

**UNIFORM STANDARD  
SPECIFICATIONS  
for  
PUBLIC WORKS  
CONSTRUCTION**

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**1998  
ARIZONA  
(Includes revisions through 2011)**

## SECTION 355

### UTILITY POTHOLES-KEYHOLE METHOD

#### 355.1 DESCRIPTION:

This specification covers the requirements for coring, vacuum excavation, backfilling, and reinstatement of the asphalt core into asphalt pavement.

#### 355.2 EXCAVATION

Excavation requires coring a circular hole through asphalt pavement using drilling/coring equipment and removal of the intact asphalt pavement core. The vertical alignment of the coring operation shall be perpendicular to the horizon and cutting shall be extended the full depth of the existing pavement section.

Pavement cores shall not be greater than 24 inches in diameter, shall not be spaced closer than 3 feet between cores (edge to edge), shall not contain a joint or any pavement cracks greater than 1/8-inch wide, and shall only be obtained from pavements where the asphalt concrete section is at least 4 inches thick.

Contractor shall place a temporary mark (paint or chalk) on the pavement core and adjacent pavement prior to cutting to insure that the pavement core when replaced will have the same orientation as found in the original pavement.

Pavement cores shall be either removed from the work site or stored in a safe and secure on-site location. The cores shall be made readily available for reinstatement into the pavement.

Soil shall be removed by air/vacuum extraction methods to expose utilities. The zone of soil removal shall remain essentially within a vertical plane extending below the edges of the core hole.

The Contractor shall dispose of all excess materials.

#### 355.3 BACKFILL AND COMPACTION

**355.3.1 Backfill Using Mechanical Compaction:** Backfill shall be aggregate base per Section 702 or native soil per Sections 601.4.3, placed in maximum 6 to 8-inch loose lifts.

Backfill compaction shall be determined by use of a compression wave amplitude monitoring device manufactured specifically for the purpose of measuring soil compaction. This device shall measure the compression wave amplitude as compaction progresses using below grade piezoelectric transducer wave sensors and an above-grade electronic monitor. The device shall signal the operator of successful compaction (the compaction wave amplitude becomes asymptotic for continued compaction effort) for each lift.

At time of compaction backfill material shall have sufficient available moisture to be compacted based on the physical appearance (soil ball) method as specified in USDA Soil Conservation Service Agricultural Information Bulletin 199, described as follows:

Firmly squeeze a palm-size sample of soil into a ball by hand. Granular soils with sufficient available moisture will tend to ball under pressure, but seldom holds together for long. Cohesive soils with sufficient available moisture will form a ball that can be rolled into approximate 1/4" wide ribbons between the palms of the hands without breaking apart, leaving no free water on the hand.

A compaction sensor shall be placed at the bottom of the first loose lift. A new sensor shall be placed for every 48 inches of compacted fill depth.

Pneumatic compaction equipment (pneumatic rammers or equivalent) shall be used for compaction of the backfill material. The size of the compactor shall not exceed one-half the diameter of the hole.

Mechanical compaction on each lift shall be continued until the electronic monitor signals that compaction is complete. A new lift shall not be placed until a positive signal has been received. Remove backfill soil and sensor if the monitor does not give a positive compaction signal after repeated compaction efforts. Repeat backfilling and compaction with a new sensor.

Contractor shall provide compaction documentation to the Agency upon request.

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**355.3.2 Slurry Backfill:** If mechanical compaction is not used, the Contractor shall use ½-sack CLSM as backfill in accordance with Section 728.

**355.3.3 Leveling Course:** A 1-1/2-inch to 2-inch thick leveling course of compacted crushed gravel meeting the requirements of ASTM C33, No. 8 coarse aggregate shall be placed above the backfill and directly below the asphalt concrete pavement section.

### 355.4 PAVEMENT RESTORATION

The pavement surface shall be restored to its original condition by setting the reinstated pavement core flush with and in its original orientation.

Bonding agent meeting the requirements of Section 708 shall be used for pavement core reinstatement. Excess bonding material shall be removed from the restored pavement surface. A "patched" appearance shall be avoided in surface restoration wherever possible.

The contractor shall reinstate the pavement core within 24 hours of cutting the pavement. Holes left open longer than 24 hours after cutting shall be covered with an approved steel road plate capable of supporting traffic loads. The steel plate must be rounded with a fitted collar that, when inserted into the hole, will prevent the steel plate from tipping, tilting, bouncing or spinning out of the hole under traffic conditions. An asphalt mix shall be used to ramp pavement up to the steel plate along all edges.

### 355.5 SURFACE TOLERANCES

The reinstated core shall be flush and level with the adjacent pavement. Gaps attributable to the positioning of the core shall be less than 1/16-inch between the bottom of a minimum 3-foot long straightedge and the surface of the pavement in any direction on the surface of the keyhole core, except across the pavement crown or drainage gutters.

### 355.6 DEFICIENCIES

Where the pavement core is found to be fractured or defective upon removal, or becomes damaged after removal and prior to reinstating, the defective or damaged core shall not be used to reinstate the pavement. Pavement repair shall be performed in accordance with Detail 212, Type A Pavement Repair.

A pavement core is considered unacceptable when one of the following conditions exist:

- a) The core contains any vertical cracks wider than 1/8-inch extending full depth or partial depth through the core; or
- b) Any deteriorated piece of the core is larger than 10 percent of the overall area of the core.
- c) Two or more successive layers of asphalt concrete in the core become horizontally delaminated and cannot be rebounded to each other with the bonding compound.

All unacceptable pavement cores shall be removed from the job site.

### 355.7 MEASUREMENT

Each acceptable utility pothole repair shall be counted. No distinction shall be made based on size of the utility pothole or method of repair.

### 355.8 PAYMENT

Payment at the contract price for utility pothole repair complete in place shall be full compensation for all labor, equipment and material required for a complete in place installation. Payment includes traffic control and disposal of all excess materials.

## SECTION 708

### ASPHALT PAVEMENT CORE BONDING MATERIALS

#### 708.1 GENERAL

This specification covers the materials required to bond asphalt pavement cores to the asphalt concrete pavement from which it was originally removed.

#### 708.2 MATERIALS

Bonding material shall be a single component cementitious, rapid hardening, high strength, waterproof bonding agent conforming to the physical properties shown in Table 708-1.

<b>TABLE 708-1</b>		
<b>Bond Material Properties</b>		
<b>Property</b>	<b>ASTM Test Method</b>	<b>Requirements</b>
Bond Strength, psi	C882	20 min.
Compressive Strength, psi, (70 degrees F., 30 minute cure)	C109	200 min.

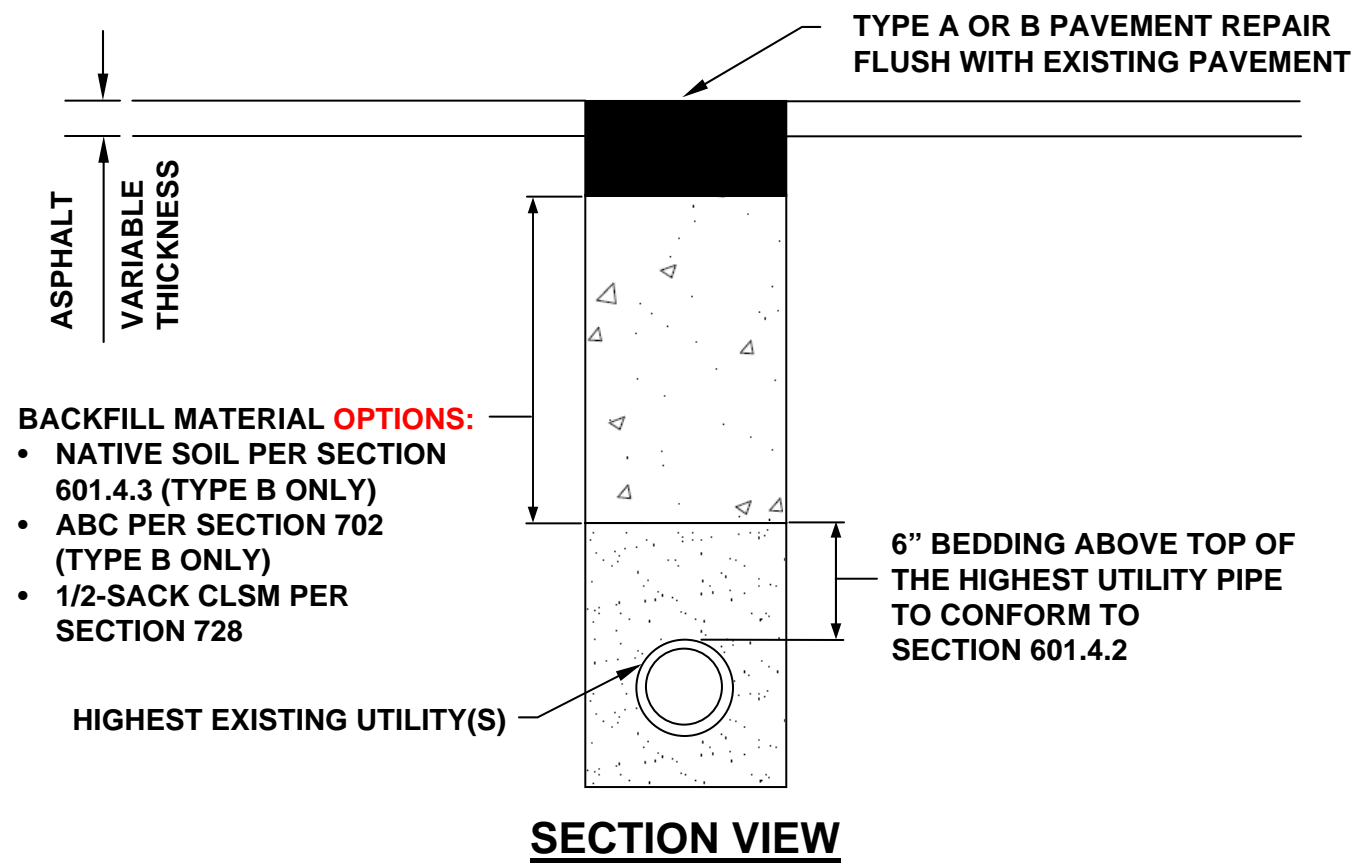
Bonding material shall be impervious to water penetration at the joint after curing.

Bonding material shall, within 30 minutes at minimum ambient temperature of 70 degrees F., allow an 18" diameter core to support a traffic load equivalent to at least three (3) times the AASHTO H-25 standard wheel load.

The bonding material is required to securely bond the asphalt concrete core to asphalt concrete pavement and to fill all voids between the core and pavement and within the core.

#### 708.3 TEST REPORT

Specifications and test results for the bonding material shall be submitted to the Agency for review and approval before use.



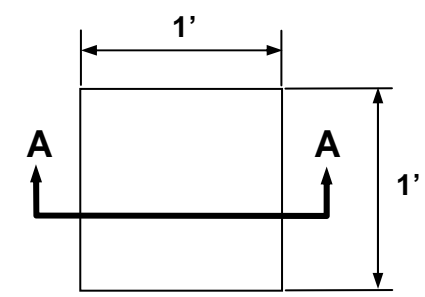
- BACKFILL MATERIAL OPTIONS:**
- NATIVE SOIL PER SECTION 601.4.3 (TYPE B ONLY)
  - ABC PER SECTION 702 (TYPE B ONLY)
  - 1/2-SACK CLSM PER SECTION 728

**SECTION VIEW**

**TYPE B – PAVEMENT REPAIR**

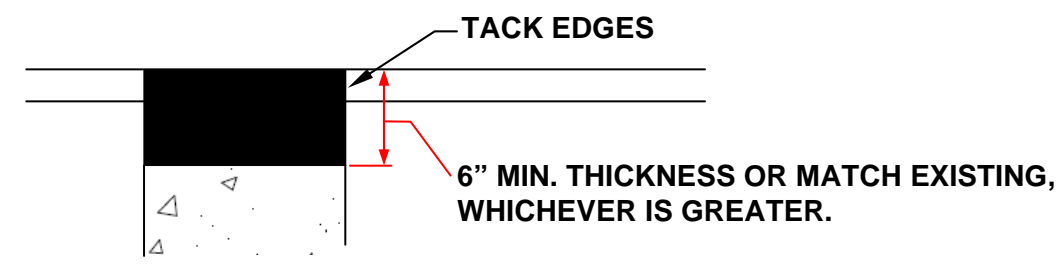
- NOTES:**
1. CUT, REMOVE AND REPLACE PAVEMENT PLUG IN ACCORDANCE WITH SECTION 355.
  2. PLACE BACKFILL IN ACCORDANCE WITH SECTION 355.
  3. BONDING MATERIAL SHALL BE AS SPECIFIED IN SECTION 708.

**TYPE A – PAVEMENT REPAIR**

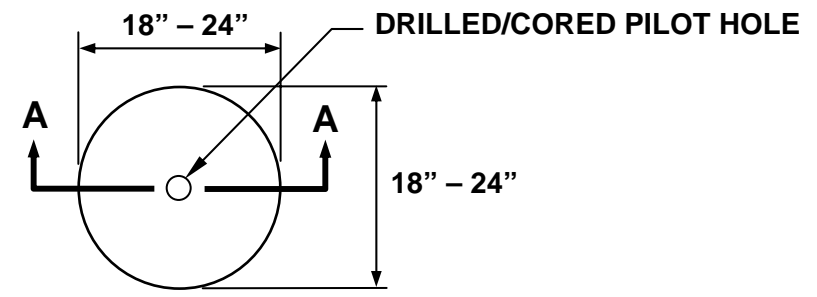


**PLAN VIEW**

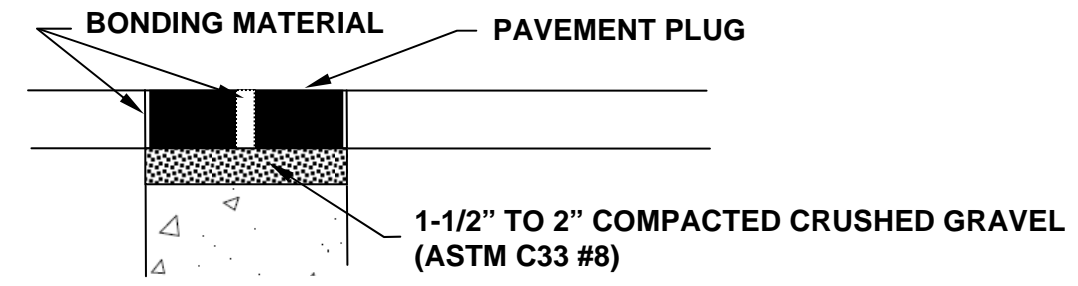
- NOTES:**
1. DIMENSIONS ARE NOMINAL.
  2. EDGES SHALL BE CUT TO A NEAT VERTICAL FACE.
  3. PLACE CLSM BACKFILL IN ACCORDANCE WITH SECTION 604.
  4. PLACE AGENCY-APPROVED ASPHALT CONCRETE IN MAXIMUM 2" LIFTS.



**SECTION A-A**



**PLAN VIEW**



**SECTION A-A**