CITY OF COLUMBUS
PUBLIC SERVICE DEPARTMENT
TRANSPORTATION DIVISION

SUPPLEMENTAL SPECIFICATION 1541
THERMAL BOND ASPHALT REPAIR
"HEATWELD"

JANUARY 31, 2002

THERMAL BOND ASPHALT REPAIR
"HEAT-WELD"

1541.01 Description

The following items represent thermal bond asphalt repair specifications and workmanship guidelines to be used on all "heat-welds". This work shall consist of furnishing all labor, material, and equipment necessary to perform all operations of a heat-weld to asphalt concrete surface courses. Thermal bond asphalt repairs shall consist of heating asphalt concrete pavement, scarification of the surface, applying a rejuvenating agent, applying a wearing course of new asphalt concrete, and compaction of the repair. Any changes to these specifications must be submitted in writing and approved by the Engineer prior to use.

1541.02 Equipment

The equipment shall include a heating panel that provides radiant heat uniformly distributed over its entire surface and adjustable from 20,000 BTU's to 40,000 BTU's per square foot. Propane gas shall be the only combustible fuel used and shall be stored within 10 feet of the heating panel. No open flames for heating the pavement will be permitted.

The heating panel shall be controlled by an automatic timer consisting of a main cycle, adjustable for both "ON" and "OFF" periods, and a repeat cycle, adjustable for the overall time of the repeat cycling action. The main cycle shall automatically start the repeat cycles at the end of its maximum adjusted time span. The repeat cycle shall be easily operated without any tools required. Complete manual override and general manual operation shall be incorporated in the system.

The heated area of the panel shall be:

A) 6 feet by 8 feet minimum area.
B) Divided into 4 quadrants sized between 1/2 and 1/3 of the panel dimensions each respective side.
C) Each quadrant shall be operable independently of the others and in all possible combinations with each other.

The heat panel shall have instant kill switches located on each side of the unit that can be activated by a rapid strike of a button. All other controls or panel activity other then the kill switches shall be at one location and include another instant kill switch at that location. All electrical and fuel devices shall comply with all applicable federal, state, and local regulations at all times.

If applicable, the equipment shall include an automated asphalt delivery system from a thermostatically controlled heated storage compartment with delivery of Item 404 asphalt concrete by a mechanical conveying system to the repair. The heated asphalt storage hopper shall be insulated and so constructed that it will keep its contents thermostatically

controlled in a good workable condition (between 225 and 250 degrees Fahrenheit). Design of the unit is to be such that no direct flames contact the hopper walls that would overheat or degrade the contents.

The heating unit shall have a yellow flasher light per OSHA standards, which shall be clearly visible from all points in front of the equipment, and an arrow board clearly visible from behind.

Compaction equipment must be a vibratory steel wheeled roller. The vibratory roller shall be equipped with a water system and have a minimum certified force of 2,000 pounds.

1541.03 Materials

The contractor must submit a certified statement from the asphalt rejuvenator manufacturer showing that the asphalt rejuvenating emulsion conforms to the following physical and chemical requirements:

Property	ASTM Test Method	Requirements
Viscosity @ 25°C, SFS	D-244	20 – 145
Sieve Test, %w	D-244 (mod.)[1]	0.1 max.
Particle Charge Test	D-244	Positive
Cement Mixing Test, %w	D-244	1.8 max.
Pumping Stability	-[2]	Pass
5-Day Settlement Test, %w	D-244	4.77 max.
Residue, %w	D-244 (mod.)[3]	64 – 66
Tests on Residue from Distillation:		
Viscosity @ 60°C, CST	D-2170	990 – 4,100
Maltene Distribution Ratio	D-2006-70	0.7 – 1.1
$\frac{PC + A_1}{S + A_2}$[4]		
PC/S Ratio	D-2006-70	0.5 min.
Asphaltenes, %w	D-2006-70	10.8 max.
Aniline °C	D-611	29 – 44
Total Acid Number	D-664	0.5 max.

---

[1] Test procedure with ASTM D-244 except that distilled water shall be used in place of two percent sodium oleate solution.

[2] Pumping stability is determined by charging 450 ml of emulsion into one-liter beaker and circulating the emulsion through a gear pump have ¼" inlet and outlet. The emulsion passes if there is no significant oil separation after circulating for ten minutes.

[3] ASTM D-244 Evaporation Test for percent of residue is modified by heating a 50 gram sample to 149°C (300°F) until foaming ceases, then cooling immediately and calculating results.
[4] In the Maltene Distribution Ratio Test by ASTM Method D-2006-70:

PC = Polar Compounds,	A_1 = First Acidaffins
A_2 = Second Acidaffins,	S = Saturated Hydrocarbons

Conversion: 242 gal/ton.

The rejuvenating agent shall be approved by the Engineer prior to use.

If applicable, the asphalt concrete used in the repair shall meet the requirements of Item 404, unless an alternate material is approved.

1541.04 Construction Methods

A project superintendent knowledgeable and experienced in construction of a thermal bond asphalt repair must be in control of each day's work. If it becomes apparent that the work is not being performed in a neat and workman like manner, the Engineer will suspend the day's activities until a qualified supervisor is brought in.

PREPARATION

All dirt, debris, vegetation, loose and foreign material shall be cleared from the repair area before the work begins.

HEATING AND SCARIFYING

The panel shall be positioned such that the heated surface of the panel extends a minimum of 4 inches beyond the area of repair. The area of repair shall include all cracked areas at the location of the repair that are less than 8 inches from each other. Only the panel quadrants needed for heating the repair area shall be used.

Pavement shall not be heated to temperatures that are harmful to the surface asphalt. An appropriate adjustment of the timer shall be made to eliminate any tendency for such effects. Once adjusted for a particular street, controls shall remain unchanged unless a change of pavement surface reveals a changed condition, or it is demonstrated to the Engineer that a modified cycle is appropriate.

The repair shall be scarified over the entire area to the required depth by viscous shearing without scratching or scraping the underlying hard asphalt. The outside perimeter shall have straight edges, which are located at least one inch inside the perimeter of the heat panel as it was positioned during heating.

PROCESSING THE REPAIR

After scarification, rejuvenating agent shall be uniformly applied at approximately 0.05 gallons per square yard over the scarified surface or at a rate directed by Engineer. A volume meter shall be provided on the flow line to the spray device, with incremental gauge units of 0.1 gallon maximum. Any piece of aggregate or other material greater than 1/2 inch in size shall then be removed with a lute after which the entire scarified surface shall be raked smooth.

If applicable, a minimum 1/2 inch thick wear course shall then be delivered from the automated delivery system. Edges shall be carefully raked to provide a smooth transition to the main repair area. The overall patch shall be raked to a smooth flat surface.

The repair shall be rolled, pinched edges first with the roller in unprocessed pavement with 6 inches over the edge of the repair. A small vibratory roller shall be used with a minimum weight of 600 pounds. The site of the repair shall be left clean.

An additional 0.05 gallon per square yard of rejuvenating agent shall then be applied to the 3 inch wide area around the perimeter after rolling and lightly mist over the entire repair. A thin layer of sand shall be applied over the entire repair if immediate opening of the street is required. If sand is not used, cones shall be adjusted to delineate traffic around the repair and shall be left in place until the asphalt will not ravel from traffic.

1541.05 Disposal of Waste Material

The contractor shall be responsible for the disposal of all waste, excess, and removed materials from the jobsite. No material will be permitted to stay on the site after the contractor has left the repair area.

1541.06 Maintenance of Traffic

Unless otherwise noted in the contract documents, the contractor shall furnish all labor, materials, equipment, signs, arrow boards, and barricades necessary for maintaining traffic control in accordance with the Ohio Manual of Traffic Control for Construction and Maintenance Operations, current edition.

The Contractor shall schedule his operations and carry out the work in a manner to cause the least disturbance and/or interference with the normal flow of traffic over the areas to be treated. Treated portions of the pavement surfaces shall be kept closed and free from traffic until penetration of the rejuvenating agent, in the opinion of the Engineer, has become complete and the area is suitable for traffic.

When, in the opinion of the Engineer, traffic must be maintained at all times on a particular street, the Contractor shall apply asphalt rejuvenating agent to one lane at a time. Traffic

shall be maintained in the untreated lane until traffic may be switched to the completed lane.

1541.07 Quality of Work

All phases of the work are subject to approval by the City. Any work or materials not passing inspection by the Engineer shall be corrected to the satisfaction of the Engineer and the cost of rework to be borne by the contractor. Work performed by the contractor shall be **guaranteed for a period of one year** exclusive of sub-base failures of materials placed by others and circumstances beyond control of the contractor. Failures are to be corrected at the contractor's expense and subject to the one year guarantee.

Any damage to existing structures and surrounding vegetation resulting from the contractor's operation shall be repaired or replaced by the contractor and subject to the inspection and approval of the Engineer.

1541.08 Method of Measurement

Thermal Bond Asphalt Repair will be measured by the square foot as provided for in the contract documents. The accepted quantities, measured as provided for above, will be paid for at the contract unit price for thermal bond asphalt repair (Heat-Weld).

1541.09 Basis of Payment

Thermal Bond Asphalt Repair shall be paid for per square foot for furnishing all materials, equipment, labor and incidentals necessary to complete the work as specified.

Item	Description	Unit
1541	Thermal Bond Asphalt Repair	Square Foot