SAMPLING

The majority of the stormwater from the developed portions of the Carmax Facility Development site will be routed to the underground stormwater detention facility, located in the western portion of the site.and will out-fall to the west where it will continue as concentrated pipe flow in the existing storm water system to the receiving waters. A small amount of the developed portion of the site, storm water will by-pass the storm sewer system via sheet flow to the northwest and southwest. Sampling of the outfalls will be utilized for the required site storm water monitoring. The surface water drainage area of the project is approximately 30.29 acres of land and the proposed project area of disturbance is10.50 acres of land (see attached USGS map for activity location and receiving waters). Therefore, the required effluent NTU appropriate to the outfall is ___X___ NTU, based on the guidelines provided in Appendix B of the permit.

Sampling Methods

Samples will be collected in accordance with the methodology outlined in the EPA guidance document named "NPDES Storm Water Sampling Guidance Document - EPA 833-B-92-001," an excerpt of which is included. All samples taken will be "grab samples." The samples collected are for a particular time and represent conditions at that moment.

The samples at this site are anticipated to be collected with an automatic sampler. All samples will be collected from the sampler no later than one business day after they are taken. The sample containers will be large-mouthed plastic jars with a minimum sample size of 100 milliliters. All sampling equipment will be thoroughly cleaned before any samples are taken, and care will be taken during sampling to avoid contamination by not stirring excess bottom debris in the channel or outfall, and by avoiding floating debris in the channel. Sample bottles will be labeled prior to sampling, if taken to a laboratory for testing. All samples will be taken in an area where the water is well mixed.

The samples will be well mixed prior to any transfer to a secondary container. (i.e. turbidity test vial). Samples will be analyzed within 48 hours of collection for turbidity in NTU in accordance with methodology and test procedures described in 40 CFR Part 136: EPA Method I-3860-85. A sampling narrative is required, which includes (for each sampling location) precise sampling methodology and the analytical method used to collect and analyze the samples. Operation of meters for turbidity analyses will follow manufacture's specifications. Samples taken from the Carmax Facility Development construction site are anticipated to be tested with an on site meter by qualified personnel. As necessary, samples will be submitted to an analytical laboratory for testing.

Monitoring records will be maintained for all sampling events. These records will include at a minimum:

* The facility name and address;
* Name of the analyst;
* Location of sample;
* Sample ID;
* Date and time of measurement;
* Date and time of analysis; and
* Name/model number of the analyzer instrument
* The analytical method used to collect and analyze the samples including quality control/quality assurance procedures. The narrative must include precise sampling methodology for each sampling location.

For all samples sent to a laboratory for analysis, a chain of custody will be implemented. If sampling equipment malfunctions or if vandalism, equipment loss, or other unforeseen circumstances prevent the collection of a sample, the situation will be reported in the sampling report and in the monthly report to the City of Roanoke, Virginia.

Sampling Frequency

All samples must be collected within 45 minutes of the accumulation of the specified rainfall amount. If discharge from an outfall begins after a minimum accumulation of rainfall, then a sample must be collected within 45 minutes of the first discharge from the outfall after a qualifying event. Sampling after each qualifying event will continue until the (NOT) is submitted with the final sampling data. Qualifying events are defined as:

a). For each area of the site that discharges to a receiving stream, the first rain event that reaches or exceeds 0.5 inch and allows for monitoring during normal business hours* (Monday thru Friday, 8:00 AM to 5:00 PM and Saturday, 8:00 AM to 5:00 PM when construction activity is being conducted by the Primary permittee) that occurs after all clearing and grubbing operations have been completed in the drainage area of the location selected as the representative sampling location; and

b). In addition to (a) above, for each area of the site that discharges to a receiving stream, the first rain event that reaches or exceeds 0.5 inch and allows for monitoring during normal business hours* that occurs either 90 days after the first sampling event or after all mass grading operations have been completed in the drainage area of the location selected as the representative sampling location, whichever comes first;

c). At the time of sampling performed pursuant to (a) and (b) above, if BMPs are found to be properly designed, installed and maintained, no further action is required. If BMPs in any area of the site that discharges to a receiving stream are not properly designed, installed and maintained, corrective action shall be defined and implemented within 2 business days, and turbidity samples shall be taken from discharges from that area of the site for each subsequent rain event that reaches or exceeds 0.5 inch during normal business hours* until the selected turbidity standard is attained, or until post-storm event inspections determine that BMPs are properly designed, installed and maintained; and

d). Existing construction activities, i.e., those that are occurring on or before the effective date of this permit, that have met the sampling required by (a) above shall sample in accordance with (b). Those existing construction activities that have met the sampling required by (b) above shall not be required to conduct additional sampling other than as required by (c) above.

*Note that the Permittee may choose to meet the requirements of (a) and (b) above by collecting turbidity samples from any rain event that reaches or exceeds 0.5 inch and allows for monitoring at any time of the day or week.

After construction is completed and the disturbed land has been stabilized, the final sampling event will take place within 45 minutes of the first storm of at least 0.5 inches or more within a 24-hour period.

If it is determined that BMP's are not properly designed, installed, or maintained in accordance with the permit, qualifying events will be re-defined as any storm greater than 0.5 inches in a 24 hour period. Sampling at this schedule will continue until the first rainfall event after the BMP's are deemed properly designed, installed, and maintained.

Any analysis of additional sampling taken beyond the minimum frequency defined above must be included in the sampling reports sent to the City of Roanoke, Virginia. Multiple samples taken in the same location may be averaged to comply with the standards outlined in the permit, but no analyzed data may be eliminated from the reporting.

Sampling Narrative
There is one (1) proposed monitoring/sampling location shown on the Erosion, Sedimentation & Pollution Control Plan. The following is a narrative describing the proposed monitoring/sampling locations:

Sampling Point #1: Station #1 is located at the outlet pipe of the storm water management Underground Facility that has been designed to attenuate the storm water runoff from the subject site. This location is designated as an out-fall sampling point for discharge from the proposed detention pond. (see the USGS Quadrant Map for activity location and receiving waters). The allowable NTU limit for this sampling station is __X__ NTU's.

REPORTING

All monitoring results will be submitted to the City of Roanoke at the address noted below, by the fifteenth day of the month following the reporting period. Reporting periods are months during which samples are taken in accordance with the GAR 100001 permit. Upon written notification, the City of Roanoke may require the permittee to submit the monitoring results on a more frequent basis. Results for the Carmax Facility Development project, which is located in the City of Roanoke, Virginia, will be submitted by **return receipt certified mail** (or similar service) to the following address:

City Of Roanoke
c/o Adrian Gilbert
215 Church Avenue SW, Room 170
Roanoke, Virginia 24011
Phone: (540) 853-5796

These monitoring reports will, at minimum, include:

* The date, exact place, and time of sampling;
* The name of the qualified personnel conducting the sampling;
* The date the analyses were performed;
* The time the analyses were initiated;
* The name of the individual conducting the analyses;
* References and written procedures, when available, for the analytical techniques or methods used;
* The results of the analyses, including the bench sheets, instrument readouts, computer disks or tapes, etc. used to determine these results;
* Results which exceed 1000 NTU shall be reported as "exceeds 1000 NTU."

If no qualifying rain event occurs during a month, a monitoring report must be filed detailing such. The monitoring reports will continue to be filed with City of Roanoke, Virginia until the (NOT) is submitted. The (NOT) for the Carmax Facility Development project will be submitted once all construction activities have ceased, final stabilization techniques have been implemented, and the site is in compliance with the permit. The (NOT) will include the following information corresponding to the information previously submitted in the (NOI):

* The permittee's legal name, address, and phone number;
* The site/project name, site location, and GPS location of the site;
* The NPDES permit number for the storm water discharge associated with construction activity identified by the (NOT);
* A copy of the final monitoring report; and
* The name of all receiving waters.
* Certification statement signed by a corporate officer.

DOCUMENT PRESERVATION

The Erosion, Sedimentation and Pollution Control Plan and the Comprehensive Monitoring Program Plan will be retained at the corporate offices of Carmax.

The following record documents should be maintained for a period of at least 3 years after the date of final stabilization including:

* Copy of (NOI), including any backup information and all data used to complete the (NOI)
* Copy of (NOT), including any backup information
* Site plans
* Inspection summaries
* Monitoring reports including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation.

The document preservation period for these records will be extended if a written request is received from the City of Roanoke, Virginia. The Carmax Facility Development project records will be maintained at the corporate offices of Carmax, (i.e., primary permittee) once all construction activities on site have ceased.

The Erosion, Sedimentation and Pollution Control Plan and the Comprehensive Monitoring Program Plan were developed to be a dynamic document. It should represent current site conditions. Documentation may include adding an addendum page to the Plans or making written corrections for small changes. All major changes and amendments to the Erosion, Sedimentation and Pollution Control Plan and the Comprehensive Monitoring Program Plan, such as changing sampling locations, must be certified by a licensed professional.

TURBIDITY
EPA Method 180.1 (Nephelometric)
Approved for NPDES and SDWA
Issued 1971; Editorial revisions 1974 and 1978
Store no. 00076

1. Scope and Application
1.1 This method is applicable to drinking, surface, and saline waters in the range of turbidity from 0 to 40 nephelometric turbidity units (NTU). Higher values may be obtained with dilution of the sample.
NOTE 1: NTU's are considered comparable to the previously reported Formazin Turbidity Units (FTU) and Jackson Turbidity Units (JTU).

2. Summary of Method
2.1 This method is based upon a comparison of the intensity of ligJbt scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension. The higher, the intensity of scattered light, the higher the turbidity. Readings, in NTU's, are made in a nephelometer designed according to specifications outlined in Apparatus. A standard suspension of FormaTin, prepared under closely defined conditions, is used to calibrate the instrument
2.1.1 Formazin polymer is used as the turbidity reference suspension for water because it is more reproducible than other types of standards previously used for turbidity standards.
2.1.2 A commercially available polymer standard is also approved for use for the National Interim Primary Drinking Water Regulations. This standard is identified as AMCO-AEPA-1 available from Amoco Standard International, Inc.

3. Sample Handling and Preservation
3.1 Preservation of the sample is not practical; analysis should begin as soon as possible. Refrigeration or icing to 4°C, to minimize microbiological decomposition of solids, is recommended.

4. Interferences
4.1 The presence of floating debris and coarse sediments which settle out rapidly will give low readings. Finely divided air bubbles will affect the results in a positive manner.
4.2 The presence of true color, that is the color of water which is due to dissolved substances which absorb light, will cause turbidities to be low, although this effect is generally not significant with finished waters.

5. Apparatus
5.1 The turbidimeter shall consist of a nephelometer with light source for illuminating the sample and one or more photo-electric detectors with a readout device to indicate the intensity of light scattered at right angles to the path of the incident light The turbidimeter should be so designed that little stray light reaches the detector in the absence of turbidity and should be free from significant drift after a short warm-up period.
5.2 The sensitivity of the instrument should permit detection of a turbidity difference of 0.02 unit or less in waters having turbidities less than 1 unit The instrument should measure from 0 to 40 units turbidity. Several ranges will be necessary to obtain both adequate coverage and sufficient sensitivity for low turbidities.
5.3 The sample tubes to be used with the available instrument must be of clear, colorless glass. They should be kept scrupulously clean, both inside and out, and discarded when they become scratched or etched. They must not be handled at *all* where the Light strikes them, but should be provided with sufficient extra length, or with a protective case, so that they may be handled.
5.4 Differences in physical design of turbidimeters will cause differences in measured values for turbidity even though the same suspension is used for calibration. To minimize such differences, the following design criteria should be observed:
5.4.1 Light source: Tungsten lamp operated at a color temperature between 2200-3000° K.
5.4.2 Distance traversed by incident light and scattered light within the sample tube: Total not to exceed 10 cm.
5.4.3 Detector: Centered at 90° to the incident light path and not to exceed ±30° from 90°. The Detector and filter system, if used, shall have a spectral peak response between 400 and 600 nm.
5.5 The Hatch Turbidimeter, Model 2100 and 2100A, is in wide use and has been found to be reliable; however, other instruments meeting the above design criteria are acceptable.

6. Reagents
6.1 Turbidity-free water: Pass distilled water through a 0.45*u* pore size membrane filter if such filtered water shows a lower turbidity than the distilled water.
6.2 Stock formazin turbidity suspension:
Solution. 1: Dissolve 1.00g hydrazine sulfate, (NH2),*H2SO4, in distilled water and dilute to 100 ml in a volumetric flask.
Solution 2: Dissolve 10.00g hexamemylenetetramine in distilled water and dilute to 100 ml in a volumetric flask.
In a 100 ml volumetric flask, mix 5.0 ml Solution 1 with 5.0 ml Solution 2. Allow to stand 24 hours at 25 ±3°C, then dilute to the mark and mix.
6.3 Standard formazin turbidity suspension: Dilute 10.00ml stock turbidity suspension to 100ml with turbidity-free water. The turbidity of this suspension is defined as 40 units. Dilute portions of the standard turbidity suspension with turbidity-free water as required.
6.3.1 A new stock turbidity suspension should be prepared each month. The standard turbidity suspension and dilute turbidity standards should be prepared weekly by dilution of the stock turbidity suspension.
6.4 The AMCO-AEPA-1 standard as supplied requires no preparation or dilution prior to use.

7. Procedure
7.1 Turbidimeter calibration: The manufacturer's operating instructions should be followed. Measure standards on the turbidimeter covering the range of interest. If the instrument is already calibrated in standard turbidity units, this procedure will check the accuracy of the calibration scales. At least one standard should be run in each instrument range to be used. Some instruments permit adjustments of sensitivity so that scale values will correspond to turbidities. Reliance on a manufacturer's solid scattering standard for setting overall instrument sensitivity for all ranges is not an acceptable practice unless the turbidimeter has been shown to be free of drift on all ranges. If a pre-calibrated scale is not supplied, then calibration curves should be prepared for each range of the instrument.
7.2 Turbidities less than 40 units: Shake the sample to thoroughly disperse the solids. Wait until air bubbles disappear, then pour the sample into the turbidimeter tube. Read the turbidity directly from the instrument scale or from the appropriate calibration curve.
7.3 Turbidities exceeding 40 units: Dilute the sample with one or more volumes of turbidity-free water until the turbidity falls below 40 units. The turbidity of the original sample is then computed from the turbidity of the diluted sample and the dilution factor. For example, if 5 volumes of turbidity-free water were added to 1 volume of sample, and the diluted sample showed a turbidity of 30 units, then the turbidity of fee original sample was 180 units.
7.3.1 The Hach Turbidimeters, Models 2100 and 2100A, are equipped with 5 separate scales: 0-0.2, 0-1.0, 0-100, and 0-1000 NTU. The upper scales are to be used only as indicators of required dilution volumes to reduce readings to less than 40 NTU. **NOTE 2**: Comparative work performed in the MDQAR Laboratory indicates a progressive error on sample turbidities in excess of 40 units.

8. Calculation
8.1 Multiply sample readings by appropriate dilution to obtain final reading.
8.2 Report results as follows:

NTU	Record to Nearest:
0,0-1.0	0.05
1-10	0.1
10-40	1
40-100	5
100-400	10
400-1000	50
>1000	100

9. Precision and Accuracy
9.1 In a single laboratory (EMSL), using surface water samples at levels of 26, 41, 75 and 180 NTU, the standard deviations were ±0.60, ±0.94, ±1.2 and ±4.7 units, respectively.
9.2 Accuracy data are not available at this time.

INSPECTIONS

Permittee Requirements

1). Each day when any type of construction activity has taken place, qualified personnel (i.e., a person who has successfully completed an erosion and sediment control short course approved by the City of Roanoke, Virginia shall:

* Inspect all areas at the site where petroleum products are stored, used, or handled for spills and leaks from vehicles and equipment.
* Inspect all locations at the site where vehicles enter or exit the site for evidence of off-site sediment tracking.
* Measure rainfall once each twenty-four hour period at the site.

These inspections must be conducted until a Notice of Termination is submitted.

2). Qualified personnel (provided by the primary permittee) shall inspect at least once every business days or (ii) once every five (5) business days and within 48 hours after a storm event totaling 0.5 inches or more. In the event that a measurable storm event occurs when there are more than 48 hours between business days, the inspection shall be conducted on the next business day. Areas that already have been stabilized or where runoff is unlikely due to frozen or snow covered ground shall be inspected at least on a monthly basis. Inspections shall be performed for the following areas:

* Disturbed areas of the site that have not undergone final stabilization.
* Areas used for storage of materials that are exposed to precipitation that have not undergone final stabilization.
* Structural control measures.

Erosion and sediment control measures identified in the Plan applicable to the site shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving water(s). For areas of a site that have undergone final stabilization, the permittee must comply with Part IV.D.3.a.(3) of the general permit no. GAR 100001. These inspections must be conducted until a Notice of Termination is submitted.

3). Qualified personnel (provided by the primary permittee) shall inspect at lease once per month (until a Notice of Termination is received by the City of Roanoke, Virginia) the areas of the site that have undergone final stabilization. These areas shall be inspected for evidence of, or the potential for, pollutants entering the drainage system and the receiving water(s). Erosion and sediment control measures identified on the Erosion, Sedimentation and Pollution Control Plans on sheets C9.0 - C12.0, shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

4). Based on the results of each inspection, the site description and the pollution prevention and control measures identified in the Erosion, Sedimentation and Pollution Control Plans on sheets C9.0 - C12.0, the Plans shall be revised as appropriate not later than seven (7) calendar days following each inspection. Implementation of such changes shall be made as soon as practical but in no case later than seven (7) calendar days following each inspection.

A report summarizing the scope of each inspection, will, at a minimum, include the name of the qualified personnel making the inspection, the date of the inspection, major observations during the inspection relating to the implementation of the Erosion, Sedimentation and Pollution Control Plan on sheets C9.0 - C12.0, and any foreseen revisions to the plan, shall be made and retained at the site or be readily available at a designated alternate location until the entire site or that portion of a construction project that has been phased has undergone final stabilization and a Notice of Termination is submitted to EPD. The reports will also identify any incidents of non-compliance. Where the report does not identify any incidents of non-compliance, the report shall contain a certification that the facility is in compliance with the Erosion, Sedimentation and Pollution Control Plan and this permit. The report shall be signed in accordance with Part V.G. of the GAR 100001 permit. Reports of all inspections will be retained and readily available at the corporate offices of Carmax.

Excerpts from NPDES Storm Water Sampling Guidance Document (Page 67-70; 119-123)
United States Environmental Protection Agency
Office of Water (EN-336)
EPA 833-B-92-001
July 1992

6. Health and Safety

Storm water sampling activities may occur when the sampling environment and/or storm water discharges create hazardous conditions. Hazardous conditions associated with sampling include:

· Hazardous weather conditions (e.g. wind, lightning, flooding, etc.)
· Sampling in confined spaces (e.g. manholes)
· Hazards associated with chemicals
· Biological hazards (e.g. rodents and snakes)
· Physical hazards (e.g. traffic, falling objects, sharp edges, slippery footing, and the potential for lifting injuries from opening or removing access panels an manhole covers, etc.)

It is essential that sampling personnel be aware of these hazards. Sampling personnel should be trained to evaluate potentially hazardous situations and develop ways for handling them. Since sampling hazards can be life threatening, safety must be the highest priority for all personnel. This chapter outlines general health and safety issues and concerns. Additional references discussed below should be consulted for more specific guidance to avoid adverse health and safety situations.

6.1 General Training Requirements

Preparation and training of all sampling personnel should be completed before beginning any sampling task. Extreme care should be taken to allow for safety precautions including proper equipment and appropriate operational techniques, sufficient time to accomplish the task, training on potential hazards, and emergency procedures. EPA's Order 1440.2 sets out the policy, responsibilities, and mandatory requirements for the safety of personnel who are involved in sampling activities. This order, which is found within the EPD NPDES Compliance Monitoring Inspector Training: Sampling manual provides further guidance to applicants' storm water sampling personnel. Basic emergency precautions include having access to both local emergency phone numbers and communication equipment (i.e. phones or radios), and ensuring that personnel are trained in first aid and carry first aid equipment.

6.2 Necessary Safety Equipment

Exhibit 6-1 contains a list of safety equipment that may be appropriate depending on the characteristics of the sampling site.
Exhibit 6-1: List of Safety Equipment
Flashlight18-inch traffic cones, Meters (for oxygen, explosivity, toxic gasses)Insect/rodent repellant, Ladder, Ventilation equipment, Safety harness50 feet of ½ inch nylon rope, Hard hat, Safety shoes, Safety goggles, Rain wear, Coveralls, Gloves (rubber)qRespiratorFirst aid kit, Reflective vestsSelf-contained breathing apparatus, Source: Adapted from NPDES Compliance Monitoring Inspector Training: Sampling,
U.S. EPA, August 1990

6.3 Hazardous Weather Conditions

Common sense should dictate whether sampling be conducted during adverse weather conditions. No sampling personnel should place themselves in danger during high winds, lightening storms, or flooding conditions which might be unsafe. Under extreme conditions, a less hazardous storm event should be sampled.

6.4 Sampling in Confined Spaces

Confined spaces encountered by storm water sampling personnel typically include manholes and deep, unventilated ditches. A confined space is generally defined as a space that is somewhat enclosed with limited access and inadequate ventilation.

The National Institute of Occupational Safety and Health (NIOSH) has developed a manual entitled "Working in Confined Spaces" which should be consulted prior to confined space entry. Also, several states have developed specific procedures, which should be consulted. Unless they have been trained for confined space entry, sampling personnel should avoid entry under all circumstances.

6.4.1 Hazardous Conditions in Confined Spaces

Confined spaces pose a threat to sampling personnel because of low oxygen, explosivity, and toxic gases. When entering a confined space, a qualified person should ensure that the atmosphere is safe by sampling to test for oxygen levels, potential flammable hazards, and toxic materials known or suspected to be present. If atmospheric conditions are detected, the confined space should be ventilated or sampling personnel should use a self-contained air supply and wear a lifeline. At least one person should remain outside of the confined space in the event that problems arise. If atmospheric testing has not been properly conducted, the confined space should not be entered. Manholes can also pose a threat to safety because of the small confined area, slippery surfaces, sharp objects, unsafe ladders, etc.

6.4.2 Special Training Requirements

Personnel should not enter into a confined space unless trained in confined space entry techniques. Such training covers hazard recognition, the use of respiratory equipment and atmospheric testing devices, use of special equipment and tools, and emergency rescue procedures. In addition, at least one member of the sampling crew should be certified in basic first aid and Cardiopulmonary Resuscitation (CPR). Sampling personnel should, on an annual basis, practice confined space rescues.

6.4.3 Permit System

If entry into a confined space is necessary, an entry permit system should be developed which includes a written procedure. This permit should include, at a minimum:

· Description of work to be done
· Hazards that may be encountered
· Location and description of the confined space
· Information on atmospheric conditions at confined space
· Personnel training and emergency procedures
· Names of sampling personnel

The manual developed by NIOSH discusses this permit system in more detail. Furthermore, the Occupational Safety and Health Administration (OSHA) proposed a rule on June 5, 1989 (54 FR 24080) that would implement a permit system.

6.5 Chemical Hazards

Sampling personnel can also be at risk of exposure to hazardous chemicals - either chemical in the actual storm water discharge or the chemicals that have been placed in the sample collection containers for sample preservation. Therefore, direct contact with the preservatives and the storm water (if hazardous chemicals are suspected to be present) should be avoided. Sampling personnel should wear gloves and safety glasses to avoid skin and eye exposure to harmful chemicals. Sampling personnel should be trained to avoid exposure and instructed as to what to do if exposure occurs (e.g. flush the eyes, rinse the skin, ventilate the area, etc.).

6.6 Biological Hazards

Storm water sampling personnel may also encounter biological hazards such as rodents, snakes, and insects. The sampling crew should remain alert to these hazards. As mentioned in Section 6.2 necessary sampling equipment, for certain locations, should include repellent and a first aid kit.

6.7 Physical Hazards

The sampling crew should be aware of a number of physical hazards that could cause incidents at the sampling site. These hazards include traffic hazards, sharp edges, falling objects, slippery footing, and lifting injuries from removing manhole covers. Sampling personnel should pay close attention in order to prevent these safety hazards at all times.

If the sample point is in a manhole, a street gutter, or a ditch near the street, particular attention must be given to marking off the work area to warn oncoming traffic of the presence of the sampling crew. Traffic cones, warning signs, and barricades should be placed in appropriate places around the sampling point.

End of Applicable Section

RAINFALL MONITORING

Rainfall measurements will be measured and recorded daily by automatic rain gauges. The gauges are to be mounted away from any other obstructions and inspected to ensure they are free from obstructions and debris. One gauge is to be utilized for each sampling device and inspected during the rainfall events to record the time the qualifying event occurs. One gauge must be designated as the primary measuring point for the purpose of daily rainfall measurements. If this gauge fails, another gauge may be used until a replacement is installed.

The design of the rainfall gauges requires the adjustment for the rainfall sensor to trigger the automatic sampler (if used as anticipated, please see Section 9 - Sampling). The sensor must be adjusted for the appropriate qualifying event. Sampling shall occur for the following events:

a. For each area of the site that discharges to a receiving stream, the first rain event that reaches of exceeds 0.5 inch and allows for monitoring during normal business hours* (Monday thru Friday, 8:00 AM to 5:00 PM and Saturday 8:00 AM to 5:00 PM when construction activity is being conducted by the Primary permittee) that occurs after all clearing and grubbing operations have been completed in the drainage area of the location selected as the representative sampling location;

b. In addition to (a.) above, for each area of the site that discharges to a receiving stream, the first rain event that reaches or exceeds 0.5 inch and allows for monitoring during normal business hours* that occurs either 90 days after the first sampling event or after all mass grading operations have been completed in the drainage area of the location selected as the representative sampling location, whichever comes first;

c. At the time of sampling performed pursuant to (a.) and (b.) above, if BMPs are found to be properly designed, installed and maintained, no further action is required. If BMPs in any area of the site that discharges to a receiving stream are not properly designed, installed and maintained, corrective action shall be defined and implemented within 2 business days, and turbidity samples shall be taken from discharges from that area of the site of each subsequent rain event that reaches or exceeds 0.5 inch during normal business hours* until the selected turbidity standard is attained, or until post-storm event inspections determine that BMPs are properly designed, installed and maintained; and

d. Existing construction activities, i.e., those that are occurring on or before the effective date of this permit, that have met the sampling required by (a.) above shall sample in accordance with (b.). Those existing construction activities that have met the sampling required by (b.) above shall not be required to conduct additional sampling other than as required by (c.) above.

* Note that the Permittee may choose to meet the requirements of (a.) and (b.) above by collecting turbidity samples from any rain event that reaches of exceeds 0.5 inch and allows for monitoring at any time of the day or week.

*Notes on this sheet reflect Carmax requirements & G.C. shall be responsible for VA state VSMP permit & Stormwater Pollution Prevention Plan (SWPPP) for this project.

Excerpts from NPDES Storm Water Sampling Guidance Document (Page 67-70; 119-123)
United States Environmental Protection Agency
Office of Water (EN-336)
EPA 833-B-92-001
July 1992

3.2.6 Measuring Rainfall

Many types of instruments have been developed to measure the amount and intensity of precipitation. All forms of precipitation are measured on the basis of depth of the water that would accumulate on a level surface if precipitation remained where it fell. There are two types of rain gauges - standard and recording gauges. A standard rain gauge collects the rainfall so that the amount of rain can be easily measured. The standard gauge for the NWS has a collector, which is 8 inches in diameter. Rain flows from the collector into a cylindrical measuring tube inside the overflow can. The measuring tube has a cross-sectional area one-tenth the size of the collector so that 0.1-inch of rainfall will fill 1 inch of the measuring tube. While this standard gauge is both accurate and easy to use, any open receptacle with vertical sides can be an effective rain gauge. Standard rain gauges are simple and inexpensive; however, with a standard gauge, there is no way to record the changes in the intensity of the rainfall without making frequent observations of the gauge during the storm.

The second type of gauge is the recording rain gauge, which provides a permanent record of the amount of rainfall which accumulates over time. These common types of recording gauges are:

· Tipping Bucket Gauge - Water caught in a collector is funneled into a two-component bucket; a know quantity of rain fills one compartment, overbalancing the bucket and emptying it into a reservoir. This moves the second bucket into place beneath the funnel. The tipping of the bucket engages an electric circuit, which records the event.
· Weighing Type Gauge - Water is weighed when it falls into a bucket placed on the platform of a spring or lever balance. The weight of the contents is recorded on a chart, showing the accumulation of precipitation.
· Float Recording Gauge - Water is measured by the rise of a float that is placed in the receiver. These gauges may be self-siphoning, or may need to be emptied periodically by hand.

Recording rain gauges provide a permanent record of rainfall, and they can be used to determine variations in rainfall intensity over time without making frequent observations during the storm. But recording gauges are more complicated mechanically than standard gauges, making them more costly, less durable, and more difficult to operate.

Although all gauges are subject to error, most errors can be minimized. To minimize errors, the gauge should be placed on a level surface that is not windswept and is away from trees or buildings that might interfere with the path of rainfall. When taking measurements, other factors contributing to error should also be considered: mistakes in reading the scale, dents in the collector rim (which change the receiving area), measuring sticks that may retain some of the water, and water lost to evaporation. In the case of tipping bucket gauges, water may not be collected while the bucket is still tipping. The most common source of inaccuracy is changes in data that are attributable to wind. It is possible to assess wind errors by comparing measurements of gauges that are protected from wind with those that are not.

3.3 Grab Sample Collection

Section 3.1.2 discussed both the parameters that must be monitored by grab samples and the conditions under which grab sampling is required. This section explains how to collect grab samples. The entire sample is collected at an uninterrupted interval (i.e. grabbed at one time). A grab sample provides information on the characterization of storm water at a given time and may be collected either manually or automatically as discussed below.

3.3.1 How to Manually Collect Grab Samples

A manual grab is collected by inserting a container under a downcurrent of a discharge with the container opening facing upstream. Generally, simplified equipment and procedures can be used. In most cases, the sample container itself may be used to collect the sample. Less accessible outfalls may require the use of poles and buckets to collect grab samples. To ensure the manual grab samples are representative of the storm water discharged, the procedure set forth in Exhibit 3-17 should be followed.

Exhibit 3-17. Recommended Operating Procedures for Taking Grab Samples

· Label sample containers before sampling event
· Take a cooler with ice to the sampling point
· Take the grab from the horizontal and vertical center of the channel
· Avoid stirring up the bottom sediments in the channel
· Hold the container so the opening faces upstream
· Avoid touching the inside of the container to prevent contamination
· Keep the sample free from uncharacteristic floating debris
· Transfer samples into proper containers (e.g. from bucket to sample container), however, fecal coliform, fecal streptococcus, phenols, and O&G should remain in original containers
· If taking numerous grabs, keep the samples separate and labeled clearly
· Use safety precautions (see Chapter 6)

Specialized equipment may be needed, particularly in situations where storm water discharges are inaccessible or where certain parameters are monitored. For example:

· When sampling for O&G and VOCs equipment that safely and securely houses O&G bottles or VOC vials should be used. This may be necessary because: (1) O&G will adhere to containers and thus should not be transferred from one container to another; and (2) excessive aeration during sampling may result in the partial escape of VOCs.
· Since facilities sometimes use sample bottles that already contain preservatives (as provided by correct laboratories), extreme care should be taken when filling them to avoid spills, splatters, or washout of preservatives.

All equipment and containers that come into contact with the sample must be clean to avoid contamination. Additionally, sample collection equipment and container materials should be totally unreactive to prevent leaching of pollutants. Cleaning procedures are discussed in detail in Section 3.5.

3.3.2 How to Collect Grab Samples by Automatic Sampler

Grab samples can also be collected using programmed automatic samplers. Automatic samplers come equipped with computers that can be programmed to collect grab samples. Programming for grabs is specific to the type of automatic sampler. Some samplers are portable and have been developed specifically to sample for storm water discharges. These samplers are frequently attached to a rain gauge and/or a flow sensor. Such samplers can be programmed to initiate sample collection by one or more of the following conditions: (1) depth of flow in a channel; (2) rainfall in inches; (3) flow rate; (4) time; (5) external signal; and (6) combinations of the first three conditions. For example, an automatic sampler could be used to collect a sample at 15-minute intervals after its sensors indicate that rainfall has begun.

When using an automatic sampler, planning is very important. First, all equipment must be properly cleaned, particularly the tubing and the sample containers. There are several different types of tubing available, including rubber and Tygon tubing. Tygon tubing is commonly used since it does not leach contaminants. Deionized water should be drawn through the sampler to remove any remaining pollutant residuals prior to taking samples. Tubing should also be drawn through the sampler to remove any remaining pollutant residuals prior to taking samples. Tubing should also be replaced periodically to avoid algae or bacterial growth.

Sampling personnel should also use adequate and appropriate containers to ensure they are properly cleaned. Section 3.5 contains information on cleaning procedures, which should be followed for all equipment. Additionally, the utilization of blanks (a control used to verify the accuracy of analytical results) is recommended to determine if cross-contamination of sampling equipment has occurred. Samplers should also be programmed, set up, and supplied with a source of power. Properly charged batteries should be readily available for portable samplers in advance of a storm event, and as a backup power supply in case of power failure. Finally, although automatic samplers may be useful in some situations, several parameters are not amenable to collection by automatic sampler. These pollutants include fecal streptococcus, fecal coliforms, oil and grease, and VOCs which should be collected manually, not automatically, as discussed in Section 3.1.2.

End of Applicable Section

SITE DESCRIPTION

This Comprehensive Monitoring Plan (CMP) has been prepared to meet the requirements under the General Permit No. VAR10 for Authorization to Discharge under the Virginia Stormwater Management Program (VSMP), general VPDES permit for discharges of stormwater from construction activities, under the Commonwealth of Virginia Department of Environmental Quality (DEQ). The Carmax Facility Development Site Activities will disturb an area of approximately 10.5 acres, subsequently, a Notice of Intent (NOI), Erosion, Sedimentation and Pollution Control Plan (ES&PC), Comprehensive Monitoring Plan (CMP), and a Notice of Termination (NOT) are required for the site. The ES&PC Plan and the (CMP) will be kept at the corporate offices of Carmax and will be updated when erosion controls on site are modified to improve erosion and sediment control. The (NOT) will be submitted after Construction and final site stabilization is completed.

Carmax has identified the need to construct the 7,590 s.f. automobile dealership facility in the City of Roanoke, Virginia. The proposed project is located on a 11.81 acre tract of land in the City of Roanoke, Virginia. Currently, the existing site contains an existing building, carport, asphalt parking lot, and other miscellaneous improvements. The remainder fo the site is a mixture of managed turf and wooden area. The surface water body that will be receiving the proposed discharge from this site is not located on the subject property. The receiving surface water body for storm water runoff from this site is Peters Creek and then the Roanoke River. Please see the site USDA Quad map for reference.

The project includes construction of the 7,590 s.f. Sales and Service building with the accompanying customer/employee/sales vehicle parking area, storm water management facilities, and other infrastructure to support the facility. The proposed site is located in a generally urban area of the City of Roanoke, Virginia The site is bound on the north, south, and east by a mixture of private property zoned MX, R-5, RMF, IN-PUD, and CG, and on the west by the public right of way of Peters Creek Road. The Carmax Facility Development Site construction activities will disturb approximately 10.5 acres of land. Final stabilization of the construction area is anticipated to occur 12 months after the beginning of construction. For additional information see the Site Map and Anticipated Activity Schedule included on the attached drawings.

Erosion and sedimentation control requirements for this site were explained in the accompanying ES&PC Plan and SWWWP dated 6/10/2019 The comprehensive monitoring program details the monitoring and reporting steps required under the permit. Storm water from the Carmax Facility Development Site will ultimately be routed from the proposed storm water management conveyance systems into the existing drainage system which exits the subject property along its western property boundary lines. Outfall sampling will be utilized for the required site storm water monitoring; this is discussed in further detail in Section 9, Sampling. The location of the outfall, streams or other bodies of water, receiving waters, and sampling locations are indicated on the Comprehensive Monitoring Program Plan (CMP1.0). The Storm Water Pollution Prevention Plan (SWPPP) has been developed as a requirement of the Virginia Stormwater Management Plan (VSMP) General Permit for Discharges of Storm Water from Construction Activities (Permit), as defined in 9VAC25-870-10 et seq.

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CHECKED BY:	BALZER & ASSOC. / CPB

REVISIONS

REV#	DATE	DESCRIPTION	BY
1	5/5/19	CLIENT REV.	BTC
2	6/10/19	LOCALITY REV.	BTC
3	7/19/19	PLAN REVISION	BTC

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PROJECT NO.	04180107.00
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SHEET TITLE	GENERAL NOTES 2
SHEET NO.	**C19.0**