System for Reinforcing Structure Using Site-Customized Materials

We claim:

1. A method of reinforcing structures; including the steps of:

attaching a textile composed of alkaline-resistant fibers to a surface of the structure to be reinforced; and

spreading a layer of a hardenable slurry over the attached textile such that the slurry covers and embeds the textile; the slurry including mineral particles that are similar in texture, color, or both, to the original surface of the structure.

2. The method of claim 1, the step of attaching a textile comprising the sub-steps of:

spreading a fabric composed of basalt fibers over a surface of the structure; and

attaching the fabric to the surface with ductile attachment means.

3. The method of claim 1, wherein the step of:

attaching the fabric to the surface with ductile attachment means comprises the sub-steps of:

boring a hole through the alkaline-resistant fabric and into the structure;

inserting a length of fiber roving into the borehole, with a free end protruding above the fabric;

backfilling the borehole with suitable backfill material; and

attaching the free end of the roving over the fabric with a suitable adhesive.

4. The method of claim 1, the step of spreading a layer of hardenable slurry over the fabric comprising:

spreading a slurry containing cementitious or polymer matrix and further including mineral materials quarried in a location geographically close to the structure to be repaired.

5. The method of claim 4, the step of spreading a layer of slurry containing sand, ground rock, or minerals comprising:

spreading a slurry including sand, ground rock, or mineral materials that produces a finished appearance substantially the same in color and texture as the original surface of the structure.

6. The method of claim 1, further including the steps of:
spreading a bottom layer of hardenable slurry containing mineral particles directly over the surface of the structure.

7. A method of reinforcing a structure including the steps of:
creating a customized surface finishing mortar by mixing mineral materials with a hardenable fluid matrix; the customized surface finishing mortar formulated so as to produce a finished appearance substantially the same in color and texture as the original surface of the structure;
spreading a fabric composed of alkaline-resistant fibers over surfaces of the structure to be reinforced;
attaching the fabric to the structure by ductile attachment means; and
spreading a layer of customized surface finishing mortar over the attached fabric.

8. The method of claim 7; the step of creating a customized surface finishing mortar further including: obtaining mineral materials from a source geographically local to the structure.

9. The method of claim 7, the step of spreading a fabric comprising:
spreading a fabric composed of alkaline-resistant fibers over one or more surfaces of the structure to be reinforced.

10. The method of claim 7, wherein the step of creating a customized surface finishing material includes the sub-steps of:
obtaining a suitable hardenable fluid matrix from the group of: cementitious mortar, ductile cement, epoxy, polyurethane, or acrylic.

11. The method of claim 7, wherein the structure to be reinforced is a historical building that must substantially retain its original appearance after being reinforced.

12. The method of claim 7, the step of spreading a fabric comprising:
spreading a fabric composed of basalt fibers over one or more surfaces of the structure to be reinforced.

13. A system for reinforcement of a structure; including:

alkaline-resistant textile substantially covering a structural element of the structure to be reinforced;

ductile connecting means for connecting said textile to the structural element; and

mortar including:

mineral materials selected to match the existing color, texture, or both of the structure.

14. The system of claim 13, said alkaline-resistant textile comprising: a fabric woven from fibers of basalt.

15. The system of claim 13, said ductile connecting means comprising: a plurality of fiber anchors.

16. The system of claim 13, said mineral materials including at least one component obtained geographically close to the structure being reinforced.

Claims

1. A method of reinforcing structures; including the steps of:

attaching a fabric composed of alkaline-resistant fibers to a surface of the structure to be reinforced with ductile reinforcement means; and

spreading a layer of a hardenable slurry over the attached fabric such that the slurry covers the fabric; the slurry including mineral particles that are similar in texture, color, or both, to the original surface of the structure;

wherein the step of attaching the fabric to the surface with ductile attachment means includes the sub-steps of: boring a hole through the alkaline-resistant fabric and into the structure; inserting a length of fiber roving into the borehole, with a free end protruding above the fabric; backfilling the borehole with suitable backfill material; and attaching the free end of the roving over the fabric with a suitable adhesive.

2. The method of claim 1, the step of attaching a fabric comprising the sub-steps of: spreading a fabric composed of basalt fibers over a surface of the structure.

3. The method of claim 1, the step of spreading a layer of hardenable slurry over the fabric comprising:

spreading a slurry containing cementitious or polymer matrix and further including mineral materials quarried in a location geographically close to the structure to be repaired.

4. The method of claim 3, the step of spreading a layer of slurry containing sand, ground rock, or minerals comprising:

spreading a slurry including sand, ground rock, or mineral materials that produces a finished appearance substantially the same in color and texture as the original surface of the structure.

5. The method of claim 1, further including the steps of:

spreading a bottom layer of hardenable slurry containing mineral particles directly over the surface of the structure.

6. A method of reinforcing a structure including the steps of:

creating a customized surface finishing mortar by mixing mineral materials with a hardenable fluid matrix; the customized surface finishing mortar formulated so as to produce a finished appearance substantially the same in color and texture as the original surface of the structure;

spreading a fabric composed of alkaline-resistant fibers over a surface of the structure to be reinforced;

attaching the fabric to the structure by ductile attachment means; and

spreading a layer of customized surface finishing mortar over the attached fabric;

wherein the step of attaching the fabric to the surface with ductile attachment means includes the sub-steps of: boring a hole through the alkaline-resistant fabric and into the structure; inserting a length of fiber roving into the borehole, with a free end protruding above the fabric; backfilling the borehole with suitable backfill material; and attaching the free end of the roving to the surface being reinforced and over the fabric with a suitable adhesive.

7. The method of claim 6; the step of creating a customized surface finishing mortar further including: obtaining mineral materials from a source geographically local to the structure.

8. The method of claim 6, the step of spreading a fabric comprising:

spreading a fabric composed of alkaline-resistant fibers over one or more surfaces of the structure to be reinforced.

9. The method of claim 6, wherein the step of creating a customized surface finishing material includes the sub-steps of:

obtaining a suitable hardenable fluid matrix from the group of: cementitious mortar, ductile cement, epoxy, polyurethane, or acrylic.

10. The method of claim 6, wherein the structure to be reinforced is a historical building that must substantially retain its original appearance after being reinforced.

11. The method of claim 6, the step of spreading a fabric comprising:

spreading a fabric composed of basalt fibers over one or more surfaces of the structure to be reinforced.

12. A system for reinforcement of a structure; including:

alkaline-resistant textile substantially covering a structural element of the structure to be reinforced;

ductile connecting means for connecting said textile to the structural element, wherein said ductile connecting means comprises a plurality of fiber anchors; and

a mortar including:

mineral materials selected to match the existing color, texture, or both of the structure.

13. The system of claim 12, said alkaline-resistant textile comprising: a fabric woven from fibers of basalt.

14. The system of claim 12, said mineral materials including at least one component obtained geographically close to the structure being reinforced.