

# **Fugitive Dust Control Plan**

## **Compliance Plan and Schedule**

**City of Rapid City**  
**Rapid City, South Dakota**

**Submitted to:**  
Rapid City Air Quality Board

**Prepared by:**  
Rapid City Public Works  
October 2016

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## **INTRODUCTION**

In accordance with Section 8.34 of the Rapid City Municipal Code and Administrative Rules of South Dakota 74:36:17, Rapid City Public Works is submitting this updated Fugitive Dust Compliance Plan for review and approval by the Rapid City Air Quality Board. This Plan will become effective upon Air Quality Board and South Dakota Department of Environment and Natural Resources approval. The Deicing Operations and Traction and Sweeper Operation and Street Cleaning sections shall be reviewed every three years, updated if necessary, and plan submitted to the Department of Environment and Natural Resources for approval as required by Administrative Rules of South Dakota 74:36:17:04.

Air quality is important to Rapid City because poor air quality has economic impacts. If the City is designated non-attainment, some businesses may not want to locate in this community or existing businesses may want to relocate. Other financial impacts include possible loss of highway construction funds and the imposition of more restrictive requirements on development and construction activities. It is in the City's best interest to set the standard for our community through our actions.

This updated Plan provides a compliance summary and identifies fugitive dust sources; appropriate, cost effective control measures; and the amount of emissions generated on an annual basis. In addition to the Street Division and Landfill Operations, Air Quality Staff has identified the Water and Wastewater Division's Utility Maintenance Operations as also being a generator of fugitive dust. This Plan addresses each of these City operations. Emissions calculations are provided for the Street Division, Utility Maintenance and Landfill operations.

The City of Rapid City is responsible for minimizing dust generated on City property and by City operations. The City also has some control over the dust generated by certain private operations. The Plan also outlines City policies and procedures to reduce fugitive dust emissions from City property and City controlled private operations.

The Rapid City Street Division performs numerous functions potentially capable of producing fugitive dust emissions. This section of the Compliance Plan identifies each function of the Street Department and the proposed measures to control fugitive dust emissions. The City Street Shop is located at 605 Steele Avenue (Appendix A – Map 1).

### **Deicing Operations and Street Traction**

The primary method of City-wide street anti-icing/deicing is the use of magnesium chloride and quarried sodium chloride. The sodium chloride (road salt) is loaded into the spreader trucks and a solution of 28% to 32 % by volume of enhanced liquid magnesium chloride (mag water) is applied via a spray bar to the top of the load. The .45% to .55% by volume "enhancer" in the mag solution is agricultural-based and basically inert. This additive increases the melting capacity of the road salt, makes it easier to apply at lower temperatures, and acts as a rust inhibitor. The present ratio of mag water to salt is about 50-100 gallons per 10 tons for the large sanders and 25-50 gallons per 5 tons for the small sanders. This mixture and application equipment varies as the Street Division strives to define the most effective application methods and material application rates.

Traction material (washed river sand and road salt in a 6:1 ratio) is typically used on streets within drainage basins that discharge into Rapid Creek upstream of the Jolly Lane Bridge, on steep hills when necessary during extreme weather conditions or if all other deicing materials are depleted. The Streets Division strives to use only the amount of sand necessary to be in compliance with water quality standards in Rapid Creek as they pertain to chloride levels. Purchased traction materials are tested on a regular basis for fines content and hardness. Test results are compared to specifications in Section 8.34 of the Rapid City Municipal Code and Administrative Rules of South Dakota 74:36:17:03 and kept on file at the Street Division office. See Appendix A – Map 5 for an exhibit showing locations likely to receive sand for traction control.

All salt and traction materials are stockpiled in three large structures erected just for this storage use. Traction materials are mixed with salt before stockpiling. These structures eliminate environmental exposure of the deicing and traction materials.

## Sweeper Operations and Street Cleaning

The City has an ongoing year-round (temperature permitting) sweeping program. This program reduces the amount of particulate matter present on the streets that may become re-entrained into the air through traffic or wind erosion. The Street Department has ten sweepers and one flusher truck. This table gives a full description of each:

| Dept # | Unit # | Year | Description                                |
|--------|--------|------|--|
| 401    | S042   | 2014 | Freightliner Johnston Sweeper VT651        |
| 401    | S044   | 2006 | Sterling Schwartz A700 Sweeper             |
| 401    | S046   | 2011 | Freightliner/Johnston Sweeper              |
| 401    | S047   | 2009 | Isuzu Johnston Sweeper                     |
| 401    | S048   | 2007 | Freightliner FC80 Johnson Sweeper          |
| 401    | S049   | 2017 | Freightliner/Johnston Street Sweeper       |
| 401    | S050   | 2013 | Freightliner/Johnston Sweeper              |
| 401    | S070   | 2016 | Freightliner Water Flusher Truck           |
| 401    | S075   | 2015 | Freightliner/Johnston Vacuum Sweeper VT651 |
| 401    | S077   | 2013 | Freightliner/Johnston Sweeper              |
| 401    | S100   | 2016 | Freightliner/Schwartz A7 Tornado Sweeper   |

Sweeping operations follow a general seasonal pattern. In the spring, all sweepers are in operation until all streets have been swept, then another round is made on all the streets to make sure any winter traction material and debris has been cleaned. Sweeping continues through the summer with fewer operators because there are other maintenance activities that need to be done. More sweepers are used after a heavy rain to remove soil and gravel that has been washed into the streets. In the fall, the areas of the City with more leaves are targeted for cleanup with sweeping in other areas continuing as sweepers are available. In the winter, the sweeping is done as temperatures allow. If traction materials have not been used, sweeping operations are concentrated on arterial roads using only the night crew. If traction materials have been used, both the day and night crews are in operation. Both crews work on cleaning the arterial roads first and the collector and local roads as time allows. If an oil spill occurs on a City street, the Fire Department acts as the first responder and uses absorbent material to cover the spill and prevent immediate traffic hazards, then the Street Division typically completes the cleanup with a vacuum sweeper.

Street sweeping is conducted on a regular basis on all paved streets (Appendix A, Map 2). The arterial streets are swept every two or three weeks. Omaha Street, West Chicago Street, and Deadwood Avenue are swept every week due to high truck traffic. The collector streets are swept every four to six weeks. Local streets are swept approximately every six to eight weeks, but depending on other maintenance activities, that schedule may extend to once every three or four months. Typically, the mainline streets are swept at night and residential streets are swept during the day. West Rapid City is swept on Monday and Tuesday. The West Boulevard area is swept on Wednesday. South Rapid is swept on Thursday and North Rapid on Friday (during the daytime). The downtown area is swept every Sunday night.

City owned parking lots and paved alleys are swept by a contractor on a monthly basis. This contract is handled through the Public Works Department, Transit Division.

The paved areas of the Street Department facility are swept once every other week and more if necessary.

The sweepers are cleaned out across the street from the Street Division at the sweeper dump facility. The material is cleaned out of the sweepers daily and stored at this facility. It is hauled to the Landfill for disposal on an ongoing basis throughout the week. Because all the sweepers use water, the material is moist and not subject to wind erosion while stored at this site. The paved areas of this facility are swept once per week.

## **Gravel Surfaces**

The Street Division maintains unpaved City right-of-ways open to public vehicular traffic. These areas are typically graveled. The Street Division maintains the graveled areas as needed. When maintenance occurs, a water truck is onsite to suppress dust from trucks dumping gravel and dust created during the installation process. There are approximately 10.6 miles of unpaved roadways within the City limits and 17 miles of unpaved alleyways. Each year and after heavy rains, gravel roadways and alleys are inspected and potholes are repaired as necessary. It takes a month to repair all the alleys. The City also administers and Out of the Dust program. This program has an allocation of \$60,000 annually to pay for the cost to pave alleyways and streets which currently have gravel surfaces.

When complaints are received concerning fugitive dust from gravel streets within the public right of way, the Street Division will investigate the cause and attempt to remedy the situation. If the cause appears to be from a construction site not under the direction of the City then Code Enforcement and/or Growth Management may seek to remedy the situation.

## **Asphalt Surface Treatments**

The City of Rapid City prefers overlaying and chip sealing for street maintenance. Overlays are a two inch pad of asphalt laid by a machine over an existing asphalt surface. Chip sealing is asphalt oil applied to the existing asphalt surface with a 3/8" minus rock chip applied over the top. Excess rock chip is swept from the surface after rolling. Chip sealing is allowed in City limits as per the Standard Specifications, Sections 37 and 116 (Appendix B). When chip sealing is used, excess chip must be swept from the surface within 24 hours of application.

## **Contracted Mill and Overlays**

Mill and overlay work on roads produces fugitive dust if conventional methods of millings cleanup are used. Conventional methods include sweeping with an open, dry broom. Air quality control measures are specified by the City when contracting milling work. These control measures include using a bobcat to clean up the largest piles of millings. The milled area is then sprayed with water and swept to loosen all grit. Finally the area is vacuumed to recover the moist grit and grime prior to overlaying. This method of minimizing fugitive dust emissions or a comparable method will be used on all City milling projects.

## **Truck Fleet Operations**

The City Street Division has tarps installed on all dump trucks to prevent fugitive emissions. Tarps are used approximately ninety-nine percent of the time for hauling everything but snow.

## **Outside Material Storage**

The Street Division commonly maintains four small material stockpiles outside adjacent to the shop. These piles consist of three-inch ballast gravel for road patching, “dirty fines” for oil spills on streets, one-inch base course gravel for alley repair, and cold mix asphalt for weekend/winter street repairs. All piles are contained in concrete sided bins and kept to a low height and watered on windy days to prevent wind erosion.

## **Sandblasting Operations**

The Street Division sandblasts equipment to prepare for painting. Sandblasting materials are stored inside a building. Sandblasting is done outside on days when wind will not transport the material off-site and there is no High Wind Air Pollution Alert. After sandblasting is completed, the spent material is immediately swept from the surface.

## **Snow Disposal Site**

The snow disposal site is located on East Saint Charles Street (Appendix A, Map 3). It is an undeveloped parcel of land with a gravel access road. Currently a large stockpile of rock is located on the south side of the property. Snow is stockpiled throughout the winter months. Once the snow season is over, and the stockpile has melted, the City blades the stockpile area and grades and re-gravels the road. This is done once per year and monitored periodically. The night supervisor checks the area once a week to determine if sweeping is necessary. The site is not reseeded.

## **WATER DIVISION - UTILITY MAINT.                      John Wagner, Water Superintendent 394-4162**

The Rapid City Water Division’s Utility Maintenance Group performs some functions that are potentially capable of producing fugitive dust emissions. This group works under both the Water and Water Reclamation Divisions. The Utility Maintenance Shop is located at 251 E Main Street N (Appendix A, Map 1) and has the main function of fixing and replacing water and sewer lines. This section of the Compliance Plan identifies functions of concern and the measures that are or will be used to control fugitive dust emissions.

## **Water Line Repairs**

On an annual basis Utility Maintenance fixes about 130 water line breaks. Appendix C-Trench Dewatering Action Plan describes the process to remove water from excavations on water main ruptures. Each break produces five to six dump truck loads of water-saturated dirt. The very saturated dirt is excavated from the hole with a backhoe and placed in one of the two Water Department dump trucks. The very saturated dirt is allowed to sit for a few minutes, then the dump truck bed is raised and water is decanted back into the excavation through a ¾ inch gap at the base of the tailgate. This decanting process was started after an air quality complaint in 2002. The complaint was related to spilling onto the roads and re-entrainment. Hauling a liquid in a dump truck was identified as the problem and efforts were made to limit the water being hauled by decanting. This seems to be working well, but still allows some saturated sediment to seep from the back of the truck. Upon the recommendation of the air quality staff in 2004, filter fabric was used to line the back of the truck by the bottom of the tailgate to retain sediment so spillage would only consist of water. This process was monitored and it was determined to be ineffective. This process is not used. Two dump trucks are used to haul this material back to the shop (Appendix A, Map 1). Getting a waterline back in service is a first

priority. Stockpiling at the Utility Maintenance Shop can save up to an hour per load depending on the location of the break.

Water line breaks may surface like an erupting volcano or like a spring. How each surfaces directly impacts the mess at the site and the amount of trackout from equipment and trucks. Traffic through this area is minimized by keeping barricades in place until the excavation, fix, backfilling and cleanup are complete. Cleanup only occurs during daylight hours. Heavy mud is scraped up using the loader bucket on the backhoe. Remaining mud and trackout is then swept or flushed and vacuumed up. The Street Division is called and generally available to sweep the area. If the Street Division is not available to sweep within the shift, a contract sweeper is contacted. Winter presents additional difficulties with ice. Traction material may be applied locally, for safety reasons, but the same cleanup methods are followed.

### **Material Storage Area**

The material storage area is located to the south and west of the Utility Maintenance Building (Appendix A, Map 1). Stockpiles of gravel, excavated soil, topsoil mixed with compost, base material and cold mix asphalt are maintained on the site. The gravel stockpile is contained in a concrete storage bin, which reduces fugitive dust emissions. The excavated dirt pile consists of material from water line break repairs. The topsoil pile is kept low to reduce emissions. The base course and cold mix asphalt piles are generally not subject to wind erosion. Construction of additional storage bins is being considered.

Prior to 2004, the saturated soil storage area at the Utility Maintenance facility had poor drainage and a dirt surface. Trackout of materials was a significant source of fugitive dust. This area was cleaned out, a spoils pit was excavated, and the area was regraded and stabilized with cobbly river rock. The pit is used for dumping wet excavated materials from water main breaks. Once the material has settled, the water is taken from the top of the material. The material is then removed from the pit and placed in a stockpile, air dried and then used for future backfilling. As of today, the majority of the spoil pile has been removed from the site. Currently a gravel access is maintained back to the fill dirt pile. Trucks hauling dry fill dirt back to the excavation will continue to be loaded on the paved surface with the loader using the gravel road to access the pile. Both of these actions minimize the trackout around the shop and fugitive dust emissions.

### **Hauling Materials**

The Utility Maintenance Group will minimize all fugitive dust from transporting materials. The Utility Maintenance Group uses two dump trucks, one of which has a tarp. The tarped truck is used when hauling topsoil. Any materials hauled on the flat bed (generally not dirt) will also be tarped when the material has the potential to fall off. The fill dirt commonly hauled to a break is moist and does not produce dust. Tarping or moisture will be the means by which fugitive dust is controlled during transportation.

## **LANDFILL OPERATIONS**

**Karl Merbach, Superintendent 355-**

**3496**

The Rapid City Landfill performs many operations potentially capable of producing fugitive dust emissions. This section of the Compliance Plan identifies each function and the measures used to control fugitive dust emissions. Landfill Operations are located at 5555 South Highway 79 (Appendix A, Map 4).



## **Trackout to Paved Surfaces**

Trackout onto paved surfaces is a source of fugitive dust at the Landfill. Most of the access roads at the Landfill have been surfaced with a crushed stone or rock base and covered with a layer of recycled asphalt. Trackout occurs mostly on the main access road to the working pit resulting from commercial and city garbage trucks, and from commercial vehicles used by the public. Garbage trucks and commercial vehicles are often minor contributors due to the muddy pit area. The Landfill commonly stabilizes the pit area with a layer of yard waste reject material to help minimize the mud picked up by vehicle wheels. Trackout causes fugitive dust after it has dried. The highest trackout occurs during spring, late fall and winter.

When trackout occurs onto the main access road, the road is cleaned. Cleaning includes blading the excess mud off the road and/or utilizing the water truck to flush the main road within 24 hours. On a regular basis, if the surfaces at the landfill, MRF and Citizen Campus need additional cleaning, the Street Division is contacted to conduct full sweeping of all major paved roads, the Citizen Campus, and the 24-hour drop off area.

Due to the length of the road between the pit area and the scale house, this length of roadway is used to knock material loose from vehicle tires. Access roads are constructed into disposal areas as needed. Coarse rock and milled asphalt or other yard waste reject material is installed with the length of access roads to control trackout from the active pit area. With the temporary nature of many roads and the heavy truck traffic, it is most feasible for the Landfill to use disposal materials as necessary to prevent trackout onto the main access road and onto Highway 79. If trackout onto Highway 79 occurs, sweeping occurs as soon as possible to eliminate slick conditions. Sweeping is generally performed by the Street Division when called, or when the Department of Transportation performs their road maintenance work.

## **Unpaved Roads**

Other primary sources of fugitive dust are from soil surface haul roads. Many are used infrequently, but soil surface haul roads, totaling approximately 0.25 miles, are commonly used by the scraper for hauling cover dirt from borrow pits to the garbage pit for daily cover. Due to the temporary nature of these roads, the use of a cover material like gravel or recycled asphalt is not economically feasible for the scraper haul roads. These roads are susceptible to wind erosion due to the fine particle size of most on-site soils. Scraper haul roads, in dusty conditions, are managed with the application of water.

Dust from unpaved roads totaling approximately 0.50 miles is limited with control measures used to maintain fugitive dust. The most commonly used dust suppressant is water. It is applied as necessary to minimize fugitive dust from unimproved surfaces. The frequency of water application increases on days when the roadway is used frequently and on days with high winds. Contractors hired for moving soils over the unimproved roads are required to provide dust suppression. Additional control measures that may be implemented in these areas include applying yard waste grindings to the soil surface roads and borrow areas.

The tipping area (area where vehicles unload garbage) is also a potential source of fugitive dust. This area is constantly in flux as the filling progresses. The on-site soils used for covering the garbage can be very fine and powdery and are re-entrained easily into the air from vehicle traffic and wind erosion. Watering can be a short-term viable control measure, however the water makes the soil very slippery and creates a safety issue. Reject compost materials are used to stabilize the tipping area during wet conditions. While the Landfill is no longer closed to small load customers for dumping during high winds, these loads are sent to the MRF for disposal, which is in a paved area. These control measures

appear to reduce the dust and will be used until another reasonable means of dust control is found for the tipping area.

## **Wind Erosion**

The current Landfill property covers about 460 acres. Excluding the scheduled closures and the current active operating cell, approximately 19 acres will be open for disposal with approximately 20 acres of borrow area exposed. About 4.0 acres are unpaved roads. Therefore, the total area potentially contributing to re-entrained particulate matter by wind erosion is about 23 acres. Commonly, wind erosion from these areas is not significant unless the soils are being manipulated. This specifically applies to the borrow and final cap areas. The soil areas will crust up readily with a small amount of surface moisture. The active tipping area and soil haul roads commonly are a potential for wind erosion and are monitored by staff and treated when dry conditions persist.

Measures used to control wind erosion from these areas include, but are not limited to, the application of yard waste grindings or compost, milled asphalt, temporary seeding and watering. As discussed above, some success has been achieved by applying coarse compost grindings and gravel to the active fill or tipping area. Regular watering of soil and haul roads reduces the wind erosion and fugitive dust even more. Borrow soil and final cap areas are not worked on days when there is a high wind dust alert unless operations require. When they are being worked these areas and soil haul roads are watered as necessary.

Borrow soil and final cap areas comprise the inactive disturbed areas and are covered by the Landfill Reclamation Plan found in Appendix D. This Plan lays out a general reclamation plan for any disturbed area on the Landfill property. It outlines a standard schedule from the time of cap completion or reaching final grade, to seeding. The Plan will be followed for any disturbed area on the Landfill. Areas that may be dormant for a period of time before completion and final reclamation are also addressed.

## **Compost Grinding**

The Rapid City Landfill grinds about 15,000 to 18,000 tons of yard waste materials annually for composting and screens around the same amount. The grinding and screening generally produces large particles, but fugitive dust may still be generated. The grinding area is located near the base of a hill. The grinding discharge area is generally surrounded by stockpiled materials which serve as a partial wind break. No grinding or screening occurs on days when there is high wind which will create dusty conditions.

## **Compost Activities**

Yard waste grindings are placed in large windrows on an eleven-acre asphalt paved pad for composting. These windrows are turned right after placement on the pad and once per month thereafter. Generally the grindings are very dry due to handling and even with the use of the spray bar on the turner they generate a lot of fugitive dust during this first turn. After the first turn the moisture in the windrows remains high (up to 50%) for the remainder of the process. When the windrow process is complete, the next step is screening and stockpiling the product. The most reasonable control measure for the windrow and screening processes is to not perform the dust generating activities on days when there is a high wind alert.

## **CITY CONSTRUCTION PROJECTS**

The City requires an Air Quality Permit as part of the Grading Permit Process, for all construction sites disturbing one or more acres, within the Air Quality Control Zone.

City Ordinance 8.46 requires erosion and sediment control measures to be implemented by all construction sites, vacant lots and homes without landscaping. Such controls must be capable of preventing soil from going off site to public rights-of-way where soil can be readily re-entrained.

Appendix E contains a copy of Sections 70-72 of the Rapid City Standard Specifications for Public Works Construction.

Appendix F contains a copy of Section 7.28 – General Conditions - Standard Specifications for Public Works Construction. Section 7.28 requires the Contractor to make every reasonable effort to minimize fugitive dust resulting from construction activities.

## **CONCLUSIONS**

Air Quality in Rapid City is steadily improving. City operations are making a concerted effort to set the standard for their community through their actions. Staff continues to work with the Air Quality Division to improve operations and minimize fugitive dust.

This updated Plan provides a compliance summary, identifies fugitive dust sources and outlines appropriate, cost effective control measures for those City operations likely to produce fugitive dust through their normal daily operations. The specific City operations addressed in this Plan include the Street Division, Landfill Operations, and Utility Maintenance. The Plan also highlights City controls over public works construction.

City operations continue to modify their actions to minimize fugitive dust sources. Paving and sweeping should continue throughout City operations because it is conducive to cleaner air. As the sweeper fleet is expanded and upgraded, the frequency and efficiency of cleaning will increase. Reclamation work continues at the Landfill as new areas are opened for use and old areas are closed and seeded. The Landfill will continue to water gravel and soil roads and pave where possible to reduce dust.

The City will continue to be vigilant in improving the air quality in the Rapid City area. This will be accomplished by new and improved equipment and materials, the enforcement of policies and ordinances relating to dust control, and the continued efforts to implement new ordinances and amend existing ordinances which aid in reducing fugitive dust emissions.

## APPENDIX A



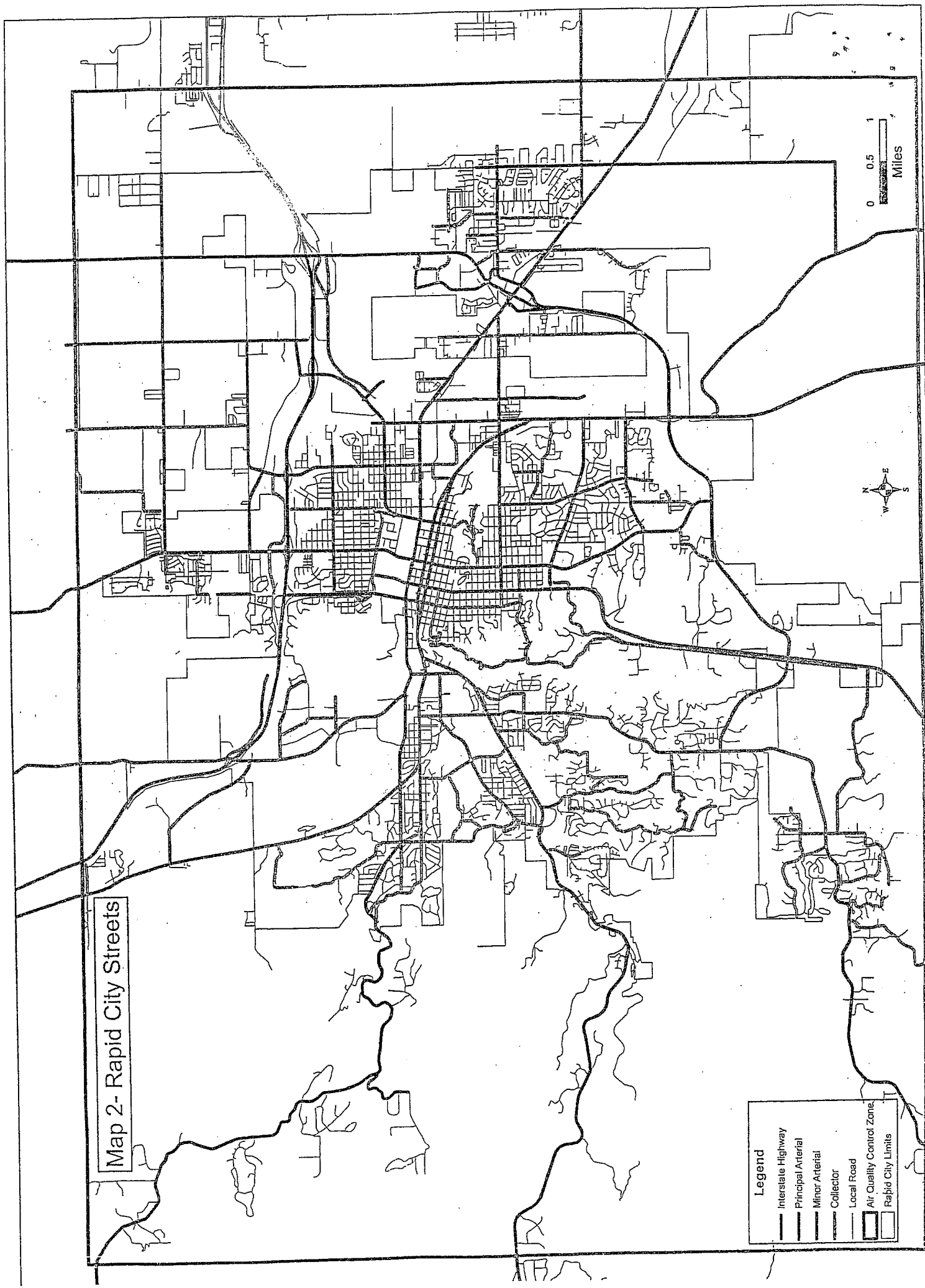
Now Utility  
Maintenance

Street Maintenance

Map 1 - Street Division and Utility Maintenance Division

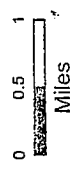


Map 2- Rapid City Streets



**Legend**

- Interstate Highway
- Principal Arterial
- Minor Arterial
- Collector
- Local Road
- Air Quality Control Zone
- Rapid City Limits



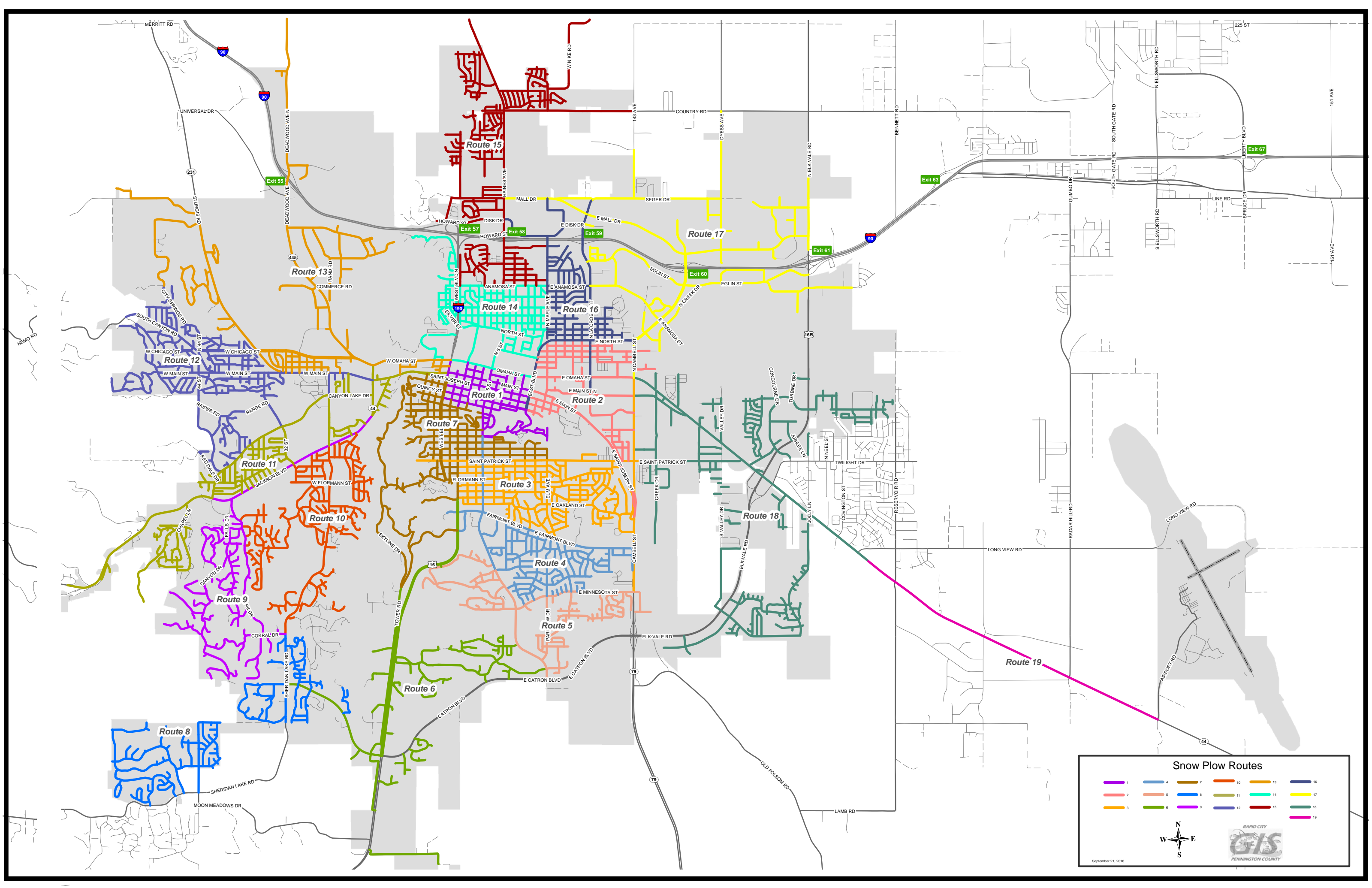


MAP 3  
Snow Disposal Site









**Snow Plow Routes**

|   |   |   |    |    |    |
|---|---|---|----|----|----|
| 1 | 4 | 7 | 10 | 13 | 16 |
| 2 | 5 | 8 | 11 | 14 | 17 |
| 3 | 6 | 9 | 12 | 15 | 18 |
|   |   |   |    |    | 19 |

September 21, 2016

W N E S

RAPID CITY  
GIS  
PENNINGTON COUNTY

## APPENDIX B

## SECTION 116

### AGGREGATES FOR ASPHALT SURFACE TREATMENTS

#### 116.1 REQUIREMENTS

##### A. General

The cover aggregate for asphalt surface treatments shall be sand, crushed rock or crushed gravel, which is free of dirt, vegetable and other foreign material. The physical characteristics and quality of the materials shall conform to the specifications for the particular material required by the contract.

##### B. Related Work

Section 37 Asphalt Surface Treatments  
Section 38 Cold Mix Asphalt Concrete

#### 116.2 SPECIFIC REQUIREMENTS

Cover aggregates of the various types shall conform to the following table:

| REQUIREMENT<br>Processing Required | TYPE 1       |              | TYPE 2       |              | TYPE 3    |
|------------------------------------|--------------|--------------|--------------|--------------|-----------|
|                                    | A<br>Crushed | B<br>Crushed | A<br>Crushed | B<br>Crushed | Crushed   |
| Passing 5/8 inch Sieve             |              |              |              |              | 100       |
| Passing 1/2 inch Sieve             | 100          |              |              | 100          |           |
| Passing 3/8 inch Sieve             | 90-100       | 100          | 100          | 30-90        |           |
| Passing 1/4 inch Sieve             | 0-70         |              |              |              |           |
| Passing #4 Sieve                   | 0-15         | 10 - 90      | 0 - 70       | 0 - 50       | 10 - 75   |
| Passing #8 Sieve                   | 0-5          | 0-30         | 0 - 28       | 0 - 20       | 0 - 62    |
| Passing #40 Sieve                  |              | 0 - 4        | 0 - 4        | 0 - 5        | 0 - 35    |
| Passing #200 Sieve                 | 0 - 1        | 0 - 3        | 0 - 3        | 0 - 3        | 0 - 18    |
| Plasticity Index, max.             | Non-plastic  | 3            | 3            | 3            | 3         |
| L.A. Abra. Loss, max.              | 40%          |              | 40%          | 40%          | 40%       |
| <u>Soundness Loss, max.</u>        | <u>12</u>    | <u>15</u>    | <u>15</u>    | <u>15</u>    | <u>15</u> |
| Flakiness index (Max.)             | 30%          |              |              |              |           |
| Foot Notes                         | 1            | 2            | 1,2          | 1,2          | 2         |

1. At least 50 percent of material retained on the No. 4 (4.75 mm) sieve shall have two or more fractured faces produced by crushing.
2. The plasticity index may be waived if not more than 4.0% of the material passes the No.40 (425um) sieve.

### **116.3 SAMPLING AND TESTING**

|  |              |
|--|--------------|
| Sampling .....   | SD 201       |
| Gradation .....  | SD 202       |
| Plasticity Index .....   | SD 207       |
| L.A. Abrasion Test.....  | AASHTO T 96  |
| Soundness Test (Sodium Sulfate Solution,<br>Five Alternations) ..... | AASHTO T 104 |
| Crushed Particle Test.....   | SD 211       |

### **116.4 METHOD OF MEASUREMENT &**

### **116.5 BASIS OF PAYMENT**

Measurement and payment for various cover aggregates for asphalt surface treatments shall be in accordance with Sections 37 & 38.

**END OF SECTION**

## SECTION 37

### ASPHALT SURFACE TREATMENT

#### 37.1 MATERIALS

##### A. General:

This work consists of an application of asphalt covered with a spread of cover aggregate.

##### B. Related Work:

Section 35 – Prime, Tack, and Flush Seal Coats

Section 116 - Aggregates for Asphalt Surface Treatment

Section 118 - Asphalt Material

#### 37.2 MATERIALS

##### A. Asphalt:

Asphalt of the type and grade shown on the plans shall conform to the requirements of Section 118 and the following additional requirements:

When tested in accordance with SD 305 using Standard Aggregate (Sioux Falls Quartzite, from the Sioux Falls, South Dakota area), the asphalt shall conform to the following requirements;

Coating Obtained, Min.....95% Aggregate Surface Coated

Coating Retained, Min.....85% Aggregate Surface Coated

This specification requirement (SD 305) will be applicable only to cutback asphalt (Rapid Curing Type).

##### B. Cover Aggregate:

Cover aggregate of the type specified shall conform to the requirements of Section 116.

**37.3 CONSTRUCTION REQUIREMENTS****A. Weather and Seasonal Requirements:**

The application of surface treatments will be permitted only during daylight hours when conditions are dry and when it does not adversely affect the spraying operation.

Minimum temperatures and seasonal limitations are as follows:

| <b>COVER<br/>AGGREGATE</b> | <b>AIR AND SURFACE TEMP.<br/>(IN THE SHADE)</b> | <b>SEASONAL LIMITATIONS<br/>(DATES ARE INCLUSIVE)</b> |
|----------------------------|---|---|
| Type 1                     | 70 degrees F.                                   | June 1 - October 1                                    |
| Type 2                     | 70 degrees F.                                   | June 1 - October 1                                    |
| Type 3A                    | 60 degrees F.                                   | June 1 - October 1                                    |
| Type 3A                    | 70 degrees F.                                   | Sept. 1 - October 1                                   |
| Type 3B                    | 50 degrees F.                                   | May 1 - December 1                                    |

**B. Equipment:**

The following minimum equipment shall be furnished in good condition by the Contractor:

1. A vacuum, power broom.
2. Equipment for heating and applying the asphalt shall conform to the requirements of Section 35.
3. A self-propelled aggregate spreader, with positive controls capable of depositing the required amount of aggregate uniformly over the full width of the asphalt application. When spreading Type 2 cover aggregate, the spreader shall be equipped with means of applying the larger aggregate to the surface ahead of the smaller aggregate. A tailgate spreader of the type approved by the Engineer may be substituted for the above-described spreader when applying Type 3B cover aggregate.
4. The rollers shall completely cover an overall surface width of at least sixty (60) inches and furnish a minimum uniform rolling pressure of two hundred fifty (250) pounds per inch of rolling width.

**C. Surface Preparation:**

The surface to be treated shall be thoroughly swept with a vacuum power broom and cleaned of all loose and adhering foreign material. Appurtenances immediately adjacent to the surface to be treated shall be protected from the splatter of asphalt. Freshly primed bases shall be cured prior to the application of surface treatments.

D. Application of Asphalt:

Adjacent appurtenances shall be protected from the splatter of asphalt. The Engineer will specify the temperature range within which the asphalt shall be maintained at the time of application. Asphalt shall be applied by means of a pressure distributor in a uniform and continuous manner. Specified rates shall be applied unless otherwise ordered by the Engineer. Unauthorized increases in rates will not be eligible for payment.

The angle of the spray nozzles and the height of the spray bar shall be set to obtain uniform distribution. A strip of building paper, at least three (3) feet in width and with a length equal to that of the spray bar plus one (1) foot, shall be used at the beginning of each spread. The distributor shall be traveling at the proper speed when the spray bar is opened. Skipped areas and deficiencies shall be corrected as soon as they are discovered. The edges of the spread shall not appreciably overlap. Areas inaccessible to the distributor shall be satisfactorily covered by hand spray methods.

Under no circumstances shall spraying operations proceed when it is evident the asphalt spread will not be covered with aggregate and rolled all in accordance with the prescribed schedule contained in the following sections.

E. Application of Cover Aggregate:

Cover aggregate shall be spread immediately following application of the asphalt. Under calm wind conditions, approximately five (5) miles per hour or less, the spread of cover aggregate shall follow within eight (8) minutes of the application of the asphalt. When the wind velocities are greater, the maximum time between applications of asphalt and cover aggregate shall be reduced as determined by the Engineer.

The spreading of cover aggregate following the application of "High Float" Emulsified Asphalt may be adjusted by the Engineer from the time limitations as shown above to fit project conditions.

The Contractor shall protect the treated surface from damage by traffic by continually maintaining a complete aggregate coverage, except that a strip of asphalt application approximately (4) four inches wide along that side of the spread forming a longitudinal joint with the adjacent spread shall be left uncovered. The adjacent asphalt and cover aggregate application shall overlap this strip. In lieu of this procedure, a butt joint may be constructed using special end nozzles.

Longitudinal joints, other than at centerline, will not be permitted within the center twenty-four (24) feet.

The cover aggregate shall be loaded in trucks to minimize segregation, eliminate oversize, and effectively break up or discard material bonded into chunks. When required, aggregate shall be uniformly moistened before or during loading.

Specified rates shall be applied unless otherwise ordered by the Engineer. Unauthorized increases in rates will not be eligible for payment.

Prior to rolling operations, the Engineer may order the Contractor to adjust inequalities in the spread of Type 3 cover aggregate by means of a drag broom.

F. Rolling Operations:

Rolling shall begin immediately behind the spreader and shall consist of four (4) complete coverages using pneumatic tired rollers. Operations shall be scheduled to complete the rolling within forty (40) minutes after the cover aggregate is applied. Rollers shall not be operated at a speed in excess of five (5) miles per hour. The weight and tire pressures of the rollers shall be varied as directed by the Engineer to obtain the most satisfactory embedment of the cover material without undue crushing of the aggregate. Turning of rollers on the freshly treated surface is prohibited. Rolling at night or when light conditions would create a traffic hazard will not be allowed.

Alternate rolling procedures that provide complete roller coverage directly behind the aggregate spread and completion of the four (4) complete roller coverages within the maximum time of forty (40) minutes may be used if approved by the Engineer.

G. Traffic Control:

Construction operations shall be coordinated to result in the least delay of traffic. If traffic is permitted, it shall be controlled by flaggers or pilot car, during application of the surface treatment on driving lanes. The traffic shall not exceed twenty (20) miles per hour for a period of four (4) hours after application. The minimum four (4) hour traffic control period may be reduced if ordered by the Engineer.

The width, arrangement, and sequence of the parallel application strips shall be governed so as not to unduly inconvenience traffic.

H. Maintenance and Repair:

Areas of the surface treatment, which may peel or otherwise be unsatisfactory for any reason shall be repaired with additional asphalt, cover aggregate, and rolling. Additional compensation for repair due to causes not the fault of the Contractor will be paid at the contract unit price for asphalt surface treatment.

The finished surface of the surface treatment shall be smooth riding and of uniform color. Lack of uniformity such as transverse or horizontal ridges, raveled spots, wheel marks, depressions, abrupt color changes, and other inequalities shall be corrected by the Contractor, as ordered by the Engineer. Payment will not be made for this correction work.



Special attention shall be given to the transverse and longitudinal joints during the process of the rolling work in order to insure a uniform appearance and smooth riding surface. The Contractor shall smooth and correct the appearance of these joints, as ordered by the Engineer, without additional compensation.

Any splatter of asphalt on roadway appurtenances, shall be satisfactorily cleaned off by the Contractor.

The loose material left on the surface shall be lightly vacuumed off three (3) to five (5) days after sealing the road.

Vacuumed-off material shall be removed and disposed of by the Contractor without additional compensation.

#### **37.4 METHOD OF MEASUREMENT**

**A. Asphalt for Surface Treatment:**

Asphalt for surface treatment will be measured to the nearest one-tenth (0.1) ton. Contractor shall provide Engineer with valid weigh tickets for asphalt, furnished and installed.

**B. Cover Aggregate:**

Cover aggregate will be measured to the nearest one-tenth (0.1) ton. Contractor shall provide Engineer with valid weigh tickets for cover aggregate, furnished and installed.

#### **37.5 BASIS OF PAYMENT**

**A. Asphalt for Surface Treatment:**

The accepted quantities of asphalt for surface treatment will be paid for at the contract price per ton, complete, in place. Weigh tickets will not be considered valid if received more than forty-eight hours after placement.

**B. Cover Aggregate:**

The accepted quantities of cover aggregate of the type specified will be paid for at the contract price per ton, complete, in place. Weigh tickets will not be considered valid if received more than forty-eight hours after placement.

**END OF SECTION**

## APPENDIX C

## TRENCH DEWATERING ACTION PLAN

September 7, 2005

### Trench Dewatering Action Plan Overview:

During trench dewatering activities by the City of Rapid City Utility Maintenance crew, a portable sediment tank will be used to accept the initial flow from the trench dewatering pump. Sediment will be trapped in this tank prior to water being discharged into a gutter or vegetated area. If the portable sediment tank is discharged into a street gutter, a rock filter berm of 1" clean rock will be placed in the gutter for additional sediment filtration prior to entering the storm sewer system or drainage way. If the portable sediment tank is discharged into a vegetated area which does not directly flow to a drainage way, no additional filtration will be necessary. If the portable sediment tank is discharged into a drainage way, a "Fiber Roll" or "Compost Roll" will be placed in the drainage way for additional sediment filtration.

### General Steps:

1. Set up Portable Sediment Tank (PST) to discharge into street gutter or vegetated area.
2. If the PST will be discharging into gutter, place a rock filter berm in the gutter flowline for additional sediment filtration.
3. If the PST will be discharging into vegetated area which does not directly flow into a drainage way, no additional filtration will be necessary.
4. If the PST will be discharging into a drainage way, place a "Fiber Roll" or "Compost Roll" downstream of the discharge perpendicular to the drainage way for additional sediment filtration. Secure rolls with wooden stakes.
5. Connect discharge pump to PST.
6. After dewatering is completed and water main is repaired remove the Rock Filter Berm and clean street with vacuum truck or remove Fiber or Compost Rolls and sediment from drainage way.

### Portable Sediment Tank Specifications:

1. The sediment tank will be constructed with steel for handling the pressure exerted by the volume of water. The structure should have a minimum depth of two feet.
2. The location for the sediment tank should be chosen for easy clean-out and disposal of the trapped sediment, and to minimize the interference with construction activities.
3. The following formula is used to determine the storage volume of the sediment tank:  
$$\text{Pump discharge (gpm)} \times 16 = \text{cubic feet of storage required}$$
4. Once the water level nears the top of the tank, the pump must be shut off while the tank drains and additional capacity is made available. The tank should be designed to allow for emergency flow over the top of the tank. Clean-out of the tank is required once one-

third of the original capacity is depleted due to sediment accumulation. The tank should be clearly marked showing the clean-out sediment level.

5. A Portable Sediment Tank detail is located in Appendix 1.

#### Rock Filter Berm Specifications:

1. The Rock Filter Berm will consist of 1" diameter clean rock.
2. The Rock Filter Berm will be a minimum of 4 foot long, 2 foot wide, and 2 foot high.
3. The Rock Filter Berm will be placed at a less than 90 degree angle towards the flow of water.

#### Compost Roll Specifications:

1. The Compost Roll will consist of a geotextile bag of knitted material with openings of 3/8 inches and contain a compost/wood chip material with a blend of 30-40% weed free compost and 60-70% decomposed wood chips, or equal.

#### Fiber Roll Specifications:

1. The Fiber Roll will consist of excelsior fibers encased in polypropylene netting with the following specifications, or equal. The netting will have approximate openings of 0.5 inch x 0.5 inch. The encased fibers shall form a cylindrical log that is a minimum of 10 foot long and 6-7 inches in diameter. A minimum of 80 percent of the fiber material shall be 6 inches or longer. Excelsior fibers shall be packed into the net casing at a density of 1.4 to 3.6 lbs/ft<sup>3</sup>.

## APPENDIX D

## 2007 Landfill Reclamation Plan

The Rapid City Landfill is a Subtitle D Landfill. It is permitted to receive up to 149,999 tons of non-hazardous municipal solid waste per year. Landfill operations include the dumping, compacting, and covering of garbage; the use of on-site dirt borrow pits for covering the garbage; the remediation of petroleum contaminated soils; the storage, drying, and use of street sweepings; and the final capping of areas used for garbage disposal. All these operations leave areas of soil open and unreclaimed. While active, these areas are not feasible to reclaim. Once these sites become inactive, temporary stabilization occurs immediately and reclamation occurs within one year.

Presently, there are about 39 acres of disturbed area on the Landfill property. These areas are indicated on the Reclamation Plan Map attached to this plan. Inactive disturbed, active disturbed and future disturbances are delineated and numbered. The following is an approximate acreage of each numbered area, a description of each, and a reclamation schedule.

Area 1. This area covers approximately 4 acres and is used for petroleum contaminated soil land farming and is continuously active.

Area 2. This area is the active landfill. It covers approximately 30 acres and is planned for reclamation in 2014. Inactive areas of the landfill area temporarily covered with yard waste grindings to control erosion and fugitive dust emissions.

Area 3. This area covers approximately 5 acres and is an active borrow area. Inactive areas of the borrow area are temporarily covered with yard waste grindings. This area will be used as the future active landfill in approximately 2021.

## Reclamation Specifications

### **Compost Application**

Any area reclaimed on the Landfill property will use one of the compost products produced by the facility for soil amendment prior to seeding. The compost layer will be applied evenly over the surface at a rate that is one third the depth of incorporation or about two inches. The depth of incorporation will depend upon the disk size and weight.

After incorporation of compost, the seeding and fertilizing will generally follow the City of Rapid City's Standard Specifications, Sections 70, 71 and 72, for seeding and fertilizing. A copy of these sections is included in this appendix.

### **Seeding**

- a. Cover Crop (interim ground cover) - not for use on landfill cap -
  - 50% - Annual Rye Grass
  - 50 % - Perennial Ryegrass

Application Rate - 50 pounds per acre

- b. Final Reclamation (permanent seeding of landfill cap)

Farm Lawn Seed Mix

- 50% Ephriam Crested Wheatgrass
- 30% Delaware Dwarf Perennial Ryegrass
- 10% Boreal Creeping Red Fescue
- 5% Gulf Annual Ryegrass
- 5% Alsike Clover, VNS

Farm Lawn II Seed Mix

- 50% Ephriam Crested Wheatgrass
- 35% Delaware Dwarf Perennial Ryegrass
- 10% Boreal Creeping Red Fescue
- 5% Gulf annual Ryegrass

Application Rate:     final reclamation - 100 lbs per acre  
                               reseeding - 50 lbs per acre

Application rates are adjusted from the suggested rate due to the open prairie location of landfill operations and the high availability of transient seed. The Farm Lawn mixes are low maintenance and drought tolerant

### **Fertilizing**

Fertilizer shall be 18-46-0 and shall be applied at a rate of 200 lbs per acre unless otherwise specified. When using yardwaste compost a minimum of 65 pounds of nitrogen and 50 pounds of phosphorous should be applied per acre. When using co-compost, the standard 18-46-0 fertilizer may be used.



LANDFILL RECLAMATION  
MAP 2007  
APPENDIX D





## APPENDIX E

## SECTION 70

### SEEDING

#### 70.1 DESCRIPTION

##### A. General

This work consists of preparing a seedbed and furnishing and planting seed on disturbed areas within limits of the work.

##### B. Related Work

Section 71 Fertilizing

Section 72 Mulching

Section 76 Compost Application

#### 70.2 MATERIALS

##### A. General

The seed furnished shall be the best quality seed available for the kind and variety specified. The seed shall comply with the requirements of the South Dakota Seed Law and shall be "Blue Tag" certified governed by Federal Regulations.

##### B. Origin Limitations

Seed furnished shall have been grown in South Dakota or an area comparable to South Dakota's growing conditions.

##### C. Seed Testing

Seed shall be tested within eighteen (18) months prior to the planting date. Testing shall be performed by a commercial seed testing lab or a registered member of the Society of Commercial Seed Analysts (Registered Seed Technologist). The Contractor shall furnish the Engineer with a certified test report prior to the start of seeding operations. Seed not planted within the eighteen (18) month period shall be retested for dormant seed, hard seed, and germination. A new certified test report shall be furnished. Testing shall be the responsibility of the Contractor.

##### D. Labeling

Before seeding begins, the Engineer shall verify that each bag of seed delivered to the project bears a tag, which shows the following information:

- Name and address of supplier.
- Project number for which the seed is to be used.
- Suppliers lot number for each kind of seed in the mixture.
- Origin (where grown) for each kind of seed.
- Purity, germination, and other information required by South Dakota Seed Law for each kind of seed.
- Pounds of bulk seed of each kind of seed in each bag.
- Total pounds of bulk seed mixture in each bag.
- Pounds of pure live seed (PLS) of each kind of seed in each bag.
- Total pounds of pure live seed (PLS) mixture in each bag.
- Dormant seed and hard seed.

When bulk seed is referred to, it is defined as total seed, including pure live seed (PLS), inert matter, crop seed, and weed seed.

#### E. Seed Mixes

Seed mixes for small applications, under two acres, may be the following:

##### a. Irrigated Lawn mix

80% of at least 3 varieties of Kentucky Bluegrass  
 20% Perennial Ryegrass  
 Rate of application – 175# per acre

##### b. Non-irrigated lawn mix

20% Blue Fescue  
 20% Chewings Fescue  
 20% Creeping Red Fescue  
 20% Hard Fescue  
 10% Perennial Ryegrass  
 10% NuBlue Kentucky Bluegrass  
 Rate of application – 200# per acre

##### c. Road Ditch mix

40% Crested Wheatgrass  
 30% Perennial Ryegrass  
 20% Hard Fescue  
 10% Annual Ryegrass  
 Rate of application – 100# per acre

Seed mixes for seeding areas over two acres shall be designed to meet site-specific requirements, such as soil type, orientation, slope, irrigation/no-irrigation, soil nutrients, and other.

The Contractor shall submit a seed mix listing the specific varieties of seed in the mix intended for use. The submittal shall be sent to the City of Rapid City Engineering Division, 300 Sixth Street Rapid City, S.D. 57701 for approval. A new submittal will be required annually. One submittal at the beginning of the year or one submittal for each project will be acceptable. If the mix changes from the original yearly submittal a new submittal will be required.

### **70.3 CONSTRUCTION REQUIREMENTS**

#### **A. General Requirements**

Within seasonal limitations, seeding shall be done as soon as finish grading and topsoiling have been completed.

The topsoil to be used in the areas to be seeded or hydroseeded shall have a minimum depth of 6 inches.

Seeding or related work shall not be done when the condition of the soil is such that a satisfactory seedbed or uniform seed placement cannot be obtained. Seed shall not be sown when the wind is strong enough to interfere with uniform seed application. Seed shall not be sown on areas under water.

Slopes shall be worked longitudinally, on contour, during the preparation of areas, drilling, and after seeding.

Fertilizing shall be provided as indicated in Section 71. Mulching shall be provided as indicated in Section 72.

The Engineer may approve necessary adjustment in the requirements outlined to obtain the most satisfactory results under varying conditions.

The Contractor shall calibrate the drill or hydro seeder on each project. Calibration runs may be performed on areas to be seeded.

#### **B. Seasonal Limitations**

Seeding shall not be done between June 15 and August 31 without written authorization from the Engineer.

Seeding may be done when the ground is not frozen and condition of the soil permits preparation of a satisfactory seedbed. Seeding shall not be done without authorization from the Engineer.

## C. Equipment and Methods

### 1. Seedbed Preparation

Initial preparation of newly graded areas for seeding shall be worked to a minimum depth of 6 inches. Every effort shall be made to obtain this depth on the first pass with tillage equipment. The implement used shall be a tool carrier with rigid shanks and sweeps or chisels or a heavy duty disk as appropriate to the conditions. The implement shall have positive means of controlling depth of penetration.

Lumps or clods exposed by the initial pass of tillage equipment over three (3) inches in diameter shall be broken up. The number of additional passes required breaking up lumps or clods shall be kept to a minimum. Working the soil to a fine, pulverized condition shall be avoided.

After seedbed preparation has been completed, the Contractor shall pick up and dispose of all loose stones or boulders having a vertical projection of two (2) inches (or more) above the soil surface. Logs, stumps, brush, weeds, cables, or other foreign material, which might interfere with the proper operation of drills, mowers, or other implements, shall be disposed of by the Contractor.

### 2. Mulching

Top dress newly seeded areas with mulch per section 72.

### 3. Reseeding of Previously Seeded Areas

Existing weeds and cover crop shall be preserved for its mulch value. The seed shall be drilled directly into existing cover if possible, or mowing and disking shall be provided to permit penetration of drill openers and placement of seed to the specified depth.

### 4. Drilling

The specified seed mixture shall be drilled in uniformly, using a press drill equipped with individually mounted, adjustable, spring-loaded, double-disk furrow openers, fitted with depth control bands or drums.

The depth control bands or drums shall provide a loose planting depth of one to one and one-half (1 - 1 ½) inches (distance from band to edge of opener disk) before compaction by the press wheel and a final planting depth of three-fourths to one (¾ - 1) inch behind the press wheel.

The press drill shall be mounted on rear press wheels, which carry a major portion of the weight of the drill and having no weight carrying wheels at the ends of the seed box. The press wheels shall be mounted independently of the furrow



openers. A press wheel shall follow directly behind each opener to compact the soil over the drill row.

The seed box shall be equipped with positive feed mechanisms, which will accurately meter the seed to be planted, and agitators which will prevent bridging in the seed box and keep seeds uniformly mixed during drilling. The drill shall conform to the following:

Drill Width Maximums:

Single Units.....10 feet  
 Flex coupled side-by-side units .....16 feet  
 (max. two 8-foot members)

Each drill shall be equipped with a meter, which will measure the area covered by the drill.

Each drill shall be equipped with fabricated baffles or partitions mounted a maximum of two (2) feet on centers and flush with the top of the seed box and extending downward to within four (4) inches of the bottom of the seed box.

On areas where a press drill cannot be operated satisfactorily, hydraulic, cyclone, knapsack hand-operated, or other broadcast type seeders may be used, when approved by the Engineer.

5. Hydro seeding

Drilling is the preferred method of seeding. The Contractor shall obtain written permission from the Engineer to hydro seed.

The specified seed mixture shall be hydro seeded uniformly, using a hydro seeder.

The hydro seeder shall be equipped with a gear-driven pump and a paddle agitator. Agitation by re-circulation from the pump will not be allowed. Agitation shall be sufficient to produce homogeneous slurry of seed and fertilizer in the designated proportions.

Fertilizer of the specified formulation shall be included at the specified rate.

Specified seed mixtures shall be included at the specified rate. No seed shall be added to the slurry until immediately prior to beginning the seeding operation.

Legume seed shall be pellet inoculated with the appropriate bacteria. Inoculation rates shall be four times that required for dry seeding.

The time allowed between placement of seed in the hydro seeder and emptying of the hydro seeder tank shall not exceed thirty (30) minutes.

Wood cellulose fiber mulch shall be degradable, wood cellulose fiber or one hundred percent (100%) recycled long-fiber pulp, free from weeds or other foreign matter toxic to seed germination and suitable for hydro mulching.

**D. Care during Construction and Final Inspection**

The Contractor is responsible for smoothing dirt ridges, which result from his operations or from traffic. Such ridges shall be smoothed so they will not interfere with future mowing.

Following completion of seeding operations, foot, vehicular, or equipment traffic over the seeded area shall be kept to a minimum.

Areas damaged from such traffic shall be reworked and reseeded as determined by the Engineer.

The Contractor shall, prior to acceptance of the project, reseed any area on which the original seed has been lost or displaced.

**B. Watering**

After seed, fertilizer and mulch have been placed, it shall be watered to provide a moist condition through the mulch as well as into the underlying soil bed.

For a period of three weeks after seeding and initial watering, the Contractor shall apply adequate water to insure proper germination of the seed and growth of the grass. The Engineer may waive watering requirements if adequate natural moisture has been present. At the end of the three (3) week watering period, the Engineer will make an inspection to determine if the grass is alive and growing. If seed has not satisfactorily rooted into the soil and is not alive and growing, the Engineer will determine if new seed and/or additional watering, at the Contractors expense, are required. Replaced seed shall be watered as required for the original.

After the Engineers acceptance of the newly seeded areas, the Contractor shall notify all affected property owners, with notification of watering requirements provided by the Owner, that they will be responsible for watering the newly seeded areas. The Contractor shall provide written verification that affected property owners have both been notified and have accepted the condition of the newly seeded areas. The growing season is defined as May through September.

**70.4 METHOD OF MEASUREMENT**

Seeding will be measured to the nearest square yard. Measurement for fertilizer and mulch will be the same as for the seeding. Tickets indicating the appropriate application rate has been met shall be furnished to the Engineer to verify this area.

**70.5 BASIS OF PAYMENT**

Seeding will be paid for at the contract unit price per square yard. This price will be full compensation for the preparation of the seed and for labor, tools, equipment, and incidentals necessary.

Payment for seeding, fertilizing, and mulch will all be included under the same bid item. Water for seeding shall be considered incidental and shall be included in the unit price bid for seeding.

**END OF SECTION**

## SECTION 71

### FERTILIZING

#### 71.1 DESCRIPTION

##### A. General

This material consists of furnishing and applying fertilizer materials on areas to be seeded or sodded.

##### B. Related Work

Section 70 Seeding

Section 72 Mulching

Section 76 Compost Application

#### 71.2 MATERIALS

A. Fertilizer shall be a dry, standard commercial product conforming to the South Dakota Fertilizer Law and subsequent amendments or revisions. Each brand and grade of fertilizer must be registered with the State Department of Agriculture. Each bag or other container shall clearly show the net weight of the contents, the name and address of the manufacturer, the brand and grade, and the guaranteed analysis of the contents, and showing the minimum percentages of total nitrogen available, phosphoric acid, and water soluble potash, in that order.

B. Fertilizer shall be in a condition, which will permit proper distribution.

C. Testing of fertilizer will not be required. Before any fertilizer is approved for use, the Contractor shall submit to the Engineer a certified statement from the manufacturer stating that the fertilizer is registered for sale in South Dakota and complies with the South Dakota Fertilizer Law. The certified statement shall include the Contractor's name, the project number, and all information that appears on the containers, as listed in "A" above.

D. Fertilizer for small projects, under two acres of seeding area, shall be 18-46-0 which shall be applied at a rate of 200# per acre, unless specified otherwise by the Engineer.

Fertilizer type and quantity for projects with seeding areas larger than two acres shall be based upon testing of topsoil for horticultural properties. Test results and fertilizer type shall be submitted to the Engineer for approval.

### **71.3 CONSTRUCTION REQUIREMENTS**

- A. Fertilizer shall be applied not more than forty-eight (48) hours prior to seeding or sodding, unless otherwise approved by the Engineer. Fertilizer shall be applied by one of the following methods:
1. With a fertilizer attachment on the drill, which will place the fertilizer in a band on or near the drill row behind the openers during the drilling operations (preferred method)?
  2. By drilling in with an approved drill prior to seeding.
  3. By spreading the fertilizer uniformly over the areas to be seeded prior to or during seedbed preparation (before final pass). This method will not be acceptable when seedbed preparation is not required.
  4. Where the seed is sown by a hydraulic seeder, the required amount of fertilizer may be placed in the tank, mixed together with the water and the seed, and applied in the seeding operation.
  5. Where required on areas to be sodded, thoroughly mix fertilizer into the top one (1) to two (2) inches of soil prior to laying sod.
  6. On slopes steeper than 3:1, where fertilizer cannot be incorporated into the soil effectively by mechanized equipment, fertilizer may be applied by any approved method and raked in to a depth of approximately one (1) inch.
- B. Clods and stones having a vertical projection of two (2) inches or more above the soil surface and other foreign materials brought to the surface shall be removed.
- C. The Contractor shall, prior to acceptance of the project, re-fertilize any area on which the original fertilizer has been lost or displaced, as determined by the Engineer.

### **71.4 METHOD OF MEASUREMENT**

Fertilizing will be measured to the nearest square yard.

### **71.5 BASIS OF PAYMENT**

Fertilizing will be paid for at the contract unit price per square yard, which will be full compensation for furnishing, hauling, placing, incorporating fertilizer into the work, labor, equipment, materials, tools, and incidentals necessary.

Payment for fertilizing, seeding, and mulching will all be included under the same bid item.

**END OF SECTION**



## SECTION 72

### MULCHING

#### 72.1 DESCRIPTION

##### A. General

This work consists of placing a mulch cover on designated areas following seeding operations.

##### B. Related Work

Section 70 Seeding

Section 71 Fertilizing

#### 72.2 MATERIALS

##### A. Grass Hay or Straw Mulch

Grass hay or straw mulching shall be substantially free of noxious weed seeds and objectionable foreign matter. The mulch shall have been baled dry, in bales of approximately equal weight and shall be relatively dry when applied. The Engineer will reject materials having characteristics, making them unsuitable for the purpose intended.

Bromegrass is not an acceptable mulch.

##### B. Fiber Mulch

Fiber Mulching shall contain no germination or growth inhibiting factors and shall have the property of becoming evenly dispersed and suspended when agitated in water. When sprayed uniformly on the surface of the soil, the fibers shall form a blotter-like ground cover, which will readily absorb water and allow infiltration to the underlying soil without restricting emergence of seedlings. Weight specification from suppliers, and for all applications, shall refer only to air dry weight of the fiber, considered to be 10 percent moisture.

The fiber mulch material shall be supplied in packages marked by the manufacturer to show the air dry weight content. Suppliers shall certify that laboratory and field testing of their product has been accomplished, and that it meets all of the foregoing requirements.

C. Compost and Wood Chip Mulch

Compost shall be  $\frac{3}{4}$  in. minus and  $\frac{3}{4}$  in. minus screened material. Wood Chip Mulch shall be material passing the  $\frac{3}{4}$  in. screen.

No chemical additives shall be added during the composting process. The process shall be completely natural utilizing the organic feedstock, water and air. The material shall be composted to a ratio of 30 parts carbon to 1 part nitrogen before screening the material. The compost shall be registered through the South Dakota Department of Agriculture as a soil amendment.

D. Hydroseeding Tackifier Amendment

Hydro seeding tackifier amendment shall be a safe, non-toxic polymer that can be used with any paper or fiber mulch products. The anionic high molecular weight polymer binds the hydroseeding media to the soil particles. The tackifier shall be hydrophobic and allow water into the mulch matrix. The tackifier shall be a synthetic material that is free of weed seed and any organic containments. It shall be compatible with biostimulants, fertilizers and surfactants. It shall not clump in the tank and clog the spray nozzle. The tackifier lubricates the slurry mix and tightens the slurry stream and will increase the shooting distance. The tackifier will break down from UV light in 5-6 weeks.

The tackifier can be used as a temporary dust abatement in non-traffic areas. The tackifier can be applied as a temporary soil stabilizer to protect against erosion. The tackifier can be applied through hydraulic equipment for clarifying sediment/holding ponds.

## 72.3 CONSTRUCTION REQUIREMENTS

A. Grass Hay or Straw Mulch

1. Placing Mulch

The rate of application shall be 4000 lbs. per acre unless otherwise specified by the Engineer. The mulch shall be placed within forty-eight (48) hours after the seeding has been completed. Mulching operations shall not be performed during periods of high winds, which preclude the proper placing of the mulch. The placing of mulch shall begin on the windward side of the areas to be covered.

The mulch shall be blown from a machine designed for that purpose and uniformly distributed over the seeded areas. The machine for placing the mulch shall be of an approved type, which will blow or eject, by constant air stream, a controlled amount of mulch. The machine shall cause a minimum of cutting or breakage in the length of the mulch.

Mulch containing excessive moisture, which prevents uniform feeding through the machine, shall not be used. Bales shall be broken up and loosened as they are fed into the blower to avoid placing of matted or unbroken lumps.

Mulch shall be placed uniformly over the seeded areas at the plan specified rates. The rates of application may be varied with the approval of the Engineer. Approximately ten percent (10%) of the soil surface shall be visible through the mulch blanket prior to mulch tiller (punching) operation.

Any existing cover left in place, as specified in Section 70.3C.2, shall be used as mulch, and the specified rate for mulching shall be reduced to leave ten percent (10%) of the soil surface visible through the mulch blanket and a loose thickness of cover of about one (1) inch prior to the punching operation.

Excessive cover, which will smother seedlings of small seeded grasses, shall be prohibited. The Engineer may order the placement of mulch on any area where protection is considered necessary to forestall erosion or encourage turf establishment.

#### B. Punching

Immediately following application, the mulch shall be punched into the soil by a mulch tiller consisting of a series of dull, flat disks with notched or cutout edges. The disks shall be approximately twenty (20) inches in diameter, one-fourth (1/4) inch thick, and shall be spaced approximately eight (8) inches apart and shall be fitted with scrapers.

Working width of the tiller shall not exceed six (6) feet per member, but may be operated in gangs of not over three (3) members. The tiller shall be operated on contour, except on slopes 3:1 or steeper, where the Engineer may order diagonal operation and, if necessary, dual drive wheelers or crawler tread on the tractor to minimize side slip and rutting damage to slopes.

Tiller members shall be ballasted to push mulch into the soil approximately three (3) inches with ends exposed above the soil surface. When light disking is required in existing cover so the seed can be drilled into a depth of one (1) to one and one-half (1 1/2) inches, the tiller members shall be ballasted to push mulch into the soil with the ends exposed above the soil surface. The Engineer shall determine on construction the depth to which the mulch is to be punched.

The mulch tiller shall follow as closely as possible behind the mulch blower. Mulch shall not be blown when the wind velocity causes appreciable displacement before it can be anchored by the mulch tiller. The Engineer may require more than one (1) pass of the mulch tiller or diagonal passes where necessary to assure adequate anchoring.

C. Fiber Mulch

Rate of application shall be 2000 lbs. per acre unless otherwise specified by the Engineer. Excessive thickness of mulch, which will smother grass seedlings, shall be avoided.

Mulch shall be placed on a given area as soon as possible, or within 48 hours after seeding.

D. Compost

Apply a ¼ inch layer of compost over the seeded area, then water to protect against hot, dry weather or drying winds.

E. Hydroseeding Tackifier Amendment

1. Hydro seeding

When using as a tackifier with paper or fiber mulch, add three pounds per acre. Slowly pour the tackifier into the water and thoroughly mix in the tank. Add mulch, seed, fertilizer and any other components in the tank and thoroughly mix.

2. Straw Tacking

Apply three pounds per acre with 750 pounds of wood or paper mulch.

3. Temporary Dust Control

Apply to non-traffic areas at a rate of three pounds per acre with 1000 gallons of water. On slopes of 4:1 to 2:1 apply at a rate of 6-12 pounds per acre.

4. Clarifying sediment/holding ponds

Slowly pour two-three pounds of tackifier into 1000 gallons of water while the tank is agitating. Thoroughly mix for 15 minutes and spray to one surface acre of water.

F. Care During Construction and Final Acceptance

Traffic, either foot, equipment, or vehicular, shall be kept to a minimum over the seeded and mulched areas.

The Contractor shall, prior to acceptance of the project, re-mulch any area on which the original mulch has been displaced as a result of excessive wind, water, or other causes.

#### **72.4 METHOD OF MEASUREMENT**

Mulching will be measured to the nearest square yard.

#### **72.5 BASIS OF PAYMENT**

Mulching will be paid for at the contract unit price per square yard, which will be full compensation for furnishing, hauling, placing, and punching, and for materials, equipment, labor, tools, and incidentals necessary. Hydroseeding Tackifier Amendment shall be included in the contract unit price bid per square yard for mulching when used as a mulch tackifier.

Payment for mulching, seeding, and fertilizing will all be included under the same bid item.

Compost and Wood Chip Mulch will be paid for at the contract unit price per ton, which will be full compensation for furnishing, hauling, and placing, and for materials, equipment, labor, tools, and incidentals necessary.

When Hydroseeding Tackifier Amendment is being used for temporary dust control or clarifying sediment/holding ponds the Hydroseeding Tackifier Amendment will be paid for at the contract unit price per acre which will be full compensation for furnishing, hauling, and placing, and for materials, equipment, labor, tools, and incidentals necessary.

**END OF SECTION**



## APPENDIX F

rules, and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the Drawings and Specifications are at variance therewith, he shall promptly notify the Engineer in writing and any necessary changes shall be adjusted as provided in the Contract for changes in the work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules, and regulations and without such notice to the Engineer, he shall bear all costs arising therefrom. Such performance shall constitute a waiver of any and all claims associated with the work.

#### **7.27 PERMITS AND LICENSES**

Unless otherwise specified, permits and licenses of a temporary nature necessary for the prosecution of the work shall be secured and paid for by the Contractor. Permits, licenses, and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Owner, unless otherwise specified.

#### **7.28 DIRT/DUST CONTROL**

All activities associated with this contract shall conform to Pennington County Ordinance #12, "Fugitive Dust Regulation." The Contractor shall obtain a dust control permit from the County Planning Office and furnish a copy to the Owner before beginning work on the project.

The Contractor shall make every reasonable effort to minimize fugitive dirt or dust as a result of construction activities. The Engineer may require the Contractor to water or take other actions necessary to prevent blowing dirt and/or dust and other nuisance conditions, at no additional cost to the Owner.

Upon substantial completion of construction at a given site or at any time prior to final project acceptance as directed by the Engineer, the Contractor shall clean up the project area(s) and remove all dirt and debris from the street and sidewalk surfaces to the satisfaction of the Engineer. In general, removal of the dirt and debris shall be conducted in such a way and/or at such a time as to minimize nuisance conditions of dirt and dust in the air, on vehicles, sidewalks, and buildings.

Specifically, the streets shall be swept with an approved, enclosed mechanical or vacuum-type sweeper, which picks up the dirt and debris and stores it for hauling and disposal off-site. The Contractor shall utilize a private sweeper whenever possible. However, he may request that the City Street Department do the sweeping if a private sweeper is not available when required. When the Contractor elects to utilize the City sweeper, he shall give the Engineer at least 72 hours' notice prior to the time the sweeper is desired. If the City sweeper is utilized, the City Street Department will then bill the Contractor for the use of the sweeper at the current hourly rate for sweeper and operator. If, in the opinion of the Engineer, the Contractor fails to make reasonable effort to minimize fugitive dust as a result of his construction activities, or refuses to take action when requested by the Engineer, the Engineer may elect to schedule the City sweeper

to provide cleanup. The City street Department will bill the Contractor at one and one-half times (1 1/2) the current hourly rate for the sweeper and operator.

## **7.29 CLAIMS AND DAMAGES**

Any claim for damage arising under this contract shall be made in writing to the party liable within ten (10) calendar days of the first observance of such damage, except as expressly stipulated otherwise, and shall be adjusted by agreement or by arbitration. Failure to comply with the notice requirement will result in denial of the claim.

In general, the Contractor may not recover for claims, which did not impact the critical path of the project.

The Contractor shall document his claim(s) in the following manner:

- A. Provide an introduction and summary.
- B. Provide a listing and explanation of subsurface information available in the bidding documents and/or through a reasonable site investigation.
- C. Provide a report of the Contractor's site investigation.
- D. Explain the conditions actually encountered.
- E. Discuss the difference between actually encountered and anticipated conditions with emphasis on the impact of such things as delay, interference, disruption, changes in construction methods, and additional direct labor and equipment requirements.
- F. Summarize the applicable laws and/or contract clauses.
- G. Set forth the time extension claim with rational, detailed calculations.
- H. Set forth the cost claim broken down to the smallest elements possible.

## **7.30 LIENS**

Neither the final payment nor any part of the retained percentage shall become due until the Contractor, if required, shall deliver to the Owner a complete release of all liens arising out of this Contract, or receipts in full in lieu thereof and, if required in either case, an affidavit that so far as he has knowledge or information the releases and receipts include all labor and materials for which a lien could be filed; but the Contractor may, if any subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Engineer, to indemnify the Owner against any lien. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.