Special Specification 2021

ULTRA HIGH PRESSURE WATER CUTTING TREATMENT

1. DESCRIPTION

Use Ultra High Pressure (UHP) water cutting treatment equipment to remove excess asphalt to improve the pavement surface texture.

2. MATERIALS

Furnish water free of industrial wastes, oils, acids, organic matter or other objectionable matter. Lake or river water will not be allowed. Do not use chemicals, abrasive materials, grinders, detergents or salt water. Supply all permits, equipment and tools necessary to obtain the water.

3. EQUIPMENT

3.1. **Ultra High Pressure Water Cutting Equipment**. Furnish equipment using ultra high pressure water to score and remove asphalt material from the pavement surface. Restore the macrotexture of the pavement surface without any damage to the pavement surface.

3.1.1. Provide continuous and uniform production using UHP water cutting equipment with the following capabilities:

- ultra high pressure pump capable of delivering a minimum of 16 gpm while operating at 36,000 psi;
- multi-jet spray head capable of rotating at 2,000 rpm with a minimum width of 24 in. and contain a minimum of 28 nozzles;
- vacuum system connected directly to the multi-jet spray head capable of removing asphalt binder, granular debris and water from the treated pavement surface and discharged to a waste storage system of sufficient capacity;
- storage capacity to hold a sufficient amount of water to operate continuously for a minimum of four hours;
- independent drive, separate from the truck transmission, capable of infinitely varying the forward speed of the truck from 0 to 7 mph during surface treatment.
- drive system capable of maintaining forward ground speed within 0.1mph of pre-set target speed, over roadway slopes of +/- 3.0 percent grade.
- capable of adjustment to vehicle speed, spray bar rotation speed, vacuum system pressure, and waste material removal, on the go, as needed to maintain the quality of the treatment process;
- capable of treating a minimum of 550 square yards per hour; and
- Instrumentation gauges visible to the operator at all times.

3.1.2. **Calibration and Monitoring.** The UHP water cutting equipment will be equipped with instrumentation to facilitate calibration, monitor treatment effectiveness, and capture treatment production data.

3.1.2.1. Gage readings will be benchmarked to time (daily work shift), and capable of continuous measurement and recording as follows:

- Forward ground speed, certified reliable to 0.1 mph within a range of 0.1 mph to 7.0 mphI and
- Spray bar rotational speed, certified reliable to 10 rpm within a range of 100 rpm to 2,000 rpm.

3.1.2.2. Ultra high pressure pump system pressure, measured as follows:

- At the pump, certified reliable to 100 psi within a range of 5,000 psi to 50,000 psi.
- At the spray head, certified reliable to 100 psi within a range of 5,000 psi to 50,000 psi.
- Pavement temperature, measured in front of the cutting head, certified reliable to 1°F within a range of 0°F to 165°F.
- Water storage tank level, certified reliable to 100 gallons over the full tank capacity range.
- Ultra high pressure pump usage, in hours, certified reliable to 0.1 hour.

3.2. **Routine Equipment Maintenance**. Maintain an inventory of common wear parts and replacement accessories for equipment to ensure routine maintenance tasks can be performed without delay to the project schedule.

3.3. **Operator.** Operate UHP water cutting equipment with personnel who are qualified through training and experience, including all safety aspects. Provide an operator certification from the equipment manufacturer or equivalent.

3.4. **Cleaning.** Use equipment for surface cleaning operations where applicable, in accordance with Item 738, "Cleaning and Sweeping Highways." Use other cleaning equipment required in this specification.

4. CONSTRUCTION

Use UHP water cutting equipment to remove excess asphalt from the pavement surface. Haul and dispose removed material in accordance with applicable federal, state, and local regulations. Obtain approval for the sequence of work and the estimated daily production.

Operate the UHP water cutting equipment when the air temperature is at least 35ºF and rising and less than 85ºF, unless otherwise directed. Suspend operations when the Engineer determines that weather conditions are unsuitable.

Operate equipment in accordance with the manufacturer's instructions, including all safety guidelines. Remove excess asphalt from the lane in the direction of travel, unless otherwise directed. Ensure the spray head is not directly in line with and followed by the vehicle tires. Maintain continuous visibility of the treatment area adjacent to and behind the cutting head for the operator or observer with sufficient detail to facilitate identification of any treatment anomalies.

Do not damage the pavement surface. Damage consists of but is not limited to raveling or localized removal of the wearing course that exposes the underlying base or pavement layer. Do not damage existing delineation features such as pavement striping or raised pavement markers. Suspend work when the pavement is damaged, unless otherwise directed. Repair damage to the pavement surface or delineation features caused by the treatment operation as directed, at the Contractor's expense.

4.1. **Control Strip.** Prior to treatment operations of each location, the Engineer will select an area with a minimum length of 100 feet and a width of the cutter head. The Engineer will select a test location within the control strip area and measure the macrotexture in each wheel path before and after treatment at that same test location in accordance with Section 4.2.

4.1.1. Demonstrate the equipment, personnel and methods of operation are capable of producing satisfactory treatment results. Determine the target settings for the pump operating pressure and flow rate; nozzle configuration; spray bar rotational speed, and vacuum system pressure to achieve optimal treatment of the flushed pavement surface. Determine the target production rate of the combined operation measured in square yards per hour, based on the control strips treatment equipment settings.

4.1.2. The Engineer will visually inspect the control strip area after treatment to confirm no damage to the treated pavement has occurred. When the macrotexture requirements in Section 4.2 are met and no damage had occurred as determined by the Engineer, proceed to treat the remaining location.

4.2. **Macrotexture.** The Engineer will measure the average texture depth in accordance with Tex-436-A, Sand Patch Method and the mean profile depth in accordance with ASTM E-2157, Circular Track Meter of the material treated at a minimum frequency of one per every 7,500 square yards in each wheel path in addition to the control strip, unless otherwise directed. The Engineer will measure the macrotexture at each selected test location before and after treatment at the same test location.

4.2.1. Treat the pavement location to achieve a minimum percent improvement in the mean profile depth of 35 percent. Repeat treatment of any deficient locations as directed. The Engineer will determine the extent of the area in need of additional treatment to correct deficient locations.

4.3. Remove and replace the UHP water cutting equipment from the project when it does not treat the pavement to achieve acceptable macrotexture results, causes damage to the pavement, or the equipment cannot maintain the established production rates, as directed. No additional time will be allowed for failure to bring the proper equipment to the project. When additional or new equipment is used on the project, construct a control strip in accordance with Section 4.1.

4.4. Remove debris from the pavement surface when the vacuum system does not adequately remove the debris from the treatment using a broom, shovel, hand scraper, or any other applicable tools and equipment.

5. MEASUREMENT

Ultra High Pressure (UHP) Water Cutting Treatment will be measured by the square yard of completed and accepted work. Measurement will be based on the limits shown on the plans regardless of the number of passes required.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit prices bid for "Ultra High Pressure Water Cutting Treatment." This price is full compensation for treatment of the pavement; ultra high pressure water cutting, vacuuming, hauling and disposing of material; debris removal, sweeping and equipment, labor, tools and incidentals. Demonstration work to receive approval for use of equipment will not be paid for unless work is performed in accordance with the Contract and is accepted.