Disclosed is a thermoplastic material and method for repairing damaged asphaltic surfaces by filling "potholes" or damaged regions with thermoplastic fill that is placed in the damaged region of an asphaltic surface, heated to melt the fill in the damaged region and when sufficiently filled a thermoplastic color matched upper patch sheet is laid thereon and heated completing the asphaltic surface.
THERMOPLASTIC POTHOLE REPAIR MATERIAL AND METHOD

FIELD OF DISCLOSURE

[0001] The present disclosure is an improved material and method for patching of damaged roadways by filling “potholes” or other concave damaged regions with waterproof fill having longevity exceeding present day patching systems. More particularly, the disclosure pertains to such patches wherein a thermoplastic material is placed in the damaged region of an asphaltic surface, heated to fill the damaged region followed by a preformed thermoplastic patch sheet.

BACKGROUND OF DISCLOSURE

[0002] The repair of “potholes” or other damaged areas in roadways has presented a continuing problem for municipal and highway engineers. Once a pothole is formed, it will continue to expand and erode under vehicular traffic and ambient temperature conditions. Therefore, a patch or repair is essential to prevent virtual destruction of the roadway. Most destructive of forces is where water is allowed to penetrate the asphaltic surface and freeze due to ambient temperatures below freezing. The water expands, thus forcing the road surface to expand with the formation of ice within the surface and erupt at the top surface. Continued repetition of these events causes more destruction and deeper and larger area holes that cause premature failure of vehicle suspensions.

[0003] The traditional approach in repairing potholes has been to fill the pothole with an asphaltic patching material. Generally, repairs are done by road crews who simply fill and pack the pothole with the asphaltic repair material, forming a crown of the patching material. These types of repairs are a quick fix and are generally unsatisfactory having relatively short services lives, especially on heavily traveled roadways. A prime deficiency with such patching efforts stems from the fact that moisture, snow, ice and normal rainfall can readily migrate from the roadway into the patching material, which tends to degrade the patch particularly in cold weather conditions where the patch is subjected to freeze-thaw cycles.

[0004] What is needed is a roadway patching material that is itself waterproof and does not degrade when the patch is subjected to freeze-thaw cycles.

RELEVANT ART

[0005] U.S. Pat. No. 5,183,352 to Buckelew, Jack E., and unassigned, describes a water tight seal over a covered paving repair material filled pavement hole comprising a cleaned out pavement opening filled with a paving repair material fill tightly compacted. A coating layer of tar is applied over the top of the paving repair material fill and extended outwardly beyond the peripheral edge of the hole and fill in every direction and a sheet is laid down on the layer of tar. The materials are from the class of materials including, tar paper, asphalt impregnated fiberglass coating material, tar impregnated fiberglass coating material, linoleum and vinyl flooring material cut to slightly less area than the pavement hole and substantially the same shape of the tar layer previously laid down. Buckelew teaches an asphaltic roofing paper applied to the pothole filler material. The present disclosure teaches a preformed thermoplastic layer that is color matched to the road surface, not waterproof and is designed to crack and move with the road surface.

[0006] U.S. Pat. No. 5,660,498 to Freeman, Roger, and unassigned, describes a patch for repairing a concave damaged region of a roadway comprising a lower asphaltic liner adapted for placement in the damaged region in closely conforming relationship to the inner contour. The liner has portions extending outwardly from the damaged region and lying on adjacent portions of the roadway, fill material atop the liner and substantially filling the damaged region and an asphaltic upper top mat covering the fill material and extending substantially over the damaged region with the top mat adhering to the liner. Freeman teaches a liner and cap used with standard asphalt fill.

[0007] U.S. Pat. No. 6,362,257 to Chehovits, et. al., and assigned to Crafo, Inc., describes a hot-applied pavement patching composition comprising a lightweight aggregate, a polymer modified asphalt binder having a penetration of between 20 and 500, with the polymer modified asphalt binder comprising a polymer, a surfactant and an air blown asphalt. Chehovits teaches a modified polymer asphalt binder system wherein the material is heated outside the pothole and poured into the pothole. The present disclosure is to a thermoplastic pellet, comprised of an alkyd/polyamide or polyamide/ester modified gum that is heated within the pothole. Heating within the pothole removes moisture and improves the bond to the surrounding bitumen.

SUMMARY OF THE DISCLOSURE

[0008] An embodiment of the disclosure is a thermoplastic alkyd/polyamide or polyamide/ester modified gum filler material and thermoplastic patch sheet for repairing potholes in asphaltic roadways and surfaces.

[0009] Another embodiment of the disclosure is a thermoplastic filler material that is placed within a pothole in an aggregate, granular or pellet form and heated sufficiently at greater than 300° F. to cause the thermoplastic filler material to melt and flow outwardly within the pothole thereby forming a continuous thermoplastic repair.

[0010] Another embodiment is a thermoplastic filler material that may have additional layers of thermoplastic filler material laid upon a first or subsequent layer and heated until the top most layer is melted into the previous layer.

[0011] Another embodiment is a thermoplastic filler material that fills the area of the pothole to be repaired and is cooled and hardened thereby forming a thermoplastic pothole repair.

[0012] Another embodiment is a thermoplastic filler material that, when molten, flows into cracks, crevices and fissures in the asphaltic material thereby providing an improved bond with the surrounding bitumen.

[0013] An additional embodiment is a preformed thermoplastic patch sheet that can be marked, cut and sized to extend over the thermoplastic pothole repair and heated sufficiently to melt the thermoplastic patch to the asphaltic surface and/or to the thermoplastic pothole repair.

[0014] An additional embodiment is a preformed thermoplastic layer that is color matched to the road surface, not waterproof and is designed to crack and move with the road surface.

[0015] Another embodiment of the disclosure is a thermoplastic filler material that is 0-100% recycled materials.

Method of the Disclosure

Material Handling Instructions:

[0016] PRM-EXP is a Thermoplastic Pothole Repair Material designed to fill and patch small potholes on asphaltic surfaces. PRM-EXP Pothole Repair Material is supplied as a
kit that consist of two components: a bag/box of broken/crushed thermoplastic used to fill the pothole; and a top sheet of thermoplastic material that is used as the color matching patch. PRM-EXP should be kept dry at all times—in storage, in transit and on the project. The PRM-EXP material kit should be stored in a building that is between 35° F. and 90° F. The bags/boxes of fill material can be stored to a maximum of 5 bags/boxes high. The top sheet patch material should be stored flat to a maximum of 20 boxes high. Shelf life for PRM-EXP for both the fill material and patch material is 12 months when stored properly.

Safety Precautions:

[0017] Protective clothing should be worn during installation of the PRM-EXP material. The protective clothing should consist of leather boots or work shoes, long pants (note: synthetic fabrics should be avoided), gloves, and safety glasses.

Instructions for Application on Asphalt:

[0018] 1. Clean the pothole, and the area surrounding the pothole that will receive the patch, thoroughly. All loose particles, sand, dust, etc. must be removed. Utilize a power blower or compressed air if available. Remove any loose chunks of asphalt from the edge of the pothole.

[0019] 2. Ensure that no moisture is present in the repair area. Heat the pothole with the flame from a propane fueled torch, such as the FLINT 2000EX® until the asphalt darkens.

[0020] 3. Scatter just enough of the supplied PRM-EXP fill material, about ¾", into the pothole to cover the bottom. While holding the torch about 8” above it, heat the fill material until it is molten and the pieces flow into each other. Remember, when heating the material, always position yourself with the wind at your back, if possible, so the wind moves the heat over the unheated material and moves heat away from the applicator’s feet.

[0021] 4. While this layer of material is still molten, add approximately ¾” of the fill material. Heat this second layer as described in step 3 until the pieces flow into each other. Remember to keep the nozzle of the torch at least 8” above the fill material to keep it from scorching.

[0022] 5. Repeat step 4 until the pothole is packed with the fill material. Do not add more than ¾” of fill material before melting it in to the previous layer.

[0023] 6. Due to irregularities in the pavement surface the PRM-EXP fill material may not be level with the outer edges of the pothole. If this occurs simply wait a few minutes for the fill material to harden inside the pothole. Then add additional PRM-EXP fill material in to any gaps that may exist in order to achieve a level surface with the surrounding pavement. Heat the fill material as described in step 3. The pothole should now be completely packed with the PRM-EXP fill material.

[0024] 7. Take a sheet of the PRM-EXP color matching patch material and cut it so that the resulting piece is slightly larger than the filled pothole. Note that the PRM-EXP patch material comes with regularly spaced indents on one side. Place this piece of the PRM-EXP patch, with the indents side up, over the filled pothole.

[0025] 8. Using your propane torch, begin heating the patch by moving the flame slowly, but steadily over the material. Move the torch in a sweeping motion, approximately 2 feet wide, over the patch at a height of 4 to 8 inches so that heat is evenly applied as you move the torch across the patch and melt the material. Remember to position yourself with the wind at your back, if possible, so that the wind moves the heat over the unheated material and moves heat away from the applicator’s feet. The thermoplastic patch material must be heated to its melting temperature to achieve a bond with the pavement and underlying fill material. During heating, it is imperative that the indents in the surface of the patch material begin to flow together. This is the key indicator that sufficient heat has been applied. Caution: Superficial scorched of the material can occur without adequate melting throughout. Maintain a height of 4 to 8 inches with the torch over the patch material. Sufficient heat has been applied once all the indents have closed. Note, an insufficient amount of heat to the patch material will result in inadequate bonding and failure.

[0026] 9. Water may be sprayed or poured on the area to speed cooling of PRM-EXP.

DESCRIPTION OF THE DRAWINGS

[0027] FIG. 1 is an example of a pothole with the loose debris being removed.

[0028] FIG. 2 is an example of a pothole with the moisture removed by pre-heating the asphaltic surface. The asphaltic surface is heated until the bitumen becomes dark.

[0029] FIG. 3 shows a ½” layer of PRM-EXP fill added to the bottom of the pothole. The layer of PRM-EXP is heated until molten.

[0030] FIG. 4 shows additional layers of PRM-EXP fill material on top of the molten material in the pothole and heated until molten. This manner of filling is continued by adding additional ½” layers and heating until the pothole is filled.

[0031] FIG. 5 shows the repair area being covered with a preformed thermoplastic patch sheet. The thermoplastic patch sheet may be cut to match the repair pattern and heated until the thermoplastic patch sheet is secure.

DETAILED DESCRIPTION OF THE DRAWINGS

[0032] FIG. 1 is an example of a pothole [100] in an asphaltic surface [105] with the loose debris [110] being removed with a portable blower [115].

[0033] FIG. 2 is an example of a pothole [100] with the moisture removed by pre-heating the asphaltic surface [105] with a torch (not shown). The asphaltic surface [105] is heated until the bitumen [205] becomes dark.

[0034] FIG. 3 shows a layer of PRM-EXP fill [300] being added to the bottom of the pothole [100]. The layer of PRM-EXP fill [300] is heated with a torch [305] until molten.

[0035] FIG. 4 shows additional melted layers of PRM-EXP fill [300] in the pothole [100] thereby filling the pothole [100].

[0036] FIG. 5 shows the repaired pothole [100] (not shown) being covered with a preformed thermoplastic patch sheet [500]. The thermoplastic patch sheet [500] is normally cut to match the repair area and heated until the thermoplastic patch sheet [500] is secured to the asphaltic surface [105].

What is claimed is:

1. A pothole filling material comprising a thermoplastic, wherein said thermoplastic is comprised of alkyd/polyamide or polyamide/ester modified gum.

2. The pothole material of claim 1, wherein said thermoplastic fills and thereby repairs potholes in asphaltic surfaces.
3. The pothole material of claim 2, wherein said thermoplastic is a color matching preformed thermoplastic patch sheet that covers said potholes.

4. The pothole material of claim 1, wherein said thermoplastic is provided in an aggregate, granular or pellet form and applied in layers in said pothole.

5. The pothole material of claim 4, wherein said thermoplastic is heated within said pothole to a molten state such that said layers are combined by melting into a single thermoplastic filling compound to complete pothole reparation.

6. The pothole material of claim 5, wherein said molten state is achieved at a temperature greater than 300°F.

7. The pothole material of claim 6, wherein said thermoplastic in said molten state flows into cracks, crevices and fissures in the asphaltic surfaces thereby providing an improved bond between the surrounding bitumen and said potholes.

8. The pothole material of claim 4, wherein said preformed thermoplastic patch sheet is marked, cut and sized to extend over said pothole and heated sufficiently to melt said preformed thermoplastic patch sheet in order to combine said asphaltic surface with said pothole for optimized repair.

9. The pothole material of claim 4, wherein said preformed thermoplastic patch sheet is color matched to any asphaltic road surface.

10. The pothole material of claim 4, wherein said preformed thermoplastic patch sheet cracks and moves with said asphaltic road surface.

11. The pothole material of claim 1, wherein said thermoplastic comprises from zero up to 100% recycled materials.

12. A method of applying a pothole material comprising a thermoplastic, wherein said thermoplastic is comprised of alkyd/polyamide or polyamide/ester modified gum.

13. The method of applying the pothole material of claim 12, wherein said thermoplastic wherein said thermoplastic fills and thereby repairs potholes in asphaltic surfaces.

14. The method of applying the pothole material of claim 13, wherein applying said thermoplastic is a color matching preformed thermoplastic patch sheet covering potholes.

15. The method of applying the pothole material of claim 13, wherein said thermoplastic is supplied in an aggregate, granular or pellet form and applied in layers in said pothole.

16. The method of applying the pothole material of claim 13, wherein heating said thermoplastic within said pothole to a molten state provides for melting said layers together into a continuous thermoplastic repair.

17. The method of applying the pothole material of claim 16, wherein heating said thermoplastic into said molten state is achieved at a temperature greater than 300°F.

18. The method of applying the pothole material of claim 17, wherein heating said thermoplastic into said molten state allows for flowing said thermoplastic flow into cracks, crevices and fissures in the asphaltic surfaces thereby providing an improved bond with the surrounding bitumen.

19. The method of applying the pothole material of claim 16, wherein preparation includes marking, cutting and sizing of said preformed thermoplastic patch sheet by extending said patch sheet over said pothole and heating sufficiently such that melting said preformed thermoplastic patch sheet together with said asphaltic surface and/or to said pothole, is achieved.

20. The method of applying the pothole material of claim 16, wherein color matching blends said preformed thermoplastic patch sheet with any asphaltic road surface.

21. The method of applying the pothole material of claim 16, wherein bonding of said preformed thermoplastic patch sheet with said pothole and said asphaltic road surface allows said preformed thermoplastic patch sheet to crack and move with said asphaltic road surface.

22. The method of applying the pothole material of claim 13, wherein filling said pothole with said thermoplastic uses zero to up to 100% recycled materials.

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