
      b. One test per change in borrow source
      c. New test shall be required for each source regardless of whether the USCS designation changes or not.

E. Minimum Frequency of Test for leveling pad and subgrade (foundation) soils, or as stated in the contract documents:
   51. Leveling Pad Trench: A minimum rate of one test per 100 feet (30 m) of trench.
   52. Subgrade Soil: A minimum rate of one test per 50 feet (15 m) length of structure.

END OF SECTION

Strata Systems, Inc.

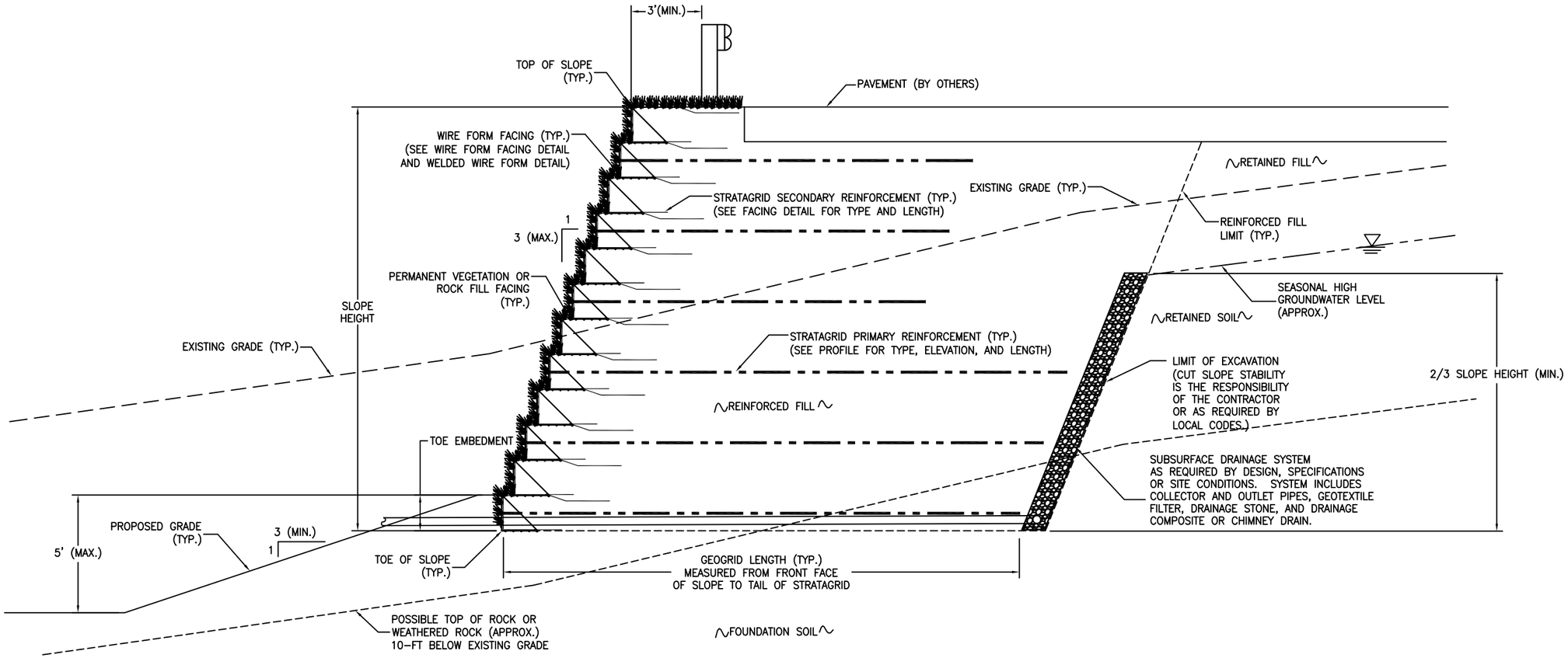
380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

Strata Slope System

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA Global GeoSolutions



Strata Systems, Inc.

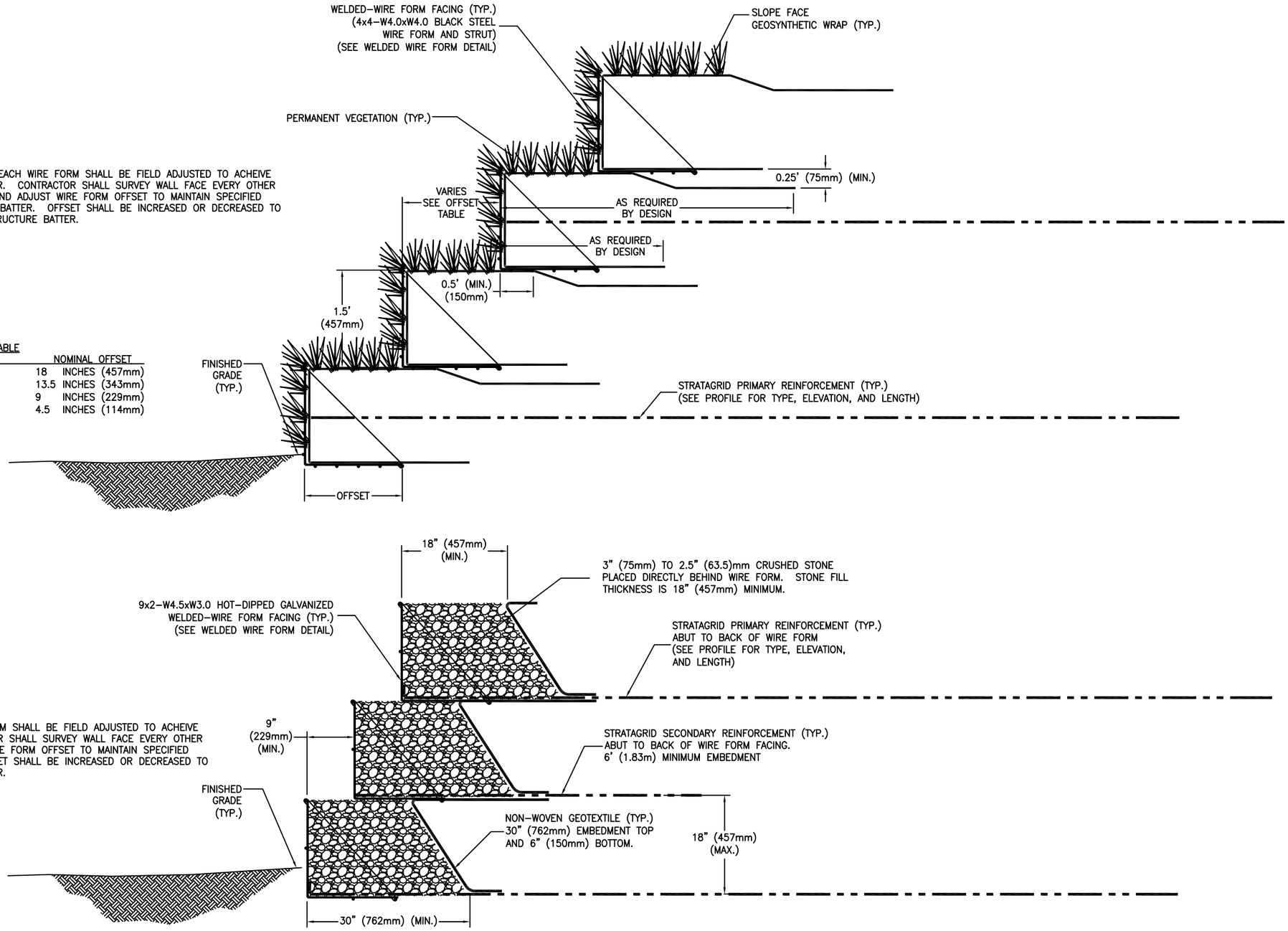
380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

Reinforced Soil Slope
Typical Cross Section
1H1V or Steeper

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: 1:50

STRATA
Global GeoSolutions



NOTE:
OFFSET BETWEEN EACH WIRE FORM SHALL BE FIELD ADJUSTED TO ACHEIVE FINAL WALL BATTER. CONTRACTOR SHALL SURVEY WALL FACE EVERY OTHER WIRE FORM LIFT AND ADJUST WIRE FORM OFFSET TO MAINTAIN SPECIFIED FINAL STRUCTURE BATTER. OFFSET SHALL BE INCREASED OR DECREASED TO ACHEIVE FINAL STRUCTURE BATTER.

OFFSET TABLE

SLOPE ANGLE	NOMINAL OFFSET
1H:1V	18 INCHES (457mm)
0.75H:1V	13.5 INCHES (343mm)
0.5H:1V	9 INCHES (229mm)
0.25H:1V	4.5 INCHES (114mm)

NOTE:
OFFSET BETWEEN EACH WIRE FORM SHALL BE FIELD ADJUSTED TO ACHEIVE FINAL WALL BATTER. CONTRACTOR SHALL SURVEY WALL FACE EVERY OTHER WIRE FORM LIFT AND ADJUST WIRE FORM OFFSET TO MAINTAIN SPECIFIED FINAL STRUCTURE BATTER. OFFSET SHALL BE INCREASED OR DECREASED TO ACHEIVE FINAL STRUCTURE BATTER.

Strata Systems, Inc.

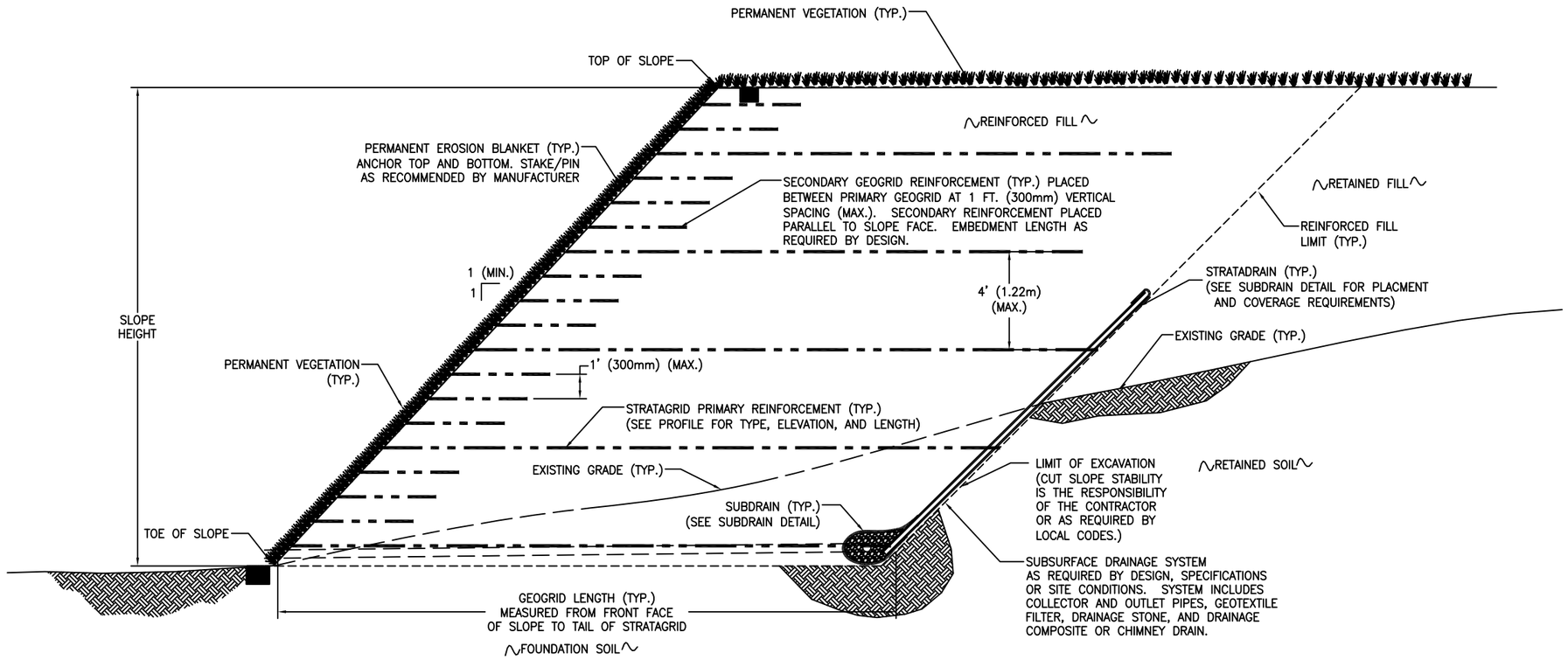
380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

Reinforced Soil Slope
Facing Detail – 1H1V or Steeper

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA
Global GeoSolutions



Strata Systems, Inc.

380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

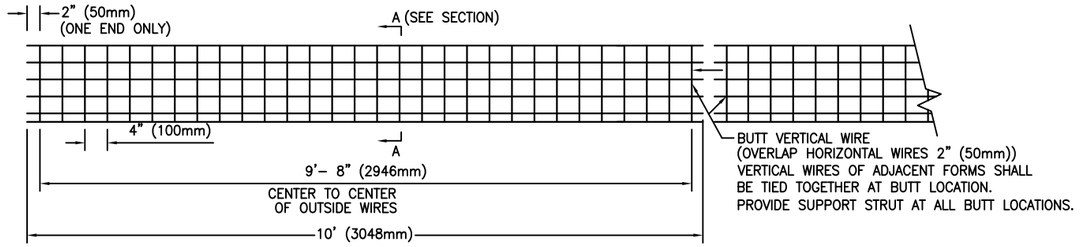
DESCRIPTION

Reinforced Soil Slope
Typical Cross Section
1H1V or Flatter

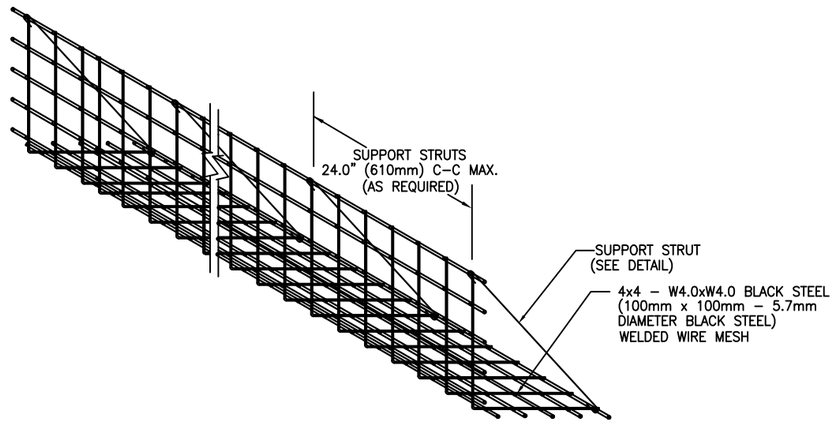
Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA
Global GeoSolutions

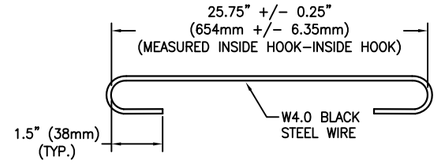
C:\Users\cartl\OneDrive\Strata Systems\2015 Strata CAD Details\StrataSlope ReinforcedSlopeSystem.dwg, 3/1/2015 10:07:41 PM, Adobe PDF



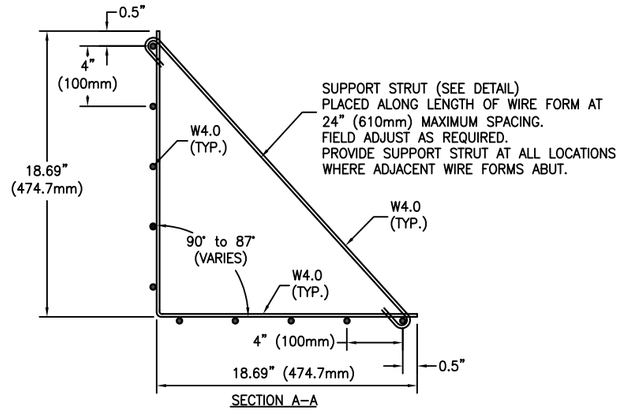
ELEVATION VIEW



NOTES:
1. FACING TO CONSIST OF PREFABRICATED BLACK WWF, 4x4–W4.0xW4.0 (100mm x 100mm – 5.7mm DIAMETER) FORMS.
2. ALL FORMS AND STRUTS SHALL BE BLACK.
3. STEEL WIRE AND STRUTS SHALL COMPLY WITH ASTM A82. FABRICATION SHALL MEET ASTM A185.
4. OVERALL LENGTH OF WIRE FORMS IS 10'–0" (3048mm) EFFECTIVE CONSTRUCTED LENGTH IS 9–'8" (2946mm) WITH 2" (50mm) OVERLAP AT ENDS.



SUPPORT STRUT DETAIL



SECTION A–A

Strata Systems, Inc.

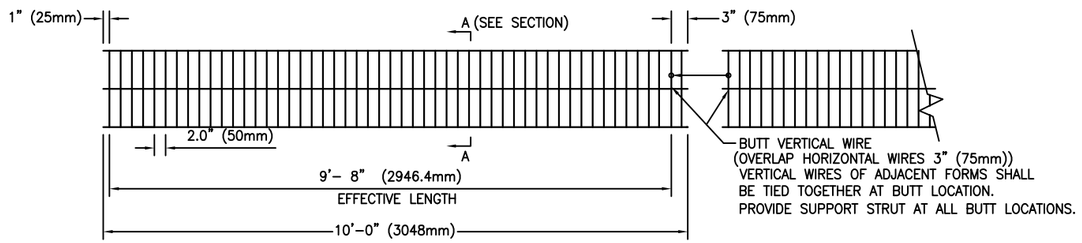
380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

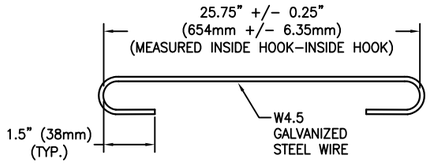
Reinforced Soil Slope
90° – Black–Steel Welded–Wire Form Details

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

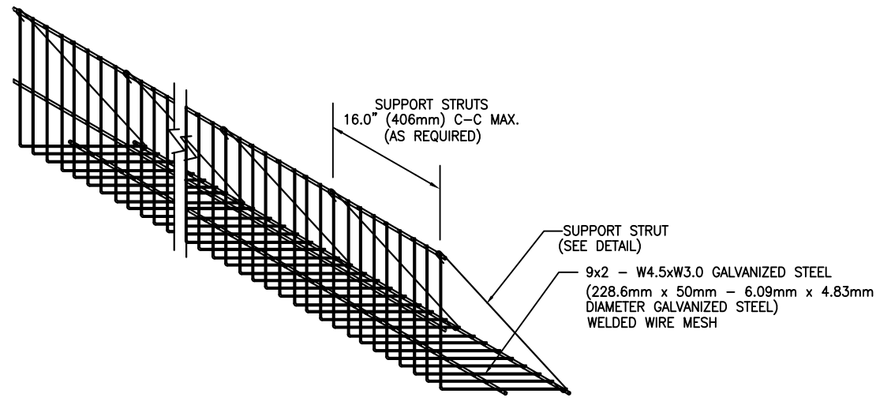
STRATA
Global GeoSolutions



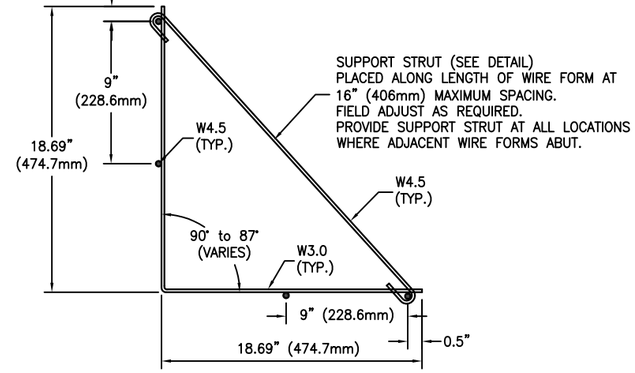
ELEVATION VIEW



GALVANIZED SUPPORT STRUT DETAIL



NOTES:
1. FACING TO CONSIST OF PREFABRICATED HOT–DIP GALVANIZED STEEL WWF, 9x2–W4.5xW3.0 (228.6mm x 50mm – 6.09mm x 4.83mm DIAMETER WIRE) FORMS.
2. ALL FORMS AND STRUTS SHALL BE GALVANIZED.
3. STEEL WIRE AND STRUTS SHALL COMPLY WITH ASTM A82. FABRICATION SHALL MEET ASTM A185.
4. WIRE FORMS SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A123/A123M.
5. STEEL STRUTS SHALL BE GALVANIZED (ELECTROPLATED), ASTM A641/A641M.
6. OVERALL LENGTH OF WIRE FORMS IS 10'–0" (3048mm). EFFECTIVE CONSTRUCTED LENGTH IS 9'–8" (2946.4mm) WITH 2" (50mm) OVERLAP AT ENDS.



SECTION A–A

Strata Systems, Inc.

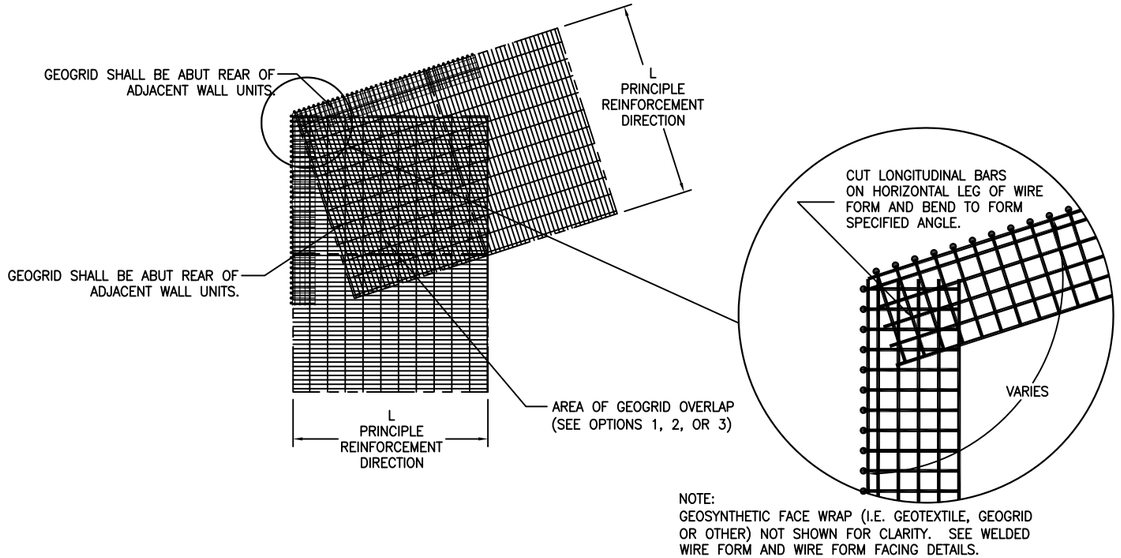
380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

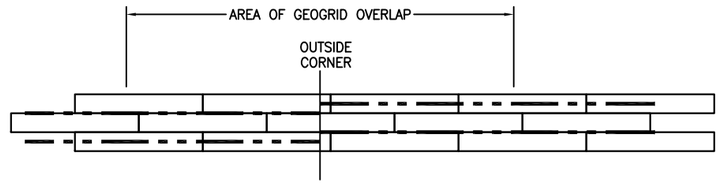
Reinforced Soil Slope
90° – Hot–Dip Galvanized Steel Welded–Wire Form Details

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA
Global GeoSolutions

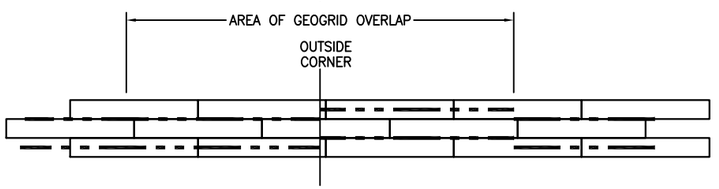


NOTE:
GEOSYNTHETIC FACE WRAP (I.E. GEOTEXTILE, GEOGRID OR OTHER) NOT SHOWN FOR CLARITY. SEE WELDED WIRE FORM AND WIRE FORM FACING DETAILS.



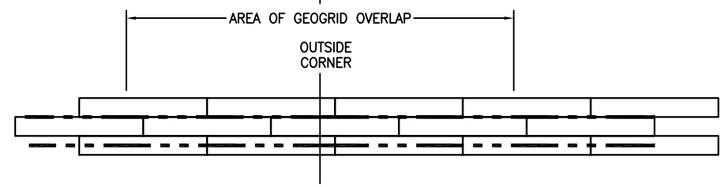
OPTION 1:

DESIGN GEOGRID LAYOUT SUCH THAT GEOGRID ELEVATION(S) ALONG ADJACENT WALL FACES ARE SEPARATED BY A MINIMUM OF ONE FACING UNIT.



OPTION 2:

MODIFY GEOGRID LAYOUT SUCH THAT GEOGRID ELEVATION(S) IN AREA OF OVERLAP ARE SEPARATED BY A MINIMUM OF ONE FACING UNIT. RETURN GEOGRID ELEVATIONS TO SPECIFIED DESIGN ELEVATIONS BEYOND AREA OF OVERLAP.



OPTION 3:

IN AREA OF GEOGRID OVERLAP PLACE 3–INCH (75mm) SOIL COVER BETWEEN OVERLAPPING LAYERS OF GEOGRID. TRIM GEOGRID AT ADJACENT WALL FACE SUCH THAT GEOGRID DOES NOT OVERLAP BETWEEN FACING UNITS.

Strata Systems, Inc.

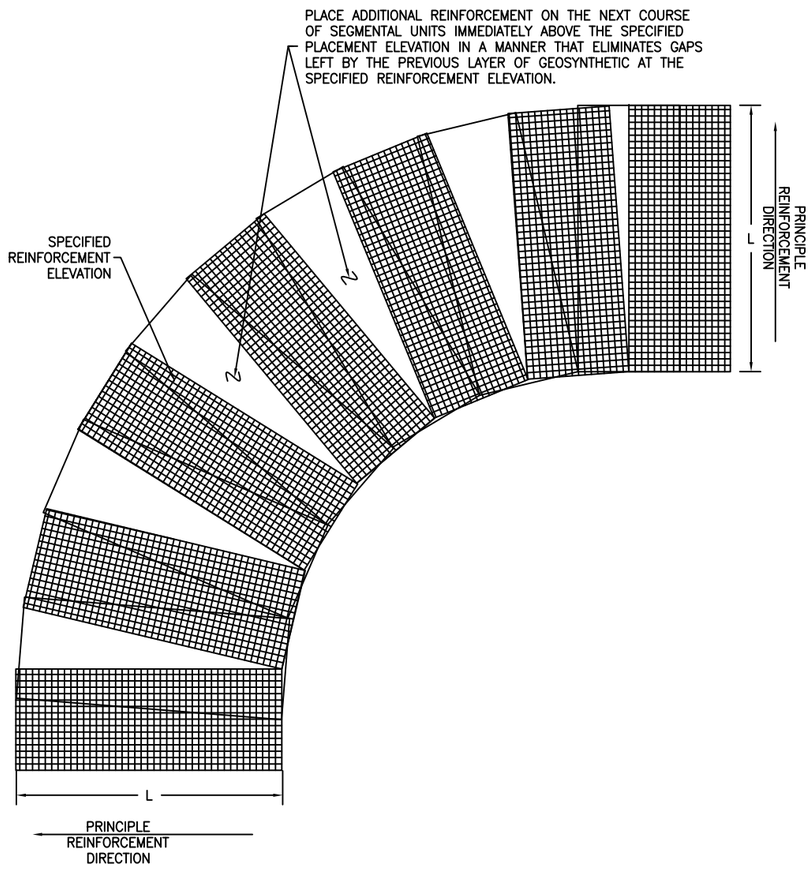
380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

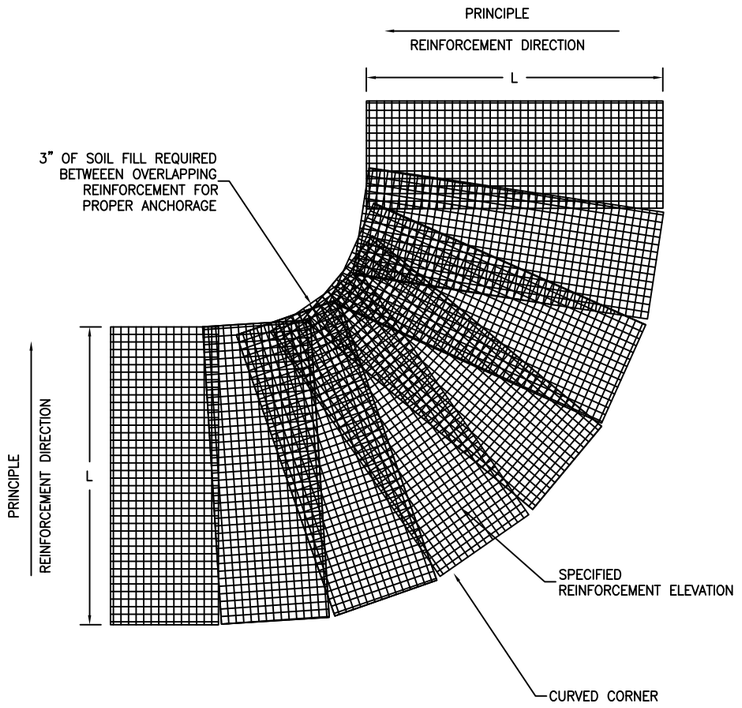
DESCRIPTION

Reinforced Soil Slope
Welded–Wire Form – Outside Corner

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA
Global GeoSolutions





Strata Systems, Inc.

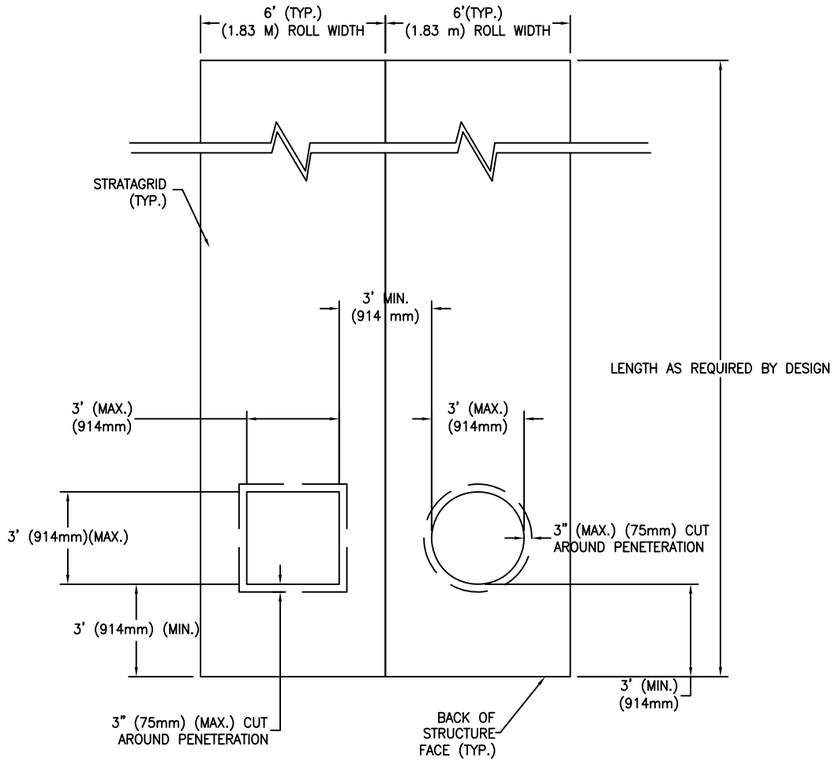
380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

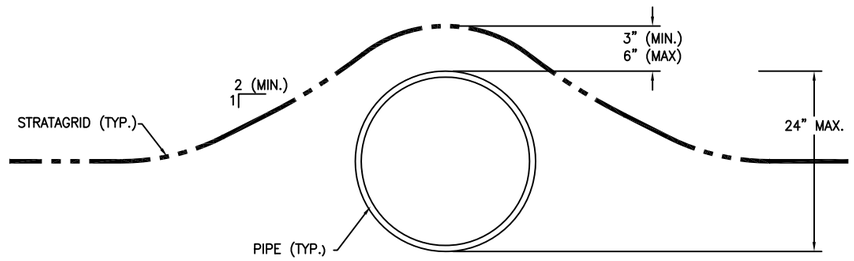
DESCRIPTION

Reinforced Soil Slope
Geogrid on Curve Details

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA
Global GeoSolutions





Strata Systems, Inc.

380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

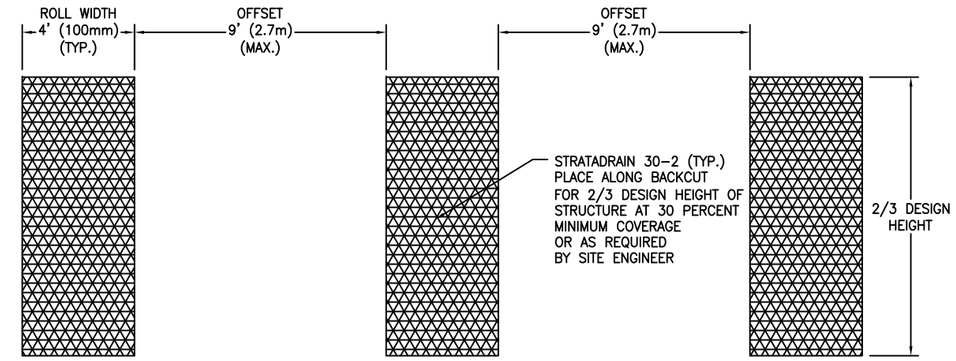
DESCRIPTION

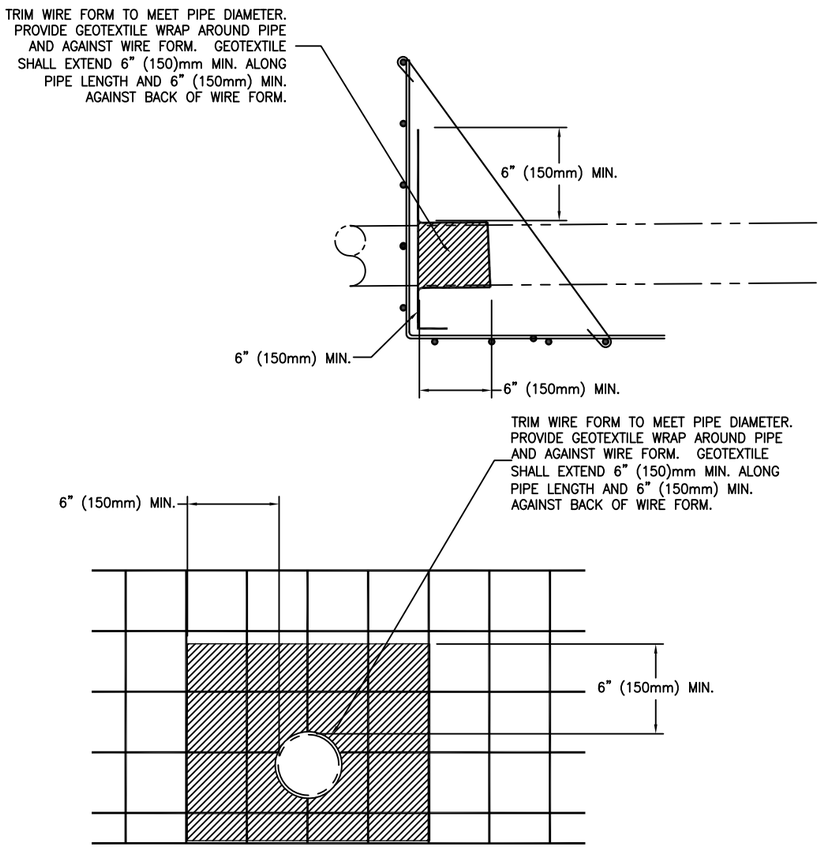
Reinforced Soil Slope
Geogrid Interference Details

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

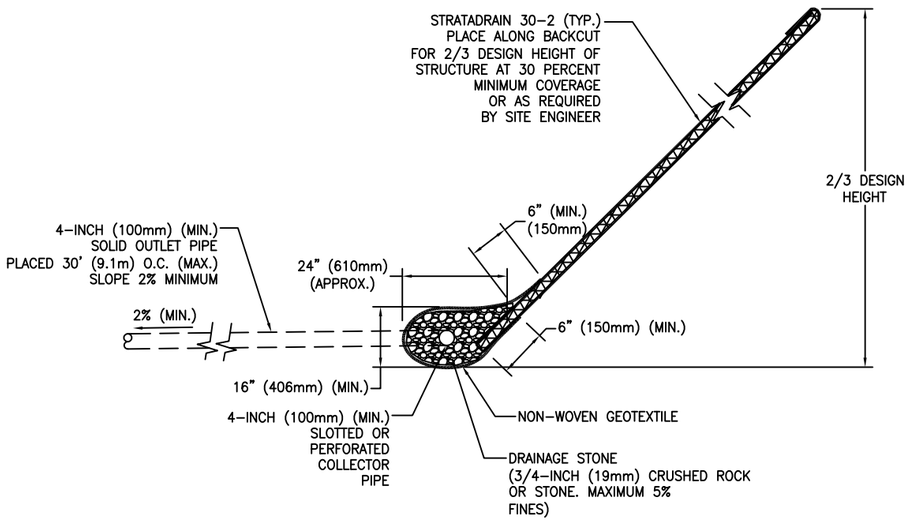
STRATA
Global GeoSolutions

Sheet 13/14





NOTE: GEOGRID FACE WRAP, GEOTEXTILE WRAP, OR EROSION BLANKET WRAP NOT SHOWN FOR CLARITY.



Strata Systems, Inc.

380 Dahlonega Road, Suite 200
Cumming, Georgia, 30040 USA
Tel: 770-888-6688
www.geogrid.com

DESCRIPTION

Reinforced Soil Slope
Drainage Feature Details

Project No.:	Design By: RLC
Date: March 31, 2010	Drawn By: RLC
Rev #: 002	Scale: Not to Scale

STRATA
Global GeoSolutions