SECTION 2600

CITY OF FARGO SPECIFICATIONS
SEAL COAT

PART 1
DESCRIPTION OF WORK

The work to be done under these Specifications and the accompanying plans consist of furnishing all labor, material, accessories, and plant necessary to complete the improvement of designated streets, avenues, or alleys in the City of Fargo.

This item shall include the cleaning, drying, and preparing the existing pavement and the application of the seal bitumen, seal aggregate, rolling, and other operations necessary to properly complete the seal coat.

All seal coat design and application will be based off of the “Minnesota Seal Coat Handbook”.

PART 2
MATERIALS

2.1. MATERIAL

All material shall be obtained from approved sources and shall conform to the latest applicable ASTM standards.

2.1.1. SEAL BITUMEN

Seal bitumen shall be an asphalt emulsion CRS-2 or CRS-2P. The particular seal bitumen used for the seal coat shall be subject to the approval of the engineer.

The emulsion shall be protected from freezing and from separating and breaking. Any emulsion that has been frozen or has separated and broken will be rejected and removed from the site at the contractor's expense.

2.1.2. SEAL AGGREGATE

Seal aggregate shall be free of dirt, strippings, and organic matter. Seal aggregate shall be sufficiently moistened with water so that it is in the saturated surface dry condition when applied. The seal aggregate shall be North Dakota Class 43.

2.2. EQUIPMENT

All equipment shall be kept in satisfactory repair at all times and shall meet the approval of the engineer.

2.2.1. BROOMS

Mechanical brooms shall be of the revolving type and be so constructed that the revolutions may be adjusted to its progression.

2.2.2. ASPHALT DISTRIBUTOR

The distributor shall be capable of uniformly distributing the bituminous material at the desired rate. It shall be equipped with a pressure pump and gauges capable of maintaining uniform and adequate pressure throughout the length of the spray-bar. The distributor shall have a system to evenly heat and circulate the material and be equipped with a thermometer to accurately measure the temperature. It shall be equipped with adjustable full circulation spray-bars with cut off valves or other means of starting and stopping the flow of bitumen quickly and uniformly over the length of the spray-bar. The contractor shall make available data showing the manufacturer's recommendation for spray bar height above the surface, nozzle size, and the angle of the spray fan with the spray bar axis.

The truck shall be equipped with a tachometer, operated by a wheel independent of the truck wheels, to accurately measure the truck speed in feet per minute. A bitumeter and tachometer chart shall be kept in the truck at all times. These charts shall be readily available to the engineer at any time during the job to check the application rates of the bituminous material. The distributor shall be equipped with a digital application rate indicator that indicates the application rate in square yards as the truck is applying the bitumen.

2.2.3. SCALES

The scales shall be of the platform type sensitive to a weight of twenty pounds and shall have the capacity to weigh the maximum load. The scales shall be approved and calibrated by the state in which it is located and proof of such calibration furnished to the engineer upon his request.

2.2.4. PNEUMATIC TIRED ROLLERS

Rollers shall be equipped with a minimum of six wheels in front and seven wheels in the rear. Each wheel shall be mounted on an oscillating axle and the rear wheels shall be staggered with the front wheels. They shall be constructed so that they can be loaded to a gross weight of at least two hundred and twenty-five (225) pounds per inch of tread width.

2.2.5. AGGREGATE SPREADER

The mechanical spreader shall be capable of placing the designated amount of aggregate in a smooth, uniform layer on the seal bitumen. The spreader shall be designed so the wheels do not contact the seal bitumen before it is covered with the aggregate. The application rate of the spreader shall be adequate to cover the width of one traffic lane plus one foot minimum. The spinner broadcast type of aggregate spreader will not be allowed.

Prior to the application of the aggregate, the contractor shall verify with the engineer that the machine has been calibrated to evenly distribute the designated amount of aggregate.

Calibration shall be done in accordance with the latest revision of ASTM D-5624. The spreader should be adjusted until all of the gates are dropping the correct amount of aggregate, plus or minus one pound per square yard. If the spreader is not calibrated, the project will be suspended until calibration has been completed.

PART 3

CONSTRUCTION (revised January, 2002)

3.1. PREPARATION OF THE EXISTING PAVEMENT

All loose, pocketed, caked, or other deleterious material shall be removed from the existing pavement. Flushing or sweeping with hand or power brooms will be acceptable methods of cleaning the pavement and shall be done daily prior to the application of the seal bitumen.

When directed by the engineer, asphalt wearing course shall be used to level depressed joints and depressions. The leveling process shall be done a minimum of 2 weeks prior to the chip seal installation. Wear course leveling shall be according to standard practices, which include cleaning the surface and tack coat application prior to placing the wear course.

Costs associated with installing the leveling course shall be included in the bid item for "Asphalt Wearing Course".

3.2. TEST STRIPS

The contractor shall spray and apply chips to a test strip of approximately 50 feet to be certain the chips are being properly embedded in the oil. This process will be repeated as necessary until the proper application rate is verified.

Note: Application rates may vary according to specific design for the particular aggregate used.

The contractor shall be responsible for submitting an aggregate sample to Northern Technologies, Inc. to determine the appropriate aggregate and oil application rate for bidding purposes.

The contractor shall make certain the distributor and chip spreader are in good working order and calibrated to apply the materials at the specified rates. If the contractor fails to calibrate the equipment prior to the start of the project, the project will be shut down until the contractor can verify that the equipment is properly calibrated and prove to the engineer that the design application rates are being obtained.

3.3. APPLICATION OF THE SEAL BITUMEN

Prior to applying the seal bitumen, all manholes castings and gate valves shall have be covered with paper to prevent the seal bitumen from coming into contact with them. The application of the seal bitumen shall not begin until the aggregate and aggregate spreader and rollers are standing by and ready to follow immediately.

Normal application of the bitumen will be based on the following Table 1, which depends on the condition of the existing pavement surface. The specific application rate will be determined by the engineer and may be varied or changed to adjust to conditions. The spraying temperature shall be within the following limits at the time of application:

Temperature = 110 to 160° F, or 40 to 70° C

The seal bitumen shall only be applied when the pavement temperature is 70° F (20°C) or above. When pavement temperature is between 60° and 70° F sealing may be permitted provided the contractor adds an approved coating aid in the amount of one percent of the volume of bitumen used. The pavement surface shall be dry prior to application and application shall only be done in daylight hours. Seal work may not be started after September 1 except with written permission of the engineer.

The contractor shall use appropriate procedures to make certain oil spray does not overlap at longitudinal or transverse edges when continuing on from a previous application.

TABLE 1

Seal oil required for chip seals

Avg Least Dimension H	Traffic Factor T	Voids in Loose Agg. V	Surface Condition S	Residual Asphalt % R	Agg. Absorb. Ga;s/Yd2 A	Coverage Gals/SY B	Remarks **CRS-2**	
0.13	0.75	0.41	0.03	0.65	0.02	0.215	CRS-2 seal on newer asphalt with light traffic	Aggregate
0.13	0.75	0.40	0.03	0.65	0.02	0.212	CRS-2 seal on newer asphalt with light traffic	Strata
0.15	0.75	0.39	0.03	0.65	0.02	0.228	CRS-2 seal on newer asphalt with light traffic	Northern
0.13	0.75	0.41	0.09	0.65	0.02	0.307	CRS-2 seal on older asphalt with light traffic	Aggregate
0.13	0.75	0.40	0.09	0.65	0.02	0.304	CRS-2 seal on older asphalt with light traffic	Strata
0.15	0.75	0.39	0.09	0.65	0.02	0.321	CRS-2 seal on older asphalt with light traffic	Northern
0.13	0.60	0.41	0.03	0.65	0.02	0.187	CRS-2 seal on newer asphalt with heavy traffic	Aggregate
0.13	0.60	0.40	0.03	0.65	0.02	0.185	CRS-2 seal on newer asphalt with heavy traffic	Strata
0.15	0.60	0.39	0.03	0.65	0.02	0.198	CRS-2 seal on newer asphalt with heavy traffic	Northern
0.13	0.60	0.41	0.09	0.65	0.02	0.280	CRS-2 seal on older asphalt with heavy traffic	Aggregate
0.13	0.60	0.40	0.09	0.65	0.02	0.277	CRS-2 seal on older asphalt with heavy traffic	Strata
0.15	0.60	0.39	0.09	0.65	0.02	0.290	CRS-2 seal on older asphalt with heavy traffic	Northern
CRS-2 Residual Asphalt Content = 65-66%			CRS-2P Residual Asphalt Content = 67-68%				**CRS-2P**	
0.13	0.75	0.41	0.03	0.67	0.02	0.209	CRS-2P seal on newer asphalt with light traffic	Aggregate
0.13	0.75	0.40	0.03	0.67	0.02	0.205	CRS-2P seal on newer asphalt with light traffic	Strata
0.15	0.75	0.39	0.03	0.67	0.02	0.222	CRS-2P seal on newer asphalt with light traffic	Northern
0.13	0.75	0.41	0.09	0.67	0.02	0.298	CRS-2P seal on older asphalt with light traffic	Aggregate
0.13	0.75	0.40	0.09	0.67	0.02	0.295	CRS-2P seal on older asphalt with light traffic	Strata
0.15	0.75	0.39	0.09	0.67	0.02	0.311	CRS-2P seal on older asphalt with light traffic	Northern
0.13	0.60	0.41	0.03	0.67	0.02	0.182	CRS-2P seal on newer asphalt with heavy traffic	Aggregate
0.13	0.60	0.40	0.03	0.67	0.02	0.179	CRS-2P seal on newer asphalt with heavy traffic	Strata
0.15	0.60	0.39	0.03	0.67	0.02	0.192	CRS-2P seal on newer asphalt with heavy traffic	Northern
0.13	0.60	0.41	0.09	0.67	0.02	0.271	CRS-2P seal on older asphalt with heavy traffic	Aggregate
0.13	0.60	0.40	0.09	0.67	0.02	0.269	CRS-2P seal on older asphalt with heavy traffic	Strata
0.15	0.60	0.39	0.09	0.67	0.02	0.282	CRS-2P seal on older asphalt with heavy traffic	Northern

3.4. APPLICATION OF THE SEAL AGGREGATE

The application of the seal aggregate shall begin immediately behind the asphalt distributor. **Seal bitumen shall be covered with the aggregate in less than one minute and the aggregate shall be rolled within 15 minutes after being spread.** The aggregate shall be applied with the spreader and shall be in the saturated surface dry condition at the time of application.

Any areas in which aggregate is not placed within 90 seconds of the oil being shot will be rejected and no payment will be made for the rejected area.

Normal application rate of the aggregate shall as indicated on the following Table 2. The specific application rate shall be determined by the engineer. The application rate may be varied at any time during the work to adjust to conditions.

Areas inaccessible to mechanical equipment may by sealed by hand equipment in an approved manner. The contractor shall remove any excessive deposits of aggregate piles that may result in a rough ride.

TABLE 2

Actual Aggregate cover required for chip seals as per NTI testing Updated 2-28-00

Loose Wt. PCF W	Specific Gravity G	Voids in Loose Agg. V		Avg Least Dimension H	Wastage Factor E	Coverage Lb/SY C		Supplier
92.7	2.602	0.41		0.13	1.05	13.90		Aggregate – Light Traffic/Residential Street
92.7	2.602	0.41		0.13	1.10	14.56		Aggregate – Heavy Traffic/Arterial Street
96.9	2.662	0.40		0.13	1.05	14.28		Strata – Light Traffic/Residential Street
96.9	2.662	0.40		0.13	1.10	14.96		Strata – Heavy Traffic/Arterial Street
101.3	2.708	0.39		0.15	1.05	16.85		Northern – Light Traffic/Residential Street
101.3	2.708	0.39		0.15	1.10	17.65		Northern – Heavy Traffic/Arterial Street
Median Particle Size: M								
92.7	2.602	0.41		0.16	1.05	17.10		Aggregate – Light Traffic/Residential Street
92.7	2.602	0.41		0.16	1.10	17.92		Aggregate – Heavy Traffic/Arterial Street
96.9	2.662	0.40		0.17	1.05	18.68		Strata – Light Traffic/Residential Street
96.9	2.662	0.40		0.17	1.10	19.57		Strata – Heavy Traffic/Arterial Street
101.3	2.708	0.39		0.20	1.05	22.46		Northern – Light Traffic/Residential Street
101.3	2.708	0.39		0.20	1.10	23.53		Northern –Heavy Traffic/Arterial Street

3.5. ROLLING THE SEAL COAT

Rolling shall be commenced as soon as the aggregate has been spread. A minimum of three pneumatic tired rollers shall be used to embed the aggregate. Rolling shall be done in straight, parallel, overlapping strips as quickly as possible before the asphalt emulsion breaks. Travel speed of the roller should not exceed 5 mph so that the chips are properly embedded. As soon as rolling has been completed the street may be opened to traffic. If deemed necessary, additional rolling and sweeping may be required to insure distribution and incorporation of the material into the mat and to redistribute material displaced by traffic. These costs shall be included in the bid price per gallon of seal bitumen.

3.6 LANE MARKERS FOR SEAL JOBS (SPOTTING TAB))

Lane markers will be required on all previously striped streets. The spotting tabs shall be placed at 40-foot intervals on straight line markings and skips. The spotting tabs shall be placed at 20-foot intervals at all turn lanes and special traffic marking locations. The lane markers shall be installed prior to the beginning of the seal coat application. Immediately after the seal is placed, the protective cover shall be removed from the marker. Marker types shall be as follows:

Type Y – yellow body and cover with yellow reflective tape on both sides
Type W – white body and cover with white reflective tape on one side

Spotting tabs will meet the requirements of the NDDOT specification D-704-3. Spotting tabs will be incidental to the seal coat installation.

3.7. TRAFFIC MAINTENANCE

The contractor shall conduct his work in such a manner as to interfere as little as possible with the use of the streets for public travel. When streets or public thoroughfares are impacted by construction activity, the public will be protected by placement of adequate warning devices. All barricades and obstructions shall be illuminated by means of amber lights or reflective sheeting for nighttime hours. All traffic control devices shall be constructed, maintained, and located in accordance with the "Manual of Uniform Traffic Control Devices" as set forth by the U. S. Department of Transportation and the Federal Highway Administration. "Fresh Oil, Loose Rock" signs shall be placed at all ends of the project and any necessary temporary "No Parking" signs shall be furnished, installed, and removed by the contractor at no cost to the City.

3.8. SWEEPING OF THE EXCESS AGGREGATE

Pick-up sweeping will occur 24 to 72 hours after the application of the seal coat in most cases. The City of Fargo will provide this sweeping of excess aggregate at no cost to the contractor. The contractor shall promptly repair any defects uncovered during the sweeping process.

PART 4
GUARANTEE, MEASUREMENT & PAYMENT

4.1. GUARANTEE

The guarantee shall cover the contract as to workmanship and materials for a period of one (1) year from the date of final acceptance and payment.

4.2. MEASUREMENT AND PAYMENT

4.2.1. SEAL BITUMEN

The amount of seal bitumen will be measured by the gallon at the standard temperature of 60° F. One gallon shall equal a volume of 231 cubic inches at a temperature of 60° F. Corrections will be made for temperature corrections using a coefficient of expansion of 0.00035. Temperature measurements will be made at the point of delivery to the project. The contractor shall furnish one copy of the manifest for the seal bitumen. The contractor shall assist the engineer in determining any remaining amounts in the asphalt distributor at the completion of the sealing. Payment will be made at the contract unit bid price per gallon.

4.2.2. SEAL AGGREGATE (revised January, 2002)

Payment for seal aggregate shall be by the ton. The tonnage to be paid shall be figured by multiplying the total square yardage of seal area by the application rate.

4.2.3. ASPHALT WEARING COURSE (revised January, 2002)

Payment for asphalt wearing course shall be by the ton and includes 5 ½ to 6% asphalt cement.

4.2.4. OTHER COSTS

All other costs of work necessary to properly complete the seal coat shall not be bid items but shall be charged to other items, unless specifically included in the contract proposal for a particular miscellaneous item.