WHAT IS CLAIMED IS:

1. A multi-axial integral geogrid comprising:

a plurality of interconnected oriented strands and partially oriented junctions forming a repeating pattern of outer hexagons having an array of openings therein,

supporting ribs extending inwardly from each of said outer hexagons to support inside each of said outer hexagons a smaller inner hexagon having an unobstructed, open center and oriented strands and tri-nodes, each of said tri-nodes interconnecting only one of said supporting ribs and two of said oriented strands of the inner hexagon,

said outer hexagons, said supporting ribs and said inner hexagons defining three different geometric configurations which are repeating throughout an entirety of the geogrid, and

said oriented strands and said partially oriented junctions of said outer hexagons defining a plurality of linear strands that extend continuously throughout an entirety of the geogrid.

2. The multi-axial integral geogrid according to claim 1, wherein said plurality of linear strands extend continuously throughout the entirety of the geogrid without intersecting an inside of the outer hexagons.

3. The multi-axial integral geogrid according to claim 1 or 2, wherein the oriented strands have been biaxially stretched.

4. The multi-axial integral geogrid according to claim 1, 2 or 3, wherein the inner hexagon can deflect up and down out of a plane of the geogrid during compaction of aggregate.

5. The multi-axial integral geogrid according to claim 4, wherein the inner hexagon can deflect up and down out of the plane of the geogrid during compaction of the aggregate up to 33% of a thickness of the partially oriented junctions.

6. The multi-axial integral geogrid according to any one of claims 1 to 5, wherein the oriented geogrid exhibits an increased individual aperture area distribution and stiffness relative to the individual aperture area distribution, strength, and stiffness of a triaxial integral geogrid.

7. The multi-axial integral geogrid according to any one of claims 1 to 6, wherein the oriented strands form openings having repeating hexagonal, trapezoidal and triangular shapes.

8. The multi-axial integral geogrid according to any one of claims 1 to 7, wherein there are three continuous linear strands that extend continuously throughout the entirety of the geogrid, the three continuous linear strands being separated from each other by 120°.

9. The multi-axial integral geogrid according to any one of claims 1 to 8, wherein the geogrid is a monolayer.

10. The multi-axial integral geogrid according to any one of claims 1 to 9, wherein the geogrid has a thickness of from 3 mm to 9 mm.

11. The multi-axial integral geogrid according to claim 10, wherein the geogrid has a thickness of from 4 mm to 7 mm.

12. The multi-axial integral geogrid according claim 7, wherein the openings provide a range of interaction with granular materials of varying particles size of at least 200 mm^2.

13. The multi-axial integral geogrid according to any one of claims 1 to 12, wherein the oriented strands have an aspect ratio of at least 1.0, and preferably greater than 1.86.

14. The multi-axial integral geogrid according to claim 4, wherein the inner hexagon can deflect up and down as much as 33% of the overall thickness of the surrounding outer hexagon.

15. The multi-axial integral geogrid according to claim 4, wherein the inner hexagon can deflect up and down out of the plane of the geogrid during compaction of the aggregate in an area of compliance in the order of 50% to 75%.

16. A starting material for making a multi-axial integral geogrid comprising a polymer sheet having a pattern of holes or depressions therein that provide three different shaped openings, including an outer hexagon and a smaller inner hexagon having an unobstructed, open center and oriented strands and tri-nodes, and a plurality of linear strands that extend continuously throughout an entirety of the geogrid without intersecting an inside of the outer hexagon, when the sheet is biaxially stretched.

17. The starting material according to claim 16, wherein the pattern of holes or depressions provides a repeating hexagon formed of oriented strands within a hexagon pattern of openings when the sheet is biaxially stretched.

18. The starting material according to claim 16 or 17, wherein the three different shaped openings are repeating hexagonal, trapezoidal and triangular shapes.

19. The starting material according to claim 16, 17 or 18, wherein the polymer sheet has an initial thickness of from 3 mm to 10 mm.

20. The starting material according to claim 19, wherein the polymer sheet has an initial thickness of from 5 mm to 8 mm.

21. The starting material according to claim 16 wherein the multi-axial integral geogrid is in accordance with any one of claims 1 to 15.

22. A method of making a multi-axial integral geogrid, comprising:

providing a polymer sheet;

providing a patterned plurality of holes or depressions in the polymer sheet; and

orienting the polymer sheet having the patterned plurality of holes or depressions therein to provide a plurality of interconnected oriented strands and partially oriented junctions forming a repeating pattern of outer hexagons having an array of openings therein, supporting ribs extending inwardly from each of said outer hexagons to support inside each of said outer hexagons a smaller inner hexagon

having an unobstructed, open center and oriented strands and tri-nodes, each of said tri-nodes interconnecting only one of said supporting ribs and two of said oriented strands of the inner hexagon, said outer hexagons, said supporting ribs and said inner hexagons defining three different geometric configurations which are repeating throughout an entirety of the geogrid, and said oriented strands and said partially oriented junctions of said outer hexagons forming a plurality of linear strands that extend continuously throughout an entirety of the multi-axial integral geogrid.

23. A method of making a multi-axial integral geogrid, comprising:

providing a polymer sheet;

providing a patterned plurality of holes or depressions in the polymer sheet; an

orienting the polymer sheet having the patterned plurality of holes or depressions therein to provide a plurality of interconnected oriented strands and partially oriented junctions forming a repeating pattern of outer hexagons having an array of openings therein, supporting ribs extending inwardly from each of said outer hexagons to support inside each of said outer hexagons a smaller inner hexagon having an unobstructed, open center and oriented strands and tri-nodes, each of said tri-nodes interconnecting only one of said supporting ribs and two of said oriented strands of the inner hexagon so as to enable the inner hexagon to float up and down relative to a plane of the associated outer hexagon, said outer hexagons, said

supporting ribs and said inner hexagons defining three different geometric configurations which are repeating throughout an entirety of the geogrid, and said oriented strands and said partially oriented junctions of said outer hexagons defining a plurality of linear strands that extend continuously throughout an entirety of the multi-axial integral geogrid.

24. The method according to claim 22 or 23, wherein the polymer sheet having the patterned plurality of holes or depressions therein is oriented by biaxial stretching.

25. The method according to any one of claims 22 to 24, wherein the polymer sheet has an initial thickness of from 3 mm to 10 mm.

26. The method according to claim 25, wherein the polymer sheet has an initial thickness of from 5 mm to 8 mm.

27. The method according to any one of claims 22 to 26, wherein the openings have repeating hexagonal, trapezoidal and triangular shapes.

28. The method according to claim 22 or 23 wherein the multi-axial integral geogrid is in accordance with any one of claims 1 to 15.

29. A method of providing a multi-axial integral geogrid construction, comprising:

biaxially stretching a starting material that is a polymer sheet having a patterned plurality of holes or depressions therein to provide a multi-axial integral geogrid having a plurality of interconnected oriented strands and partially oriented junctions forming a repeating pattern of outer hexagons having an array of openings therein, supporting ribs extending inwardly from each of said outer hexagons to support inside each of said outer hexagons a smaller inner hexagon having an unobstructed, open center and oriented strands and tri-nodes, each of said tri-nodes interconnecting only one of said supporting ribs and two of said oriented strands of the inner hexagon, said outer hexagons, said supporting ribs and said inner hexagons defining three different geometric configurations which are repeating throughout an entirety of the geogrid, and said oriented strands and said partially oriented junctions of said outer hexagons defining a plurality of linear strands that extend continuously throughout an entirety of the multi-axial integral geogrid; and

embedding the multi-axial integral geogrid in a mass of particulate material.

30. The method according to claim 29, wherein the plurality of linear strands extend continuously throughout the entirety of the multi-axial integral geogrid without intersecting an inside of the outer hexagons.

31. The method according to claim 29 or 30, wherein the openings have repeating hexagonal, trapezoidal and triangular shapes.

32. The method according to claim 29 or 30, wherein the multi-axial integral geogrid is in accordance with any one of claims 1 to 15.

33. A multi-axial integral geogrid comprising:

a plurality of interconnecting oriented strands and partially oriented junctions forming a repeating pattern of a selected outer geometric shape having an array of openings therein;

each of said outer geometric shapes supporting and surrounding a smaller inner geometric shape having an unobstructed, open center and oriented strands, which inner geometric shape is the same as or different from the outer geometric shape;

said oriented strands and said partially oriented junctions of said outer geometric shape forming at least two sets of substantially parallel linear strands that extend continuously throughout the entirety of the geogrid, and

said geogrid having a thickness of from 3 mm to 9 mm.

34. The multi-axial integral geogrid according to claim 33, wherein the outer geometric shape and the inner geometric shape are the same, and the shape is selected from the group consisting of triangles, rectangles, squares, and hexagons.

35. The multi-axial integral geogrid according to claim 33 or 34, wherein the inner geometric shape is flexible or not flexible within the outer geometric shape.

36. A reinforced and stabilized composite soil structure comprising:

a mass of particulate material; and

a multi-axial integral geogrid embedded in and engaging with said particulate material and having a plurality of interconnected oriented strands and partially oriented junctions forming a repeating pattern of outer hexagons having an array of openings therein,

supporting ribs extending inwardly from each of said outer hexagons to support inside each of said outer hexagons a smaller inner hexagon having an unobstructed, open center and oriented strands and tri-nodes, each of said tri-nodes interconnecting only one of said supporting ribs and two of said oriented strands of the inner hexagon,

said outer hexagons, said supporting ribs and said inner hexagons defining three different geometric configurations which are repeating throughout an entirety of the geogrid, and

said oriented strands and said partially oriented junctions of said outer hexagons forming a plurality of linear strands that extend continuously throughout an entirety of the multi-axial integral geogrid.

37. A multi-axial integral geogrid comprising:

a plurality of interconnected oriented strands and partially oriented junctions forming a repeating pattern of outer hexagons having an array of openings therein,

supporting ribs extending inwardly from each of said outer hexagons to support inside each of said outer hexagons a smaller inner hexagon having an unobstructed, open center and oriented strands and tri-nodes, each of said tri-nodes interconnecting only one of said supporting ribs and two of said oriented strands of the inner hexagon,

said oriented strands, said partially oriented junctions, said supporting ribs, and said inner hexagons forming at least three different geometric configurations which are repeating throughout an entirety of the geogrid, and

said oriented strands and said partially oriented junctions of said outer hexagon defining a plurality of linear strands that extend continuously throughout the entirety of the geogrid.

38. The multi-axial integral geogrid according to claim 37, wherein said three different geometric configurations are a hexagon, a trapezoid, a triangle.