

INFRARED STREET REPAIR

Mark Jones, Street Superintendent


City of Traverse City, MI

INFRARED SYSTEM HISTORY

- Started infrared repair policy in 2006 for repairs to existing asphalt streets
- Established guidelines for contractors making repairs after construction work

Construction Advisory

City of Traverse City



CA-2006-1
February 16, 2006

City of Traverse City
400 Boardman Avenue
Traverse City, Michigan 49684
Phone 231-922-4460

Questions regarding this Construction Advisory should be directed to:

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Permanent Road Repair Using Infrared Asphalt Restoration Technology

Effective with the 2006 construction season, all road repairs required on any City of Traverse City street or alley constructed with hot mix asphalt must be in compliance with the following procedures and specifications using Infrared Asphalt Restoration.

Infrared Patching - Specifications

These specifications govern the repair of utility and/or installations, manhole casting adjustments and driveway retro fit connections.

Infrared Thermal Bond Bituminous Pavement Patching

is a method of blending new bituminous material with infrared heated existing material to form a joint free integral mix.

Equipment

1. Pavement Restoration Vehicle (PRV) shall be a truck mounted, self contained pavement maintenance heating system equipped with a fuel system and a heated chamber capable of maintaining the fresh blacktop at a temperature of 275 degrees or higher.
2. The adjustable height infrared heating unit may be truck or trailer mounted to the PRV. The unit shall be equipped with a chamber or chambers capable of heating the existing bituminous pavement to a workable condition without oxidation or burning. There shall be no flame in direct contact with the existing bituminous surface.
3. Compaction shall be achieved with a self-propelled vibratory roller of sufficient size to provide complete compaction to the full heated depth of the patched area. Minimum of 36" wide roller drum wheels.

Materials

New bituminous material for patching shall conform to MDOT specifications for EJA HMA. A minimum of 20 percent of new material shall be added to all patched areas.

Construction

1. The infrared heating unit shall be lowered to within six (6) inches of the existing pavement. The heated area must extend at least six (6) inches outside the area of repair. Apply heat to the area continuously until the surface is heated to a depth of approximately two (2) inches. When the existing bituminous material can be worked with a rake, proper heat penetration has been achieved.
2. Etch an outline of the perimeter of the repair area with the back of a rake at least three (3) inches beyond the edges of the repair area. Scarify the existing bituminous surface within the repair area to the full heated depth.
3. Remove enough existing bituminous material (as required by adjacent grades) to allow for the addition of 20 percent new bituminous mix to achieve a blend of 20 percent new/80 percent existing heated material within the area of the patch.
4. Reshape patched area by hand with rake and trowel to match grade of existing adjacent pavement.
5. Compact new paving with the specified roller to the full depth of the heated patch. Compacted surface shall be smooth, in texture and shall have positive drainage matching the slope of the existing adjacent pavement.
6. Clean-up site after paving. Remove all debris resulting from patching operation.
7. On repairs larger than 5' x 5', only the outside edges of the repair need to be heated/raked using infrared technology.

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Equipment

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3. Compaction shall be achieved with a self-propelled vibratory roller of sufficient size to provide complete compaction to the full heated depth of the patched area. Minimum of 36" wide roller drum wheels.

Materials

New bituminous material for patching shall conform to MDOT specifications for 13A HMA. A minimum of 20 percent of new material shall be added to all patched areas.

Construction

1. The infrared heating unit shall be lowered to within six (6) inches of the existing pavement. The heated area must extend at least six (6) inches outside the area of repair. Apply heat to the area continuously until the surface is heated to a depth of approximately two (2) inches. When the existing bituminous material can be worked with a rake, proper heat penetration has been achieved.
2. Etch an outline of the perimeter of the repair area with the back of a rake at least three (3) inches beyond the edges of the repair area. Scarify the existing bituminous surface within the repair area to the full heated depth.
3. Remove enough existing bituminous material (as required by adjacent grades) to allow for the addition of 20 percent new bituminous mix to achieve a blend of 20 percent new/80 percent existing heated material within the area of the patch.
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ORIGINAL EQUIPMENT

- Started with Blue Flame machine in 2006

We found that the equipment was way undersized (4' x 4') for making repairs around manholes, etc.



CURRENT EQUIPMENT

- In 2010 the City purchased a KM 4-48 Infrared Asphalt Recycler, 6' x 8', for \$16,950. This is the equipment we are currently using for our infrared repair work.



USING RECYCLED ASPHALT

- Local asphalt plant closes around November 15 each year, and doesn't re-open until around May 1st. By recycling the asphalt material we are able to make use of the infrared equipment year-round for street repair work.

OBTAIN MATERIAL

- When asphalt plants are open, obtain material from plant.
- Fall, before plant shut-down, obtain the virgin asphalt from various contractors to stockpile for use in repairs.
- Contact contractors working on street paving projects and let them know that the City will accept the remainder of asphalt loads from their paving projects instead of having to haul it back to their yard.

COSTS

- 31A material (preferred) - \$75 per ton
(We purchased a large quantity of 31A in the fall for \$55 per ton)
- Cold patch - \$125 per ton
- Recycled asphalt used between November 17, 2012 to April 16, 2013: 97.87 tons, \$5,289.47.
- Cold patch to accomplish the same work would have cost \$12,233.75
- This resulted in a material cost savings of \$6,935.28

In the winter of 2012/13 we ran out of material and were able to purchase recycled asphalt from a contractor for \$50 per ton.



SCRAP STEEL ONLY
NO OTHER MATERIALS
NO CARS, TRUCKS, BUSES
NO HOUSES, GARAGES, SHEDS
NO REFRIGERATORS, A/C UNITS
NO STOVE, OVEN, WASHING MACHINES
NO DRYERS, FREEZERS, FREE COOLERS
NO REFRIGERATION SYSTEMS
NO AIR CONDITIONING SYSTEMS
NO HEATING SYSTEMS
NO WATER HEATERS
NO BOILERS
NO FURNACES
NO STOVE, OVEN, WASHING MACHINES
NO DRYERS, FREEZERS, FREE COOLERS
NO REFRIGERATION SYSTEMS
NO AIR CONDITIONING SYSTEMS
NO HEATING SYSTEMS
NO WATER HEATERS
NO BOILERS
NO FURNACES



SCRAP STEEL ONLY
NO OTHER DEBRIS
NO COPPER LEAD
NO PLASTIC
NO TILES
NO PAINTS
NO OILS
NO FUELS
NO ACIDS
NO SOLIDS
NO LIQUIDS
NO GASES
NO OTHER HAZARDOUS MATERIALS

bobcat

PROCEDURE

1. Clean the area to be repaired. Remove all dirt, foreign debris, standing water and loose aggregate.
2. Position the infrared unit over the area to be repaired. Maintain a minimum 3" perimeter larger than the actual repair.
3. Allow the infrared heating unit to properly soften the pavement to a depth of 1.5" - 2.5". (Approximate time 8-10 minutes)
4. Move the heating unit off of the repair area. Reposition for the next repair when necessary.
5. Scarify (rake) the entire minimum heated depth of the repair area. Note: Frame edges first for an attractive repair.
6. Optional: Remove material if necessary (high spots). Remove contaminated material.
7. Rejuvenate, maltenes rejuvenator, the heated and raked asphalt. Rejuvenate the heated and un-scarified edges (.12 gal/sq).
8. Add new asphalt as required per job conditions.
9. Lute the repair area level. Typical practice leaves the repair area 1/4" above surrounding grade before compaction.
10. Compact the repair.
11. Apply maltenes rejuvenator (.12 gal/sq yd) over the entire repair area. Apply stone dust and compact or broom into area.
12. Clean up repair area and surrounding area.
13. Open repair to straight drive over traffic. Allow sufficient cool down where vehicle stopping or turning is present.

BEFORE AND AFTER REPAIR BARLOW STREET



Looking North



Looking South

BEFORE AND AFTER BOUGHEY STREET MANHOLE



Looking East



Looking West

BEFORE AND AFTER CIRCLE DRIVE



FAILED REPAIR – ASPHALT OVER CONCRETE

