

2021 MS4 Summary

2021 DOT&PF Central Region M&O Expenditure Summary:

Sweeping- \$1,721,618.62

Storm Drain Inspections and Cleaning- \$487,300.00

Sand/Salt- \$250,405.00/\$584,010.00

MS4 Permit Administration and Compliance

Payment to the Municipality of Anchorage for Permit Implementation- \$350,000

DOT&PF M&O Permit Administration Costs - \$33,487.13

3.1.5. Construction Site Runoff Control Program – Enforcement Response Policy

DOT&PF Central Region Maintenance and Operations does not have an Enforcement Response Policy for the work performed by its own staff.

3.3.1.4 Inventory of industrial and commercial facilities

Please see attached facilities sheet.

3.4.3.2 Inventory of street maintenance materials

Please see attached sand/salt sheet.

3.4.4 Annual street sweeping report

Please see attached annual report.

3.4.6 Annual inspections of permittee owned facilities

Please see attached annual inspections.

3.6.2 Targeted Education and Training

See attached attendee list

SWPPP Documents

- **Facility SWPPPs:** Birchwood, Girdwood and Anchorage have active SWPPPs.
- **Snow Storage Sites:** Both DOT&PF snow storage sites have active SWPPPs.

Anchorage District Maintenance Station

Receiving Watershed – Campbell Creek

Address – 5300 E Tudor Road, Anchorage, AK 99507

Nature of Business – Maintenance Facility

SIC code – 1611007

Girdwood Maintenance Station

Receiving Watershed – Glacier Creek

Address – Mile 90 Seward Hwy, Girdwood, AK 99587

Nature of Business – Maintenance Facility

SIC Code – 1611007

Birchwood Airport & Maintenance Station

Receiving Watershed – Peters Creek

Address – 20651 Birchwood Spur Road, Chugiak, 99567

Nature of Business – Maintenance Facility

SIC Code – 1611007

O'Malley Snow Storage Site

Receiving Watershed – Campbell Creek

Address – O'Malley Road & Old Seward Hwy

Nature of Business – Snow Storage Site

SIC Code - 1611007

Hiland Snow Storage Site

Received Watershed – Eagle River

Address - MP 0.05 on Hiland Road, Eagle River, 99577

Nature of Business – Snow Storage Site

SIC Code - 1611007

DOT&PF Maintenance Standard Operating Procedures for Storm Water Control

**Maintenance and Operations
Division Alaska Department of Transportation &
Public Facilities**

January 2022

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Abbreviations

ADEC	Alaska Department of Environmental Conservation
DOT&PF	Alaska Department of Transportation and Public Facilities (also known as DOT&PF)
ARDSA	Anchorage Roads and Drainage Service Area
AST	Alaska State Troopers
BMP	best management practice
CBD	Central Business District
CBERRRSA	Chugiak Birchwood Eagle River Rural Road Service Area
EPA	U.S. Environmental Protection Agency
LRSA	Limited Road Service Area
MOA	Municipality of Anchorage
M&O	Maintenance and Operations Division (DOT&PF)
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
OGS	Oil and Grit Separator
PWA	Public Works Administration
RMSA	Road Maintenance Service Areas
RRSA	Rural Road Service Area
SA	Service Area
SMD	Street Maintenance Department (MOA)
SOPs	Standard Operating Procedures
WMS	Watershed Management Section

1 Introduction

The storm water collection systems are comprised of a variety of structural controls (e.g. catch basins, manholes, storm drains, and outfalls) that convey storm water from impervious surfaces to receiving waters. Because storm water is discharged to “waters of the United States,” a Alaska Pollutant Discharge Elimination System (APDES) permit must be obtained from the Alaska Department of Environmental Conservation that has been delegated program authority from U.S. Environmental Protection Agency (EPA). Due to the similarities in purpose, function, and areas of service, the Municipality of Anchorage (MOA) and Alaska Department of Transportation and Public Facilities (DOT&PF), elected to obtain coverage under a single NPDES permit. As they are co-permittees, both agencies have agreed to combine their efforts so that permit requirements can be met in an efficient and effective manner. The agencies have been authorized to discharge stormwater from their municipal separate storm sewer system (MS4) system under the NPDES permit AKS-052558.

Under the current permit (effective August 1, 2020) all street maintenance operators of MOA or DOT&PF owned MS4 drainage systems are required under part 3.4.3 to prepare and submit standard operational procedures (SOPs) that relate to the inspection and maintenance procedures of storm water controls. SOPs that describe the practices and schedules used by street maintenance personnel to maintain storm water controls and prevent storm water contamination have been prepared and are presented in this report.

2 Description of Street Maintenance Service Areas

Municipal road maintenance services are delineated by road maintenance service areas (RMSA). The RMSA is classified by the type of road maintenance services that can be authorized uses of the service area taxes. A RMSA can be defined either as exclusively for maintenance or as both capital and maintenance improvement areas. Ultimately the Municipal Assembly and the service area voters determine the authority, capacity, and ability of the individual RMSA. Each RMSA has clearly defined boundaries as well as a board of supervisors (Board) elected by each individual area's voters. The main responsibility of each RMSA is to perform or furnish contractual road maintenance services in accordance with state statutes, Municipal ordinances, and the NPDES permit. The Board determines the level of maintenance and directs the contractual services accordingly; therefore, each RMSA has a unique set of SOPs depending on their range of responsibilities, are performed by staff or are outsourced to a contractor.

According to the MOA RMSA Program, a Service Area (SA) has authority to provide basic road maintenance to make capital improvements and to save for capital projects. In addition, a service area may have other authority, such as fire protection and rescue, as well as parks and recreation.

A SA can be further defined as a Rural Road Service Area (RRSA) or Limited Road Service Area (LRSA). A RRSA has authority to provide basic road maintenance services. RRSA's also have the ability to save taxes for capital improvements and capital road projects. A LRSA has limited authority to provide or issue contracts to provide basic road maintenance services. LRSAs do not have the ability to save taxes for capital projects.

A description of the RMSA Program can be seen below in Table 2-1.

Table 2-1: RMSA Program

Entity Name	Acronym	Area of Responsibility
Alaska Department of Transportation and Public Facilities Maintenance and Operations	DOT&PF M&O	All DOT&PF owned MS4 streets and drainage ways
Municipality Anchorage Street Maintenance Anchorage Roads and Drainage Service Area	MOA - ARDSA	All MOA owned MS4 streets and drainage ways within the ARDSA boundaries
Municipality Anchorage Street Maintenance Anchorage Chugiak Birchwood Eagle River Rural Road Service Area	MOA - CBERRRSA	All MOA owned MS4 streets and drainage ways within the CBERRRSA boundaries
Municipality of Anchorage Public Works Administration	MOA – PWA (LRSA)	(1) All MOA owned MS4 streets and drainage ways within all established RMSA (RRSAs/LRSAs other than CBERRRSA and ARDSA) that are served by the RMSA Program and (2) All MOA owned MS4 streets and drainage ways within areas having no formally established road maintenance service (Independent Road Service Areas, IRSAs)
Municipality of Anchorage Parks and Recreation	MOA – Parks and Rec.	All MOA owned MS4 trails and drainage ways within the Parks and Recreation service area

2.1 DOT&PF

DOT&PF Maintenance and Operations (M&O) is responsible for maintaining services for the State owned roads and streets, classified as arterial and collector roads and streets, discharging into the MS4. A map of M&O service area can be found in Appendix A.

3 Standard Operating Procedures for Street Maintenance Activities

Standard operating procedures (SOPs) were prepared for DOT&PF to satisfy the current APDES permit requiring that SOPs contain information describing the activity, inspection and maintenance schedules specific to the activity, and any pollution prevention/good housekeeping procedures used during the activity (3.4.3). The permit also specifies that the SOPs address, but are not limited to, the following activities:

- Road deicing
- Anti-icing
- Snow removal practices
- Snow disposal storage areas
- Maintenance of green infrastructure
- BMPs to reduce pollutants from roads and parking lots (i.e. sweeping)

The SOPs developed defines the activity, summarizes any specific permit references, provides a description of the activity, outlines the inspection and maintenance criteria and schedules, and describes pollution prevention and good housekeeping procedures used during the activity to reduce the discharge of pollutants to the maximum extent possible.

**Alaska Department of Transportation and Public
Facilities (DOT&PF) Standard Operating Procedures**

SOPs

Inlets/Catchbasins

Manholes/Pipe

***Inspections/Weirs Pipe Jetting
and Cleaning***

Check Dams

Oil and Grit Separators

Outfalls

Tree and Brush Removal

Drywells

Pothole Repair

Vegetated Swales

Snow Removal and Disposal Practices

Snow Disposal Site Maintenance

Road Deicing Practices and Storage

Flow Conveyance System and Stream Thawing

Aggregate Application and Storage

Contaminated Materials

Litter Control

Mowing

Infiltration Devices and Constructed Wetlands

Drainage Ditch Maintenance

Holding Tank and Retention Pond Water

Inlets/Catch Basins

RESOURCE NEEDS

DEFINITIONS:

Catch basins are subsurface concrete basins that receive water through a metal or slotted grate. These basins can also be round concrete chambers, manholes, which contain flow control and/or water quality devices. The catch basin's primary function is to convey flow while filtering debris and sediment to prevent these items from transferring and clogging the piped collection system downstream.

PERMIT REFERENCES:

DOT&PF performs annual inspection and (when necessary) cleaning of all catch basins and inlet control measures to meet permit requirements (3.4.2.).

ACTIVITY DESCRIPTION:

Inlet and catch basin inspection and maintenance is a contracted service. A contract for these services is negotiated with the Contractor. Contractor is responsible for inspection and maintenance of inlets and catch basins in accordance with the terms and conditions set forth in the contract. Once complete, the Contractor sends an invoice specifying activities performed to include a daily work log detailing where inspections and maintenance was performed along with any special notes for DOT&PF to take action on. When invoices are received, a DOT&PF foreman visually inspects the sites for work completion. DOT&PF supervisor or foreman reviews contractor daily logs, records and special notes from inspections that require DOT&PF to take action.

INSPECTION CRITERIA:

1. The depth of sediment accumulation is noted in the field notes. If sediment depths are greater than 1/2 the capacity of the catch basin then maintenance is required.
2. The structure is checked for structural integrity and/or damage for the following items:
 - A. Inlet condition is flowing and free from any blockages.
 - B. Evidence of infiltration including drips or water flowing into structure at joints and/or grouting and evidence of discoloration above the sump indicating former water intrusion.
 - C. Cracks and deterioration of the structure or grouting including rotting of concrete structure, exposure of rebar or structural matting, discontinuous sections in the grout.
 - D. Structural integrity including barrel sections is in good alignment, grade rings show no evidence of cracking, lifting, or movement.

MAINTENANCE CRITERIA:

1. Remove sediment using vactor truck. If repairs and/or maintenance are required, the contractor will document them.
2. The conditions will be put on the DOT&PF work log for prioritization and scheduling.
 - A. Remove inlet blockage.
 - B. Record and/or photograph infiltration condition for DOT&PF work log.
 - C. Record and/or photograph cracks and deterioration for DOT&PF work log.
 - D. Record and/or photograph structural integrity for DOT&PF work log.
 - E. Record and/or photograph corrosion or abrasion for DOT&PF work log.

INSPECTION SCHEDULE:

Inspection of each catch basin is completed on an annual basis. After analyzing years of collected data, DOT&PF does not see a benefit to an alternating annual cleaning schedule.

MAINTENANCE SCHEDULE:

Maintenance is performed as determined by the amount of sediment accumulation. Maintenance requirements are logged after inspection, noted, and prioritized on the DOT&PF work log, and maintenance activities are completed as warranted by the priority assigned.

Inlets/Catch Basins

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Pollution prevention and good housekeeping procedures are conducted in accordance with the terms and conditions set forth in the contract, including the following:


Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles, including vactor trucks, used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to the contractor starting work. For equipment inspection and maintenance, the contractor should:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips cannot reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Check fittings associated with the vactor truck prior to starting operation of the vactor truck to remove accumulated sediment material.

Remove all litter and debris found during the inspection procedure. Dispose of acceptable litter/debris from the site in solid waste containers.  Dispose of any hazardous material from the site following Solid Waste Services guidelines.

Sediment, debris, and liquids collected in the vactor truck are transferred to a APDES permitted facility or a paid disposal of material is made through Anchorage Sand and Gravel Company. Maintain a chain of command for disposal of material and submit to DOT&PF supervisor. If sediment is spilled or released during collection or disposal clean the area thoroughly and immediately.

Manholes/Pipe Inspection/Weirs

RESOURCE NEEDS

DEFINITIONS:

Manholes allow surface access to underground utilities and piping conveyances for inspection and maintenance operations. Pipes within the storm water system convey storm water flow to receiving bodies of water. Weirs installed within manholes provide flow control.

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

Manhole/pipe/weir inspection and maintenance is a contracted service. A contract for these services is negotiated with the Contractor. Contractor is responsible for inspection and maintenance of manholes/pipes/weirs in accordance with the terms and conditions set forth in the contract. Once complete, the Contractor sends an invoice specifying activities performed to include a daily work log detailing where inspections and maintenance was performed along with any special notes for DOT&PF to take action on. When invoices are received, a DOT&PF foreman visually inspects the sites for work completion. DOT&PF supervisor or foreman reviews contractor daily logs and records and special notes from inspections that require DOT&PF to take action.

INSPECTION CRITERIA:

1. The depth of sediment accumulation is noted in the field notes. If sediment depths are greater than ½ the capacity of the structure then maintenance is required.
2. The structure is checked for structural integrity and/or damage for the following items:
 - A. Evidence of infiltration including drips or water flowing into structure at joints and/or grouting, and evidence of discoloration above the sump indicating former water intrusion.
 - B. Cracks and deterioration of the structure or grouting including rotting of concrete structure, exposure of rebar or structural matting, discontinuous sections in the grout.
 - C. Structural integrity including barrel sections is in good alignment, grade rings show no evidence of cracking, lifting, or movement.
 - D. Signs of abrasion and/or corrosion and deterioration of pipes.
3. Measure the depth of sediment accumulation in the upstream and downstream pipes.

MAINTENANCE CRITERIA:

1. Remove sediment in manhole or pipes using vacor truck.
2. If repairs and/or maintenance are required, record the condition and transfer to the DOT&PF work log for prioritization and scheduling.
 - A. Record and/or photograph infiltration condition for DOT&PF work log.
 - B. Record and/or photograph cracks and deterioration for DOT&PF work log.
 - C. Record and/or photograph structural integrity for DOT&PF work log.
 - D. Record and/or photograph corrosion or abrasion for DOT&PF work log.
3. If the sediment level in pipes is more than ½ full, schedule the pipes to be jetted and cleaned. Please see Pipe Jetting/Cleaning SOP for detail.

INSPECTION SCHEDULE:

Inspection of manholes and associated weirs and pipes are completed on an annual basis. After analyzing years of collected data, DOT&PF does not see a benefit to an alternating annual cleaning schedule.

MAINTENANCE SCHEDULE:

Maintenance is performed as identified during inspections.

Manholes/Pipe Inspection/Weirs

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Pollution prevention and good housekeeping procedures are conducted in accordance with the terms and conditions set forth in the contract, including the following:


Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles, including vactor trucks, used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to starting work. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips cannot reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Check fittings associated with the vactor truck prior to starting operation of the vactor truck to remove accumulated sediment material.

Remove all litter and debris found during the inspection procedure. Dispose of acceptable litter/debris from the site in solid waste containers.  Dispose of any hazardous material from the site following Solid Waste Services guidelines.

Sediment, debris, and liquids collected in the vactor truck are transferred to a APDES permitted facility or a paid disposal of material is made through Anchorage Sand and Gravel Company. Maintain a chain of command for disposal of material and submit to DOT&PF supervisor. If sediment is spilled or released during collection or disposal clean the area thoroughly and immediately.



Pipe Jetting and Cleaning

RESOURCE NEEDS

DEFINITIONS:

Pipe jetting and cleaning is the process of bending a high pressure water nozzle through a pipe, beating debris and sediment from the pipe. Sediment and debris is collected and removed through an access point via vactor truck.

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

Pipe jetting and cleaning is a contracted service. A contract for these services is negotiated with the Contractor. Contractor is responsible for inspection and maintenance of manholes/pipes/weirs in accordance with the terms and conditions set forth in the contract. Once complete, the Contractor sends an invoice specifying activities performed to include a daily work log detailing where inspections and maintenance was performed along with any special notes for DOT&PF to take action on. When invoices are received, a DOT&PF foreman visually inspects the sites for work completion. DOT&PF supervisor or foreman reviews contractor daily logs and records and special notes from inspections that require DOT&PF to take action.

INSPECTION CRITERIA:

1. The depth of sediment accumulation is noted in the field notes. If sediment depths are greater than ½ the depth of the pipe it is cleaned by jetting.
2. The structure is checked for structural integrity and/or damage for the following items:
 - A. Evidence of infiltration including drips or water flowing into structure at joints.
 - B. Cracks and deterioration of the structure.
 - C. Structural integrity is in good alignment, with no evidence of shifting, shearing, cracking, lifting, or movement.
 - D. Signs of abrasion and/or corrosion.

MAINTENANCE CRITERIA:

1. Remove sediment using vactor truck. Place a downstream bladder of floating boom to collect water and sediment to ensure sediment plumes are not released into receiving water. Dispose of sediment from the vactor truck at the sedimentation basin at the contractor's yard.
2. If repairs and/or maintenance are required, record the condition and transfer to the DOT&PF work log for prioritization and scheduling.
 - A. Record and/or photograph infiltration condition for DOT&PF work log.
 - B. Record and/or photograph cracks and deterioration for DOT&PF work log.
 - C. Record and/or photograph structural integrity for DOT&PF work log.
 - D. Record and/or photograph corrosion or abrasion for DOT&PF

INSPECTION SCHEDULE:

Pipes are inspected during routine manhole inspections (see SOP for Manhole Inspection of Pipes and Weirs).

MAINTENANCE SCHEDULE:

Maintenance is performed as identified during inspections.

Pipe Jetting and Cleaning

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Pollution prevention and good housekeeping procedures are conducted in accordance with the terms and conditions set forth in the contract, including the following:


Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles, including vactor trucks, used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to starting work. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips cannot reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Check fittings associated with the vactor truck prior to starting operation of the vactor truck to remove accumulated sediment material.

Remove all litter and debris found during the inspection procedure. Dispose of acceptable litter/debris from the site in solid waste containers.  Dispose of any hazardous material from the site following Solid Waste Services guidelines.

Sediment, debris, and liquids collected in the vactor truck are transferred to a APDES permitted facility or a paid disposal of material is made through Anchorage Sand and Gravel Company. Maintain a chain of command for disposal of material and submit to DOT&PF supervisor. If sediment is spilled or released during collection or disposal clean the area thoroughly and immediately.

Check Dams

RESOURCE NEEDS

DEFINITIONS:

Check dams are used to slow the velocity of concentrated stormwater, to prevent erosion in an unlined channel or vegetative swale. Check dams catch sediment from the channel and are constructed out of rock. NOTE: DOT&PF does not construct check dams out of the other materials listed. Last sentence is missing, fix text box alignment.

PERMIT REFERENCES:

DOT&PF performs inspection and cleaning of manholes/pipes/weirs to meet permit requirements (3.4.2.)

ACTIVITY DESCRIPTION:

A detailed inspection is completed of each check dam and minor cleaning, such as litter pick-up, is completed as part of the inspection routine. Check dams are visually inspected for sediment accumulation and signs of deterioration, or evidence of previous overtopping or flooding. If sediment accumulation prevents the check dam from functioning properly, then sediment buildup is removed. If repairs are required, the location and condition is reported to the DOT&PF Supervisor upon return from the field activities. The Supervisor will assign the repair to daily field crews as needed.

INSPECTION CRITERIA:

1. The depth of sediment accumulation at the check dam is noted in the field notes. If sediment depths are greater than 1/3 the height of the check dam, maintenance is needed. The accumulation of sediment and evidence of previous flooding or channel overtopping is checked to ensure functionality of the check dam.
2. The condition of the check dam structure:
 - A. Check for signs of structural deterioration including loss of rock structure, and/or crumbling.
 - B. Check for signs of scour on the downstream side of the check dam.

MAINTENANCE CRITERIA:

1. If the sediment and debris level behind the check dam is greater than 1/3 the height of the dam, remove sediment to restore capacity. To keep it functioning properly, the sediment and/or debris is removed.
2. If repairs and/or maintenance are required, record the condition and transfer to the DOT&PF work log for prioritization and scheduling.
 - A. Record and/or photograph structural condition for DOT&PF work log.
 - B. Record and/or photograph scour condition for DOT&PF work log.

INSPECTION SCHEDULE:

Check dams are inspected as needed or when reported to be causing a problem.

MAINTENANCE SCHEDULE:

Maintenance is performed on an as needed basis. Typically maintenance requirements are reported to the DOT&PF Supervisor and maintenance activities are completed as warranted by the priority assigned.

Check Dams

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles, including vector trucks, used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to starting work. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips cannot reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site in solid waste containers.

Sediment and debris collected during check dam maintenance are transferred to the snow disposal site and used to regrade the site or a paid disposal of material is made through Anchorage Sand and Gravel Company. If sediment is spilled or released during collection or disposal clean the area thoroughly and immediately.

Prevent tracking on roadways from the work area and sweep to remove any tracked sediment.

Oil and Grit Separators

RESOURCE NEEDS

DEFINITIONS:

Oil and grit separators (OGS) are structural Best Management Practice (BMPs) designed to remove hydrocarbons and sediment from runoff. Runoff passes through these compartments to separate grit, oil and sediment before continuing in the downstream conveyance system.

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

A detailed inspection is completed of each OGS and minor cleaning, such as litter pick-up, is completed as part of the normal inspection routine. A list of OGSs is developed and given to a contractor to inspect. Contractors inspect and prepare the vehicle fleet, including vactor trucks, to perform the inspection of the assigned structures. Vehicle fleets, including vactor trucks, are driven to the structure and crews start the inspection procedure. Each structure is visually inspected for signs of cracks, breaks, displacement, infiltration, or deterioration. Vactor trucks are used to remove the sediment and clean the OGSs.

Sediment and liquid collected during OGS cleaning activities is transported and disposed of at transfer stations owned and operated by the Anchorage Water and Wastewater Utility (AWWU) and a copy of the disposal receipts supplied to the DOT&PF Supervisor at the end of field activities. Any testing or reporting requirements are completed in accordance with the agreement of AWWU to accept this additional waste stream into the sanitary sewer system.

The contractor records the date each OGS was inspected and cleaned. If repairs are required for the OGS structure, the location and condition is reported to the DOT&PF Supervisor upon return from the field activities. The information collected in the field is prioritized for repair or additional work. If the field inspection notes indicate repairs need immediate attention, the DOT&PF Supervisor assigns this repair to daily field crews.

INSPECTION CRITERIA:

1. The depth of sediment accumulation is noted in the field notes.
2. The structural components of the OGSs are checked to ensure proper flow conveyance.
 - A. Evidence of infiltration including drips or water flowing into structure at joints and/or grouting, and evidence of discoloration above the sump indicating former water intrusion.
 - B. Cracks and deterioration of the structure or grouting including rotting of concrete structure, exposure of rebar or structural matting, discontinuous sections in the grout.
 - C. Structural integrity including barrel sections is in good alignment, grade rings show no evidence of cracking, lifting, or movement.
 - D. Signs of abrasion and/or corrosion are inspected.

MAINTENANCE CRITERIA:

1. All Sediment and debris in the OGS are removed via vactor truck.
2. If repairs and/or maintenance are required, record the condition and transfer to the DOT&PF work log for prioritization and scheduling.
 - A. Record and/or photograph infiltration condition for DOT&PF work log
 - B. Record and/or photograph cracks and deterioration for DOT&PF work log.
 - C. Record and/or photograph structural integrity for DOT&PF work log.
 - D. Record and/or photograph corrosion or abrasion for DOT&PF work log.

INSPECTION SCHEDULE:

Each OGS is inspected annually.

MAINTENANCE SCHEDULE:

Sediment and debris are removed on an annual basis.

Other maintenance needs are performed as identified during inspection.

Oil and Grit Separators

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles, including vactor trucks, used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to starting work. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Check fittings associated with the vactor truck prior to starting operation of the vactor truck to remove accumulated sediment material.

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site in a solid waste container.

Sediment and debris collected in the vactor truck are transferred to the sanitary sewer system using the Anchorage Water and Wastewater receiving stations. AWWU has permitted this discharge to the sanitary sewer system. If sediment is spilled or released during collection or disposal clean the area thoroughly and immediately.

Prevent tracking on roadways from the work area and sweep to remove any tracked sediment.

Outfalls

RESOURCE NEEDS

DEFINITIONS:

Outfalls are the discharge points where storm water enters the receiving body of water at the end of a storm water conveyance system.

PERMIT REFERENCES:

DOT&PF performs inspection and cleaning of outfalls to meet permits requirements (3.5.4)

ACTIVITY DESCRIPTION:

Outfall inspection is performed between June 1st and August 30th as part of the dry weather screening program conducted by Watershed Management Services. Outfall inspection and maintenance is performed by DOT&PF, if repairs are required. DOT&PF then prioritizes repairs as simple or complex. Simple repairs are recorded

INSPECTION CRITERIA:

1. Check for litter, rubbish, and debris around the outfall area.
2. The outfall is inspected to ensure flow conveyance and functionality. The outfall site is inspected for signs of:
 - a. Sediment accumulation and localized erosion
 - b. Exposed soil material with no vegetative cover
3. Evidence of illicit discharges should be checked and may include the following items:
 - Odor
 - Color
 - Clarity
 - Floatables
 - Deposits/stains
 - Vegetation condition
 - Structural condition
 - Biology

MAINTENANCE CRITERIA:

1. Sediment and debris in and around the outfall is removed.
2. If repairs are required, the condition is reported and prioritized for completion with other maintenance activities.
3. Watershed Management Services should be contacted if any illicit discharges are suspected as noted during inspection.

INSPECTION SCHEDULE:

Each outfall is inspected once every two years.

MAINTENANCE SCHEDULE:

Maintenance needs are performed on an as needed basis.

Outfalls

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Check all vehicles used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site in solid waste containers located at the DOT&PF yard.

During inspection and maintenance of outfalls, precaution is taken to prevent disturbance of the receiving water body and any best management practices in place to provide treatment or protection to the receiving water body which may include but is not limited to straw wattles, silt fence, jute matting.

Tree and Brush Removal

RESOURCE NEEDS

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

Tree and brush removal and maintenance is mostly a contracted service as DOT&PF has a limited capability to do some smaller scale brush removal. DOT&PF foreman perform the inspections. A contract for these services is negotiated with the Contractor. Contractor is responsible for inspection and maintenance of tree and brush removal in accordance with the terms and conditions set forth in the contract. Once complete, the Contractor sends an invoice specifying activities performed. When invoices are received, a DOT&PF foreman visually inspects the sites for work completion. DOT&PF crews remove brush as dictated by the foreman based on inspections or other methods of notifications of problem areas.

INSPECTION CRITERIA:

1. Crews inspect tree and brush encroachment during inspections of other maintenance activities. If during inspections site distance can be improved, trimming or brush removal may be recommended. Also, crews look for tree and brush encroachment that may cause an obstruction for flow conveyance within the storm water conveyance system.

MAINTENANCE CRITERIA:

1. Trim tree and brush material to improve site distance or clear obstruction for flow conveyance. As material is cut, chipped and spread over the existing vegetative portion of the right-of-way.

INSPECTION SCHEDULE:

Tree and brush removal is provided as needed or in response to a resident or agency request.

MAINTENANCE SCHEDULE:

Tree and brush removal is provided on an as needed basis.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Check all vehicles used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to starting work. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site at a solid waste facility.

Pick up and dispose of clippings, leaves, sticks, branches, mulching, or other collected vegetation from all impermeable surfaces (driveways, sidewalks, trails, roadsides, etc.) that could runoff into stormdrain collection systems.

Do not dispose of vegetation into waterways or storm drainage systems.

During tree and brush removal prevent disturbance of the receiving water body and any best management practices in place to provide treatment or protection to the receiving water body which may include but is not limited to straw waddles, silt fence, jute matting.

Prevent tracking on roadways from the work area and sweep to remove any tracked sediment.

Drywells

RESOURCE NEEDS

DEFINITIONS:

Drywells are facilities that collect and infiltrate storm water runoff into the ground.

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

An inspection is completed of each drywell and minor cleaning, such as litter pick-up, is completed as part of the inspection routine. The inspection and maintenance of outfalls requires accurate record keeping. This task is completed by using MOA's GIS mapping system to inventory the drainage structures. The DOT&PF Supervisor prints out grid maps identifying the drywells and assigns maintenance crews to inspect the structures on the map. Crews inspect and prepare the equipment fleet needed to perform the inspection of the assigned structures. Each drywell is visually inspected for sediment buildup, structural deterioration, and evidence of infiltration.

INSPECTION CRITERIA:

1. The depth of sediment accumulation is noted in the field notes. If sediment build-up appears to prevent proper infiltration the drywell is cleaned.
3. The structure is checked for structural integrity and/or damage for the following items:
 - A. Drywell is clear and free from plugging
 - B. Cracks and deterioration of the structure or grouting including rotting of concrete structure, exposure of rebar or structural matting, discontinuous sections in the grout.
 - C. Structural integrity is in good alignment, showing no evidence of cracking, lifting, or movement.
 - D. Signs of abrasion and/or corrosion

MAINTENANCE CRITERIA:

1. Remove sediment using vactor truck.
2. If repairs and/or maintenance are required, record the condition and transfer to the DOT&PF work log for prioritization and scheduling.
 - A. Record and/or photograph plugging condition for DOT&PF work log
 - B. Record and/or photograph cracks and deterioration for DOT&PF work log.
 - C. Record and/or photograph structural integrity for DOT&PF work log.
 - D. Record and/or photograph corrosion or abrasion for DOT&PF work log.

INSPECTION SCHEDULE:

Drywell inspection is performed on an annual basis.

MAINTENANCE SCHEDULE:

Drywell maintenance is performed as identified through inspections.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles, including vector trucks, used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Check fittings associated with the vector truck prior to starting operation of the vector truck to remove accumulated sediment material.

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site in solid waste containers located at the DOT&PF yard.

Sediment and debris collected in the vector truck are transferred to the snow disposal site and used to regrade the site or a paid disposal of material is made through Anchorage Sand and Gravel Company. If sediment is spilled or released during collection or disposal clean the area thoroughly and immediately.

Pothole Repair

RESOURCE NEEDS

DEFINITIONS:

Potholes are formed when moisture penetrates cracks in the road surface. Cold weather freezes the water, which causes an expansion further cracking the pavement surface. Dirt and gravel are forced out of the crack by vehicular traffic eventually forming a pothole.

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

DOT&PF has established programs to maintain and repair roads within the DOT&PF service area and provide a best management mechanism to reduce road debris. These programs include a year-round pothole repair service.

Potholes are repaired year-round using asphalt. During the winter months, when asphalt plants are shut down, DOT&PF prepares batches of asphalt within the DOT&PF M&O yard. Crews inspect and prepare the vehicle fleet needed to make road repairs before leaving the DOT&PF M&O yard. They travel to the site and make necessary repairs. Crews log and track areas of pothole repairs and approximate quantity of asphalt used. A supervisor collects field notes that log and track the potholes repaired.

INSPECTION CRITERIA:

1. Potholes are reported to DOT&PF M&O by motorist. A DOT&PF foreman inspects, verifies and records the condition on a Complaint/Request Slip.

MAINTENANCE CRITERIA:

1. Crews fill pothole at locations indicated on the Complaint/Request Slip.

INSPECTION SCHEDULE:

Potholes reported to DOT&PF M&O are verified and recorded within 24 hours

MAINTENANCE SCHEDULE:

Potholes are repaired within 24 hours of DOT&PF M&O inspection.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles, including vector trucks, used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site in solid waste containers. Prevent tracking on

roadways from the work area and sweep to remove any tracked sediment.

Vegetated Swales

RESOURCE NEEDS

DEFINITIONS:

Vegetated swales are gently sloping depressions planted with vegetation that allow stormwater runoff to be treated before entering the flow conveyance system. The vegetation slows the runoff flow, allowing the water to be filtered and, in some cases, infiltrated into the ground.

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

Vegetated swales are periodically inspected, and maintained, when improper functioning becomes evident. Crews inspect and prepare the equipment fleet needed to perform the inspection. After vehicles are driven to the location, the swale is visually inspected for sediment accumulation, vegetation that inhibits drainage conveyance, signs of erosion, channeling, or signs of flooding. If repairs are required, the location and condition is recorded and reported to the DOT&PF Supervisor upon return from the field activities. The Supervisor collects field notes from the daily inspection activities and transfers the information collected in the field to the DOT&PF work log. Needed repairs are cataloged and prioritized over the winter season and assigned for repair or additional work for the following season. If the field inspection notes repairs need immediate attention, the DOT&PF Supervisor assigns this repair to daily field crews.

INSPECTION CRITERIA:

1. Look for trash, debris, or large objects and sediment that could obstruct water flow.
2. Look for vegetation impeding drainage, laying over, or matted down.
3. Inspect for signs of channeling, erosion, and previous flooding to assess the functionality of the swale.

MAINTENANCE CRITERIA:

1. Remove trash, debris, or sediment from swale. Dispose of at the DOT&PF yard.
2. Conduct mulch-mowing (see Mowing SOP). Set mulching blade to 3-6 inches for mowing operations.
3. If signs of channeling, erosion, or flooding are present indicating sediment transfer through the swale, record and transfer to the DOT&PF work log for prioritization and scheduling for repairs.
 - A. Record and/or photograph condition for DOT&PF work log
 - B. Consider adding energy dissipation rock, check dams, or stabilizing vegetation to minimize sediment transfer and slow water velocity within the swale

INSPECTION SCHEDULE:

Swale inspection is performed on an as needed basis, as evidence of improper functioning is noticed or reported.

MAINTENANCE SCHEDULE:

Maintenance is performed based on inspection results.

Vegetated Swales

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site in solid waste containers.

Pick up and dispose of clippings, leaves, sticks, branches, mulching, or other collected vegetation from all impermeable surfaces (driveways, sidewalks, trails, roadsides, etc.) that could runoff into stormdrain collection systems.

Do not dispose of vegetation into waterways or storm drainage systems.

Take precaution to prevent disturbance of the receiving body water if any is nearby. If disturbance occurs, stabilize areas with exposed soil to prevent sediment transfer to receiving water bodies and use any best management practices in place to provide treatment or protection to the receiving water body which may include but is not limited to straw wattles, silt fence, jute matting until re-vegetation is established.

Prevent tracking on roadways from the work area and sweep to remove any tracked sediment.

If repairs are made to the side slopes of the swale, re-seed to re-establish vegetation on slopes and minimize sediment accumulation in the swale and provide temporary best management practices may be needed to protect the receiving system until vegetation has occurred.

Snow Removal and Disposal Practices

RESOURCE NEEDS

DEFINITIONS:

Snow removal and disposal refers to the clearing of snow from the road surface, the temporary storage of plowed snow in the road right-of-way (ROW), and the removal and disposal of accumulated snow from the road ROW at DOT&PF owned snow storage facilities.

PERMIT REFERENCE:

DOT&PF has prepared this standard operating procedure to meet the permit requirement of section (3.4.3.1)

ACTIVITY DESCRIPTION:

The roads are continuously plowed and sanded during a snow event to maintain a safe mode of travel for motorist. After a snowfall event, roads are plowed continuously following an event in a plow-out mode that cleans up all adjacent areas. Crews inspect and prepare the vehicle fleet needed to plow the snow before leaving the DOT&PF M&O yard. Typically snow is plowed onto and stored on the adjacent road ROW, until the available storage is used up and prevents crews from future plowing. Once road storage is full, crews remove the snow via graders, blowers and loaders into haul trucks that dump the snow at DOT&PF snow disposal sites. At the disposal site snow is removed from the haul trucks and moved to form lifts of snow, in an effort to maximize snow storage capacity within the disposal site.

INSPECTION CRITERIA:

1. Roadways are inspected after a snow fall event.
2. Graders and blowers remove accumulated snow in ROW when storage is no longer available.

MAINTENANCE CRITERIA:

1. Snow is plowed and pushed into the adjacent ROW.
2. Accumulated snow is removed from the ROW via graders, blowers, loaders and contracted haul trucks and taken to designated snow disposal sites.

INSPECTION SCHEDULE:

Plowing begins after snowfall events, as needed.

MAINTENANCE SCHEDULE:

Maintenance is performed in accordance with criteria specified, as needed.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Snow Disposal Site Maintenance

RESOURCE NEEDS

DEFINITIONS:

DOT&PF owns and maintains two snow disposal sites. These sites are used to store snow that is removed from stored snow from plowing operations accumulated in the road right-of-way.

PERMIT REFERENCES:

DOT&PF has prepared this standard operating procedure to meet the permit requirement of section (3.4.3.1).

ACTIVITY DESCRIPTION:

Snow removed from the road surface by DOT&PF crews is brought to one of the DOT&PF snow storage sites. Snow is removed from the haul trucks and placed as a lift of snow. Equipment compacts the lifts to stabilize it for the next lift.

All snow disposal sites are operated in accordance with their own Storm Water Pollution Prevention Plan which specifies the Best Management Practices employed at the site, and defines the monitoring and maintenance of the stormwater control measures.

All snow disposal sites have BMPs in place to capture run off before it enters the storm water conveyance system. During summer months BMPs are implemented to maintain storage sites and ensure proper functioning for winter and spring months. This may include the following: grading the site to drain, maintaining swales, inspecting and cleaning oil and grit separators, inspecting and maintaining sedimentation basins. All of these BMPs have individual SOPs developed for the inspection and maintenance procedures. During spring and summer months, crews collect litter at the snow disposal sites.

<p>INSPECTION CRITERIA:</p> <ol style="list-style-type: none"> 1. Sites are inspected for litter 2. Site BMPs are inspected in accordance with appropriate SOPs 	<p>MAINTENANCE CRITERIA:</p> <ol style="list-style-type: none"> 1. Crews collect litter and dispose of waste in solid waste containers 2. Site BMPs are maintained in accordance with applicable SOP
<p>INSPECTION SCHEDULE:</p> <p>Litter control is provided year round, especially as sites begin to thaw.</p> <p>Snow disposal site BMPs are inspected year round.</p>	<p>MAINTENANCE SCHEDULE:</p> <p>Litter is collected as needed.</p> <p>BMPs are maintained as needed.</p>

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Road Deicing Practices and Storage

RESOURCE NEEDS

DEFINITIONS:

Deicing refers to the placement of materials to a road surface in reaction to a winter event once snow and ice have bonded to the road surface. These materials add traction to the surface or assist in the removal of snow and ice from the road surface.

PERMIT REFERENCE:

DOT&PF has prepared this standard operating procedure to meet the permit requirement of section (3.4.3.1).

ACTIVITY DESCRIPTION:

Road deicing practices are not used to prevent ice build-up on roads and streets in most cases. DOT&PF uses salt exclusively to keep the sand stockpile from freezing. A mixture of 5% (by weight) salt to sand ratio is used to achieve this result. DOT&PF does maintain a small stockpile of salt in a cold storage building that can be used to make hot sand or be used as straight salt for conditions like freezing rain events. Hot sand is applied when very slick conditions occur and, if conditions permit, a brine solution may be applied to roads and streets. The brine solution is a mixture of salt and water and can be applied to the sand in the trucks or applied directly onto the road surface. The most effective temperature range for brine to work is 20 F or above. If brine is applied to sand it keeps the sand from freezing in the trucks, improves adhesion to the road surface, and melts the ice faster on the road. If temperatures are too low magnesium chloride can also be applied to sand or directly on the roadway surfaces. The process is the same as brine use stated above. Calcium Chloride works at temperatures 15 F or above. Crews inspect and prepare the vehicle fleet needed for sanding practices before leaving the DOT&PF M&O yard. The inspection and application of the salt and hot sand requires accurate record keeping. Crews track the areas of where salt and hot sand have been applied and approximately how much has been used. This data is loaded into the Maintenance Management System database.

INSPECTION CRITERIA

1. Roads are inspected for ice.

MAINTENANCE CRITERIA:

1. If deicing conditions are warranted, hot sand or salt is applied to streets and roads to help mitigate icing conditions.

INSPECTION SCHEDULE:

Road deicing practices are performed as needed.

MAINTENANCE SCHEDULE:

Maintenance is performed as needed.

Road Deicing Practices and Storage

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles used for chemical application for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Minimize application of de-icing and anti-icing agents to the extent possible.

SALT STORAGE:

Salt is stored inside of the sand storage facility. Divert drainage away from the salts. Collect run-off during spring thaw to avoid entrance into the storm drainage conveyance system.

When the sand is delivered salt is mixed into the sand by loader bucket to achieve a 5%, by weight, salt to sand ratio to keep the stockpile from freezing.

Hot sand is prepared inside of the sand storage building in the DOT&PF M&O sand storage building yard prior to application. Salt is mixed into the sand by loader bucket to achieve a desired ratio by the operator that is dependent on the current weather conditions.

Loader buckets of salt and hot sand are transferred to the deicing application equipment in the sand storage building yard. When the salt and hot sand is transferred to the application equipment used for deicing applications, precaution is taken to avoid overloading the application equipment.

Flow Conveyance System and Stream Thawing

RESOURCE NEEDS

PERMIT REFERENCES:

DOT&PF has prepared this standard operating procedure to meet the permit requirement of section (3.4.3.1).

ACTIVITY DESCRIPTION:

Pipe and ditch thawing is performed when flooding occurs as a result of blockages of a flow conveyance system or stream from freezing. Problems may be most evident during the spring during break-up or rainstorm events. Typically maintenance personnel are notified of a problem from residents. Crews inspect and prepare the vehicle fleet needed for thawing practices, before leaving the DOT&PF M&O yard. Areas with a known history of freezing problems are monitored more frequently.

Thawing is performed via portable steam boiler truck, of which DOT&PF owns and operates. The boiler has several versatile fittings that can be used to thaw sections of frozen conveyance systems or streams. The type of fitting used for thawing is unique to the drainage problem.

INSPECTION CRITERIA:

1. Conveyance systems and streams are inspected for flooding of ROW or private property or blocked drainage anticipation of creating hazardous drainage conditions or in response to a customer complaint.

MAINTENANCE CRITERIA:

1. If thawing is warranted, a steam boiler is used to mitigate the drainage problem.

INSPECTION SCHEDULE:

During spring break-up, DOT&PF crews monitor roads and streets for drainage concerns.

MAINTENANCE SCHEDULE:

Thawing practices are performed as drainage conditions warrant.

The general public informs personnel of drainage issues.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Keep training records that include attendees, date, and description of training.

Check all vehicles used for thawing for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Prevent tracking on roadways from the work area and sweep to remove any tracked sediment.

Aggregate Application and Storage

RESOURCE NEEDS

PERMIT REFERENCE:

DOT&PF has written this standard operating procedure to meet the permit requirement of section (3.4.3.1).

ACTIVITY DESCRIPTION:

After a snowfall event roads and streets are plowed and an aggregate mixture of 5% (by weight) salt to sand ratio is applied to help vehicle traction. The sand is used for aggregate traction and is applied during and after snow has been plowed. The 5% salt is added to the sand stockpile in an effort to keep the sand from freezing. Crews inspect and prepare the vehicle fleet needed to apply the aggregate. Before leaving the sand storage building, sand is loaded into the sanders. Additional salt is mixed into the sand by loader bucket to achieve the desired ratio in the event conditions require a hot sand mixture. In addition, there are application bars to add magnesium chloride for better deicing ability during certain weather conditions. Crews leave the yard and apply the aggregate. Areas with a known history of icing problems are monitored more frequently.

INSPECTION CRITERIA:

1. Accumulation of snow during and after snow fall event requiring plowing
2. Diminished traction on the road surface

MAINTENANCE CRITERIA:

1. Aggregate is applied to areas of concern on the roadways
2. Aggregate is applied after snow has been plowed from the roads

INSPECTION SCHEDULE:

During and after snowfall events, as needed.

MAINTENANCE SCHEDULE:

During and after snowfall events as needed.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Keep training records that include attendees, date, and description of training.

Check all vehicles used for aggregate application are checked for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

AGGREGATE STORAGE:

Store aggregate inside a building designed to keep aggregates from freezing if available.

Aggregate, well graded sand, is stored at the DOT&PF sand storage building. Salt is added to the aggregate in an effort to keep the sand from freezing. Hot sand is prepared in the DOT&PF sand storage building prior to application. Salt is mixed into the sand by loader bucket to achieve a desired ratio for the present road conditions.

Loader buckets of hot sand are transferred to the deicing application equipment in the DOT&PF sand storage yard. Prevent overloading the trucks with aggregate and spilling excessive aggregate onto the ground. Any spilled material is recollected and place back inside of the sand storage building.

Contaminated Materials

RESOURCE NEEDS

PERMIT REFERENCE:

DOT&PF has written this standard operating procedure to meet the permit requirement of section (3.4.3.1).

ACTIVITY DESCRIPTION:

Any contaminated materials spills or releases within the DOT&PF M&O yard are reported immediately to appropriate personnel within the agency. Once appropriate personnel have been notified the material is handled in accordance with the agency's hazardous materials operating policy.

Within the DOT&PF service area, contaminated materials handling is a contracted service. A contract for these services is negotiated with the Contractor. Contractor is responsible for the handling of contaminated materials set forth in the contract. Once complete, the Contractor sends an invoice specifying activities performed. When invoices are received, a DOT&PF foreman visually inspects the sites for work completion.

INSPECTION CRITERIA:

Inspection of contaminated material is performed by appropriate personnel with proper training.

MAINTENANCE CRITERIA:

Maintenance is performed in accordance with the agency's hazardous materials operating policy.

INSPECTION SCHEDULE:

Inspection is performed on an as needed or reported basis.

MAINTENANCE SCHEDULE:

Maintenance is performed as needed.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Prepare spill plans for all areas where there is oil storage of 1,320 gallons or more (including fuels) or the location directly drains into a water of the U.S.

Keep chemicals stored indoors on secondary containment, in the proper storage cabinets if appropriate.

Clean up small spills or drips immediately with dry clean up methods.

Provide and post notification procedures with contact information and phone numbers.

Train all personnel on response procedures. Keep training records.

Litter Control

RESOURCE NEEDS

PERMIT REFERENCE:

DOT&PF has written this standard operating procedure to meet the permit requirement of section (3.4.3.1).

ACTIVITY DESCRIPTION:

Litter is collected as part of good housekeeping procedures set forth for the inspection and maintenance activities performed by DOT&PF

personnel. Litter along the road system is collected by volunteer groups and agencies.

Litter is collected in trash bags and then set in the right-of-way. Bags are situated in the right-of-way away from drainage structures and flow paths. Appropriate personnel collect the trash bags and dispose of it properly in solid waste containers or hauled to a solid waste facility.

INSPECTION CRITERIA:

1. Litter is monitored by DOT&PF personnel who determine when maintenance activities are performed.
2. Volunteer groups choose areas within the service area to collect litter.

MAINTENANCE CRITERIA:

1. Where litter is found during routine inspections, personnel collect and dispose of it in trash bags. Trash bags are disposed of at the DOT&PF M&O yard or a disposal facility.
2. Volunteer groups collect litter along roadsides in trash bags. Bags of litter are set in the right-of-way, away from areas of drainage conveyance. The bags of litter are picked up and disposed of properly in solid waste containers or hauled to a solid waste facility.

INSPECTION SCHEDULE:

Litter control is part of the good housekeeping procedures set forth in the inspection and maintenance activities performed by DOT&PF personnel.

Volunteer groups pick-up litter within designated service areas three times during the year.

MAINTENANCE SCHEDULE:

Litter is collected when encountered during routine inspections and other street maintenance work activities.

Volunteer groups schedule litter pick-up throughout the spring and summer season.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Pick up litter collected in trash bags in a timely manner.

Do not place trash bags within 10 feet of streams or stormwater inlets.

Mowing

RESOURCE NEEDS

ACTIVITY DESCRIPTION:

Mowing is performed by DOT&PF and through a contracted service. A schedule is developed and inspections performed to direct mowing activities. A contract for these services is negotiated with the Contractor to perform mowing in the Anchorage Bowl area where the larger tractor type mowers cannot be utilized. The contractor is responsible for the act of mowing in accordance with the terms and conditions set forth in the contract. Once complete, the Contractor sends an invoice specifying activities performed. When invoices are received, a DOT&PF foreman visually inspects the sites for work completion.

INSPECTION CRITERIA:

1. Mowing inspections conducted concurrently with stormwater infrastructure/road repair inspection and maintenance activities.

MAINTENANCE CRITERIA:

1. Mowing needs are coordinated and performed by DOT&PF or a Contractor.

INSPECTION SCHEDULE:

Inspection is performed as needed on a reported basis as part of the inspection and maintenance activities performed by DOT&PF personnel.

MAINTENANCE SCHEDULE:

Maintenance is performed as needed by DOT&PF and the Contractor.

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Check all vehicles used for mowing for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than 1/2 full
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Remove litter and debris prior to mowing activities. Take any litter collected back to the DOT&PF or Contractor's yard and dispose in

solid waste containers. Use a mulching blade to leave clippings in place.

Cease mowing activities within 10 feet of entry points to the stormwater conveyance system.

Do not expose soils when mowing (for instance, mow no shorter than 1/3 of grass blade height).

Infiltration Devices and Constructed Wetlands

RESOURCE NEEDS

DEFINITIONS:

Infiltration devices and constructed wetlands are areas designed to treat stormwater runoff and reduce the amount of water entering a receiving water body.

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

Infiltration devices and constructed wetlands are periodically inspected and maintained on an as needed basis, when improper functioning is observed. Crews inspect and prepare the equipment fleet needed to perform the inspection. Vehicles are driven to the location and crews visually inspect for sediment accumulation, vegetation overgrowth that inhibits drainage, conveyance, and signs of erosion. If repairs are required, the location and condition are reported to the DOT&PF Supervisor upon return from the field activities. The Supervisor collects and assigns repairs or additional maintenance activities as needed.

INSPECTION CRITERIA:

1. Look for sediment, trash, debris, or large objects that could obstruct water flow.
2. Look for vegetation impeding drainage, such as vegetation that is laying over or matted down.
3. Inspect for signs of channeling, erosion, short-circuiting and previous flooding to assess the functionality of the wetland or infiltration device.
4. Inspect for damage to private property, the right of way, or the roadway.
5. If any of these signs are noted, record and transfer to the DOT&PF work log for prioritization and scheduling for repairs.

MAINTENANCE CRITERIA:

1. Remove sediment, trash or debris from swale. Dispose of at the DOT&PF yard.
2. Remove vegetative overgrowth by hand (when practical) to reduce damage to wetland feature.
3. If signs of channeling, erosion, or flooding are present indicating sediment transfer through the wetland, record and transfer to the DOT&PF work log for prioritization and scheduling for repairs.
 - A. Record and/or photograph condition for DOT&PF work log

INSPECTION SCHEDULE:

Inspection is performed as needed, as evidence of improper functioning is noted or reported.

MAINTENANCE SCHEDULE:

Maintenance is performed based on inspection results.

Infiltration Devices and Constructed Wetlands

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to leaving the DOT&PF yard. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips can not reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site in solid waste containers located at the DOT&PF

yard. Do not dispose of vegetation into waterways or storm drainage systems.

Stabilize areas with exposed soil to prevent sediment transfer to receiving water bodies and use any best management practices in place to provide treatment or protection to the receiving water body which may include but is not limited to straw wattles, silt fence, jute matting until re-vegetation is established.

Drainage Ditch Maintenance

DEFINITIONS:

Cleaning and shaping ditches to restore proper cross-section and flow line, and to ensure proper drainage of the roadway and adjacent roadway.

PERMIT REFERENCES:

This SOP was prepared according to the permit requirements (3.4.3.1).

ACTIVITY DESCRIPTION:

Drainage ditches are periodically inspected and maintained on an as needed basis, when improper functioning becomes evident. Crews inspect and prepare the equipment fleet needed to perform the inspection. Vehicles are driven to the location and crews start the inspection procedure. The ditch is visually inspected for sediment accumulation, vegetation overgrowth that inhibits drainage conveyance, signs of erosion, channeling, or signs of flooding. If repairs are required, the location and condition is manually recorded and reported to the DOT&PF foreman upon return from the field activities. Repairs are noted and prioritized for repair or additional work. If the field inspection notes indicate repairs need immediate attention, the DOT&PF foreman assigns this repair to daily crews. DOT&PF also utilizes a federally funded maintenance program to perform drainage and ditch maintenance. Road segments are nominated based on seasonal inspections and submitted to the list for the next season.

INSPECTION CRITERIA:

1. Look for trash, debris, or large objects that could obstruct water flow.
2. Look for vegetation impeding drainage, laying over, or matted down.
3. Inspect for signs of channeling, erosion, and previous flooding to assess the functionality of the swale.

MAINTENANCE CRITERIA:

1. Remove trash or debris from drainage structure. Dispose of at the DOT&PF yard.
2. Conduct mulch-mowing (see Mowing SOP). Set mulching blade to 3-6 inches for mowing operations.
3. If signs of channeling, erosion, or flooding are present indicating sediment transfer through the drainage structure, record and transfer to the DOT&PF work log for prioritization and scheduling for repairs.
 - A. Record and/or photograph condition for DOT&PF work log
 - B. Consider adding energy dissipation rock, check dams, or stabilizing vegetation to minimize sediment transfer and slow water velocity within the swale

INSPECTION SCHEDULE:

DOT&PF foreman, crew, other agencies, and general public monitor drainage structures year-round for problems with most inspections and work occurring during the summer. The problems are most apparent during the spring when the ice and snow are melting or during rainstorms. DOT&PF personnel are periodically contacted and made aware of problem areas by the general public. In most events maintenance workers responding to problems are able to discern whether the drainage structure needs repairs. DOT&PF also utilizes a federally funded program for ditch maintenance. Road segments are inspected throughout the summer season and the segments in need of drainage maintenance are recorded and then submitted for the next season's program.

MAINTENANCE SCHEDULE:

Drainage structures causing significant damage to the road, ROW, or private property are taken care of as soon as practicable. Structures that have been problematic either during the winter or the spring are scheduled for cleaning and repair on an as needed basis during the summer months. DOT&PF also utilizes a federally funded program for drainage and ditch maintenance. Each year entire road segments are nominated for the list and therefore cleaned and reshaped under this program.

Drainage Ditch Maintenance

POLLUTION PREVENTION/GOOD HOUSEKEEPING PROCEDURES

Train field crews annually and provide frequent verbal reminders on how to operate the equipment and what to look for during routine inspections prior to the field season.

Keep training records that include attendees, date, and description of training.

Check all vehicles used for stormwater infrastructure inspection and maintenance for operational condition, leaks, and deficiencies prior to starting work. For equipment inspection and maintenance:

- Place drip pans under equipment parts that may leak. Empty drip pans when they are more than ½ full.
- Clean up all drips and leaks immediately
- Empty fuel and oil filters where drips cannot reach stormwater
- Do not wash equipment or pavement surrounding equipment where wash water can enter storm drains

Remove all litter and debris found during the inspection procedure. Dispose of litter/debris from the site in solid waste containers.

Prevent tracking on roadways from the work area and sweep to remove any tracked sediment. Do not dispose of vegetation into waterways or storm drainage systems.

Stabilize areas with exposed soil to prevent sediment transfer to receiving water bodies and use any best management practices in place to provide treatment or protection to the receiving water body which may include but is not limited to straw wattles, silt fence, jute matting until re-vegetation is established.

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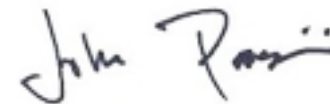
Renee Goentzel

has earned 0.1 Continuing Education Unit (CEU)
or 1.0 Professional Development Hour (PDH)
by successfully completing

Addressing Aging Stormwater Infrastructure in the
Face of Climate Change & Extreme Weather Events

Presented by Erin Zaske

Santa Barbara, California
11/12/2020



John Pasini,
Executive Director, Events & Education

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1. Purpose

Alaska Pollutant Discharge Elimination System (APDES) Permit No. AKS-052558, Section 3.4.4.4 requires the permittees, the Municipality of Anchorage (MOA) and the State of Alaska Department of Transportation and Public Facilities (ADOT&PF), to inventory and designate arterial and residential streets and large parking lots within the Anchorage Municipal Separate Storm Sewer System (MS4) for sweeping maintenance; to record and report sweeping performed along these systems on an annual basis; and to annually assess these sweeping practices relative to minimization of pollutant discharges from these systems into receiving waters. Specifically, permittees are required to submit:

- Sweeping maps: each year permittees must submit maps of the streets and parking lots that have been designated for sweeping that year and their proposed sweeping frequency relative to the frequencies specified in this permit. Permittees must also designate those streets that they deem ‘technically infeasible’ for sweeping.
- Sweeping records: permittees must submit annual records of the sweeping practices used, and the curb miles and volumes of materials swept for street and parking lots organized by sweeping event, general location, and sweeping frequency class. Analyses of particle size distributions for samples representative of swept materials must also be submitted.
- Sweeping assessment: permittees must annually prepare an assessment on the basis of submitted sweeping records of the effectiveness of MS4 sweeping completed that year in minimizing pollutant discharges to storm drains and receiving waters.

ADOT&PF have completed and compiled these inventories, records and assessments and submitted summaries of these data and findings in this report in compliance with this permit part. The report is organized into five major sections. Section 1.0 summarizes the purpose of this report. Section 2.0 identifies 2021 swept streets and large public parking lots as well as those streets designated infeasible for sweeping. Section 3.0 summarizes sweeping records for 2021. Section 4.0 summarizes an assessment of the permittees’ sweeping effectiveness for this year. Section 5.0 includes maps and additional summary tables described in Sections 2.0 through 4.0.

2. Streets and Parking Lots Designated for Sweeping

Permit Section 3.4.4.1 requires permittees to map all streets and large public parking lots to be swept in the coming year and designate their assigned sweeping frequency relative to permit requirements. Further, Section 3.4.4.3 requires that permittees designate streets that are technically infeasible for sweeping and specify why. Finally, Section 3.4.4.4.1 requires that permittees annually ‘..identify any significant changes..’ in mapping of ‘..residential, arterial, and public parking lots..’ subject to regular sweeping under the permit and ‘..the basis for those changes.’ The following section summarizes this information. Section 2.1 identifies types of streets deemed technically infeasible for sweeping by the permittees. Section 2.2 identifies streets designated for sweeping within each of the permittees’ jurisdictions, and the sweeping management areas (‘general locations’) that the permittees’ use to organize sweeping efforts. Section 2.3 identifies the public parking lots designated as large and swept by the permittees. Any changes in swept features and the basis for those changes are also summarized in Section 2.2 and 2.3.

2.1 Technical Feasibility for Sweeping

Permittees must document areas where street sweeping is technically infeasible and why (Part 3.4.4.3). The permittees specify the technical infeasibility of regularly sweeping a street based on two factors: surface type and cases where the combined character of speed, access and drainage type make regular sweeping unnecessary, disruptive and/or dangerous.

Unpaved road surfaces are not technically feasible for sweeping. Such surfaces of course will include dirt and gravel roadways but include as well those whose surfaces have been treated with applications of chemicals or asphaltic or other mixtures to create a smooth and temporarily hardened surface. Treatment typically results in only a short-term hardening of the road surface with a primary intent of smoothing the road surface for traffic over the summer season. However, the treatment also serves to temporarily bind particles to reduce dust and erosion. Sweeping can speed deterioration of these surfaces and increase mobilization of fines during runoff. Therefore, these roads are not swept but may be periodically re-graded or re-treated to reduce erosion and dust generation.

High-speed, high-traffic roadways (freeways and expressways), where access is limited and drainage is provided by open channels on both sides of the road, are also not regularly swept. Regular sweeping along these street segments is considered both technically infeasible and unnecessary. Regular sweeping is technically infeasible along these roadway segments because of the speed and volume of the traffic. Regular sweeping activity along these segments would present unpredictable danger to traffic as a slow-speed obstruction. It would also limit for prolonged periods of time the utility of these roadways as high-speed thoroughways. From a more practical standpoint, regular sweeping along these segments is also generally unnecessary. Winter traction sand applications along these segments is less frequently done, significantly reducing sediment loading on the roadway. The sediment that does accumulate is rapidly removed by high-speed traffic along these segments. Wind and wheel energy generated by traffic very effectively move particulates off the paved surface and onto vegetated shoulder and median areas where these materials are collected on a seasonal or as-needed basis during shoulder maintenance.

2.2. Designated Streets for 2021 Sweeping

Permittees are required to identify and map all streets designated for sweeping and provide maps of streets swept in an annual report of these activities (3.4.4.1 and 3.4.4.4.1). Any changes in swept features and the basis for those changes must also be summarized. Maps of the Anchorage MS4 streets and public parking lots are compiled and available in Section 5. ADOT&PF divides this region into three smaller operational areas, and these operational areas are used in this document as a basis for permit-required sweeping reporting.

Operational areas are shown in Figure 5-1 and streets that were designated for sweeping in 2021 are shown in Figures 5-2 through 5-8 in Section 5.1 for each of the primary maintenance administrative agencies for the Anchorage MS4.

In 2021, there were no changes in management practices or streets designated for sweeping from its 2020 reporting period.

2.3. Designated Large Public Parking Lots

Section 3.4.4 specifies that permittees must identify and designate those large parking lots for sweeping that serve schools, cultural facilities, plazas, sports and event venues and similar facilities. The permittees have interpreted a large public parking lot to be any such lot that has a total exposed parking footprint within a single parcel or a complex of closely associated parcels of 2 acres or larger (see the Anchorage MS4 Sweeping Plan, p4).

ADOT&PF owns no public parking lots that meet these criteria.

3. 2021 Sweeping Performance Reports

Permit Part 3.4.4.4 requires permittees to report sweeping performance annually in terms of specific factors and to assess sweeping effectiveness in minimizing discharge of pollutants to storm drains and creeks based on those factors. Sweeping performance reports must at minimum identify and map the actual streets and parking lots that were swept in the reporting year. In addition, permittees must compile and report specific sweeping performance factors including dates of sweeping, completeness, sweeping practices used, interference from parked vehicles or construction activities, other relevant qualitative information such as 'visually clean' evaluation, volume or weight of swept materials, and particle size distributions of representative swept materials.

The permit specifies that sweeping performance information is to be organized and reported, in some respect, by date, general location, and sweeping 'frequency category' (defined in the permit as Arterial or Residential streets, and Parking). All these factors are specifically to be used in assessing the effectiveness of MS4 sweeping on limiting discharge of pollutants to the MS4 and receiving waters. This section summarizes sweeping performance records sorted for streets (Subsection 3.1). Subsection 3.2 describes particle size distribution measures for street materials collected during the 2021 sweep periods. In Section 4, we use these performance records, along with other information, to assess effectiveness of the 2021 MS4 sweeping program and the 'visually clean' standard.

3.1. Street Sweeping Performance Reports for 2021

The sweeping performance data has been organized to reflect both significant differences in drainage types across the MS4 and variations in street sediment loading between those drainage types. As described in the MS4 Sweeping Plan, the permittees may use different sweeping practices for streets having curb and gutter (CG) drainage as opposed to those having open channel (OC) or ditch drainage. For streets with curb and gutter drainages, sediments are concentrated along the gutter pan and readily available for mobilization in washoff events. For these streets, swept materials are always collected during sweeping, and the removed volumes can be readily inventoried. Sediments from streets with open channel drainages tend to become concentrated onto the adjacent vegetated shoulders where runoff events are much less likely to mobilize them. Along these streets, the materials are removed in the same manner as the streets with CG and volumes are inventoried the same. The material that, prior to sweeping, may leave the road and end up in the vegetated shoulder will eventually be removed during later shoulder maintenance and ditch 'dressing'. As a result, inventories of the volumes of sediment swept from a

large portion of open channel street segments may not be as reliable in determining the sediment loading on these segments.

Given these practices, reporting sweeping information for curb miles alone, as the permit specifies, is problematic. Reporting only those streets having 'curb miles' (i.e., curb and gutter type streets) as specified in the permit would obviously bias measurement of total Anchorage MS4 sweeping performance. Similarly, using total street miles when assessing the total volume of swept materials will bias loading and efficiency estimates when the only swept sediment volumes recorded are for curb and gutter streets but open channel street miles are included in the analysis. Finally, potential for biasing analysis is even further compounded considering differences in sediment loading between drainage types (and sweeping frequency categories).

To account for these sweeping practices and characteristics, sweeping performance information for Anchorage MS4 streets is collected and sorted by a number of factors. These include sweeping frequency type and drainage type, the sweeping event (measured by the sweeping completion date range; spring, summer, fall), and the operational area ('general locations' in the permit language). Sweeping frequency types include 'Arterial' and 'Residential' categories as already described in the permittees MS4 Sweeping Plan.

Sweeping performance information reported for the Anchorage MS4 includes total swept volumes (in cubic yards) referenced to operational areas and to 'Street Miles', 'Curb Miles', and/or 'Pick Up Miles'. 'Street Miles' for all designated swept streets are included in this performance report and are calculated as the total centerline lengths of swept street segments.

Because sweep practices that collect swept material (i.e., swept volumes are inventoried) are used on both curb and gutter and open channel drainage type roads, the term 'Pick Up Miles' is more appropriate and used in place 'Curb Miles' for this report. Pick Up Miles optimally represent the total actual length of road shoulder swept, for the case of open channel road segments, and the actual length of curbed drainage swept, for curb and gutter road segments. Where this is not known, Pick Up Miles are estimated as twice the length of the swept streets along which the sediments are collected. Where possible, the Anchorage MS4 sweeping performance report also includes an estimate of the unit swept volume (cubic yards per Pick Up Mile) for each combination of frequency type and drainage type.

2021 sweeping performance records are summarized for all three sweeping events in Table 3-1 below. Note that the two tandem sweeps required for arterial frequency category streets are summarized under the single spring event shown. Operational areas are as described in Section 2.2 and shown in Figure 5-1. More detailed sweeping summary tables are included in Section 5.2, including all required permit reporting elements.

Sweeping of designated streets was completed in accordance with permit requirements using the various practices as described in the previously published MS4 Sweeping Management Plan.

Table 3-1 Anchorage MS4 Sweeping Summary, 2021**Spring 2021**

EPA Category	Drainage Type	Street Miles	Pick Up Miles	Total Volume* (CY)	Unit Volume (CY/mile)
Arterial	OC	5.1	25.5	143.4	5.6
	CG	43.9	198.8	3040.7	15.3
	Mixed	48.5	188.2	3475.5	18.5
	Total	97.5	412.5	6659.5	16.1
Residential	OC	55.8	146.4	847.7	5.8
	CG	3.7	21.5	175.4	8.1
	Mixed	26.9	107.7	550.3	5.1
	Total	86.3	275.6	1573.3	5.7

Summer 2021

EPA Category	Drainage Type	Street Miles	Pick Up Miles	Total Volume* (CY)	Unit Volume (CY/mile)
Arterial	OC	5.1	25.5	39.3	1.5
	CG	43.9	198.8	693.1	3.5
	Mixed	48.5	188.2	570.2	3.0
	Total	97.5	412.5	1302.6	3.2
Residential	OC	55.8	146.4	271.2	1.9
	CG	3.7	21.5	92.5	4.3
	Mixed	26.9	107.7	170.6	1.6
	Total	86.3	275.6	534.4	1.9

Fall 2021

EPA Category	Drainage Type	Street Miles	Pick Up Miles	Total Volume* (CY)	Unit Volume (CY/mile)
Arterial	OC	5.1	25.5	39.6	1.6
	CG	43.9	198.8	781.5	3.9
	Mixed	48.5	188.2	783.6	4.2
	Total	97.5	412.5	1604.7	3.9
Residential	OC	55.8	146.4	284.3	1.9
	CG	3.7	21.5	71.7	3.3
	Mixed	26.9	107.7	193.7	1.8
	Total	86.3	275.6	549.7	2.0

* Volumes represent only swept materials collected along reported/estimated Curb/PickUp Miles

OC = Open Channel Drainage

CG = Curb and Gutter Drainage

For 2021, ADOT&PF reported 100% completeness for all road segments and operational areas for the spring, summer, and fall sweep periods.

3.3. Particle Size Distributions for Swept Materials

Permit requirements at 3.4.4.4 require that particle size distribution be evaluated for a representative sample of swept materials. Representative samples of swept street materials were collected by subsampling temporary sweeping storage piles built up by MS4 operators and the samples were then submitted to DOT's Materials section for analysis. Particle size distributions representative of samples collected during 2021 sweeping events are included in Table 3-2 below.

Table 3-2 – Representative Particle Size Distribution

Sieve Size	% Smaller Than Sieve Size			
	Arterial A	Arterial B	Residential A	Residential B
1.5"	100	100	100	100
1"	100	100	100	100
3/4"	100	99	100	100
1/2"	100	99	99	100
3/8"	100	99	99	100
1/4"	97	94	95	98
#4	95	91	91	95
#8	81	78	70	76
#10	78	75	66	71
#16	68	66	50	54
#30	50	49	28	30
#40	39	40	20	20
#50	29	30	13	12
#100	19	19	7	7
#200	14.2	13.4	4.1	4.3
0.02 mm	9.8	8.5	3.2	2.9
0.002 mm	2.3	2.2	0.6	0.9

Table 3-2 includes particle size distributions (PSDs) of samples collected from temporary storage piles generated from street sweeping.

The sampled material shows that approximately half of the material on the arterial routes was smaller than 600 micron (#30) and on the residential routes approximately half of the material was smaller than 1180 micron (#16) in areas A and B. The material over the four samples seems to be fairly uniform.

4. 2021 Sweeping Performance Assessment

Section 3.4.4.4 requires the permittees to ‘perform annual assessments of street sweeping effectiveness to minimize pollutant discharges to storm drains and receiving waters on the basis of the performance factors required to be reported under the permit. To help in this assessment, the permittees completed additional sampling of street sweeping activities in 2021 and compared that data to sampling performed in previous years.

Section 4.1 provides a comparison of unit loads (cubic yards per pick up mile) for swept dirt for the past four years (2018-2021). Based on both this additional information and current performance reports, Section 4.2 summarizes the effectiveness of the 2021 sweeping program as required under Part 3.4.5.4.

4.1. Unit Load Comparison 2018-2021

Swept volume data, collected over the past four years, have been analyzed and where possible have been converted to unit load values (cubic yards/pick up mile), to give a measure of what volume of dirt is being swept up per pick up mile for each different operator and sweep frequency category. Table 4.1 shows unit load in cubic yards per pick up mile for the spring, summer, and fall sweep periods for 2018-2021.

Table 4-1 2018-2021 Unit Load Comparison

Spring Sweeps					
EPA Category	Drainage Type	Spring 2021 (CY/mi)	Spring 2020 (CY/mi)	Spring 2019 (CY/mi)	Spring 2018 (CY/mi)
Arterial	OC	5.6	5.5	5.0	5.2
	C&G	15.3	14.9	13.7	14.3
	Mixed	18.5	17.9	16.5	17.2
	All	16.1	15.7	14.5	15.2
Residential	OC	5.8	5.6	5.2	5.4
	CG	8.1	7.9	7.3	7.6
	Mixed	5.1	5.0	4.6	4.8
	All	5.7	5.5	5.2	5.3

Summer Sweeps					
EPA Category	Drainage Type	Summer 2021 (CY/mi)	Summer 2020 (CY/mi)	Summer 2019 (CY/mi)	Summer 2018 (CY/mi)
Arterial	OC	1.5	1.6	1.5	1.6
	C&G	3.5	3.5	3.5	3.6
	Mixed	3.0	3.0	2.9	3.0
	All	3.2	3.2	3.1	3.2
Residential	OC	1.9	1.9	1.8	1.9
	CG	4.3	4.3	4.2	4.3
	Mixed	1.6	1.6	1.6	1.6
	All	1.9	1.9	1.9	2.0

Fall Sweeps					
EPA Category	Drainage Type	Fall 2021 (CY/mi)	Fall 2020 (CY/mi)	Fall 2019 (CY/mi)	Fall 2018 (CY/mi)
Arterial	OC	1.6	1.6	1.6	1.6
	C&G	3.9	4.0	3.9	4.1
	Mixed	4.2	4.1	4.0	4.1
	All	3.9	3.9	3.8	4.0
Residential	OC	1.9	1.9	1.9	2.0
	CG	3.3	3.3	3.2	3.3
	Mixed	1.8	1.8	1.8	1.8
	All	2.0	2.0	2.0	2.0

2021 sweeping shows similar unit load values from the last two years, with only a slight increase from 2020. Other factors may be at play, as the overall sweeping quality has not decreased from past years.

4.2. Sweeping Effectiveness Assessment for 2021

Sweeping effectiveness can be related to potential for receiving water impact by a number of relationships illustrated by this data and other data presented in the annual report. The spatial relationship of street drainage to receiving waters and to the total sediment load present on those streets is an important factor. Performance records summarized in Section 3.1 along with operation maps included in Section 5 provide insight to the potential for street sediment loads to wash off into Anchorage storm drains and receiving waters based on these spatial relationships. DOT&PF is responsible for 184 street miles (98 miles arterial and 86 miles residential) spread out over a large geographic area.

Compared to previous years, there was a slight increase in the unit load volume on average. This despite the increased salt usage and slight decrease in sand usage for the 2020/2021 winter. While

the vast majority of the material is removed during the spring sweep, displaced sediment loading can find its way back onto the roadways.

The street sweeping program operates on a visually clean standard for its qualitative assessment of sweeping. This is historically what DOT&PF M&O has used for its inspections. DOT&PF coordinates with the Contractor with immediate inspections after sweeping activities to ensure that all roads meet the visually clean standard, as weather, traffic, and private entities can introduce additional material into the roadway. Figure 4.1 and Figure 4.2 below showcase one specific example of the visually clean standard. Additional photographs are shown in Section 6.

Figure 4.1 – Minnesota Dr before the spring sweep.



Figure 4.2 – Minnesota Dr after the fall sweep.



The sweepers are able to pick up a vast majority of the material from the roadway and sidewalks, which allows for approval on a visual inspection. Past MOA Watershed Management assessments have shown this sweeping to be effective at picking up medium to large sized particulates, but not the fines. Fines prove to be an issue for street sweeping efficiency. Too little water used and the fines create a dust cloud from the sweeping activity, which results in air quality and health issues. Too much water and the sweeping activity is ineffective at sweeping and picking up the water slurry. State and Municipality maintenance forces have determined vacuum trucks to not be effective enough in picking up the fines also.

Samples were taken after roads passed the visually clean standard, to determine how much material was left on the roadway after sweeping. Three roadways were chosen for dry, post-sweep sampling. On each road, a 200-foot segment was chosen and ten samples were taken approximately every twenty feet. The dry material was swept up in a 4 foot long by 1.5 foot wide section. This material was collected and then weighed to determine the amount of material left on the roadways. This length was chosen due to the majority of the debris being distributed towards the curb and gutter of the roadway, so a full lane sample was determined to not be necessary. The results of this sampling are listed in table 4-2 below. Converting the values to the unit load value of cubic yards per pick up mile, the values were compared to Arterial curb and gutter unit load values. Using the 2021 sampling and sweeping results with the same formulas from the 2015 Street Sweeping Report, approximately 0.3% to as much as 4.0% of the debris by weight was left on the roadway. While these percentages are likely not exact due to the pickup methodology not capturing all debris in the sampled sections, but it does provide a good picture of the overall efficiency of the street sweeping program.

Compared to the previous two years, the amount of material present is in line with 2020 & 2019 data. North Eagle River Access Road and International Airport Road have higher samples, but the sample area has much higher traffic on International Airport Road and the North Eagle River Access is near a construction/haul route. During sampling, construction activities were occurring which may have impacted the sampling results. Despite these higher sampling mass numbers, the overall debris left on the roadway was still comparable to previous years. Perhaps this is also due to the higher unit load volume on the arterial roadways or the timing of the sampling pick up.

Table 4-2 2021 Roadway Debris Loading Sampling Results

Post-2nd Sweep Dimond Boulevard			Post-2nd Sweep Intl Airport Rd			Post-2nd Sweep North ER Access Road		
Bag ID	Location	Sample Wt (g)	Bag ID	Location	Sample Wt (g)	Bag ID	Location	Sample Wt (g)
D-1	0+10	77.7	I-1	0+10	82.0	ER-1	0+10	276.2
D-2	0+32	55.6	I-2	0+32	155.4	ER-2	0+32	230.5
D-3	0+50	43.1	I-3	0+50	159.6	ER-3	0+50	258.8
D-4	0+72	44.5	I-4	0+72	125.8	ER-4	0+72	424.6
D-5	0+90	56.2	I-5	0+90	145.6	ER-5	0+90	656.9
D-6	1+12	55.9	I-6	1+12	206.0	ER-6	1+12	645.8
D-7	1+30	62.5	I-7	1+30	186.6	ER-7	1+30	462.5
D-8	1+52	69.2	I-8	1+52	151.6	ER-8	1+52	648.0
D-9	1+70	69.1	I-9	1+70	175.2	ER-9	1+70	673.0
D-10	1+92	109.7	I-10	1+92	209.7	ER-10	1+92	606.7
	Average	64.4		Average	159.75		Average	488.3

Note – North ER is a current haul route. This likely accounts for the larger sample size.

The full sampling result can be found in Section 5 of this report.

For more information regarding dirt loading and street sweeping performance please see WMS document WMP Apr14001, "Anchorage Street Sweeping and Storm Water Controls: 2013 Performance Evaluation" (Appendix E-2 of the 2013 APDES report).

5. 2021 Maps and Data Tables

Section 5 contains maps and detailed data tables supporting summary information and the sweeping assessment presented in Section 2 through 4 above. Section 5.1 contains maps of swept streets and operational areas. Section 5.2 contains detailed sweeping performance records for each of the Anchorage MS4 operators.

5.1. Designated Streets and General Location Maps

This section contains maps of Anchorage MS4 streets designated for sweeping. The maps also locate sweeping operational areas ('general locations') that each operator has used to structure compilation and reporting of 2021 sweeping performance records. The first map in this section, Figure 5-1, provides an overview map. More detailed maps of the areas and designated streets are presented in the following figures.

Figure 5-1 Anchorage MS4 Sweeping 'General Locations' 2021

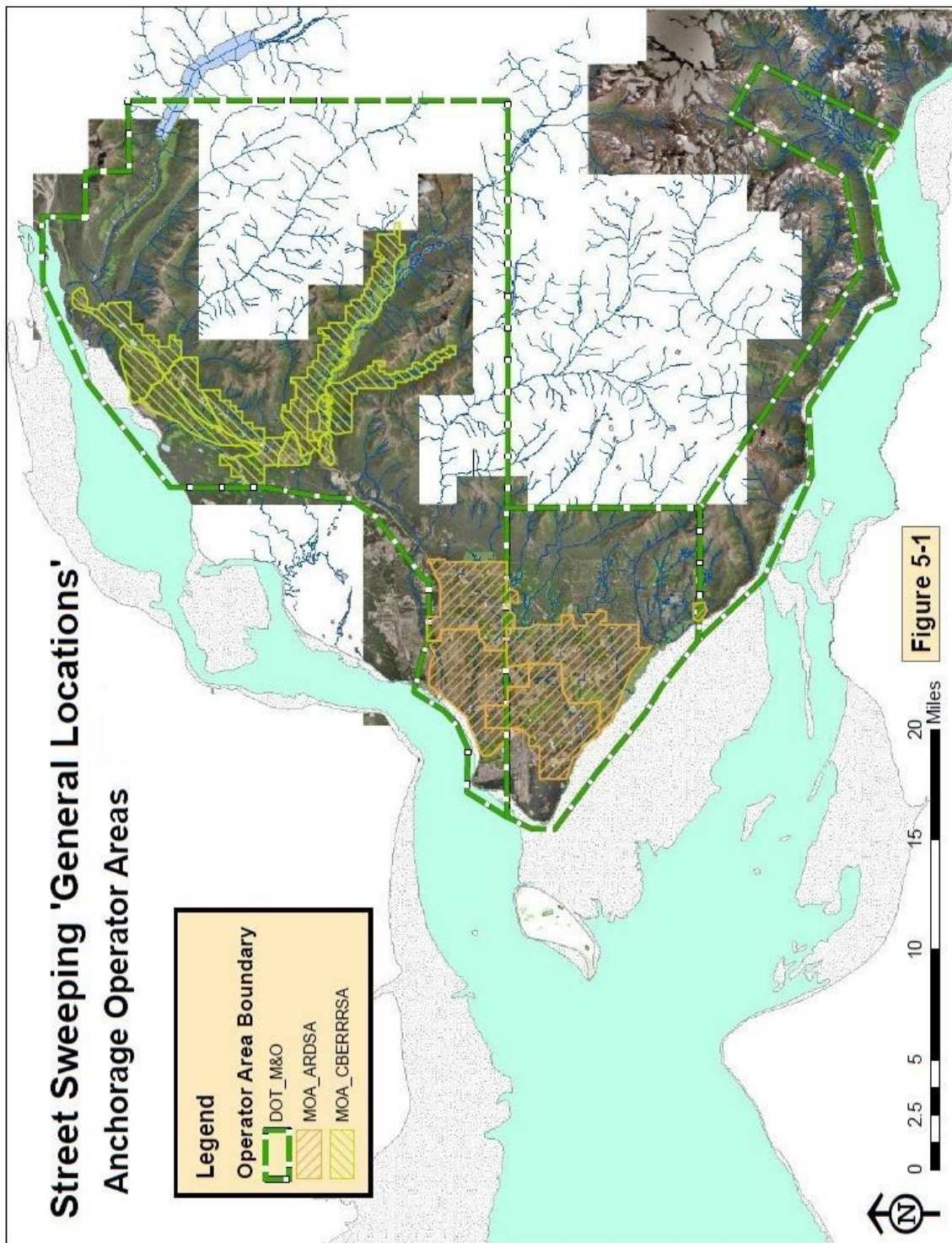


Figure 5-2 ADOT&PF Area A—2021 Designated Swept Streets

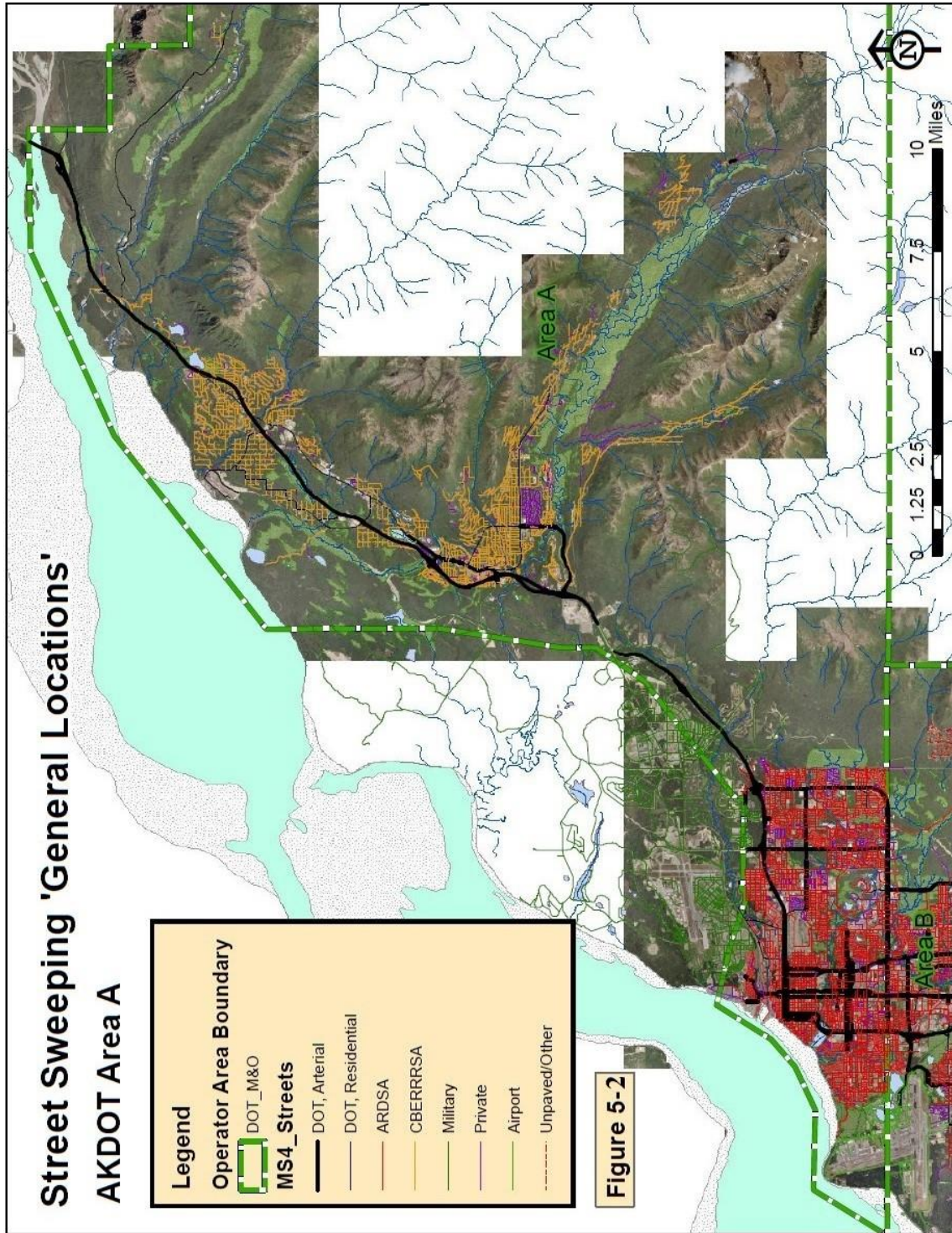


Figure 5-3 ADOT&PF Area B—2021 Designated Swept Streets

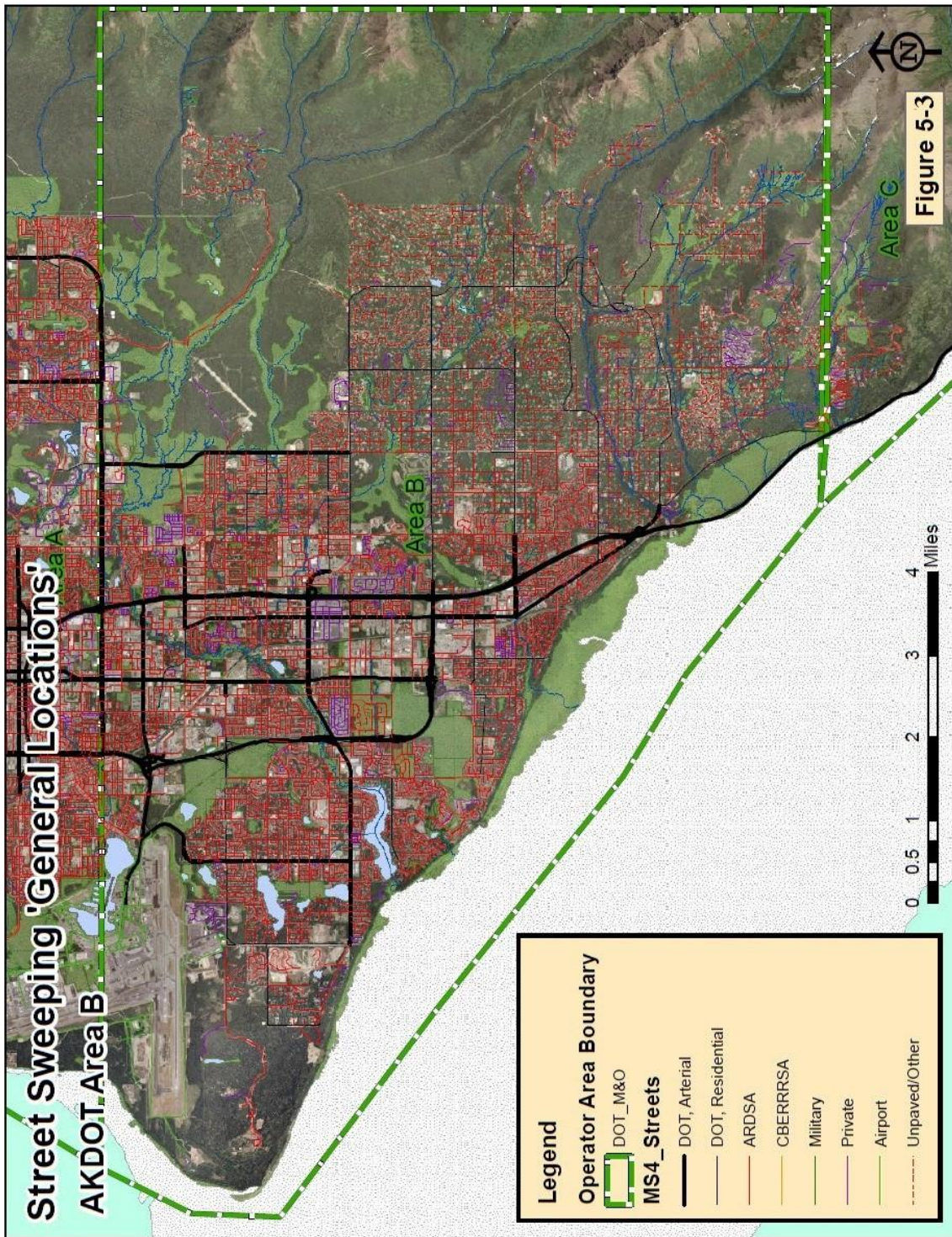
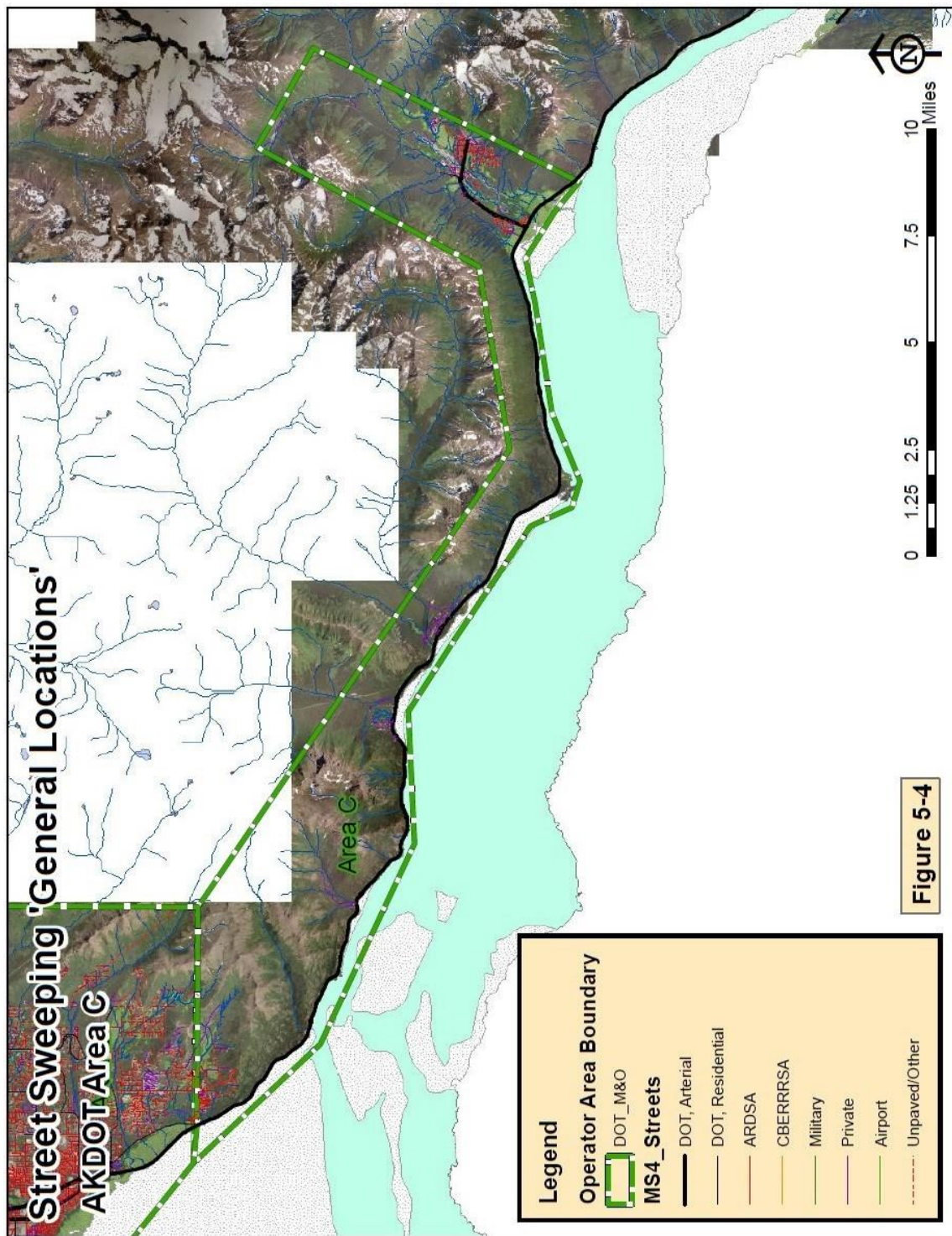


Figure 5-4 ADOT&PF Area C—2021 Designated Swept Streets



5.2. Anchorage MS4 Detailed Sweeping Records for 2021

Section 5.2 contains detailed sweeping records for 2021 for each of the sweep periods, separated by operational areas ('general locations') and by EPA category.

5.2.1. ADOT&PF 2021 Detailed Sweeping Reports

Table 5-1 ADOT&PF Spring 2021 Sweeping Report

Completion Range: 4/13/2021 - 6/15/2021							
Area A	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.5	16.1	95	5.9	100%
		CG	29.6	137.0	2104	15.4	100%
		Mixed	17.2	81.4	883.7	10.9	100%
	Residential	OC	24.4	60.1	382.5	6.4	100%
		CG	1.1	3.4	60	17.7	100%
		Mixed	11.2	54.9	342	6.2	100%
Totals			86.0	352.8	3866.6		
Area B	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.6	9.4	49	5.2	100%
		CG	14.3	61.8	937	15.2	100%
		Mixed	31.3	106.8	2592	24.3	100%
	Residential	OC	31.4	86.3	465	5.4	100%
		CG	2.5	18.2	116	6.4	100%
		Mixed	15.7	52.9	208	3.9	100%
Totals			97.8	335.2	4366		
Area C	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.9	0.0	0	0.0	100%
Totals			2.9	0.0	0		

Table 5-2 ADOT&PF Summer 2021 Sweeping Report

Completion Range: 6/25/21 - 8/30/21							
Area A	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.5	16.1	27	1.7	100%
		CG	29.6	137.0	510	3.7	100%
		Mixed	17.2	81.4	153	1.9	100%
							100%
	Residential	OC	24.4	60.1	131	2.2	
		CG	1.1	3.4	19	5.7	100%
		Mixed	11.2	54.9	103	1.9	100%
Totals			86.0	352.8	942.0		
Area B	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.6	9.4	13	1.4	100%
		CG	14.3	61.8	184	3.0	100%
		Mixed	31.3	106.8	417	3.9	100%
	Residential	OC	31.4	86.3	141	1.6	100%
		CG	2.5	18.2	73	4.0	100%
		Mixed	15.7	52.9	68	1.3	100%
Totals			97.8	335.2	895.1		
Area C	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial*	OC	2.9	0.0	0	0.0	100%
Totals			2.9	0.0	0		

Table 5-3 ADOT&PF Fall 2021 Sweeping Report

5.2.2. ADOT&PF 2021 Post-Sweep Sampling Results

Completion Range: 9/15/21 - 10/7/21							
Area A	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.5	16.1	27	1.7	100%
		CG	29.6	137.0	513	3.7	100%
		Mixed	17.2	81.4	153	1.9	100%
	Residential	OC	24.4	60.1	132	2.2	100%
		CG	1.1	3.4	19	5.7	100%
		Mixed	11.2	54.9	104	1.9	100%
Totals			86.0	352.8	948.4		
Area B	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.6	9.4	13	1.4	100%
		CG	14.3	61.8	268	4.3	100%
		Mixed	31.3	106.8	630	5.9	100%
	Residential	OC	31.4	86.3	152	1.8	100%
		CG	2.5	18.2	53	2.9	100%
		Mixed	15.7	52.9	90	1.7	100%
Totals			97.8	335.2	1206.1		
Area C	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.9	0.0	0	0.0	100%
Totals			2.9	0.0	0		

Table 5-4 2021 Post 1st Sweep Roadway Debris Loading Sampling Results

Post-1st Sweep Dimond Boulevard			Post-1st Sweep Intl Airport Rd			Post-1st Sweep North ER Access Road		
Bag ID	Location	Sample Wt (g)	Bag ID	Location	Sample Wt (g)	Bag ID	Location	Sample Wt (g)
D-1	0+10	42.2	I-1	0+10	106.0	ER-1	0+10	491.4
D-2	0+32	61.2	I-2	0+32	132.5	ER-2	0+32	154.7
D-3	0+50	49.3	I-3	0+50	149.9	ER-3	0+50	481.4
D-4	0+72	40.5	I-4	0+72	144.0	ER-4	0+72	699.2
D-5	0+90	53.2	I-5	0+90	189.8	ER-5	0+90	800.5
D-6	1+12	50.7	I-6	1+12	210.7	ER-6	1+12	338.8
D-7	1+30	63.9	I-7	1+30	185.4	ER-7	1+30	383.8
D-8	1+52	62.6	I-8	1+52	202.5	ER-8	1+52	297.6
D-9	1+70	47.3	I-9	1+70	146.2	ER-9	1+70	421.9
D-10	1+92	88.4	I-10	1+92	199.7	ER-10	1+92	318.0
	Average	55.93		Average	166.67		Average	438.73

Note – North ER is a current haul route. This likely accounts for the larger sample size.

Table 5-5 2021 Post 2nd Sweep Roadway Debris Loading Sampling Results

Post-2nd Sweep Dimond Boulevard			Post-2nd Sweep Intl Airport Rd			Post-2nd Sweep North ER Access Road		
Bag ID	Location	Sample Wt (g)	Bag ID	Location	Sample Wt (g)	Bag ID	Location	Sample Wt (g)
D-1	0+10	77.7	I-1	0+10	82.0	ER-1	0+10	276.2
D-2	0+32	55.6	I-2	0+32	155.4	ER-2	0+32	230.5
D-3	0+50	43.1	I-3	0+50	159.6	ER-3	0+50	258.8
D-4	0+72	44.5	I-4	0+72	125.8	ER-4	0+72	424.6
D-5	0+90	56.2	I-5	0+90	145.6	ER-5	0+90	656.9
D-6	1+12	55.9	I-6	1+12	206.0	ER-6	1+12	645.8
D-7	1+30	62.5	I-7	1+30	186.6	ER-7	1+30	462.5
D-8	1+52	69.2	I-8	1+52	151.6	ER-8	1+52	648.0
D-9	1+70	69.1	I-9	1+70	175.2	ER-9	1+70	673.0
D-10	1+92	109.7	I-10	1+92	209.7	ER-10	1+92	606.7
	Average	64.4		Average	159.75		Average	488.3

Note – North ER is a current haul route. This likely accounts for the larger sample size.

Table 5-6 2021 Post 3rd Sweep Roadway Debris Loading Sampling Results

Post-3rd Sweep Dimond Boulevard			Post-3rd Sweep Intl Airport Rd			Post-3rd Sweep North ER Access Road		
Bag ID	Location	Sample Wt (g)	Bag ID	Location	Sample Wt (g)	Bag ID	Location	Sample Wt (g)
D-1	0+10	52.4	I-1	0+10	170.1	ER-1	0+10	192.5
D-2	0+32	41.1	I-2	0+32	96.2	ER-2	0+32	160.8
D-3	0+50	59.1	I-3	0+50	113.9	ER-3	0+50	148.4
D-4	0+72	43.5	I-4	0+72	131.4	ER-4	0+72	338.7
D-5	0+90	43.5	I-5	0+90	98.2	ER-5	0+90	367.6
D-6	1+12	74.0	I-6	1+12	157.3	ER-6	1+12	410.3
D-7	1+30	70.1	I-7	1+30	137.9	ER-7	1+30	270.8
D-8	1+52	66.3	I-8	1+52	188.1	ER-8	1+52	272.1
D-9	1+70	77.4	I-9	1+70	193.1	ER-9	1+70	346.9
D-10	1+92	80.9	I-10	1+92	207.2	ER-10	1+92	261.8
	Average	60.8		Average	149.34		Average	276.99

Note – North ER is a current haul route. This likely accounts for the larger sample size.

6. 2021 Sweeping Photographs

Section 6 contains additional before and after photographs of the sweeping efforts taken by the DOT contractor.

Figure 6.1 – Northern Lights Boulevard before sweeping operations.



Figure 6.2 – Northern Lights Boulevard after sweeping operations



Figure 6.3 – Muldoon Rd before sweeping operations.



Figure 6.4 – Muldoon Rd after sweeping operations.



Figure 6.5 – Northern Lights Boulevard before sweeping operations.



Figure 6.6 – Northern Lights Boulevard after sweeping operations.



Certificate of Attendance

U.S. EPA's Tools & Resources Webinar Series

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October 20th, 2021

Renee Goentzel

This certificate represents participation in the one-hour webinar mentioned above as part of EPA's Tool & Resources Webinar Series. The webinar included a presentation by EPA staff in the Office of Research and Development.



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PROFESSIONAL DEVELOPMENT HOURS

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