SECTION 510 -- COLD MILLING

510.01 -- Description

Cold milling shall consist of removing and salvaging existing surfacing material as shown in the plans. Cold milling is divided into the following classes and types:

1. Bituminous Surfaces:

a. Cold Milling, Class 1. The surface shall be milled to remove surface irregularities, including longitudinal wheel ruts. When milling is finished, there shall be no evidence of longitudinal wheel ruts. Milling to a specified transverse slope will not be required. Milling will include inlays to meet fixed elevations where shown in the plans.

b. Cold Milling, Class 2. The surface shall be milled to remove surface irregularities and to attain the slope shown in the plans. Milling will include inlays to meet fixed elevations where shown in the plans.

c. Cold Milling, Class 3. The surface shall be milled to a uniform depth shown in the plans or described in the special provisions. Milling to a specified transverse slope will be required if shown in the plans.

d. Cold Milling, Class 4. The entire depth of existing surfacing shall be milled to the underlying base or subgrade. Approximately 1 inch of existing surfacing may be left in place to serve as a working platform.

e. Cold Milling, Class 5. Irregular sections of surfacing shall be milled as shown in the plans or described in the special provisions.

2. Concrete Surfaces:

a. Milling Concrete Curb. Concrete curbs shall be milled to a uniform depth shown in the plans or described in the special provisions.

b. Milling Concrete for Inlays. Concrete surfaces shall be milled to create an area to place an asphaltic concrete inlay.

c. Concrete Surface Milling. The concrete surface shall be milled to remove surface irregularities, including longitudinal wheel ruts.

510.02 -- Material Requirements

1. Essentially all of the milled material shall be pulverized to pass a 2 inch sieve.

2. The Contractor shall not include any underlying material in the millings.

510.03 -- Equipment

1. The milling shall be done with a commercially manufactured machine able to perform this work to the Engineer's satisfaction. The milling machine shall be self-propelled and shall have sufficient power, traction, and stability to maintain an accurate depth of cut. Pavement removal by scarifying, blading, or heating will not be allowed as milling.

2. a. The cold milling machine shall be equipped with automatic controls for establishing profile grades at each edge of the machine. The reference shall be the existing pavement or taut reference lines erected and maintained by the Contractor true to line and grade. A single reference may be used if the machine can maintain the designated transverse slope.

b. When referenced from existing pavement, the cold milling machine shall be controlled by a self-contained grade reference system provided by the machine's manufacturer for that purpose. The sensing point shall react to compensate for 25 percent of the actual change in elevation due to a hump or dip that is 3 feet or less in length. The self-contained grade reference system shall be used at or near the centerline of the roadway. On the adjacent pass with the milling machine, a joint matching shoe may be used.

3. Broken, missing, or worn teeth shall be replaced if the machine is unable to maintain the surface texture requirements.

4. The machine shall be equipped with a loading elevator to remove the milled material from the roadway surface.

5. The machine shall be equipped with means to effectively control dust generated by the cutting operation.

510.04 -- Construction Methods

1. a. When the milled surface is open to traffic, vertical cuts resulting in an elevation differential of greater than 2 inches along a gutter line or shoulder line shall be protected by temporary barricades and warning signs erected by the Contractor in accordance with the requirements of Section 422.

b. When milling removes pavement markings, the Contractor must place temporary pavement marking before opening the road for public use.

2. If the milled surface is to be open to traffic for more than 30 days, the texture produced by the cold milling operation shall be uniform and provide a satisfactory riding surface and skid resistance. Continuous longitudinal striations will not be allowed.

3. a. When milling is done under traffic maintained conditions, the Contractor shall uniformly mill the entire lane width with one machine or a combination of milling machines in tandem.

b. If the milling results in a vertical longitudinal face greater than 1 inch in depth between the lanes, milling shall be performed on the adjacent lane in the same day. At

the end of each day, no more than 500 feet shall have a drop off of over 1 inch. Work shall be scheduled so that a vertical drop off will not be present between traffic lanes over weekends, holidays, or other extended periods when work is not being performed.

c. Transitions between milled and unmilled surfaces will be feathered either by milling or with wedges of bituminous material (maximum slope 1 horizontal to 4 vertical).

4. Surfacing material that cannot be removed by cold milling equipment because of physical or geometric constraints shall be removed by other methods approved by the Engineer.

5. If traffic has been detoured from the milled area, the surface shall be swept once per day. When milling is performed under traffic maintained conditions, the milled surface shall be swept before traffic is placed on it.

6. Bituminous surfacing left on the roadway as a working platform shall be disposed of in the subsequent operations at no additional cost to the Department.

7. The Contractor shall mill curbs in accordance with the plans.

8. The Contractor shall prepare stockpile sites by removing all vegetation on the portion of the site on which the material will actually be placed. The stockpile area shall be graded so that water will drain away from the stockpiled material. Unsurfaced areas upon which material is stockpiled shall be smoothed and rolled so that the salvaged material may later be removed with a minimum of loss.

9. a. The Contractor shall stockpile salvaged material for the Department at the locations shown in the plans or special provisions.

b. The Engineer shall locate each stockpile. The maximum height of stockpiles is 10 feet. Equipment shall not be driven over the stockpiled material.

10. a. When both the driving lane(s) and the shoulders are to be milled, they shall be milled the same day to eliminate traffic lane surface drainage restrictions.

b. When the surfaced shoulders are not milled, drainage channels in the shoulders may be cut by milling or by any other method approved by the Engineer. The width shall be 2 feet minimum, and the depth shall be the same as the milling depth with sufficient spacing to provide proper drainage. This operation shall be performed as directed by the Engineer.

c. Drainage channels shall be repaired by patching with asphaltic concrete of the type in the adjacent surfacing before the outside surfaced shoulders are fog sealed or surfaced.

d. Earth shoulders must be cut to an elevation that will allow drainage.

11. Concrete millings from inlays will not be salvaged but shall be disposed of in accordance with the removal requirements of Section 203.

510.05 -- Method of Measurement

1. a. The bid proposal "Schedule of Items" shall indicate whether the milling will be measured for payment by the ton, station, or square yards of completed and accepted work.

b. (1) (i) Roadways that are measured by the station (100 feet) shall be measured horizontally along the project centerline between the beginning and ending points of the work. Areas outside the typical cross section shown in the plans will be measured in equivalent stations based on one station's area for the immediately adjacent roadway.

(ii) If there is a length of the roadway where the entire roadway width is not milled, the length of that portion of the roadway shall be deducted from the payment stations.

(2) (i) Each shoulder will be measured separately in stations of 100 feet without regard to width. Stations will be measured horizontally along the project centerline between the beginning and ending points.

(ii) Areas where there is no shoulder for 300 feet or more shall be deducted from the total measured length of shoulder. Small (less than 300 feet) intersections shall not be deducted from the shoulder station measurements.

c. (1) Roadways that are measured by the square yard shall be measured to ± 1 SY.

(2) Areas outside the typical cross section shown in the plans will also be measured to ± 1 SY.

(3) Deductions will be made for all areas greater than 1 SY that are not milled.

d. Only "Cold Milling Class 4" is measured by the ton. The amount of Class 4 millings shall be weighed on approved scales if the plans or special provisions indicate payment is by the ton.

2. Measurement of temporary traffic control devices will be made in accordance with Section 422.

3. Milling concrete for inlays will be measured for payment by the each.

4. Milling concrete curb is measured in linear feet along the back face of the curb.

510.06 -- Basis of Payment

1.

Pay Item	Pay Unit
Cold Milling, Class _____	Station (Sta)
Cold Milling, Class _____	Square Yard (SY)
Concrete Surface Milling	Station (Sta)
Concrete Surface Milling	Square Yard (SY)
Milling Concrete Curb	Linear Foot (LF)
Milling Concrete for Inlays	Each (ea)
Cold Milling, Class 4	Ton (Tn)

2. Payment for temporary traffic control devices will be made in accordance with Section 422.

3. Asphaltic concrete for patching the drainage channels will be measured and paid for as "Asphaltic Concrete, Type _____" and "Asphaltic Cement, Type _____" as prescribed in Section 503. Construction and patching of the drainage channels is subsidiary to these bid items.

4. Payment is full compensation for all work prescribed in this Section.