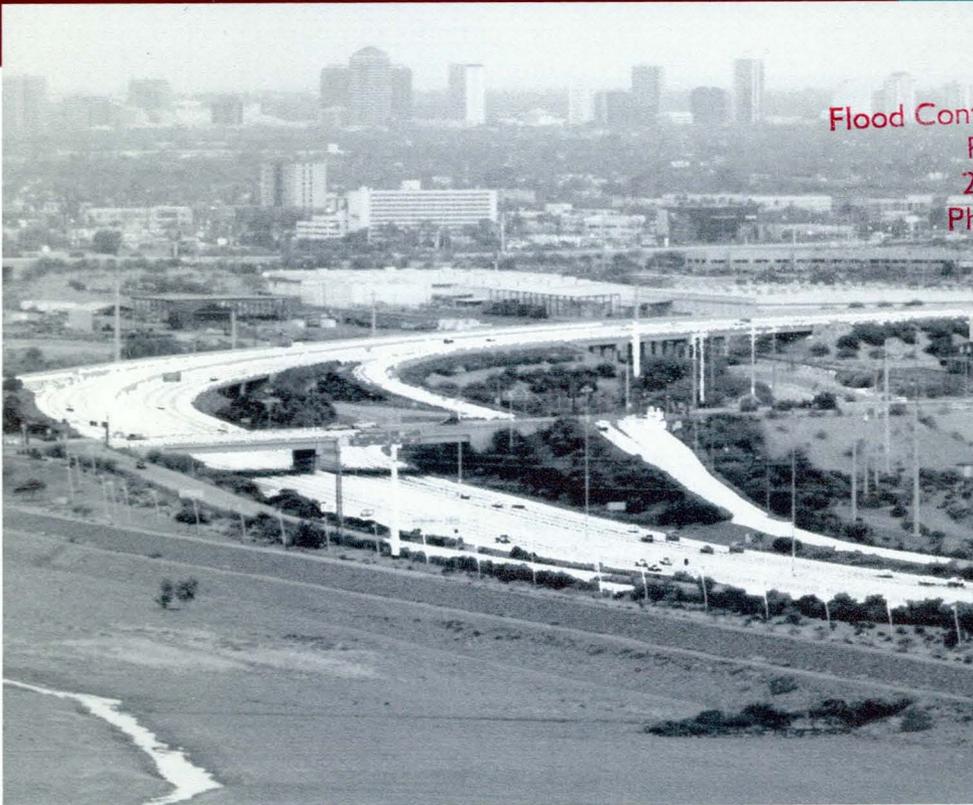


STORMWATER MANAGEMENT PLAN FOR ARIZONA DEPARTMENT OF TRANSPORTATION



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**ANNUAL REPORT
SEPTEMBER 2000**

NPDES Permit Number AZS000018



ARIZONA
DEPARTMENT OF
TRANSPORTATION

**STORMWATER MANAGEMENT PLAN
FOR
ARIZONA DEPARTMENT OF TRANSPORTATION**

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COVER: Westbound Loop 202, Tempe, Arizona
Photo by Greg Rodzenko

NPDES Permit Number AZS000018



ARIZONA
DEPARTMENT OF
TRANSPORTATION

Executive Summary

EXECUTIVE SUMMARY

This Annual Report describes the activities and programs implemented by the Arizona Department of Transportation (ADOT) from October 1, 1999 through September 30, 2000, as part of its statewide Storm Water Management Program (SWMP) for the Municipal Storm Sewer System (MS4), Phase I Program. This report is prepared pursuant to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit Number AZS000018. The Permit stipulates that an Annual Report be prepared and submitted to the EPA regarding the status of permit activities. This is ADOT's first annual report.

ADOT's SWMP addresses the stipulations established in the following documents:

- ^{Title} 40 Code of Federal Regulations 122.26
- NPDES permit No. AZS000018, effective October 1, 1999
- ADOT Part 1 Permit Application dated November 1991
- ADOT Part 2 Permit Application dated November 1992

The 1999/2000 Annual Report includes the following items required by the Permit:

Section 1 - includes the Certification Statement.

Section 2 - describes the status of implementing the various elements of the SWMP.

Section 3 - describes the outfall monitoring sites, including the monitoring instrumentation, and the testing protocol.

Section 4 - describes the elements of illicit discharge control including the outfalls, the dry weather sampling protocol, the results of the sampling, and the control procedures and actions taken.

Section 5 - describes the effectiveness of the various categories of Best Management Practices, by category.

Section 6 - describes the data limitations and proposed changes to the stormwater management program

Section 7 - summarizes the annual expenditures for the various activities and programs specifically related to the SWMP, for the current year, and the budget for the year following the annual report.

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Section 1

Certification Statement

SECTION 1

CERTIFICATION STATEMENT

MUNICIPAL SEPARATE STORM SEWER SYSTEM
ANNUAL REPORT
FOR THE YEAR ENDING SEPTEMBER 30, 2000

NPDES Permit Holder: Arizona Department of Transportation

Period Covered by This Report: October 1, 1999 through September 30, 2000

NPDES Permit Number: AZS000018

Person to contact concerning information contained in the report:

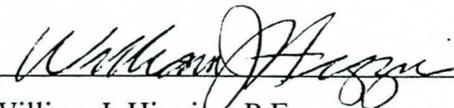
Roland Tang, P.E.
Environmental Planning Group
Arizona Department of Transportation
205 S. 17th Avenue
Mail Drop 619E
Phoenix, AZ 85007
602-712-7769

As required by 40 C.F.R. Section 122.22(b)(2):

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering this information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

As required by NPDES Permit Number AZS000018:

I certify that storm water management program revisions previously approved by EPA, after consultation with ADEQ, were implemented on schedule.



William J. Higgins, P.E.
Deputy State Engineer of Operations
Arizona Department of Transportation

9/28/00

Date

Section 2

Status of Implementing Stormwater Management Plan

STORM WATER MANAGEMENT PLAN

This storm water management plan describes the current best management practices (BMPs) that ADOT has incorporated into the construction and operation of the State's Highway system. This section reports the BMPs carried out from October 1, 1999 through September 30, 2000. These practices are continuously being reviewed and improved as new research and technology becomes available. The plan is divided into four categories: Maintenance, Construction, Design and Transportation Control Measures.

Maintenance programs for the Phoenix Area and the Tucson Area are discussed separately since they are tailored to meet each individual District's needs. For instance, ADOT's storm sewer system in the Phoenix Area is quite extensive and includes pipes, open channels, pump stations and detention basins, whereas, the storm drainage system in the Tucson Area is primarily cross-drainage. Consequently, each metropolitan area requires its own unique system of highway storm sewer and storm drainage maintenance. Also the volume of traffic in the Phoenix Area is much greater which results in a more frequent street sweeping and litter pickup program.

Maintenance – ADOT carries out a number of maintenance programs that assist in controlling the amount of pollutants entering storm water along existing roadways. In addition, ADOT, along with the Arizona Department of Public Safety and the Arizona Department of Environmental Quality, is very responsive to accidental spills of hazardous materials.

Construction - All of ADOT's construction projects which result in grading or clearing 5 or more acres of land must be covered by a permit from the Environmental Protection Agency (EPA) prior to construction. ADOT performs several activities at construction sites to minimize the amount of pollutants entering storm water,

Design – ADOT incorporates structural controls of storm water into the design of roadways and landscaping. These features promote the filtering of storm water and reduce erosion.

Transportation Control Measures - Transportation control measures include a number of programs aimed at reducing vehicle emissions. They include traffic control measures, vehicle emission controls and programs to reduce traffic volume. For the most part, these programs have been instituted for the purpose of improving air quality. However, an additional benefit is a reduction in pollutant deposition on the highways.

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**BEST MANAGEMENT PRACTICE #1
MAINTENANCE**

Street Sweeping and Litter Pick-Up

PHOENIX

Street Sweeping

Highways are swept at least once each week. This is done on a contract basis with several local street sweeping companies. (See Appendix A)

Mechanized Litter Pick-Up

Litter, debris, dead animals, and other discarded materials are picked up off the roadway surface on daily routes. This is done with a special truck that picks the litter and debris up off the roadway surface without the need for maintenance crews to walk into the highway traffic. (See Appendix A)

Manual Litter Pick-Up

Litter pickup is also done by ADOT personnel and contract labor on weekly, bi-weekly and monthly intervals based on location within the highway system (locations with higher traffic volumes require more frequent cleaning than others). The work includes cleaning up all types of litter and debris left at the roadway edge and within the right of way.

In the event that containers or other materials, which appear to be hazardous, are found during litter pickup, the crews are instructed to leave them in place so that they can be tested. ADOT staff members are instructed to contact the ADOT HAZMAT office. ADOT has a contract with a hazardous materials handler to test and dispose of such materials. If found to be hazardous, the wastes are properly disposed of by the contracted company.

Adopt-A-Highway Program

The ADOT Adopt-A-Highway Program helps reduce litter on Arizona Highways by encouraging volunteers to clean up litter and by heightening public awareness of the need to keep the Highways clean.

The program allows organizations to adopt designated sections of highway for which they are responsible to pick up litter at least three times a year. ADOT erects signs, which call the motorist's attention to the litter control program. The signs also credit the adoptive organization for its effort in keeping the highway clean.

TUCSON

Street Sweeping

Highways are swept once per month by ADOT personnel and contract labor except for U.S. Route 89 and State Route 86. The City of Tucson, through an intergovernmental agreement with ADOT, is responsible for surface maintenance on U.S. 89 and S.R. 86

within the Tucson City limits. ADOT is responsible for sweeping the portions of U.S. 89 and S.R. 86 that fall outside of the City, four times per year.

Mechanized Litter Pick-Up

Litter, debris, dead animals and other discarded materials are picked up off the roadway surface daily. This is done with a special truck that picks the litter and debris up off the highway without the need for maintenance crews to walk into the highway traffic.

Manual Litter Pick-Up

Litter pickup is also done by ADOT personnel and contract labor on a monthly basis. The work includes cleaning up all types of litter and debris left at the roadway edge and within the right of way.

In the event that containers or other materials, which appear to be hazardous, are found during litter pickup, the crews are instructed to leave them in place so that they can be tested. ADOT staff members are instructed to contact the ADOT HAZMAT office. ADOT has a contract with a hazardous materials handler to test and dispose of such materials. If found to be hazardous, the wastes are properly disposed of by the contracted company.

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BEST MANAGEMENT PRACTICE #2
MAINTENANCE

Storm Sewer System Maintenance

PHOENIX

Pump Station Maintenance

All pump stations within ADOT's drainage system are inspected two or more times per year. If necessary, the wet wells are cleaned of sediment and debris. If during the inspection, water is found in the wet well that appears to be polluted (evidenced by odor, color, etc.) a sample is taken for immediate laboratory testing. If found to be polluted, the water is pumped out and properly disposed of. ADOT also endeavors to determine the source of the pollution to prevent further occurrences.

Tunnel Maintenance

ADOT owns and operates three large drainage tunnels (18' to 21' diameter) in the Phoenix area. The profiles of the tunnels have sag points (depression designed to trap sediment during low velocity flows) upstream from their outlet structures into the Salt River. The water in the tunnels is pumped out twice each year and the tunnel inspected and cleaned of debris and sediment.

Twice each year, the water in the tunnels is laboratory tested to determine levels of pollutants being discharged to the Salt River.

Storm Sewer Maintenance

Large diameter storm sewers (those large enough to walk through) are inspected when needed. Required cleaning and maintenance is performed as required by the inspection.

Storm Sewer Inlet/Catch Basin Maintenance

Inlets and catch basins on ADOT's drainage system are inspected and cleaned one or more times each year.

Open Channel Maintenance

Open channels within ADOT's drainage system are inspected annually and cleaned on a continuous basis. Maintenance crews observe the condition of the open channels on at least a weekly basis and they are cleaned of debris, vegetative growth, and sediment as required.

TUCSON

Pump Station Maintenance

ADOT does not have any pump stations in the Tucson Area.

Tunnel Maintenance

ADOT does not have any tunnels in the Tucson Area.

Storm Sewer Maintenance

Storm sewers are inspected after large flows occur or at least once every two years. Required cleaning and maintenance is performed as required by the inspection.

Storm Sewer Inlet/Catch Basin Maintenance

Inlets and catch basins on ADOT's drainage system are inspected and cleaned after large flows or at least once every two years.

Open Channel Maintenance

Open channels within ADOT's drainage system are inspected and cleaned on a continuous basis. Maintenance crews observe the condition of the open channels on at least a weekly basis and they are cleaned of debris, vegetative growth, and sediment as required.

Culvert maintenance

Cross drainage culverts under ADOT highways undergo a formal inspection once every two years. They are also inspected after large flows.

BEST MANAGEMENT PRACTICE #3
MAINTENANCE

Control of Illicit Discharges

PHOENIX

Permit System

Storm sewers, which connect and drain into ADOT's drainage system are controlled by one of two means. If the connection is made during construction of the ADOT storm sewer, there is normally an Intergovernmental Agreement formed between ADOT and the city/agency, which is discharging to ADOT's facility. If the connection is made subsequent to construction, the discharger is required to obtain a permit. In any case, the discharger is always required to either enter into an intergovernmental agreement with ADOT or obtain a permit from ADOT.

Inspection

ADOT Phoenix Maintenance District, which operates and maintains ADOT highways in the Phoenix Metropolitan Area, has two full time employees, which inspect for unpermitted activities within the ADOT's right of way. Their efforts include the identification of all types of illegal encroachments including construction work, dumping, and illicit discharges.

Dry-weather Screening

Dry weather screening was conducted at 20% of the storm water discharge sites in the Phoenix metropolitan area. All of the sites were dry. Screening performed for the original permit application revealed that nearly all of the sites were dry.

Given the local climatic conditions, the local stream channels and storm water facilities only exhibit flow immediately following a precipitation event. Dry weather flow is a local phenomena that is linked to tailwater discharge from agricultural irrigation. All agricultural in the region is irrigated, much of it using flood irrigation techniques. Tailwater is commonly discharged to local storm drain facilities.

In those cases where dry weather discharges are found, the procedure is to report them to the local municipality. The local municipality is charged with identifying the source of the discharge, determining whether it is an illicit discharge, and following up with the entity which is the source of the discharge. ADOT has no land use authority beyond the roadway right-of-way. It has no enforcement authority. The local municipalities, with different enabling legislation, do have zoning and land use authority, along with enforcement authority.

Pump Station Gas Detection

ADOT storm sewer pump stations are constructed with gas detection systems which send an alarm signal to the Phoenix District office in the event that combustible substances are detected in the wet well. The alarm is monitored on a 24-hour basis. If the alarm is sounded, pump maintenance personnel can respond in 15 – 20 minutes to shut off the pump if necessary.

TUCSON

Permit System

The system of permitting storm sewer connections is the same as ADOT Phoenix District follows for the Phoenix Area.

Inspection

ADOT Tucson District, which operates and maintains ADOT highways in the Tucson Metropolitan Area, has three maintenance supervisors who work in the Tucson Area. Each supervisor has a crew of 12 to 13 people. During their normal inspection and maintenance routine they inspect for unpermitted uses within ADOT's right of way which includes the identification of all types of illegal encroachments including construction work, dumping, and illicit discharges.

Dry weather Screening

Dry weather screening was conducted at 20% of the storm water discharge sites in the Tucson metropolitan area. All of the sites were dry. Screening performed for the original permit application revealed that nearly all of the sites were dry.

Given the local climatic conditions, the local stream channels and storm water facilities only exhibit flow immediately following a precipitation event. Dry weather flow is a local phenomena that is linked to tailwater discharge from agricultural irrigation. All agricultural in the region is irrigated, much of it using flood irrigation techniques. Tailwater is commonly discharged to local storm drain facilities.

In those cases where dry weather discharges are found, the procedures specified for the Phoenix metropolitan area are also implemented in the Tucson metropolitan area.

Pump Station Gas Detection

ADOT does not have any pump stations in the Tucson Area.

BEST MANAGEMENT PRACTICE #4
MAINTENANCE

Emergency Response Program

PHOENIX

The State of Arizona has a plan in place to respond to accidental spills of hazardous materials. The plan is called the State of Arizona Hazardous Materials Response and Recovery Plan. It defines authority and responsibility for individual State agencies in response to accidental spills. It also establishes an emergency management framework for joint state agency operations. ADOT signed a memorandum of understanding along with other State agencies, committees, and commissions that indicated their concurrence with the plan. Since then, ADOT has been actively carrying out its responsibilities under the plan.

ADOT District One has created its own response team called ALERT (an acronym for ADOT Local Emergency Response Team) that responds to all types of emergencies on ADOT's roadways including spills of hazardous material. The ALERT members are on call 24 hours a day, 7 days a week. Their duty in the event of a hazardous material spill is to contain the spill, take care of traffic problems, and manage the cleanup of the spill.

ADOT District One has prepared an ALERT Manual which designates individual responsibilities and lists key emergency personnel within ADOT and within the local communities. The District One traffic operation control center is manned 24-hours per day, 7-days per week for emergency calls and equipment monitoring. Four employees of the District Alert Team and 7 employees from District Maintenance are on call 24 hours a day, 7 days a week to respond to emergencies. In addition, the Safety and Health Section of ADOT has a statewide emergency response specialist who also responds.

In the event of an accidental spill, the Arizona Department of Public Safety (Highway Patrol) contacts the ADOT on-call ALERT members directly. The Arizona Department of Public Safety, the Arizona Department of Environmental Quality and the Arizona Department of Transportation district maintenance crews all respond to the accidental spill. ADOT's responsibilities include:

1. Coordinate with local fire and police departments
2. Contain spill by blocking storm drains, building dikes, etc.
3. Take care of traffic problems
4. Manage the cleanup of the hazardous materials

In most cases, the individual or company that is guilty of the spill is held responsible for contracting with a waste management company to clean it up. However, in the event that the guilty party either can not be identified or does not have the necessary resources, ADOT has risk management funds in place to have the spill properly cleaned up.

TUCSON

The emergency response program described above also applies to the Tucson Area.

ADOT District Two has three separate maintenance groups that respond to all types of emergencies on ADOT's roadways that include spills of hazardous material. Each maintenance group has three people who are available to the Department of Public Safety (Highway Patrol) 24-hours a day, 7 days a week. As is the case in the Phoenix Area, their duty in the event of a hazardous material spill is to contain the spill, take care of the traffic problems, and manage the cleanup of the spill. In addition, the Safety and Health Section of ADOT has a statewide emergency response specialist who also responds.

BEST MANAGEMENT PRACTICE #5

Erosion Control Practices

MAINTENANCE

PHOENIX

Erosion Control Maintenance

ADOT Phoenix Maintenance District has an ongoing maintenance program to provide permanent erosion control in areas of erodible soils. These maintenance programs include soil stabilization, reseeding bare ground, turf renovation, landscape irrigation maintenance, granite erosion control, and landscaping.

Irrigation System Pressure Detection

Through the use of telemetry, ADOT's landscape irrigation system is continuously monitored for water pressure and flow. Any malfunction or leaks in the irrigation system is detected by the pressure sensors, which in turn is automatically sent to a computer terminal at the ADOT Phoenix Maintenance District office.

The main purpose of this system is for water conservation. The system provides immediate detection of broken sprinklers and water pipes and consequently repair crews can respond very quickly. A side benefit of this system is control of erosion. Since ADOT repair crews can respond almost immediately to water system failures, there is less chance of soil erosion as a result of broken water pipes.

TUCSON

Tucson

ADOT ~~Phoenix~~ Maintenance District has an ongoing maintenance program to provide permanent erosion control in areas of erodible soils. These maintenance programs include soil stabilization, reseeding bare ground, landscape irrigation maintenance, granite erosion control, and landscaping.

BEST MANAGEMENT PRACTICE #6 Roadside Vegetation Management Program
MAINTENANCE

PHOENIX

ADOT has a statewide roadside vegetation management program to control annual weeds that tend to choke out more desirable perennial grasses. The annual weeds provide little if any erosion control since they do not have extensive root systems and since they die out or blow away each year. On the other hand, grasses and other perennial species have extensive root systems that hold the soil in place.

The vegetation management activities include chemical spraying, mowing, blading, reseeding/planting, fertilizing, and brush removal. In the case of chemical spraying, ADOT commissioned a study to determine environmentally acceptable methods of applying herbicides. The following is an excerpt from the Arizona Department of Transportation Roadside Vegetation Management Program:

*Summary
Of the
Environmental Requirements and Mitigation Measures*

1. *Qualified specialist supervisory personnel will be available to each district. Program supervisory personnel will possess the appropriate Arizona Agricultural Pesticide Control Advisor License [Name of license changed in R3-3-206 of the Arizona Revised Statutes: Agricultural Pest Control Advisor License].*
2. *It is ADOT procedure that applicators will possess the appropriate Restricted Use Applicators License [Name of license changed in R3-3-207 of the Arizona Revised Statutes: Commercial Applicator Certification for Restricted Use Pesticides]. Chemical applicators will be trained in the safe storage, mixing, application, container disposal and recordation of chemicals used.*
3. *Well maintained spray equipment will be used in the application of chemicals.*
4. *Only E.P.A. labeled and registered chemicals will be used.*
5. *No E.P.A. listed prohibited or restricted chemicals will be used.*
6. *Review of research and testing will occur on a continual basis, adjustment to the proposed chemical list will reflect continuing public and environmental concerns.*
7. *Testing of the chemicals requiring further evaluation will follow established guidelines.*

8. *Substituting an above tested chemical into the scenario applications will occur only after concurrence of the Roadside Review Committee, and preparation of updated environmental assessment.*
9. *All recommended label directions for rates of application and species treated will be strictly followed.*
10. *Drift control agents will be used with all herbicides as appropriate.*
11. *Spraying will not be attempted in adverse weather conditions. Applications will stop when wind velocities negatively affect accurate application.*
12. *All chemical treatments will be recorded in a daily spray log, and records will be kept.*
13. *The phenoxy herbicides will not be used in proximity of susceptible agricultural crops during the crop season in strict compliance to the herbicide label.*
14. *Threatened or Endangered federally listed proposed or candidate plant species known locations will be designated restricted management areas.*
15. *Special consideration will be given to areas where an encroachment potential by livestock can be anticipated.*
16. *ADOT will obtain all necessary permits from agencies who retain ownership of the right of way.*

TUCSON

The roadside vegetation management program described above also applies to the Tucson Area.

MAINTENANCE

In addition to roadways, ADOT maintenance yards are facilities which are regulated as part of ADOT's NPDES permit. These yards include facilities for roadway and landscape equipment storage and maintenance, chemical storage, sign manufacturing, and bulk paint storage for roadway striping. The ADOT permit requires the preparation of a SWPPP for each maintenance yard in the Phoenix and Tucson metropolitan areas.

SWPPPs were prepared for seven maintenance yards in Phoenix and one maintenance yard in Tucson. SWPPPs deal with stormwater runoff which includes storm water entering the yard from offsite sources and storm water leaving the yard to downstream Waters of the U.S.. Due to the value of the equipment and associated maintenance tools, the yards are located such that there are no concentrated flow from Waters of the U. S. that impact any of the sites. Each yard including the surrounding area was located on a topographic map with the local drainage pattern and outfalls identified. A site visit was conducted to field verify the mapped drainage pattern and outfall locations. Runoff discharging to Waters of the U. S. was found to occur at only one maintenance yard.

SWPPPs also deal with the control and oversight of chemicals used in the yards for routine activities which could potentially pollute storm water runoff. The various chemicals at the yards were inventoried, along with an assessment of their storage method, relative to their volatility. Recommendations were included as to changes that should be made to upgrade stormwater management practices.

The individual SWPPPs are on-site for each yard and available for inspection and use by ADOT staff. These are dynamic documents which will change over time. As more refined information becomes available, the SWPPPs will be updated to reflect the best management practices for controlling storm water pollution. NPDES training for on-site personnel at the maintenance yards is scheduled for October 2000.

CONSTRUCTION

Development of standards and typical special provisions for BMP's

ADOT developed standard details and special provisions for Best Management Practices (BMP's) to be used on ADOT construction projects. These are outlined in the *ADOT Erosion and Pollution Control Manual for Highway Design and Construction* produced by ADOT Intermodal Transportation Division. These include several typical BMP's such as silt fences, mulching, and temporary dikes.

The design engineer, project manager, and the ADOT Roadside Development Section select structural BMPs from this standard manual for use in the Special Provisions for each project. Special Provisions also include standard contract language on the "good housekeeping" procedures such as proper solid waste management and chemical storage.

CONSTRUCTION

In each District office of ADOT, the resident engineers and their staff are trained in the area of storm water erosion control and "good housekeeping" procedures on construction sites. These individuals participate in the preparation of the storm water pollution prevention plans (SWPPP's) and oversee the implementation of the plans. Contractors hired by ADOT to perform work on construction sites are invited to attend the training sessions. The *Erosion and Pollution Control Manual for Highway Design and Construction* was developed by ADOT for the purposes of training personnel effective measures for minimizing erosion.

Training sessions are provided by ADOT personnel or certified individuals hired by ADOT. Two training sessions regarding stormwater pollution prevention were lead by Roland Tang from ADOT's Environmental Planning Group: March 22, 2000 and April 25, 2000. Additional training was provided for stormwater detention and retention on August 16, 2000 and September 14, 2000 (See Appendix D).

CONSTRUCTION

Plan Review at 60% Submittal Stage

The design engineers, project manager, and Roadside Development Section reviews the construction plans at the 60% submittal stage to determine if there are any erosion control measures which need to be incorporated into the plans. The design of the temporary and permanent sediment and erosion control measures is an integral part of the design process.

Plan Review at 95% Submittal Stage

The District Engineers' office of designers and erosion control specialists review the construction plans at the 95% submittal stage with the following objectives:

- a. **Review Permanent Erosion Controls**
The proposed permanent erosion control measures are reviewed and any necessary changes are incorporated.
- b. **Prepare Temporary Erosion Control Plan for Construction Activities**
The resident engineer and the Roadside Development Section designers and erosion control specialists mark up the roadway plan and profile sheets with the BMP's that they anticipate will be required to control erosion during the different stages of construction.

**BEST MANAGEMENT PRACTICE #11
CONSTRUCTION**

Procedures following Award of Contract

Procedures following Award of Contract

- a. Critique Erosion Control Plan
After the award of the construction contract, the resident engineer attends the partnering session or pre-construction meeting and go over the SWPPP with the contractor. At this meeting the proposed temporary control measures are adjusted and revised, if necessary, to accommodate field conditions and the contractor's scheduling and phasing of the project.
- b. Prepare Revised Plan
Any changes as a result of the discussion at the above meeting are incorporated into the SWPPP. The resident engineer keeps the original and a copy remains with the contractor on the job site.
- c. Certification of SWPPP
The ADOT resident engineer signs the SWPPP and the local municipality also signs in the case of a project with local government participation.
- d. Prepare Notice of Intent (NOI)
The ADOT resident engineer and the contractor each prepares separate NOI's and submits them to the EPA at least 48 hours before any construction begins. In accordance with the general permit, ADOT is required to submit an NOI because of its control over the job specifications and the contractor is also required to submit an NOI because he has day-to-day control over the job.

The NOI's are delivered by means of certified mail to ensure that it reaches the EPA. The NOI's submitted by ADOT are signed by the District Engineer or his representative. The NOI shall be mailed to: Storm Water Notice of Intent, P.O. Box 1215, Newington, VA 22122. Copies of the NOI are sent to: Storm Water Coordinator, ADEQ, P.O. Box 600, Phoenix, Arizona 85001-0600.

BEST MANAGEMENT PRACTICE #12
CONSTRUCTION

Installation of Erosion Control

Installation of Erosion Control

The resident engineer works closely with the contractor on the installation of the erosion control features. Revisions that occur as a result of changing field conditions or construction phasing and scheduling are noted on each copy of the SWPPP.

The SWPPP is intended to be a dynamic plan, which can be revised as a result of changing conditions in the field. If the plan is found to be deficient in meeting one or more of the minimum permit requirements of the EPA, ADOT is notified and has 7 calendar days after the notification to provide the EPA written certification that the requested changes have been made.

**BEST MANAGEMENT PRACTICE #13
CONSTRUCTION**

Inspections

Inspections

- a. The NPDES stormwater permit is a self inspection program. The EPA does not perform regular inspections.
- b. In arid and semi arid areas (less than 20" mean annual rainfall), the resident engineer is to inspect the project monthly or within 24 hours after a rainfall of 2" or greater.

**BEST MANAGEMENT PRACTICE #14
CONSTRUCTION**

Notice of Termination (NOT)

Notice of Termination (NOT)

ADOT and the contractor can each submit a NOT after all the bare ground has been seeded and mulched and the permanent erosion and sediment control measures are in place.

The ADOT NOT is signed by the District Engineer or his representative and mailed by means of certified mail to the EPA at the following address: Storm Water Notice of Termination, P.O. Box 1185, Newington, VA 22122. Copies of the NOT are sent to: Storm Water Coordinator, ADEQ, P.O. Box 600, Phoenix, Arizona 85001-0600.

In the case of an urban highway project, where the landscaping contract comes after the paving project, the following rules apply for submitting the NOT.

- a. If the bare ground is seeded and mulched as part of the paving project, ADOT and the contractor submit NOT's when the contract is complete. Then, at the start of the subsequent landscaping contract, both ADOT and the landscaping contractor submit NOI's to obtain a new permit to cover the landscaping activities.
- b. If seeding and mulching are not part of the paving project, ADOT can not submit a NOT until after the completion of the landscaping project. Therefore, ADOT is required to maintain temporary erosion controls in the area and perform regular inspections (in accordance with the EPA general permit) during the interim period after the paving project is complete and before the landscape contract begins.

It should be noted that in this case the paving contractor submits a NOT at the end of the paving contract and the landscape contractor submits a NOI before he begins work. In the interim, ADOT has sole responsibility.

BEST MANAGEMENT PRACTICE #15

Retention of Records

CONSTRUCTION

Retention of Records

All records are required to be kept for a minimum of 3 years after the submittal of the NOT.

CONSTRUCTIONOther EPA Permit Requirements

- a. Asphalt and Concrete Plants - Asphalt and concrete plants are not covered by the EPA general permit for construction sites. The EPA considers these facilities to be an industrial activity, which requires separate coverage under EPA's general permit for industrial activities. This is true in all cases, including the case where the plants are portable and located within ADOT's right-of-way. The contractor, or subcontractor is responsible for filing the necessary documents with the EPA. ADOT cannot file the documents because ADOT does not own and operate the plants.

- b. ADOT Materials Sources - As is the case with asphalt and concrete plants, materials sources are not covered by EPA's general permit for construction sites. The EPA considers these facilities to be an industrial activity, which requires separate coverage under EPA's general permit for industrial activities.

In the case of commercial materials sources or contractor owned sources, the owner and/or operator is required to obtain permit coverage. In the case of ADOT owned materials sources, ADOT obtains a permit and requires each contractor that works the source area to obtain a permit (much like permits for construction sites. The contractor is required to leave the source area in a reclaimed state by finish grading the site and seeding the bare ground in a manner acceptable to ADOT.

ADOT Standard Specifications

Section 107.15 (Prevention of Landscape Defacements; Protection of Streams, Lakes and Reservoirs) of ADOT's Standard Specifications for Road and Bridge Construction have been rewritten to include the EPA's NPDES permit requirements. Among other things, the specification requires the contractor to carry out his responsibilities as described above in ADOT's plan for compliance with the NPDES permit requirements. These responsibilities include implementation of good housekeeping features; installation of erosion control measures; participation in preparing the storm water pollution prevention plan (SWPPP); submittal of the Notice of Intent; posting the SWPPP at the construction site; participation in the inspection of the SWPPP measures; and maintenance of the erosion control measures. Also, contractors working at multiple construction projects are required to obtain an industrial permit for portable asphalt and concrete batch plants (those working at a single project are included as part of the construction permit). In addition, ADOT evaluates projects which cover areas less than five acres to determine whether erosion controls are needed.

Refer to Appendix B for a copy of Section 107.15 of ADOT's Standard Specifications.

DESIGN

The design of ADOT highways includes landscaping to provide permanent erosion control on finish graded construction slopes. The type of the landscape design depends on the character of the adjacent land. For example, in urban areas all bare ground is covered with decomposed granite and trees and shrubs are planted to provide an aesthetically pleasing appearance and help to further stabilize the ground. Landscape irrigation systems are designed into these projects to foster plant growth and insure plant life in the arid environment. In the rural areas, the construction slopes are seeded with native seed mixes and treated with straw mulches. In both cases, urban and rural highways, bare ground is stabilized to provide permanent erosion control.

DESIGN

Currently, ADOT's storm sewer system includes several retention and detention basins. The detention basins were designed to control storm water quantity rather than quality and; therefore, they were typically designed as offline type basins which store the peak of the flood and provide little in terms of reducing stormwater pollutants. There are; however, several retention basins, which drain by infiltration and thereby, reduce the amount of pollutants discharged to the receiving waters.

ADOT recognizes that detention basins that are designed for the dual purpose of managing stormwater quantity and quality can be quite effective in reducing pollutant loads. Therefore, where appropriate, future detention basins will be designed to provide stormwater retention and increase detention times to help remove pollutants.

ADOT was also required to consider the use of other structural controls as part of the NPDES permit. These included grassy swales or filter strips, media filtration, and oil/water separators. The design engineers of ADOT's Roadway Group were notified of this permit requirement and were instructed to include and implement this requirement by incorporating it into the Roadway Design Manual, as a supplement to the Design Manual, or other guidelines. These other techniques can be used and are considered in the design of structural controls. Selection of the structural control includes a cost-benefit analysis in which the least cost-most effective alternative is incorporated into the design.

BEST MANAGEMENT PRACTICE #19

Erosion Control

DESIGN

The design of ADOT's highways include many permanent erosion control features to protect areas subject to erosion. Examples of the features include channel linings, culvert outlet protection, slope drains, check dams, etc. These erosion control features are reviewed by ADOT on an on-going basis to determine their effectiveness and to consider new alternatives.

BEST MANAGEMENT PRACTICE #20
TRANSPORTATION CONTROL MEASURES

Vehicle Emissions Testing

Vehicle Emissions Testing

The Arizona Department of Environmental Quality requires annual emissions testing of all vehicles registered in Maricopa (Phoenix Area) and Pima (Tucson Area) Counties. Vehicles that do not meet minimum requirements are not registered until appropriate repairs have been made and the vehicles are re-tested to insure compliance with emission standards.

TRANSPORTATION CONTROL MEASURES

ADOT is incorporating HOV lanes into the design and construction of the urban highway system. These lanes are restricted to use by buses and carpools. ADOT also funds advertising campaigns to promote the use of the HOV lanes. The intent of providing these lanes is to encourage mass transit and thereby reduce traffic volume.

TRANSPORTATION CONTROL MEASURES

IVHS is an electronic system of metering highway on-ramp traffic, coordinating traffic signals, controlling electronic billboards and monitoring traffic volumes. The system is monitored 24 hours per day at the traffic operation control center. This system helps to minimize stop-and-go traffic, which reduces pollutant generation and deposition. Idling vehicles in traffic generate more pollutants because of incomplete fuel combustion.

BEST MANAGEMENT PRACTICE #23
TRANSPORTATION CONTROL MEASURES

Clean Air Campaign

ADOT is an official sponsor of the Clean Air Campaign. This is the “don’t drive one in five” campaign which encourages commuters to use an alternative means of transportation one day out of the week. (See Appendix D)

BEST MANAGEMENT PRACTICE #24

Capitol Ride Share Program

TRANSPORTATION CONTROL MEASURES

ADOT provides promotional materials to encourage State employees to reduce travel. This includes telecommuting, flexible work schedules, assisting in carpooling, and providing mass transit information. (See Appendix D)

Section 3

Stormwater Monitoring Plan

SECTION 3

STORM WATER MONITORING PLAN

As part of its NPDES permit, ADOT is required by the EPA to sample stormwater runoff from its roadways in the Phoenix and Tucson metropolitan areas. ADOT must collect and test stormwater runoff for specific chemical constituents which are considered to be associated with pollutant sources from roadways.

One test site was required for each of the Phoenix and Tucson metropolitan areas. Site locations were determined using following four criteria:

1. Daily Traffic Volume
2. Drainage Basin
3. Access to Monitoring Equipment
4. Security of Monitoring Equipment

Vehicles traveling on the roadways are the most significant pollutant source for storm water generated on ADOT highways. A wide variation in daily traffic counts exists on ADOT's roadways in the Phoenix (47,000 to 264,000) and Tucson (24,400 to 134,300) metropolitan areas. The monitoring of storm water at locations with a range of traffic volume provides a comparison of the concentration of various constituents to the number of vehicles traveling on the highways. In many areas, storm water collected from ADOT highways is co-mingled with drainage from adjacent areas, primarily local municipalities. The water collected within the basins for the two monitoring locations is limited to highway drainage. Monitoring results from these two monitoring stations will allow for a more accurate characterization of storm water discharged from ADOT highways. Other factors in site selection were ease of access and security.

The sampling site in Phoenix is located on the Loop 202 Freeway, between 32nd Street and 40th Street. This section of roadway has one of the highest traffic count of any ADOT road in the state which is 190,000 vehicles per day. The sampling site in Tucson is located along I-10, adjacent to ADOT's Grant Road maintenance yard. This section of roadway has a traffic count of 115,900 vehicles per day.

For ADOT to generate a staff to perform the storm water monitoring would be a singular expense. A more cost-effective approach would be to coordinate efforts with an agency in Phoenix (the Flood Control District of Maricopa County) and Tucson (the City of Tucson) which already conducts storm water sampling for NPDES and other purposes. ADOT has had discussions with both of these agencies which agree, in principle, to sign Intergovernmental Agreements with ADOT to provide instrumentation and sampling expertise at cost. ADOT will reimburse the agencies for their efforts.

The Storm Water Monitoring Plan is included in Appendix C.

Section 4

Dry Weather Sampling for Control of Illicit Connections and Illegal Dumping

4.1 Dry Weather Sampling for Control of Illicit Connections and Illegal Dumping

ADOT is required to perform dry weather sampling under its NPDES permit as a means to identify illicit connections and illegal dumping activity. A minimum of 20% of the outfalls must be screened during a single year. In the original application submittal date November 1991, the total number of major outfalls identified for the Phoenix and Tucson metropolitan areas was 35 and 14, respectively. Since 1991, additional major outfalls have been added to ADOT's storm water system. ADOT is currently taking steps to integrate the existing storm water system, including major outfalls, into a geographic information system (GIS). Once the existing system has been incorporated into the GIS, procedures will be developed and implemented to continuously update the dataset to include future storm water infrastructure along ADOT roadways.

To fulfill the requirements for 1999-2000, the original list of major outfalls was used to select sites for dry weather screening activities. Visual inspections were performed for 7 outfalls in Phoenix and 3 outfalls in Tucson metropolitan areas. The sites were selected from the list based on relative proximity to each other. The purpose of the dry weather screening is to identify illicit connections and/or illegal dumping within ADOT's storm water system. The discharge points were observed during dry weather following a period of 28 days and 15 days without rain in the Phoenix and Tucson metropolitan areas, respectively. Dry weather field screen forms were developed for record keeping purposes. Results of the dry weather sampling for September 2000 is provided in Appendix C.

4.2 Dry Weather Sampling for Control of Illicit Connections and Illegal Dumping

ADOT's emergency response team is one of three state agencies (DPS, ADEQ) which responds to spills on ADOT roadways involving both known and unknown pollutant generators. Once a call is received by ADOT, staff is sent to the scene of the spill for traffic control and light clean-up activity. In the case of a large spill, the fire department is called for immediate containment of the substance. Following the containment and initial assessment, an emergency response contractor is contacted for final containment and clean-up.

If the source of the spill is known, ADOT pursues recovery of clean-up costs through ADOT's Risk Management and the Arizona Attorney General's Office. If the source of the spill is unknown, funds are allocated through ADOT's Risk Management Department and the Arizona Department of Administration for payment of necessary clean-up of accidental spills and illegal dumping activity.

MAJOR STORM SEWER OUTFALLS (Phoenix Metropolitan Area)

Outfall Identifier	Storm Sewer Data			Location Data					Construction Plan Data			
	Route No.- Mile Post	Type	Size/ Depth	Material	Route No. - Route Name	Receiving Water	Location	State Plane Coordinates North East		City	Project I.D. No.	Project Station
10-130.3 (Papago Channel)	Trapezoidal Open Channel	TW=80' D=10'	Concrete	I-10 Papago Freeway	Agua Fria River	1/2 Mile W. of E1 Mirage Rd. & 100' N. of I-10.	894900	374000	Avondale	I-10-2(75)	6869+10	L
10-145.17 (West Tunnel)	Circular Tunnel	DIA=21'	Concrete	I-10 Papago Freeway	Salt River	Central Ave.-W. side @ N. bank of Salt River.	882000	452300	Phoenix	I-10-3(223)	7667+00	R
10-149.18 (East Tunnel)	Circular Tunnel	DIA=21'	Concrete	I-10 Papago Freeway	Salt River	20th St.-E. side @ N. bank of Salt River.	880500	462700	Phoenix	I-10-3(225)	7866+00	R
10-150.44	Circular Pipe	DIA=36"	Concrete	I-10 Maricopa Freeway	Salt River	N. Bank of Salt River @ W. side of I-10.	880300	468500	Phoenix	I-10-3(206)	7936+00	R
10-150.45	Dual Circular Pipes	DIA=72"	Concrete	I-10 Maricopa Freeway	Salt River	N. Bank of Salt River @ E. side of I-10.	880500	469100	Phoenix	I-10-3(206)	7936+00	L
10-151.06	Circular Pipe	DIA=66"	Concrete	I-10 Maricopa Freeway	Tempe - 48th St. Drain	N. Quadrant of I-10 & University Traffic Interchange.	878100	471100	Phoenix	I-10-3(206)	7945+00	L
17-198.48	Circular Pipe	DIA=102"	Concrete	I-17 Black Canyon Freeway	Salt River	2200' S. of Buckeye Rd. & 1700' E. of 27th Ave.	878950	440900	Phoenix	I-17-1(9)	69+60	L 6000
51-5.45	Circular Pipe	DIA=36"	Concrete	S.R. 51 Squaw Peak Parkway	ACDC	300' N. & W. of Intersection of 18th St. & Ocotillo.	922300	461900	Phoenix	C.O.P. BR-885442	270+55	L
51-7.04	Circular Pipe	DIA=48"	Concrete	S.R. 51 Squaw Peak Parkway	Dreamy Draw Wash	400' S. & E. of Intersection of Northern Ave. & Squaw Peak Highway.	930600	463500	Phoenix	M-600-Z-502	84+50	L
101-7.76	Trapezoidal Open Channel	TW=82' D=8'	Concrete	Loop 101 Agua Fria Freeway	New River	1/4 Mile S. of Northern Ave. & 1000' W. of 99th Ave.	927000	390800	Glendale	M-600-0-501	440+83	L 1650

DIA = Diameter

TW = Top Width

D = Depth

L = Left

R = Right

MAJOR STORM SEWER OUTFALLS (Phoenix Metropolitan Area)

Outfall Identifier	Storm Sewer Data			Location Data					Construction Plan Data				
	Route No.- Mile Post	Type	Size/ Depth	Material	Route No. - Route Name	Receiving Water	Location	State Plane Coordinates		City	Project I.D. No.	Project Station	Offset L/R
								North	East				
101-10.84	Trapezoidal Open Channel	TW=65' D=12'	Concrete & Soil Cement	Loop 101 Agua Fria Freeway	New River	1/2 Mile N. of Peoria Ave. along E. Bank of New River.	942500	394700	Peoria	M-600-0-502	603+68	L 920	
101-11.85	Trapezoidal Open Channel	TW=45' D=8'	Concrete	Loop 101 Agua Fria Freeway	New River	1/2 Mile S. of Thunderbird Rd. & 300' W.	947000	396500	Peoria	M-600-0-502	658+30	L 715	
101-13.44	Dual Circular Pipes	DIA=42"	Concrete	Loop 101 Agua Fria Freeway	Skunk Creek	200' S. of S.B. Bridge over Skunk Creek & 250' W.	953100	401600	Peoria	M-600-0-502	742+10	L 260	
101-13.68	Trapezoidal Open Channel	TW=22' D=4'	Concrete	Loop 101 Agua Fria Freeway	Skunk Creek	30' N. of N.B. Bridge over Skunk Creek & 80' E.	953900	402000	Peoria	M-600-0-502	750+84	R 135	
101-14.38	Open Channel	TW=28' D=10'	Concrete	Loop 101 Agua Fria Freeway	New River	1200' S. of Bell Rd. Traffic Interchange & 300' W.	958700	401800	Peoria	M-600-0-502	800+00	L 300	
101-15.18	Circular Pipe	DIA=48"	Concrete	Loop 101 Agua Fria Freeway	New River	4/10 Mile N. of Bell Rd. & 500' W.	962000	402600	Glendale	M-600-0-502	834+00	L 560	
101-16.31	Circular Pipe	DIA=48"	Concrete	Loop 101 Agua Fria Freeway	New River	4/10 Mile S. of Beardsley Rd. & 300' W.	967900	403900	Glendale	M-600-0-503	895+00	L 340	
101-16.62	Circular Pipe	DIA=48"	Concrete	Loop 101 Agua Fria Freeway	New River	2/10 Mile S. of Beardsley Rd. & 500' W.	969600	404700	Glendale	M-600-0-503	908+25	L 560	
101-16.74	Trapezoidal Open Channel	TW=56' D=11'	Concrete	Loop 101 Agua Fria Freeway	New River	150' S. of Beardsley Rd. & 2800' W. of 75th Ave.	970200	405000	Glendale	M-600-0-503	917+50	L 550	
101-20.19	Circular Pipe	DIA=36"	Concrete	Loop 101 Agua Fria Freeway	Skunk Creek	1/2 Mile S. of Beardsley Rd. at 51st Ave.	968500	423400	Phoenix	RBA-600-0-505	1098+50		
101-21.236	Circular Pipe	DIA=42"	Concrete	Loop 101 Agua Fria Freeway	Skunk Creek	245' E. of 43rd Ave. & N. side of Beardsley Rd.	971200	429900	Phoenix	RBA-600-0-505	1154+50		

DIA = Diameter

TW = Top Width

D = Depth

L = Left

R = Right

MAJOR STORM SEWER OUTFALLS (Phoenix Metropolitan Area)

MAJOR STORM SEWER OUTFALLS (Phoenix Metropolitan Area)												
Outfall Identifier	Storm Sewer Data			Location Data						Construction Plan Data		
Route No.- Mile Post	Type	Size/ Depth	Material	Route No. - Route Name	Receiving Water	Location	State Plane Coordinates		City	Project I.D. No.	Project Station	Offset L/R
							North	East				
101-21.239	Trapezoidal Open Channel	TW=20' D=2'	Earthen	Loop 101 Agua Fria Freeway (Frontage Road)	Skunk Creek	260' E. of 43rd Ave. & N. side of N. Frontage Rd.	971200	429900	Phoenix	RBA-600-0- 505	1154+65	
101-21.83	Circular Pipe	DIA=96"	Concrete	Loop 101 Agua Fria Freeway (Frontage Road)	Scatter Wash	2000' W. of 35th Ave. & S. side of S. Frontage Rd.	970900	431900	Phoenix	RBA-600-0- 505	1186+00	
101-21.869	Circular Pipe	DIA=36"	Concrete	Loop 101 Agua Fria Freeway (Frontage Road)	Scatter Wash	1600' W. of 35th Ave. & N. side of N. Frontage Rd.	971300	432200	Phoenix	RBA-600-0- 505	1187+00	
101-21.873	Trapezoidal Open Channel	TW=32' D=8'	Concrete	Loop 101 Agua Fria Freeway (Frontage Road)	Scatter Wash	1500' W. of 35th Ave. & N. side of N. Frontage Rd.	971300	432200	Phoenix	RBA-600-0- 505	1188+00	
101-51.58 (Price Rd. Tunnel)	Circular Tunnel	DIA=18'	Concrete	Loop 101 Pima Freeway	Salt River	1 Mile N. of Univer- sity Ave. & 200' E.	885400	508500	Tempe	M-600-1-507	2871+00	L 200
143-2.90	Circular Pipe	DIA=66"	Concrete	S.R. 143 Hohokam Expressway	Old Cross Cut Canal	600' N. of Van Buren St. & 350' E. of S.R. 143 at Relocated Old Cross Cut Canal.	892400	480100	Phoenix	143-MA-H- 0843-01D	166+71	R 350
143-3.33	Trapezoidal Open Channel	TW=9' D=1'	Concrete	S.R. 143 Hohokam Expressway	Old Cross Cut Canal	350' N. of Loop 202 at W. bank of Relocated Old Cross Cut Canal.	894400	480000	Phoenix	143-MA-H- 0843-01D	189-45	R 270
202-3.57	Dual Box Culverts	TW=6' D=4'	Concrete	Loop 202 East Papago Freeway	Old Cross Cut Canal	N.E. Quadrant of S.R. 143 & Loop 202 Traffic Interchange @ bank of Relocated Old Cross Cut Canal.	894100	480100	Phoenix	202L-MA-H- 0858-01D	34+60	L 163
202-5.14	Trapezoidal Open Channel	TW=60' D=5'	Concrete	Loop 202 East Papago Freeway	Salt River	1800' S. of Washing- ton St. & 2500' W. of 56th St.	887900	484200	Phoenix	202L-MA-H- 0858-01D	112+00	R 290

Dry Weather Screening
Done 9/26/00
See Appendix C

DIA = Diameter

TW = Top Width

D = Depth

L = Left

R = Right

MAJOR STORM SEWER OUTFALLS (Phoenix Metropolitan Area)

MAJOR STORM SEWER OUTFALLS (Phoenix Metropolitan Area)												
Outfall Identifier	Storm Sewer Data			Location Data						Construction Plan Data		
Route No. - Mile Post	Type	Size/ Depth	Material	Route No. - Route Name	Receiving Water	Location	State Plane Coordinates		City	Project I.D. No.	Project Station	Offset L/R
							North	East				
202-5.90	Circular Pipe	DIA=36"	Concrete	Loop 202 East Papago Freeway	Salt River	1000' E. of Priest Dr. and 2200' N. of 1st St.	885900	487700	Tempe	202L-MA-H- 0858-010	148+80	R 280
202-7.44	Circular Pipe	DIA=48"	Concrete	Loop 202 East Papago Freeway	Salt River	1100' W. of Rural Rd. @ N. Bank of Salt River.	885100	496200	Tempe	202L-MA-H- 0858-010	230+10	R 850
202-7.98	Dual Box Culverts	TW=8' D=8'	Concrete	Loop 202 East Papago Freeway	Salt River	1100' E. of Rural Rd. @ N. Bank of Salt River.	885300	498300	Tempe	202L-MA-H- 0858-010	258+60	R 865
360-15.42	Trapezoidal Open Channel	TW=12' D=8'	Concrete	S.R. 360 Superstition Freeway	East Maricopa Floodway	1/2 Mile E. of Highley Rd. & S.R. 360 Traffic Interchange on N. side of S.R. 360.	868300	565800	Mesa	BP-028-1-509	815+80	L 65
360-17.63	Trapezoidal Open Channel		Concrete	S.R. 360 Superstition Freeway	Sossaman Channel	1/4 Mile E. of Soss- aman Rd. & S.R. 360 Traffic Interchange.	868100	569600	Mesa	F-028-1-514	939+80	L 130

Dry Weather Screening
Done 9/26/00
See Appendix C

Dry Weather Screening
Done 9/26/00
See Appendix C

Dry Weather Screening
Done 9/26/00
See Appendix C

DIA = Diameter

TW = Top Width

D = Depth

L = Left

R = Right

MAJOR STORM SEWER OUTFALLS (Tucson Metropolitan Area)

MAJOR STORM SEWER OUTFALLS (Tucson Metropolitan Area)												
Outfall Identifier	Storm Sewer Data			Location Data					Construction Plan Data			
Route No.- Mile Post	Type	Size/ Depth	Material	Route No. - Route Name	Receiving Water	Location	State Plane Coordinates		City	Project I.D. No.	Project Station	Offset L/R
							North	East				
10-260.7	Circular Pipe	DIA=72"	Concrete	I-10	Julian Wash	N. Side of Julian Wash at 10th Ave. S. of I-10.	433500	791750	Tucson	IR-10-5(54)	10th Ave 1+00	
10-261.5	Circular Pipe	DIA=78"	Concrete	I-10	Julian Wash	1400' W. of South Park Ave. & 1300' N. of Ajo Way - E. of SPRR.	430800	795750	Tucson	IR-10-5(54)	Line C 0+00	
10-264.6	Oval Pipe	56"x42"	Corrugated Metal	I-10	Julian Wash	1200' S. of I-10 & Palo Verde Rd. Traffic Interchange - W. side of Palo Verde & N. bank of Julian Wash.	422500	809500	Tucson	I-10-5(58)- 28		
19-59.0	Circular Pipe	DIA=36"	Corrugated Metal	I-19 Nogales Freeway	Santa Cruz River	1200' S. of I-19 & Valencia Rd. Traffic Interchange S. of Valencia Rd. & E. bank of Santa Cruz River.	413400	787900	Tucson	I-19-1(15)	3105+01	L
19-61.7	Trapezoidal Open Channel	TW=10' D=2'	Concrete	I-19 Nogales Freeway	Rodeo Wash	900' S. of I-19 & Ajo Way Traffic Interchange - E. side of I-19 & S. bank of Rodeo Wash.	428700	788700	Tucson	I-19-1(15)	3270+80	R
86-171.1	Circular Pipe	DIA=36"	Corrugated Metal	S.R. 86 Ajo Highway	Santa Cruz River	1600' S. of I-19 & Ajo Way Traffic Interchange @ W. bank of Santa Cruz River S. of Ajo Way.	429500	786600	Tucson	S-222-14	1447+78	R
89-68.2	Circular Pipe	DIA=42"	Concrete	U.S. 89 Tucson - Florence Highway	Bronx Wash	W. of Oracle Rd. between Adams St. & Lee St.	452700	790250	Tucson	F-031-1-515	6+55	L

Dry Weather Screening
Done 9/25/00
See Appendix C

Dry Weather Screening
Done 9/25/00
See Appendix C

Dry Weather Screening
Done 9/25/00
See Appendix C

CSH 77

DIA = Diameter

TW = Top Width

D = Depth

L = Left

R = Right

MAJOR STORM SEWER OUTFALLS (Tucson Metropolitan Area)

Outfall Identifier	Storm Sewer Data			Location Data					Construction Plan Data				
	Route No. - Mile Post	Type	Size/Depth	Material	Route No. - Route Name	Receiving Water	Location	State Plane Coordinates		City	Project I.D. No.	Project Station	Offset L/R
								North	East				
89-71.8	Circular Pipe	DIA=72"	Corrugated Metal	U.S. 89 Tucson - Florence Highway	Rillito River	S. bank of Rillito River E. of Oracle Rd.	471800	790250	Tucson	F-031-1(7)	197+89	R	
89-78.7	Open Channel	TW=15' D=4'	Concrete	U.S. 89 Tucson - Florence Highway	Tributary of Canada Del Oro	S.E. Quadrant of U.S. 89 & Greenock Dr.	507400	794400	Oro Valley	F-031-1(11)	564+00	R	
89-78.9	Circular Pipe	DIA=42"	Concrete	U.S. 89 Tucson - Florence Highway	Tributary of Canada Del Oro	N.E. Quadrant of U.S. 89 & Greenock Dr.	507900	794700	Oro Valley	F-031-1(11)	569+00	R	
89-79.9	Open Channel	TW=25' D=8'	Concrete	U.S. 89 Tucson - Florence Highway	Tributary of Canada Del Oro	S.E. Quadrant of U.S. 89 & Hanley Rd.	511800	798200	Oro Valley	BP-031-1-513	620+55	R	
89-80.8	Open Channel	TW=30' D=10'	Concrete	U.S. 89 Tucson - Florence Highway	Canada Del Oro	N.W. Quadrant of U.S. 89 and Canada Del Oro.	515300	802200	Oro Valley	BP-031-1-513	675+74	L	
210-1.2	Circular Pipe	DIA=96"	Concrete	S.R. 210 Aviation Parkway	Arroyo Chico	S.E. of intersection of 10th St. & 3rd Ave.	445500	795000	Tucson	AZP-824-9-510	Line A 185+16	L 234	
210-2.7	Circular Pipe	DIA=108"	Concrete	S.R. 210 Aviation Parkway	Railroad Wash	N.W. quadrant @ intersection of Campbell Ave. & Aviation Pkw.	441000	800750	Tucson	M-824-9-514	18+07	L	

DIA = Diameter

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D = Depth

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R = Right

Section 5

Assessment of Effectiveness of Best Management Practices

5.1 Number and Nature of Enforcement Actions; Inspections; and Public Education Programs

Enforcement Actions

ADOT has a hazardous materials response unit trained and equipped to deal with any type of materials. It is standard operating procedure for ADOT staff who come upon any substance or unidentified items on the roadway to call the HazMat unit. Likewise, if there are any spills at the maintenance yards, staff is to call the HazMat unit and NOT to attempt to clean up the spill.



Handwritten blue text: "Phone # ?" with an arrow pointing left

Having a unit with staff and equipment specifically trained to deal with hazardous materials guarantees that a minimum level of expertise will be focused on the hazardous material spill. This results in a higher level of effectiveness in cleaning up the spill in a timely manner with minimal impact to the environment, other people, and the staff themselves.

ADOT's emergency response team is one of three state agencies (DPS, ADEQ) which responds to spills on ADOT roadways involving both known and unknown pollutant generators. Once a call is received by ADOT, staff is sent to the scene of the spill for traffic control and light clean-up activity. In the case of a large spill, the fire department is called for immediate containment of the substance. Following the containment and initial assessment, an emergency response contractor is contacted for final containment and clean-up.

If the source of the spill is known, ADOT pursues recovery of clean-up costs through ADOT's Risk Management and the Arizona Attorney General's Office. If the source of the spill is unknown, funds are allocated through ADOT's Risk Management Department and the Arizona Department of Administration for payment of necessary clean-up of accidental spills and illegal dumping activity.

Records of abandoned substances, chemical spills at maintenance yards and accidental spills and illegal dumping along ADOT roadways will be reviewed for number of instances, clean-up procedures, and costs. This will be reported in subsequent annual reports.

Inspections

Road maintenance personnel perform scheduled inspections of ADOT's stormwater system. These activities include the following:

- Storm Sewer System Maintenance (Page 2-5)
- Control of Illicit Discharges (Page 2-7)
- Erosion Control Practices (Page 2-10)
- Roadside Vegetation Management Program (Page 2-11)

SWPPPs were established for the eight ADOT yards in the Phoenix and Tucson metropolitan areas as part of this year's effort to be in compliance with the stormwater discharge permit. The SWPPPs establish an overall data framework and guidance document for the maintenance yards to deal with chemical storage and procedures for the use of those chemicals. In practical terms, many of the issues that a SWPPP deals with have been addressed from the perspective of the manufacturer of the chemicals used by ADOT.

In the course of inventorying each maintenance yard and ascertaining the drainage patterns, several problem areas were identified to ADOT staff. The staff immediately resolved some of these items during the course of the site visit. The items identified in the SWPPP requiring capital expenditures will take longer to resolve. For example, there is an older building, with a leaky roof, which is used to store chemicals used for landscaping. Currently, the chemicals are placed on spill proof pallets, so there is no immediate contamination problem. ADOT will need to identify the monies to either repair the existing building or identify a new facility to store the chemicals.

With the continued review of material inventory, chemical handling, and on-site drainage, the SWPPPs will undergo changes over time to minimize the potential for storm water pollution.

Public Education Programs

ADOT is an official sponsor of the Clean Air Campaign. This is the "don't drive one in five" campaign which encourages commuters to use an alternative means of transportation one day out of the week. (See Appendix D)

ADOT provides promotional materials to encourage State employees to reduce travel. This includes telecommuting, flexible work schedules, assisting in carpooling, and providing mass transit information. (See Appendix D)

5.2 Summary of Monitoring Data

Monitoring Stations

Monitoring Stations will be established in Phoenix and Tucson. ADOT will contract with the Flood Control District of Maricopa County (FCDMC) and the City of Tucson (COT) to operate and maintain the stations, along with performing the testing procedures. The two agencies successfully operate many sampling stations of their own. It is a reasonable assumption that having the FCDMC and the COT operate the monitoring stations will generate results that are accurate and procedurally defensible.

The monitoring stations were located using several criteria. The contributing watershed had to be limited to ADOT roadways, the sites had to be accessible to staff during runoff events, the test sites should have a hard surface (e.g., channel, pipe, or basin), and the sites should be reasonably secure against vandalism.

Dry Weather Screening

Dry weather screening was conducted at 20% of the storm water discharge sites in the Phoenix and Tucson metropolitan areas. All of the sites were dry. Screening performed for the original permit application revealed that nearly all of the sites were dry.

Given the local climatic conditions, the local stream channels and storm water facilities only exhibit flow immediately following a precipitation event. Dry weather flow is a local phenomena that is linked to tailwater discharge from agricultural irrigation. All agricultural in the region is irrigated, much of it using flood irrigation techniques. Tailwater is commonly discharged to local storm drain facilities.

In those cases where dry weather discharges are found, the procedure is to report them to the local municipality. The local municipality is charged with identifying the source of the discharge, determining whether it is an illicit discharge, and following up with the entity which is the source of the discharge. ADOT has no land use authority beyond the roadway right-of-way. It has no enforcement authority. The local municipalities, with different enabling legislation, do have zoning and land use authority, along with enforcement authority.

5.3 Assessment of Water Quality Improvement or Degradation

Future assessment of the effectiveness of best management practices implemented by ADOT will be performed using data collected from the emergency response records, inspection records, SWPPPs, monitoring stations, and dry weather screening.

Section 6

Data Limitations and Proposed Changes to the SWMP

SECTION 6

**DATA LIMITATIONS AND PROPOSED CHANGES TO THE
STORMWATER MANAGEMENT PLAN**

ADOT's NPDES permit requires the removal of accumulated debris in catch basins on a regular basis and in no case shall 50% of the capacity of the basins be reached. As a practical matter, this requirement does not correspond with ADOT's design of catch basins. These basins are self-cleaning due to the absence of a settling basin. Debris would accumulate in the catch basins only when obstructed. The scheduled inspection of the catch basins serves to prevent the obstruction of the catch basins and thus the accumulation of debris.

Since this is the first year of ADOT's implementation of the stormwater management plan, sufficient data is not available to propose other changes to the stormwater management plan.

Section 7

Annual Expenditures

FISCAL RESOURCES

The Arizona Department of Transportation does not have a specific fund dedicated only for its storm water programs. There are, however, several sources available for adequate funding of this program which include: the Arizona Department of Transportation Five-Year Construction Program, The Highway Maintenance Program, and The Administrative Budget.

Five Year Construction Program

ADOT's Five-Year Construction Program is a source that will be used when a storm water issue or concern is related to a construction project that is in the existing program. The current budget for the Five-year Program is \$855,192,000.00. The Program is reviewed on an annual basis, and at that time, new projects and modifications to existing projects are made. There are several sources of funds that are identified to fund the program which include federal, state, local, and private sources. The approval process required for incorporation of the storm water issues into the program is the identification of the project and funding requirements and submittal to the Priority Planning Committee, and then in turn, to the Transportation Board for final approval. The Program is adopted July 1st of each year.

Highway Maintenance Program

Storm water issues related to maintenance will be covered under our Highway maintenance Program which is state funds. The issues and costs are identified and submitted for approval to the legislature in August of each year. Funds for new issues are received on July 1st of the following year. Currently, there is a total of approximately \$83,934,800.00 in this program.

Administrative Budget

An additional source is our Administrative Budget, which again, is state funded and appropriated by the Arizona Legislature. The process is identical to the Maintenance Program. ADOT receives a total of approximately \$40,441,300.00 in state funds.

Table 7-1 provides the expenditures and proposed budget for new activities implemented as a result of NPDES permit requirements.

TABLE 7-1

**STORM WATER MANAGEMENT PROGRAM
COMPREHENSIVE ANNUAL BUDGET**

PROGRAM/ACTIVITY	FY 1999/2000 (Actual)	FY 2000/2001 (Budgeted)
Prepare and Implement SWPPPs for ADOT yards (update as needed)	\$90,000.00	\$15,000.00
Prepare Storm Water Monitoring Plan	\$45,000.00	\$12,000.00
Water Quality Monitoring Equipment Installation and Sampling	\$0.00	\$180,000.00
Convert Storm Water Outfall Map to ADOT's GIS system – one time effort	\$0.00	\$181,000.00
Update Outfall Map with new data from 1992 to present	\$0.00	\$137,000.00
Annual Update of Outfall Map from As-Built Plans for New Freeways	\$0.00	\$46,000.00
Dry Weather Sampling – 20% of Outfalls	\$5,000.00	\$6,000.00
Train Field Staff & Contractors in NPDES Construction Permits	\$7,500.00	\$19,000.00
Write IGA's with City of Tucson and FCDMC, with ADOT Legal Staff (Sampling Stations)	\$0.00	\$40,000.00
Preparation of Annual Report	\$53,000.00	\$13,000.00
ANNUAL TOTALS	\$205,000.00	\$649,000.00

Appendix A

Street Sweeping and Litter Pick-up Schedules

ROUTE SECTIONS URBAN CURB SWEEPING CONTRACT # T00-11-00024

MONDAY NIGHT

SECTIONS	C/M	ROUTE	DESCRIPTION
3-H UNIT 556	9.84	L-202	SR-143/ L-202 JCT. TO PRIEST DR. M/L R/L'S
3-J UNITS 556,537,538, 549,550,562, 580-582	11.16	L-202	I-10/L-202 JCT. TO SR-143/ L-202 JCT. M/L R/L'S INCL. L-202/I-10 W/E & W- HOV RAMPS L-202/ SR-51 W/N RAMPS
4-A UNIT 566	52.92	L-202	PRIEST DR. TO L-202/L-101 JCT. M/L R/L'S
4-E UNIT 291 & 341	70.42	US-60	I-10/US-60 JCT. TO POWER RD. M/L R/L'S INCL. 2 nd PASS ON R'S AROUND US-60/I-10 JCT.

TUESDAY NIGHT

SECTIONS	C/M	ROUTE	DESCRIPTION
1-A UNITS 289 & 290	45.84	US-60	GRAND AVE. CAMELBACK TO AUGA FRIA RIVER M/L R/L'S
1-B UNITS 452 & 479	61.44	L-101	(AGUA FRIA) L-101/I-17 JCT. TO NOTHERN M/L R/L'S
1-C UNITS 453-476 480-503	31.91	101 RAMPS	(AGUA FRIA) L-101/I-17 JCT. TO NORTHERN RAMPS R/L'S
1-D UNITS 504 & 505	16.84	L-101	(PIMA) L-101/I-17 JCT. TO TATUM DR. R/L'S
2-A UNITS 522 & 526	8.48	SR-153	WASHINGTON TO UNIVERSITY M/L R/L'S
2-B UNITS 523-525,527- 529,516-521	7.10	SR-153	WASHINGTON TO UNIVERSITY RAMPS R/L'S
3-A	10.83	I-10	16st.TO I-10/I-17 JCT. M/L,RAMPS R/L'S, I-10/L202/SR51R/L'S

3-F 16.16 **SR/143** McDOWELL TO BROADWAY M/L R/L'S
UNITS L-202 SPUR 41st.ST. TO PRIEST DR. M/L R/L'S (MONTHLY)
506,507,
583,585

3-G 9.92 **SR/143** L-202 RAMPS FROM I-10 TO 44th. ST AND 143 RAMPS.
UNITS **L202 SPUR** (MONTHLY).
508-513,
584,586,587

3-I 11.87 **L-202** SR/143/L202 JCT. TO PRIEST DR. M/L RAMPS R/L'S
UNITS **& RAMPS**
570-579,531,
539-542

3-K 28.04 **I-10** 35th AVE. TO 91st AVE M/R/L'S
UNITS
1-64

3-P 18.37 **I-10** 35th AVE. TO 91st AVE. RAMPS R/L'S
UNITS **(RAMPS)**
6-20,104-118

3-T 77.10 **CROSS RD.** CHANDLER, RAY, WARNER, ELLIOT, BASELINE
UNITS (FROM STOP LIGHT TO STOP LIGHT)
119-123

4-B 7.82 **L-202** PRIEST TO L-202/L-101 JCT. M/L RAMPS R/L'S
UNITS **& RAMPS**
564-569,
544-548

5-E
UNITS
102,103,21,22,25-32

13.94

I-10
& RAMPS

35th AVE. TO 16th ST. M/L RAMPS R/L'S

5-F
UNITS
2-66

32.40

I-10

35th AVE. TO I-10/I-17 JCT. M/L R/L'S

WEDNESDAY

SECTIONS	C/M	ROUTES	DESCRIPTION
3-D UNITS 64&65 3&4	26.32	I-10	I-10/I-17 JCT. TO BASELINE RD. M/L R/L'S (INCL. 2 nd PASS ON RIGHT'S BEFORE & AFTER BASELINE E/B.
3-E UNITS 42-51 78-85	10.66	I-10 RAMPS	24 th . ST TO BASELINE RAMPS R/L'S.
3-L UNITS 5&63	18.84	I-10	BASELINE TO CHANDLER BLVD. M/L R/L'S
3-M UNITS 52-62 68-77	11.00	I-10 RAMPS	BASELINE TO CHANDLER BLVD. R/L'S.
4-C UNITS 389&400	11.20	L-101	L-202/101 JCT. TO SOUTHERN AVE. M/L R/L'S
4-D UNITS 322-333 :	4.74	L-101 RAMPS	L-202/101 JCT. TO SOUTHERN AVE. R/L'S.

4-H (INCL. L-101/US-60-DOBSON RAMPS) 388&401	13.87	L-101	SOUTHERN TO GUADALUPE M/L R/L'S	UNITS
4-J UNITS 391&392 408&409	2.25	L-101	SOUTHERN TO GUADALUPE M/L R/L'S.	
4-K UNITS 410&430	41.48	L-101	(PIMA L-101/L-202 JCT. TO SHEA BLVD. M/L R/L'S.	
4-L UNITS 411-429 431-451	25.65	L-101	RAMPS (PIMA L-101/L-202 JCT. TO SHEA BLVD. R/L'S	

THURSDAY

SECTION	C/M	ROUTES	DESCRIPTION
3-B UNITS 235&236&262 &263,287&288	49.57	SR-51	I-10 /SR-51 JCT TO SHEA BLVD.M/L R/L'S INCL.SR-51/I-10 S/W&E RAMPS (INCL. 2 nd PASS ON MEDIAN NORTHERN TO SHEA BLVD.)
3-C UNITS 238-253 271-286	16.67	SR/51 RAMP	McDOWELL TO SHEA M/L R/L'S (INCL. 2 nd PASS ON MEDIAN NORTHERN TO SHEA).
3-Q UNITS 237&261	16.20	SR-51	SHEA BLVD. TO BELL RD. M/L R/L'S
3-R UNITS 254-260 264-270	9.09	SR-51 RAMP	SHEA BLVD. TO BELL RD. R/L'S
4-P UNITS 551-555 557-561	4.84	L-202	COUNTRY CLUB TO DOBSON RD. M/L R/L'S

SUNDAY

SECTION	C/M	ROUTES	DESCRIPTION
4-F UNITS 292 E/W	18.44	US-60	POWER RD. TO SIGNAL BUTTE M/L R/L'S
4-G UNITS 293-340 342-387	74.04	US-60 RAMPS	SIGNAL BUTTE TO GOLDFIELD M/L R/L'S PRIEST TO GOLDFIELD R/L'S
5-A UNITS 125-127.179- 181,175-176 &185	36.10	I-17	AZ. CANAL TO DEER VALLEY M/L R/L'S (INCL. I-17/L-101 N/W & E RAMPS).
5-B UNITS 159-178 183-202	18.30	I-17 RAMPS	PEORIA AVE. TO DEER VALLEY R/L'S
5-C UNITS 124&182 234	64.76	I-17	I-17/I-10 JCT. TO AZ.CANAL M/L R/L'S (INCL. I-17/I-10 N/W & E & S/W & E RAMPS)
5-D UNITS 128-139,142-158,203-220,223-233	29.44	I-17 RAMPS	16 th ST. TO DUNLAP AVE. RAMPS & FTG.RD. R/L'S

STACK LIST

MONDAY:	I-10 / SR-51 / L-202	SHORT STACK
TUESDAY:	I-10 / I-17	TALL STACK
WEDNESDAY:	L-101 / US-60	PRICE STACK
THURSDAY:	L-202 / L-101	PIMA STACK

A. D. R. S.

MECHANICAL LITTER REMOVAL
WORK SCHEDULE
SUNDAY

HIGHWAY ROUTE	TRAVEL DIRECTION	MILE FROM	POST TO
I-17	S/L	200.0	194.0
I-17	N/L	194.0	208.0
I-17	S/R	208.0	194.0
I-17	N/R	194.0	208.0
I-17	S/L	208.0	200.0
I-10	W/L	141.0	134.0

Created on 7-23-00

A. D. R. S.

MECHANICAL LITTER REMOVAL
WORK SCHEDULE
MONDAY PM - TUESDAY AM

HIGHWAY ROUTE	TRAVEL DIRECTION	MILE FROM	POST TO
------------------	---------------------	--------------	------------

I-10	E/R	134.0	142.0
S-51	N/R	0.0	10.0
S-51	S/L	10.0	7.0
S-51	N/L	7.0	10.0
S-51	S/R	10.0	0.0
I-17	N/L	208.0	216.0
I-17	S/L	216.0	208.0
I-17	N/R	208.0	216.0
I-17	S/R	216.0	208.0

Created on 7-23-00

A. D. R. S.

MECHANICAL LITTER REMOVAL
WORK SCHEDULE
TUESDAY PM - WEDNESDAY AM

HIGHWAY ROUTE	TRAVEL DIRECTION	MILE FROM	POST TO
I-10	E/R	141.0	147.0
S-202	E/R	0.0	11.0
S-202	W/R	11.0	0.0
S-202	E/L	0.0	11.0
S-202	W/L	11.0	0.0
I-10	W/L	147.0	141.0
I-10	E/L	141.0	147.0
I-10	W/R	147.0	141.0

Created on 7-23-00

A. D. R. S.

MECHANICAL LITTER REMOVAL
WORK SCHEDULE
WEDNESDAY PM - THURSDAY AM

HIGHWAY ROUTE	TRAVEL DIRECTION	MILE FROM	POST TO
------------------	---------------------	--------------	------------

I-10	E/R	147.0	161.0
I-10	W/L	161.0	147.0
I-10	E/L	147.0	161.0
I-10	W/R	161.0	147.0
I-10	W/R	141.0	134.0

Created on 7-23-00

A. D. R. S.

MECHANICAL LITTER REMOVAL
WORK SCHEDULE
THURSDAY PM - FRIDAY AM

HIGHWAY ROUTE	TRAVEL DIRECTION	MILE FROM	POST TO
I-10	E/L	134.0	147.0
S-202	E/L	0.0	6.5
S-202	W/L	6.5	0.0
I-10	W/L	147.0	141.0
I-10	E/R	141.0	147.0
S-202	E/R	0.0	6.5
S-202	W/R	6.5	0.0
I-10	W/R	147.0	141.0

Created On 7-23-00

A. D. R. S.

MECHANICAL LITTER REMOVAL
WORK SCHEDULE
SATURDAY

HIGHWAY ROUTE	TRAVEL DIRECTION	MILE FROM	POST TO
S-202	E/L	5.4	11.0
S-202	W/L	11.0	5.4
S-202	E/R	5.4	11.0
S-202	W/R	11.0	5.4
I-10	E/R	150.0	161.0
I-10	W/L	161.0	150.0
I-10	E/L	150.0	161.0
I-10	W/R	161.0	150.0

Created on 7-23-00

Appendix B

Stormwater Monitoring Plan

ARIZONA DEPARTMENT OF TRANSPORTATION

STORMWATER MONITORING PLAN

September 22, 2000

Prepared for:
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Mesa, Arizona 85010

Prepared by:
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3501 N. 16th Street
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Project No. B30004

Submitted to:
Arizona Department of Transportation
205 South 17th Avenue
Phoenix, AZ 85007

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- Figure 1 ADOT NPDES Stormwater Monitoring Site in Phoenix, Arizona**
Figure 2 ADOT NPDES Stormwater Monitoring Site in Tucson, Arizona

References

- Appendix A Model 900 MAX Refrigerated Sampler Specifications**
Appendix B Field Sampling Protocol for Flood Control District of Maricopa County

1.0 Background

According to the National Pollutant Discharge Elimination System (NPDES) permit (Permit No. AZS000018) issued by the Environmental Protection Agency (EPA), the Arizona Department of Transportation (ADOT) must develop and submit a stormwater monitoring program to the EPA by September 30, 2000. This document serves as a proposal to the EPA for stormwater monitoring generated on ADOT roadways in fulfillment of requirement A.3, Appendix I (D) of the ADOT permit.

It was recommended by the EPA that ADOT consider designing their stormwater monitoring program based on a report entitled *Environmental Indicators to Assess Stormwater Control Programs and Practices* issued by the Center for Watershed Protection (1996). In the document, 26 environmental indicators were identified for stormwater monitoring. In reviewing the best management practices (BMPs) outlined in ADOT's NPDES permit, six indicators were identified that will be implemented as part of the Stormwater Management Plan.

1. Water Quality Monitoring
2. Impacted Dry Weather Flows
3. Number of Illicit Discharges Identified and Corrected
4. Number of BMPs Installed, Inspected and Maintained
5. Permitting and Compliance
6. BMP Performance Monitoring

While these six indicators will be employed by ADOT in managing stormwater, the focus of this document is the design and implementation of the stormwater monitoring program for monitoring water quality. This document describes the proposed methods and procedures to be used for the collection and testing of stormwater samples from ADOT's highway system. The program includes monitoring of one representative site each in both the Phoenix and Tucson metropolitan areas. Upon review of the proposal by the EPA, the permit will then be modified to incorporate the proposal following any necessary changes.

Results from the monitoring of stormwater will be recorded on Discharge Monitoring Report forms and included in subsequent annual reports submitted to the EPA. The data will be used to assess the effectiveness of the stormwater pollution control measures being implemented by ADOT.

2.0 Intergovernmental Agreements

2.1 Phoenix Metropolitan Area

ADOT will enter into an intergovernmental agreement with the Flood Control District of Maricopa County (FCDMC). This agreement will consist of FCDMC performing the stormwater sampling for the monitoring location in the Phoenix metropolitan area. ADOT will pay FCDMC for the expenditures incurred from the stormwater sampling. This includes, but is not limited to, costs of equipment installation and maintenance, lab analyses, and required personnel time.

FCDMC performs stormwater monitoring and testing for their NPDES permit issued by the EPA. In addition, FCDMC has a rain/stream gauge network of several hundred monitoring stations which they operate and maintain.

2.2 Tucson Metropolitan Area

ADOT will enter into an intergovernmental agreement with the City of Tucson. This agreement will consist of the City of Tucson performing the stormwater sampling for the monitoring location in the Phoenix metropolitan area. ADOT will pay the City of Tucson for the expenditures incurred from the stormwater sampling. This includes, but is not limited to, costs of equipment installation and maintenance, lab analyses, and required personnel time.

The City of Tucson performs stormwater monitoring and testing for their NPDES permit issued by the EPA.

3.0 Monitoring Site Selection Criteria

Criteria were developed for locating monitoring equipment for stormwater in order to collect samples considered representative of highways in Maricopa and Pima counties. Monitoring locations were chosen based on four criteria: 1) daily traffic volume, 2) drainage basin to include only highway drainage, 3) access to the monitoring equipment, and 4) security of monitoring equipment.

3.1 Daily Traffic Volume

The two monitoring sites were chosen to collect samples from a wide range of daily traffic volumes. Vehicles traveling on the roadways are the most significant pollutant source for stormwater generated on ADOT highways. The monitoring of stormwater at locations with a wide range of traffic volume will provide a comparison of the concentration of various constituents to the number of cars traveling on the highways. The ranges of average daily traffic counts for the Phoenix and Tucson metropolitan areas are 47,000 to 264,000 and 24,400 to 134,300, respectively, on ADOT roadways (Maricopa Association of Governments 1999; Pima Association of Governments 1999)

3.2 Drainage Basin

In many areas, stormwater collected from ADOT highways is co-mingled with drainage from adjacent areas, primarily local municipalities. The water collected within the basins for the two monitoring locations is limited to highway drainage. Monitoring results from these two monitoring stations will allow for a more accurate characterization of stormwater discharged from ADOT highways.

3.3 Access to Monitoring Equipment

The monitoring sites were chosen to allow persons performing stormwater monitoring and equipment maintenance to access the equipment with reasonable ease. The two monitoring locations are positioned at the end of open pipes eliminating confined space issues.

3.4 Security of Monitoring Equipment

In order to avoid accidental damage and vandalism, the monitoring equipment is located behind existing chain-link fencing erected by ADOT for security purposes.

4.0 Monitoring Site Locations

4.1 Phoenix Metropolitan Area

The monitoring site in Phoenix is located along LOOP 202 just east of 32nd Street on the north side of the highway (See Figure 1). The station collects stormwater from a portion of LOOP 202 which has an average of 190,000 vehicles traveling per day.

The site meets the necessary access requirements for sampling and maintenance. In addition, the location is generally secure since it is inconspicuous and has fencing that surrounds the site.

The monitoring station serves a drainage area of approximately 3.7 acres from which stormwater is discharged to a retention basin.

4.2 Tucson Metropolitan Area

The monitoring site in Tucson is located along I-10 just north of Grant Road on the west side of the highway (See Figure 2). The equipment collects stormwater from a portion of I-10 that has an average daily traffic volume of 115,900 vehicles per day.

The site meets the necessary access requirements for sampling and maintenance. In addition, the location is generally secure since it is within the main ADOT maintenance yard in Tucson. The maintenance yard is surrounded by a fence with a locked gate.

The monitoring station serves a drainage area of approximately 4.8 acres from which stormwater is discharged to a culvert which empties to the Santa Cruz River.

5.0 Monitoring Parameters

5.1 Criteria for Parameter Selection

Several criteria were developed for determining the list of parameters to be tested as part of ADOT NPDES permit compliance monitoring efforts. These include the following:

1. SOURCES OF CONTAMINANTS - Fossil fuel combustion, wear of tires, brake pads, bearings, bushings, and other moving parts in engines, leaking lubricants and hydraulic fluids, and road deicing are processes that may contribute to pollutants entering stormwater along roadways. These potential sources of pollutants were considered in the selection of parameters.
2. LIMITATIONS OF SAMPLING - The collection of a stormwater sample from ADOT roadways places some limitations on the selection of parameters. Due to the climatic conditions of the Phoenix and Tucson metropolitan areas and the small drainage areas of outfalls along highways, manual samples would be extremely difficult to collect. With a rain gauge in place, a designated ADOT staff person would be notified of a stormwater discharge at the monitoring location. However, the flow at the outfall may cease prior to that individual reaching the monitoring site due to short duration of the rain event and the small drainage area of the roadway. As a result, ADOT has chosen to use an automated sampler for collection of stormwater samples. The use of the automated sampler provides some limitations to the selection of parameters (i.e., volatiles).

5.2 Contaminant Parameter List

The FCDMC will collect samples for 22 constituents using the acceptable analytical methods, method detection limit, type of sample (grab, composite, grab-field analysis) and specific field quality assurance/quality control objectives that are specified in Section 9.0. The samples will be analyzed for the following parameters:

temperature	total kjeldahl nitrogen (TKN)
flow	total phosphorus
hardness	total cadmium (Cd)
pH	total chromium (Cr)
specific conductance	total copper (Cu)
chemical oxygen demand (COD)	total lead (Pb)
biochemical oxygen demand (BOD)	total zinc (Zn)
total dissolved solids (TDS)	total petroleum hydrocarbons
total suspended solids (TSS)	total phenols
nitrate	oil and grease
nitrite	DDE

The same water quality parameters will be tested for the monitoring locations in Phoenix and Tucson.

5.3 *Sample Priority List*

If the composite sample volume is insufficient to perform all the analyses indicated above, the following priority shall be used to determine the contaminant groups that will be analyzed given the reduction in total sample volume. Given that automobiles traveling on the roadways are the most significant sources of pollutants which could potentially enter stormwater, total petroleum hydrocarbons and metals were selected to have the highest priority for analysis followed by BOD, TSS, COD and TDS. The contaminant groups are listed below with the associated volumes required for analysis:

1. Total Petroleum Hydrocarbons (1 liters)
2. Total recoverable metals (0.5 liters)
3. Dissolved metals (0.5 liters)
4. BOD, TSS, COD, TDS (1.25 liters)

6.0 Sample Collection Methods

6.1 Phoenix Metropolitan Area

According to the proposed InterGovernmental Agreement, the Flood Control District of Maricopa County will provide all required operation, sampling laboratory analyses, data collection and compilation, maintenance and repair including labor, supplies, replacement parts, equipment and laboratory contracts for stormwater monitoring stations. Water quality samples will be analyzed for the compounds identified in Section 5.0, using EPA-approved methods. The FCDMC will submit to ADOT monitoring information in three quarterly reports (due on January 30, April 30, and October 30) and one annual report (due July 30) of all sampling and analysis performed in a format agreed to by ADOT.

6.1.1 Automated Sample Collection

Sample collection will be performed using an automated sampler. A sampling event occurs when flow is detected at the monitoring site. The sampling equipment is triggered when one-half inch of water is present at the level sensor placed at the lowest point in the outfall pipe.

Automated samplers will be utilized in collecting stormwater samples that will be analyzed for the parameters listed in Section 5.0. The instrument will be configured to automatically collect samples once minimum rainfall depth has been detected and adequate depth of flow has been attained. Samples collected initially will be used for oil and grease, and total phenol analysis. The remaining bottles will be filled for flow weighted composite analysis.

6.1.2 Manual Sample Collection

In the event that samples cannot be collected using an automated sampler, manual sampling will follow the following procedure: grab samples will be taken within the first 30 minutes of the flow event (if possible). A flow-weighted composite will be made by a combination of a minimum of three sample aliquots taken in each hour of discharge for the first three hours of discharge or the entire discharge if it is less than three hours. Aliquots will be taken a minimum of 15 minutes apart. Composite samples will be generated after determining flow rates.

6.2 Tucson Metropolitan Area

According to the proposed InterGovernmental Agreement, the City of Tucson will provide all required operation, sampling laboratory analyses, data collection and compilation, maintenance and repair including labor, supplies, replacement parts, equipment and laboratory contracts for stormwater monitoring stations. Water quality samples will be analyzed for the compounds identified in Section 5.0, using EPA-approved methods. The City will submit monitoring information in three quarterly reports and one annual report of all sampling and analysis performed in a format agreed to by ADOT.

6.2.1 Automated Sample Collection

The sampling methods used for stormwater monitoring in the Tucson metropolitan area will be the same as the methods used in Phoenix.

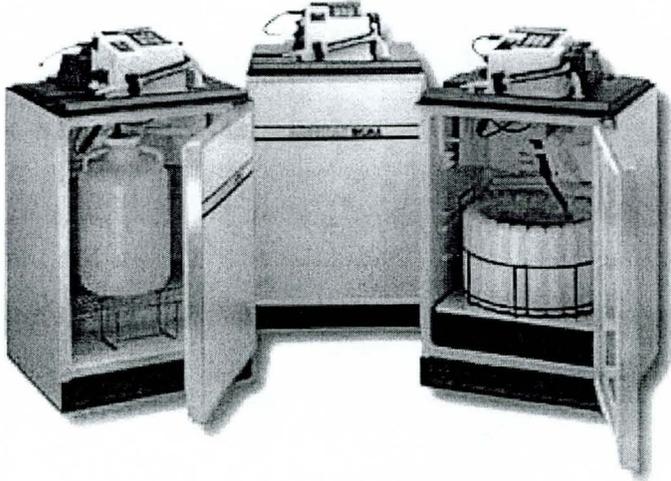
6.2.2 Manual Sample Collection

The sampling methods used for stormwater monitoring in the Tucson metropolitan area will be the same as the methods used in Phoenix.

7.0 Monitoring Equipment

7.1 Phoenix Metropolitan Area

The automated sampler to be used for stormwater sampling is the American Sigma[®] Model 900 MAX refrigerated sampler (see photo). Specifications are included in Appendix A.



Source: American Sigma[®] web site at www.americansigma.com/900port.htm

The stormwater monitoring equipment is to be installed and maintained by the Flood Control District of Maricopa County.

The instrument used for monitoring stormwater is capable of performing the following functions:

➤ Precipitation Measurement

Stormwater monitoring stations shall be capable of:

1. Measuring rainfall with a minimum accuracy of 0.01 inch.
2. Recording incremental rainfall measurements at 60 second intervals.
3. Recording cumulative rainfall measurements at 60 second intervals.

➤ Flow Measurement

The monitoring station shall have a single area-velocity meter. The AV meter shall use the Doppler principle for determining stream velocity and a pressure transducer for depth. The AV meter installation shall consist of an integral probe that measures both average velocity and depth. The probe shall be American Sigma Model 920 (or similar that is approved by ADOT) without external controls, user-interface communications, or data storage modules.

Stormwater monitoring stations shall be capable of calculating and recording at 60-second intervals:

1. Instantaneous flow
2. Total cumulative volume
3. Incremental volume

➤ Automatic Sample Collection

Stormwater monitoring stations shall be capable of collecting individual sample aliquots at pre-programmed runoff flow volumes.

➤ Data Storage and Retrieval Capabilities

Stormwater monitoring stations shall incorporate a means of storing and accessing via remote communication:

1. Total accumulated rainfall.
2. Incremental rainfall.
3. Total accumulated runoff volume.
4. Number of samples collected.
5. Instantaneous discharge.
6. Time.
7. Stage reading at sampling device.
8. Battery voltage (if battery is used for primary power source).

➤ Computer Storage and Down-loading

Stormwater monitoring stations shall have the capability of:

1. Storing five (5) days of stormwater data recorded at 60 second intervals.
2. Down-loading data in ASCII or comma delineated format(s).
3. Down-loading data either remotely via modem, or locally with an IBM compatible lap-top computer, and/or Data Transfer Unit.

➤ Remote Communication Capabilities

Stormwater monitoring stations shall have remote communication capabilities to notify FCDMC personnel responsible for O&M at the station when sampling conditions have occurred at the monitoring site.

A cellular phone with battery recharge system shall be installed at the monitoring station (similar to the current installation at the Salt River at 27th Avenue). The FCDMC shall be responsible for maintaining cellular phone service to the station to activate the auto-dialer and paging functions during storm events.

➤ Power Supply

Stormwater monitoring stations shall fulfill the following power requirements:

1. Have a power supply for computer storage such that data recorded prior to power loss is saved.
2. Provide backup battery power for a 24-hour period.

➤ Control Module

The American Sigma 900 MAX refrigerated sampler shall be modified to include factory-installed upgrades to the computer control module to accommodate the proposed AV meter probe. The modifications to the sampler control module shall accommodate all controls, user-interface, communications, power supply, and data storage functions associated with the AV meter probe.

➤ Maintenance

The FCDMC shall contact ADOT if sediment or trash build-up is observed at the monitoring location.

7.2 Tucson Metropolitan Area

The American Sigma[®] Model 900 MAX refrigerated sampler will also be used for stormwater sampling in Tucson. The stormwater monitoring equipment is to be installed and maintained by the City of Tucson.

The instrument used for monitoring stormwater is capable of performing the following functions:

➤ Precipitation Measurement

Stormwater monitoring stations shall be capable of:

1. Measuring rainfall with a minimum accuracy of 0.01 inch.
2. Recording incremental rainfall measurements at 120 second intervals.
3. Recording cumulative rainfall measurements at 120 second intervals.

➤ Flow Measurement

The monitoring stations shall have a single area-velocity meter. The AV meter shall use the Doppler principle for determining stream velocity and a pressure transducer for depth. The AV meter installation shall consist of an integral probe that measures both average velocity and depth. The probe shall be (or similar that is approved by ADOT) without external controls, user-interface communications, or data storage modules.

Stormwater monitoring stations shall be capable of calculating and recording at 120-second intervals:

1. Instantaneous flow
2. Total cumulative volume
3. Incremental volume

➤ Automatic Sample Collection

Stormwater monitoring stations shall be capable of collecting individual sample aliquots based on set time interval of 15 minutes for a 3-hour storm duration. Composite samples will be generated after determining flow rates.

➤ Data Storage and Retrieval Capabilities

Stormwater monitoring stations shall incorporate a means of storing and accessing via remote communication:

1. Total accumulated rainfall.
2. Incremental rainfall.
3. Total accumulated runoff volume.
4. Number of samples collected.
5. Instantaneous discharge.
6. Time.
7. Stage reading at sampling device.
8. Hard-wire power source with back-up battery

➤ Computer Storage and Down-loading

Stormwater monitoring stations shall have the capability of:

1. Storing five (5) days of stormwater data recorded at 120 second intervals.
2. Down-loading data in ASCII or comma delineated format(s).
3. Down-loading data either remotely via modem, or locally with an IBM compatible lap-top computer, and/or Data Transfer Unit.

➤ Remote Communication Capabilities

Stormwater monitoring stations shall have remote communication capabilities to notify City personnel responsible for O&M at the station when sampling conditions have occurred at the monitoring site.

The City shall install and maintain a hard-wired phone at the monitoring station. The City shall be responsible for maintaining phone service to this station to activate the auto-dialer and paging functions during storm events.

➤ Power Supply

Stormwater monitoring stations shall fulfill the following power requirements:

1. Have a power supply for computer storage such that data recorded prior to power loss is saved.
2. Provide backup battery power for a 24-hour period.

➤ Maintenance

The City shall contact ADOT if sediment or trash build-up is observed at the monitoring location.

8.0 Laboratory Sample Preparation and Analytical Methods

This section describes the steps to be taken by analytical laboratories to prepare for monitoring events and the procedures to be used by laboratories for stormwater sample analyses.

These procedures will be used for stormwater monitoring in Phoenix and Tucson metropolitan areas.

8.1 Laboratory Selection and Contracting

Important considerations in selecting an analytical laboratory include location, performance, ability to meet analytical reporting limits (RLs), and experience with the type of samples that will be generated by the monitoring program.

Department of Health Services (DHS) certification is required for ADOT analytical work. Sample analysis will be conducted according to the test procedures outlined in 40 CFR 136 (See Table 8-1). In certain cases it may be difficult to contract for all required analyses with DHS-certified laboratories. In such cases, alternative arrangements may be made provided that the exception is documented and approved by the ADOT task order manager. For example, if constituent reporting limits cannot be adequately achieved by certified laboratories, a research level laboratory with a proven ability to perform the needed analysis can be used with approval from the ADOT task order manager. Such laboratories may include out-of-state commercial laboratories or university/research laboratories with demonstrated expertise in EPA-sponsored research or method development programs. Quality Assurance/Quality Control (QA/QC) procedures are outlined in Section 9.0 below.

8.2 Sample Storage and Handling Prior to Analysis

To minimize the chance of sample contamination and unreliable analytical results, special measures must be taken during the storage and handling of samples prior to analysis. For example, samples must be collected and stored in the appropriate containers and preserved. If composite samples are collected, sample splitting must be conducted to properly store and preserve the samples. In addition, some analytical methods require filtration of the sample prior to analysis. Finally, samples must be analyzed within established holding times to ensure reliability of the results. Each of these measures is discussed in more detail below.

8.2.1 Composite Splitting

As mentioned above, if composite sampling procedures are used, the samples must be split prior to analysis. It is recommended that composite sample splitting be conducted by the analytical laboratory or in another similarly controlled environment to minimize the chance of contamination. Clean techniques should be used when handling and splitting the composite sample.

Table 8-1 Analytical Constituent Method Specifications and Recommended Reporting Limits

Analyte	Method Type	EPA Method No. [a]	Holding Time [b]	Container Type	Preservation	Reporting Limit	Units
Conventionals							
BOD	Probe	SM 5210B	24 hours [c]	Glass or PE	4°C	3	mg/L
COD	Titrimetric	410.1	28 days	Glass or PE	4°C and H2SO4 to pH<2	10	mg/L
Hardness	Titrimetric; colorimetric; calculation	130.2; 130.1; SM 2340B	6 months	Glass or PE	HNO3 or H2SO4 to pH<2	2	mg/L
pH	Electrometric	150.1	15 minutes	Glass or PE	None	0.1 [d]	std. units
TDS	Dried filtrate weight	160.1	7 days	Glass or PE	4°C	1	mg/L
TSS	Dried filter weight	160.2	7 days	Glass or PE	4°C	1	mg/L
Nutrients							
NO3-N	Colorimetric	352.1	48 hours	Glass or PE	4°C	10	mg/L
NO2-N	Spectrophotometric	354.1	48 hours	Glass or PE	4°C	0.1	mg/L
P	Colorimetric	365.2	28 days	Glass or PE	4°C and H2SO4 to pH<2	0.03	mg/L
TKN	Titrimetric/colorimetric/potentiometric	351.3	28 days	Glass or PE	4°C and H2SO4 to pH<2	0.1	mg/L
Metals							
Cd	GF-AA; ICP-MS	213.2; 200.8 [f]	Filter for dissolved fraction and preserve within 48 hours; 6 months to analysis	Teflon, PE, or borosilicate glass	4°C and HNO3 to pH<2 [e]	5	µg/L
Cr	GF-AA; ICP-MS	218.2; 200.8 [f]				10	µg/L
Cu	GF-AA; ICP-MS	220.2; 200.8 [f]				1	µg/L
Pb	GF-AA; ICP-MS	239.2; 200.8 [f]				1	µg/L
Zn	GF-AA; ICP-MS	289.2; 200.8 [f]				5	µg/L
Organics							
TPH	IRIR	418.1	28 days	Glass	4°C and HCL to pH<2	1	mg/L
Total Phenols	Colorimetric	420.1	28 days	Glass	4°C and H2SO4	0.1	mg/L
Pesticides							
DDE	GC	608	72 hours	Glass	4°C	0.01	µg/L

Notes for Table 8-1

All EPA 1600 series methods require collection and handling according to EPA method 1669 protocols.

- [a] = Equivalent Standard Method can be substituted.
- [b] = Holding time specified in EPA guidance or referenced in Standard Method for equivalent method.
- [c] = Standard Methods 20th Edition requires a 6-hour holding time except when the sampling location is distant from the laboratory, in which case 24 hours is the maximum holding time. Typically, this is the case for stormwater samples, and the 24-hour holding time is assumed for the purposes of this monitoring plan. The method also specifies that the storage time and conditions should be stated along with the results on the lab report when the holding time exceeds 6 hours.
- [d] = Report pH to nearest 0.1 std. pH unit. Also report temperature at time of measurement.
- [e] = Filter dissolved samples before preservation.
- [f] = EPA Method 1638 is an additional available “clean-technique” ICP-MS method that can be used for this constituent. EPA method approval is in process.

8.2.2 Sample Filtration

Sample filtration is required when collecting samples for dissolved metals determinations. It is recommended that filtration for metals be conducted by the analytical laboratory to reduce the potential for contamination in the field, especially during storm conditions. USEPA specifies the use of a 0.45 mm, 15 mm diameter or larger, tortuous-path capsule filter or equivalent (USEPA, 1996). To minimize dissolved/suspended phase partitioning of metals from the time of sample collection to the time of analysis, it is essential that the laboratory perform the sample filtration promptly. The field crew should therefore specify "filter for dissolved metals immediately upon receipt" on the sample chain-of-custody form, and coordinate this activity with the laboratory in advance.

8.2.3 Sample Preservation

Chemical preservatives are added to the samples for certain analyses to prolong the stability of the constituents during storage. Table 8-1 lists the required sample preservatives for various types of analytical constituents. If composite sampling procedures are used, no preservatives are added to the composite container, because no single chemical preservative is suitable for all of the constituents to be analyzed. The laboratory must first divide the composite sample into the appropriate bottle for each analysis, and then add chemical preservatives as appropriate for each analysis. If grab sampling procedures are used (i.e., field personnel directly fill the containers required for each analysis), the laboratory should add the appropriate preservative to each sample container immediately upon receipt at the laboratory. Use of bottles pre-filled with preservative is not recommended, as this may increase logistical problems (e.g., field crews have to avoid loss of preservative when collecting samples).

8.2.4 Holding Times

Maximum acceptable holding times are method-specified for various analytical methods and analytes (see Table 8-1). The holding time starts when sample collection is complete and is counted until extraction/preparation or analysis of the sample. The time of collection of the final sample aliquot is considered the "sample collection time" for determining sample holding time for composite samples that represent less than 24 hours of flow (APHA, *et al.*, 1998). If the composite sample collection period exceeds 24-hours, the composite sample bottle(s) should be replaced at or prior to the end of each 24-hour period. For constituents with short holding times, such as 48-hours or less, composite sample volume should be removed from each 24-hour composite for analysis as necessary to comply with holding time requirements. If a sample is not analyzed within the designated holding times, the analytical results may be suspect. Thus, it is important that the laboratories meet all specified holding times and make every effort to prepare and analyze the samples as soon as possible after they are received. Prompt analysis also allows the laboratory time to review the data and, if analytical problems are found, re-analyze the affected samples.

Table 8-1 lists the maximum acceptable analytical holding times for a comprehensive list of constituents potentially monitored in ADOT projects. Some of these holding times are short

and will require the laboratory to immediately handle the sample once received. For example, BOD₅ analysis must be performed within 24 hours after sample collection. Holding times may be a factor affecting allowable sampling times if the laboratory has not agreed to work evenings or weekends. To minimize the risk of exceeding the holding times, stormwater samples must be transferred to the analytical laboratory as soon as possible after sampling is complete.

Moreover, the laboratory should be notified before the sampling begins so that it can prepare to analyze the samples immediately upon receipt.

8.3 Reporting Limit Requirements

Table 8-1 lists the reporting limits for the comprehensive list of analytical constituents potentially monitored in ADOT projects. The reporting limit is the minimum concentration at which the analytical laboratory can reliably report detectable values. This operational definition does not distinguish between the type of reporting limit, but relies on the laboratory's historical practice of reporting and a thorough review of laboratory practice and performance. The reporting limits in Table 8-1 are provided as a guide for monitoring projects that do not have historical data sets for reference.

It is important to ensure that the RLs derived for the project are low enough to provide useful results. For example, if the analytical results are to be compared with water quality objectives every effort should be made to ensure that the RLs are lower. Therefore, the selected analytical methods should provide RLs at or below the criteria against which the stormwater samples are to be compared.

8.4 Analytical Methods

This section discusses the analytical methods that should be used to meet the reporting limits and other data quality acceptability limits or objectives for the project.

Sample analysis will be conducted according to the test procedures approved within 40 CFR 136 (See Table 8-1). For some constituents, alternative analytical methodologies may be used to meet the data quality objectives for reporting limits and control limits of QC samples. Also, methods are being updated and new methods developed for different analytical parameters. In selecting the analytical method to be used, the following questions should be addressed:

- Does the method conform to any legal or regulatory requirements for the monitoring program?
- Does the method allow the required reporting limits to be easily obtained on stormwater samples?
- Does the method have the same or more stringent control limits for QA/QC samples?
- Will the data provided by the method be comparable to historical data collected at the station?

- Is the method recognized as “standard” so that the data collected at a station can be compared to other stations?
- Is the laboratory proficient with the method? Do they have historical data to show proficiency?

The recommended analytical methods for conventional, nutrient, metal, and organic constituents are discussed below and are shown in Table 8-1. All of these methods are described either in “Standard Methods for the Examination of Water and Wastewater, 20th Edition” (APHA, *et al.*, 1998) or in the listed EPA method. The 8000 series analyses (modified soils methods) can be downloaded from the Internet at “<http://www.epa.gov/SW-846/8xxx.htm>”. The approved methods should be referenced for more detailed sampling and analytical information.

8.5 Laboratory Data Package Deliverables

As a part of the laboratory contract, the data package that will be delivered to ADOT and the timing of its delivery (turn around time) should be defined. The data package should be delivered in hard copy and electronic copy (on diskette).

The hard copy data package should include a narrative that outlines any problems, corrections, anomalies, and conclusions, as well as completed chain of custody documentation. A summary of the following QA/QC elements must be in the data package: sample extract and analysis dates, results of method blanks, summary of analytical accuracy (matrix spike compound recoveries, blank spike compound recoveries, surrogate compound recoveries), summary of analytical precision (comparison of laboratory split results and matrix spike duplicate results, expressed as relative percent difference), and reporting limits (See Section 9.0).

In addition to the hard copy, an electronic copy of the data can be requested from the laboratory. The electronic copy includes all the information found in the hard copy data package.

Common turn around times for laboratory data packages are two to three weeks for faxed data and three weeks to thirty days for hard copy and electronic copy. Receiving the faxed data quickly allows an early data review to identify any problems that may be corrected through sample re-extraction or re-analysis.

9.0 Quality Assurance/Quality Control

The Quality Assurance/Quality Control (QA/QC) to be followed ensures that the samples collected are of high quality and that the laboratory analyzing the samples is producing quality results. The program consists of sampling procedures, quality control samples, data review and validation, and equipment maintenance.

The same quality assurance/quality control procedures will be followed for the monitoring locations in Phoenix and Tucson.

9.1 Lab QA/QC Procedures

The contract laboratory has a full set of QA/QC procedures that cover all aspects of operations from building maintenance, sample log in, sample tracking, and sample analysis.

9.2 Sample QA/QC Procedures

The QA/QC procedures include aspects of preparedness and sampling.

9.2.1 Preparedness

Sample equipment, bottles, and forms are all set up at each sampling site prior to a storm event. This helps to ensure that the proper laboratory bottles and sampler jars are at each site before a discharge event occurs. By preparing for an event ahead of time, the possibility of filling incorrect bottles or mislabeled bottles can be avoided. All equipment is readied with 72 hours after the previous discharge event.

Readying a site includes:

- Placing clean, labeled sample jars in the sampling unit.
- Setting the sampler program in a ready position for the next event.
- Cleaning the intake tubing.
- Checking for hardware problems.
- Correcting hardware problems that surfaced during a previous event.

9.2.2 Field QA/QC Samples

Three types of QA/QC samples are taken: Travel Blanks, Field Duplicated, and Equipment Blanks.

Travel Blanks - are samples that accompany volatile organic samples analyzed by EPA Method 624. One set of travel blanks is placed in each cooler that contains VOC samples. The lab supplies the travel blanks and they are not opened during the sampling process. Travel blanks measure contamination that may occur during transportation to the lab.

The frequency for this sample will be one travel blank for each cooler containing other VOC samples.

Duplication or Splits - are samples taken as a single sample by the automatic sampler and split into two separate, but identical samples. The two samples' results are compared to measure errors introduced by the laboratory.

The frequency of this sample will be once per year.

Equipment Blanks - are samples taken after the equipment has been cleaned. The Equipment Blanks will be taken from the sample intake tubing and the glass sampler jars used in the automatic sampler equipment. Deionized water is used as the medium. Deionized water is poured into the glassware or pumped through the intake tubing directly into laboratory sample containers. Samples will be analyzed for all constituents to be analyzed.

The frequency of this sample will be once per year.

9.3 Analytical Quality Control Requirements

The following table lists the required quality control data.

QC Parameters

TYPE	FREQUENCY	PRECISION
Lab Duplicate	10% of instrument batch	
Sample Duplicate Precision	NA	See below
Method Blank	Once per day	
Matrix Spike	5% of instrument batch	
Matrix Spike Duplicate	5% of instrument batch	
MS/MSD Precision	NA	<25% RPD
Blind Samples	Quarterly	

Sample Duplication Precision

PARAMETER	PRECISION
pH	<15% RPD
Temperature	<15% RPD
Hardness	<15% RPD
TDS	<15% RPD
TSS	<15% RPD
BOD	<30% RPD
COD	<30% RPD
All Metals	<35% RPD
TPH	<50% RPD
Total Phenols	<35% RPD
Nutrients	<15% RPD

9.4 Cleanliness

The cleanliness of the equipment is vital to ensuring that contamination is not introduced from a controllable factor. Both the intake tubing and the sample jars are cleaned to minimize or eliminate sample contamination.

Equipment cleaning consists of the following steps:

1. Disconnect distributor tubing on sampling unit.
2. Pump common tap water through the tubing, (1/2-gallon).
3. Pump Liquinox[®] mixed with tap water through the line (1/2-gallon).
4. Pump copious amount of tap water through line (1+ gallon).
5. Pump nitric acid through line, (1/4-gallon).
6. Pump deionized water through line, (1-2 gallons).

Glassware cleaning consists of the following steps:

1. Wash the container with Liquinox[®] solution using a stiff brush to clean sides and bottom.
2. Thoroughly rinse containers with tap water.
3. Rinse the container with nitric acid.
4. Rinse the container with deionized water.

9.5 Equipment Service and Calibrations

Equipment will be serviced a minimum of twice per year, usually before the next rainy season. Calibrations are conducted during both twice-yearly

services. Calibrations of the flow measuring devices (pressure transducers) and pumped sample volume are conducted a minimum of twice annually.

For reference, a log of the service is kept. The information kept in the log will include the following:

- Date and time of the service
- Person(s) doing calibration
- Depth of water to which PT probe is submerged
- Volume of water pumped to calibrate sampler delivery volume
- Service information on batteries, etc.

A log sheet will be used for recording maintenance and calibration information. One sheet is completed each time the site is visited.

9.6 **Sample Collection**

During actual discharge sample collection events, a number of procedures are done to ensure that sample collection is done in a careful and consistent manner.

Phoenix Metropolitan Area

A Field Sampling Protocol was developed by the Flood Control District of Maricopa County and will be used to guide field sampling personnel (See Appendix B). This document provides all information needed for an individual to set up, maintain, and collect samples from stormwater quality sampling stations. This document is updated during the year as needed.

Tucson Metropolitan Area

A field sampling protocol was developed by the City of Tucson and will be used to guide field sampling personnel. This document provides all information needed for an individual to set up, maintain, and collect samples from stormwater quality sampling stations. This document is updated during the year as needed.

Some of the procedures followed during storm events include using latex gloves while handling samples and equipment, using chain of custody forms to record sample numbers and collection information. All individuals who have physical possession of the samples will sign and date the form. Furthermore, no sample ever leaves the possession of any Agency/City employee. No third party will be used to collect, prepare, or deliver samples. Sampling personnel use ice in the transport coolers and in the sampler bases. All samples are given a unique identification number that includes the site, type of sample, and the date of sample. Custody seals are used on each cooler. They may, at the sampler's discretion, be used on each individual container.

9.7 Field Records

A field notebook is kept to record all activities at each site. Information such as sampling events, times, and dates, calibration activities, and maintenance activities are recorded in the book.

9.8 Data Review and Validation

Data review and validation uses all of the sampling data received for an event. Checks of the holding times, proper chain of custody procedures, preservation, sample data, QA/QC sample data, and lab QA/QC data are made to determine the validity of the data.

Data review and validation will be completed by personnel at the Flood Control District of Maricopa County and the City of Tucson prior to submittal to ADOT. A Data Validation Sheet is completed and attached to each data set.

Any circumstances in which the data does not meet the criteria on the review sheet, or data that seems questionable, is reported to the laboratory for resolution.

9.9 Data Retrieval and Storage

There are two primary types of data collected in the stormwater monitoring program: Water Quality and Discharge/Ambient Conditions.

9.9.1 Water Quality Data

The water quality data is a direct result of the samples collected during a discharge event from composite samples. The samples are analyzed for the pollutants listed previously in Section 5.0. Data is reported from the contract laboratory as hard copy and electronic file on disk.

All reports from the contract laboratory are reviewed when received as described in Section 9.1.8 above.

The numerical data is entered into a Microsoft Excel spreadsheet. Electronic data is provided on disk in the Excel format. The hard copies of the laboratory reports are filed. Copies of all hard copy data as well as quality control reports are kept at a central filing location.

9.9.2 Discharge/Ambient Data

Along with the water quality data, a number of parameters are collected and retained as part of the overall storm data. Data collected in this category includes:

Discharge quality sampled
Total event discharge
Peak discharge
Discharge duration
Drainage basin size

Flow data is downloaded by telephone line or direct connection with field equipment. Data is checked to ensure integrity.

9.10 Preventative Maintenance

As mentioned in Section 9.1.5, maintenance of the equipment will be on a scheduled, periodic basis. A regular six-month and annual maintenance will be done.

The six-month maintenance is done in June of each year and will consist of:

1. Calibrate the depth sensor.
2. Calibrate the pumped sample volume.
3. Inspect sample intake line, connections, cables, pump tubing, batteries, solar panels, and battery charging system.

The annual maintenance is done in October of each year, and will include the six-month maintenance, and:

1. Replace sample intake tubing.
2. Replace sampler pump and distributor tubing.
3. Rinse new intake tubing with deionized water.

Since equipment failures tend to increase with time, maintenance that is more frequent may be required. Any repairs and replacements will be made as necessary. In addition, an Equipment Blank sample may indicate the need for tubing replacement before scheduled replacement.

9.11 Record Keeping

All records will be kept at the Flood Control District of Maricopa County offices for the first two years and ADOT thereafter, except for the field notebook kept at the site. Sample logs, maintenance sheets, equipment cleaning sheets, laboratory data, and historic reports are examples of these types of items.

9.12 *Equipment Replacement*

As mentioned previously, equipment failures increase with age. The policy is to replace equipment that is no longer functional and cannot be repaired, as well as equipment that has been serviced many times without satisfactory resolution of the problems. All equipment is first repaired for reuse. If a problem persists, the equipment will be replaced.

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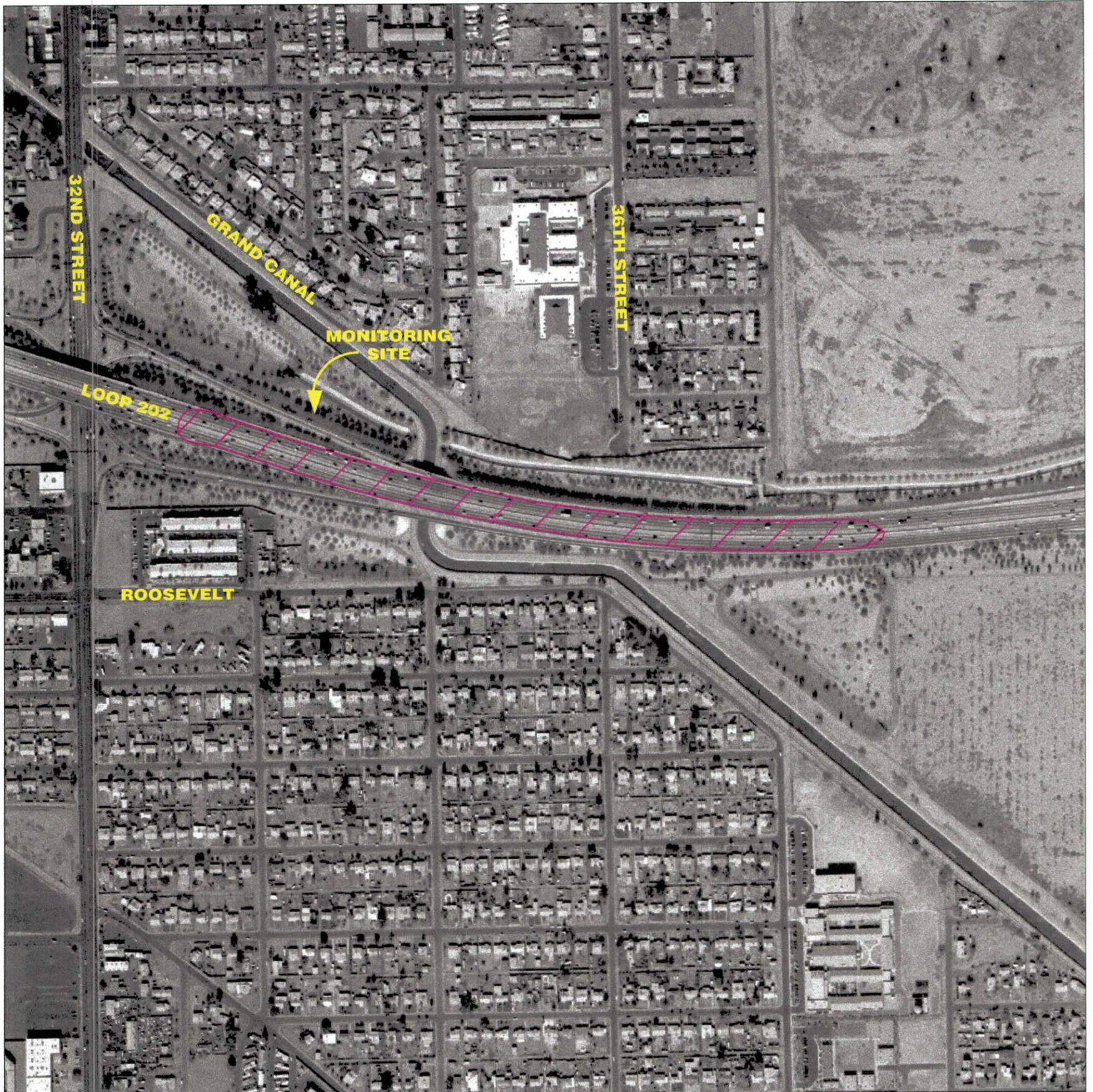
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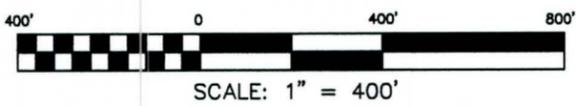
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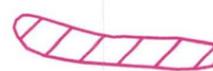
SOURCE: LANDISCOR AERIAL INFORMATION



SOURCE: 3-D TopoQuads 1999 Delorme

Scale: 1" = 4000'

LOCATION MAP



CONTRIBUTING DRAINAGE AREA FOR MONITORING SITE

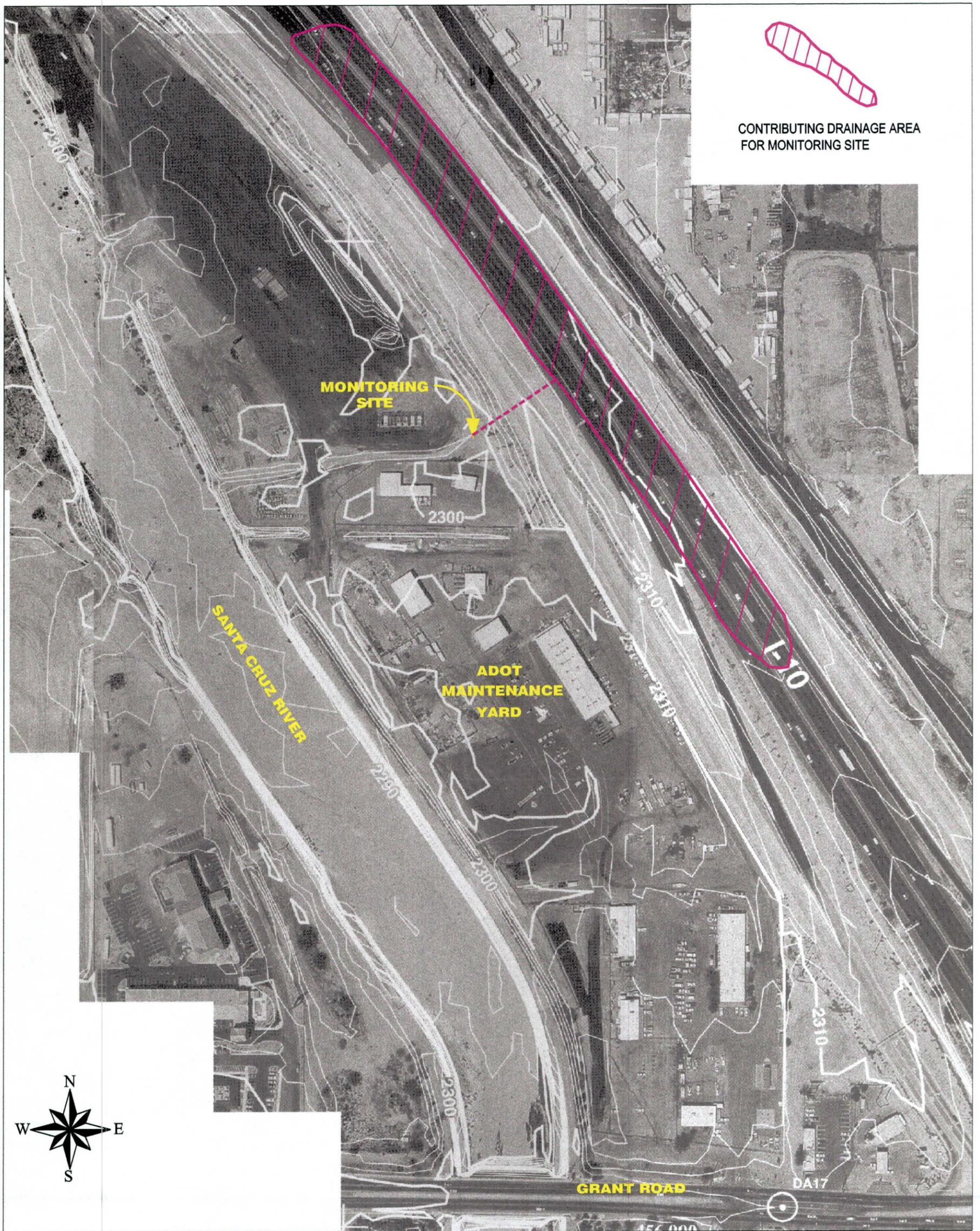


Engineering and Environmental Consultants, Inc.
 3501 North 16th Street
 Phoenix, Arizona 85016
 TEL: (602)248-7702 FAX: (602)248-7851

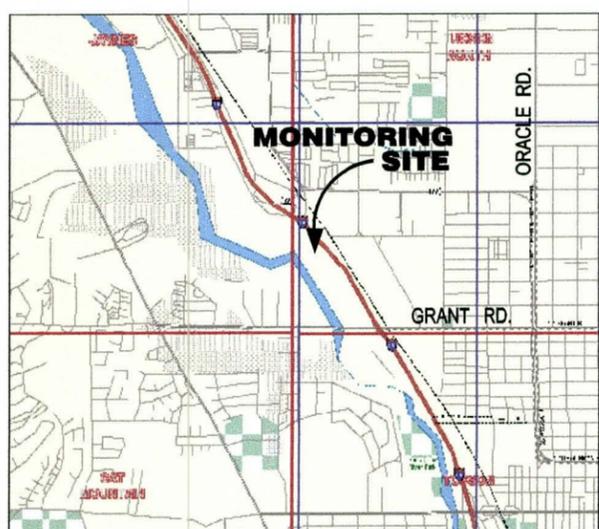
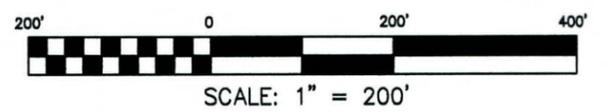


ARIZONA DEPARTMENT OF TRANSPORTATION
 NPDES STORM WATER MONITORING SITE
 PHOENIX, ARIZONA

FIGURE 1



SOURCE: SAIC/CITY OF TUCSON DEPARTMENT OF TRANSPORTATION 4/98



SOURCE: 3-D TopoQuads 1999 Delorme Scale: 1" = 2000'

LOCATION MAP



Engineering and Environmental Consultants, Inc.
 3501 North 16th Street
 Phoenix, Arizona 85016
 TEL: (602)248-7702 FAX: (602)248-7851



ARIZONA DEPARTMENT OF TRANSPORTATION
 NPDES STORM WATER MONITORING SITE
 TUCSON, ARIZONA
 FIGURE 2

APPENDIX A

Model 900 MAX Refrigerated Sampler Specifications

Model 900 MAX Refrigerated Sampler Specifications

General:

- Dimensions: Width 24" (61 cm), Depth 24" (61 cm), Height 44" (112 cm), Weight 140 lbs. (63 kg).
- Sample Pump: High speed peristaltic, dual roller, with 3/8" (.95 cm) ID by 5/8" (1.6 cm) pump tube.
- Pump Body: High impact, corrosion resistant, glass reinforced Delrin*.
- Vertical Lift: 27 ft. (8.2 m) maximum (note: Remote Pump Option recommended for lifts from 22 ft. (6.7 m) to 35 ft. (10.7 m)).
- Sample Transport Velocity: 2 ft./sec. (.6 m/sec.) minimum at 15 ft. (4.6 m) vertical lift in a 3/8" (.95 cm) ID intake tube.
- Pump Flow Rate: 60 ml/sec at 3 ft. (.9 m) vertical lift in a 3/8" (.95 cm) ID intake tube.
- Liquid Sensor: Single sensor, non-wetted, non-contact.
- Sample Volume: Programmed in milliliters, in one ml increments from 10 to 9,999 ml.
- Sample Volume Repeatability: ± 10 ml typical.
- Sample Bottle Capacity:
 - Composite: 2-1/2 gal. glass, 5 gal. glass, 3 gal. polyethylene, 4 gal. polyethylene, and 5 gal. polyethylene.
 - Multiple Bottle: (2) 1 gal. glass, (2) 1 gal. polyethylene, (4) 1 gal. glass, (4) 1 gal. polyethylene, (8) 950 ml glass, (8) 1.9 liter glass, (8) 2.3 liter polyethylene, (12) 950 ml glass, (24) 350 ml glass, and (24) 575 ml polyethylene and (24) 1 liter polyethylene.
- Sampling Modes: Multiple Bottle Time, Multiple Bottle Flow, Composite Time, Composite Flow, Flow with Time Override, Variable Interval, Start/Stop, and Level Actuation.
- Interval Between Samples: Selectable in single increments from 1 to 9,999 flow pulses (249 ohm impedance; 4-20 mA interface), or 1 to 9,999 minutes in one minute increments.
- Multiplex: Multiple Bottle Mode: multiple samples per bottle and/or multiple bottles per sample collection.
- Intake Purge: Air purged automatically before and after each sample; duration automatically compensated for varying intake line lengths.
- Pump/Controller Housing: High impact injection molded ABS; submersible, watertight, dust tight, corrosion & ice resistant; NEMA 4X,6.
- Control Panel: 18 key membrane switch keypad; 24 character alphanumeric liquid crystal display.
- Internal Clock: Indicates real time and date; 0.007% time base accuracy.
- Diagnostics: Tests RAM, ROM, pump, and distributor.
- Flash Memory: Permits embedded software upgrades in the field.
- Program Delay: Sampler start at time of day or delay in minutes.
- Manual Sample: Initiates a sample collection independent of program in progress.
- Intake Rinse: Intake line automatically rinsed with source liquid prior to each sample, from 1 to 3 rinses.

- Intake Fault: Sample collection cycle automatically repeated from 1 to 3 times if sample not obtained on initial attempt.
- Multiple Programs: Stores up to five sampling programs.
- Cascade: Allows using two samplers in combination where the first sampler at the completion of the program initiates the second.
- Data Logging: Records program start time and date, stores up to 400 sample collection times/dates, all program entries, operational status including number of minutes or pulses to next sample, bottle number, number of samples collected, number remaining, sample identification number, and all logged data (i.e. level, flow, pH, stream temperature, ORP, rainfall, and any externally logged data - up to 7 external channels).
- Set Point Sample Trigger: When equipped with integral flow meter, pH/temperature/ORP meter, conductivity, and/or D.O. monitoring options ... Mode 1 - Sampling can be triggered upon an upset condition when field selectable limits are exceeded. Mode 2 - Concurrent with normal sampling routine, sample liquid is deposited in designated "Trouble Bottle(s)".
- Serial Interface: RS-232 compatible; allows on-site collection of stored data.
- Status Output: Low memory power, plugged intake, jammed distributor arm, sample collected, and purge failure.
- Automatic Shutdown: Composite Mode: After preset number of samples have been delivered to composite container, from 1-999 samples, or upon full container.
- Program Lock: Access code protection precludes tampering.
- Intake Tubing: 3/8" (.95 cm) ID Teflon* lined polyethylene with protective outer cover.
- Intake Strainers: Teflon* and 316 stainless construction.
- Power Requirements: 115 VAC, 60 Hz (230 and 100 VAC optional); Compressor Running Amperage 1.5-2.0 A. Locked rotor current 12 Amps.
- Internal Battery: Two C cell alkaline batteries; maintains program logic and real time clock for five years. Internal battery current draws less than 40 micro amps.
- Overload Protection: Controller: 5 amp DC line fuse. Compressor: Thermal overload relay opens at 230°F (110°C).
- Refrigeration System: 1/10 HP, 75 Watt, 400 BTU/hr. compressor, 120 CFM condenser fan; 3 sided wrap-around plate type evaporator; rigid foam insulation; air sensing thermostat capable of maintaining sample liquid at 39°F (4°C) in ambient temperatures up to 120°F (49°C); accurate to ±1.5°F (0.8°C); magnetic door seal; refrigerator body is 22 gauge steel with vinyl laminate overcoating; refrigeration components and copper plumbing are corrosion protected with phenolic resin coating.
- Temperature Range: General use: 32°F to 120°F (0°C to 50°C); Liquid Crystal Display: Operating - 14°F to 158°F (-10°C to 70°C), Storage - 40°F to 176°F (-40°C to 80°C).

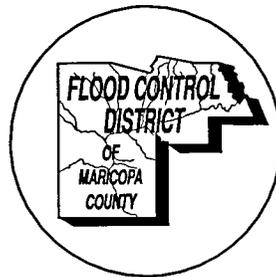
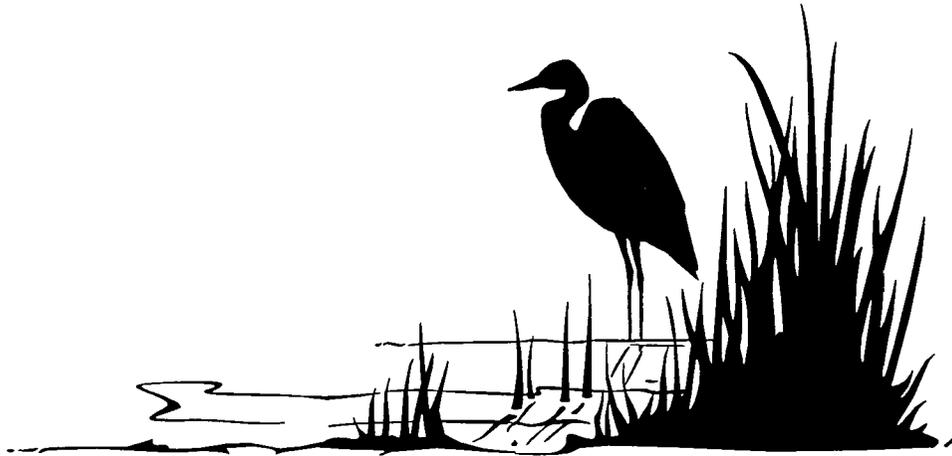
APPENDIX B

Field Sampling Protocol
developed by the
Flood Control District of Maricopa County

Field Sampling Protocol

Version 5.0

May 20, 1999



Flood Control District of
2801 West Durango Street

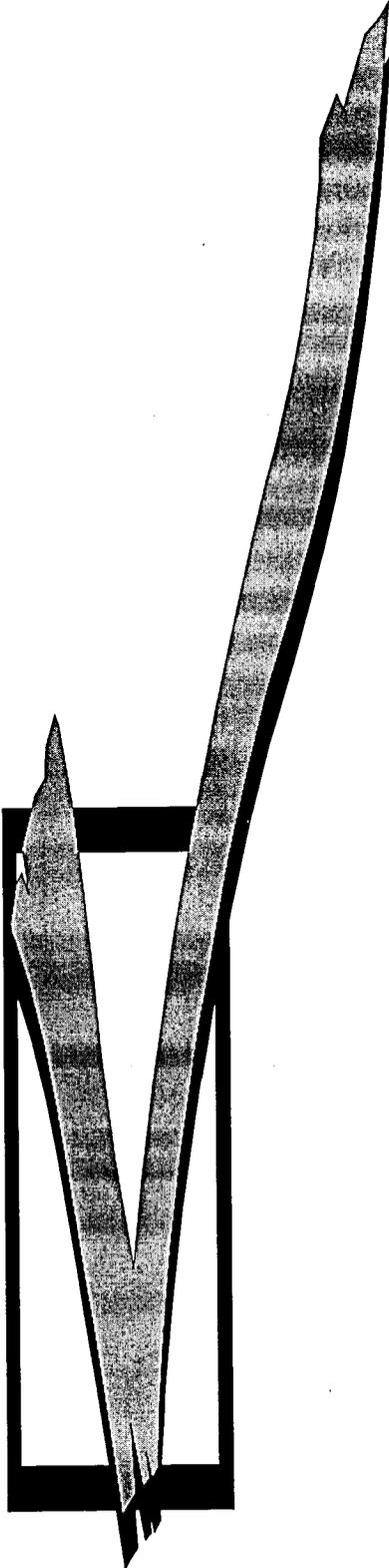
Maricopa County

Phoenix, Arizona 85009
602-506-1501

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Sampling Checklist



- Refer to PROCEDURE SHEETS
- Check Voice Mail
- Check sampling status via computer, if available
- Gather equipment - coolers, ice, pH/temperature probes, gloves, etc.
- Call lab to alert them about incoming samples
- Collect grab samples and return them to lab within 6 hours of collection. Collect grabs in laboratory bottles.
- Collect composite samples
- Hold one or two composite samples for a QC sample
- Prepare the QC sample(s), and turn in to the lab
- Turn composite samples in to the lab
- Clean station equipment
- Download data
- Reset program

GRAB SAMPLE COLLECTION PROCEDURE

1. Bottles will be stored on site.
2. Ensure that the laboratory grab sample bottles are properly labeled before filling. For the ID number use STGmmddy for the identification number, where ST is the sample location (such as M1, M2, P1, G4, etc.), G indicates a grab sample, and mmddy is the date of the sample.
3. Place ice around the remaining jars in the sampler unit.
4. Using the grab sample apparatus, collect samples directly into the unpreserved sample bottles. Do this by lowering the apparatus to the bottom of the pipe/channel. Once at the bottom, the apparatus is slowly raised through the entire discharge depth. Repeat if the bottles are not completely filled.
5. Preserve the samples using the acids provided. The following are the quantities of acid to add and to what bottles.

40 mL vials	4 drops HCl
Blue label, one-liter amber glass bottles	20 drops HCl
Brown label, one-liter amber glass bottles	20 drops H ₂ SO ₄

No other bottles have preservatives added!

6. Place all labeled bottles into an ice chest, surrounding the bottles with ice. Place the 4 travel blank bottles into the ice chest also.
7. Collect pH and temperature data and record them on the field data sheet.
8. Record the time, date, and sample ID number on the chain of custody form.

COMPOSITE SAMPLE COLLECTION PROCEDURE

1. When program is complete, remove the composite sample jars from the sampler unit. Cap the jars and place them into a suitable carrying case or ice chest. Add ice to the case or chest.

DO NOT RESET THE SAMPLER PROGRAM AT THIS TIME. If this is done, all of the flow data will be erased. If the sampler is accidentally reset, **DO NOT** submit the samples to the lab. The chemical data is not useful without the flow data.

2. Fill out the Chain of Custody sheet indicating time, date, and sample ID number on the form.
3. If the contract lab is available, take the samples to the contract lab for compositing and preservation. Skip remaining steps.
4. If the contract lab is unavailable, take the samples to the Instrumentation Lab for compositing.
5. Take the composite jars for a single site and combine the contents into a single clean glass compositing jar.
6. Using a clean glass or stainless steel rod, gently stir the contents of the composite jar.
7. Using the Sample Bottle Priority sheet in the Appendix, or following the numbering on the bottles, fill the laboratory provided sample bottles using either a pipette or stopcock on the jar. The sample bottles should be filled to within one inch from the top. **DO NOT** overfill the bottle.
8. Fill out the Lab Analysis Sheet in the Appendix. Use a separate sheet for each site.

The compositing jar must be cleaned after each use. Use the following procedure to clean the jars, stirring rod, and pipette or stopcock.

GLASSWARE CLEANING PROCEDURE

1. Pour out any remaining contents, and rinse thoroughly with tap water.
2. Wash the container with Liquinox® solution. Use a wire brush to scrub the inside of the container.
3. Thoroughly rinse the container with tap water.
4. Rinse the container with nitric acid. Pour rinsate into waste collection container.
5. Rinse with deionized water.
6. Rinse with acetone if the vessel is to be used again immediately. If not, allow to air dry. Pour excess acetone into waste collection container.

Deionized water is available from the laboratory on request.

MSDS sheets are available for nitric acid and acetone, both of which are harmful chemicals.

QUALITY CONTROL SAMPLING PROCEDURES

TRAVEL BLANKS – Taken each time VOC samples are taken.

1. These are provided by the lab. Submit one set of four bottles for each cooler/container of grab samples.

SPLIT SAMPLES – minimum one per municipality per sample event

1. Using one set of jars from one site only, this sample will become the Split Sample. Both samples will be submitted the same as any storm sample.
2. Composite as described in the COMPOSITE SAMPLING PROCEDURE.
3. Fill TWO sets of composite bottles. (You will have two samples.)
4. Provide separate identification numbers for each set. One ID number will be the same as a regular composite sample. The second will use MM, GG, PP, SS, etc. in place of M1, GA, P1, etc. Place samples in ice chest and fill with ice. Fill out Chain of Custody form. Submit samples to lab.

EQUIPMENT BLANKS – One site per year per municipality

1. After sample event, clean the automatic samplers as usual. The equipment must be cleaned prior to the sampling. Clean or place clean sample bottles in the sampler base.
2. At one site per event, using the distributor tubing, pump deionized water through the tubing directly into one set of laboratory provided composite bottles.
3. Give a sample identification number in the form, LBmmddyy, where LB indicates a line equipment blank and mmddyy is the sample date. Fill out the chain of custody, and place the samples on ice.
4. Pour deionized water into the eight glass jars and then pour the water into the laboratory provided container in the second set of composite bottles.
5. Give an identification number to the set in the form Bbmmddyy. Fill out the chain-of-custody form and place the samples on ice.

EQUIPMENT CLEANING PROCEDURE

1. Connect cleaning tube to the distributor arm tubing.
2. Pump approximately 1/2 gallon of tap water through the intake tubing.
3. Pump a 1/2 gallon mixture of tap water and Liquinox® through the intake tubing.
4. Pump a large amount of tap water through the intake tubing line to flush the soap out of the line.
5. Pump a small amount of nitric acid (pH 3-4) through the line.
6. Final rinse of 1/2 to 1 gallon deionized water through the line.
7. Reconnect the distributor arm tubing on the sampler unit.
8. Reset the sampler for the next storm event.

NOTE: Deionized water can be obtained from the lab on request.

DATA DOWNLOADING PROCEDURES

800 SERIES SIGMAS
(MESA, SOUTH MOUNTAIN)

At each site, the data can be downloaded onto a DTU. This procedure is necessary whenever a phone download fails, or no phone line exists. To use the DTU, connect the DTU and the sampler unit's RS-232 port. Follow the directions on the DTU unit for downloading.

Remotely, the data can be downloaded by site from a computer through the program BITCOM. Once BITCOM is started, a screen should have the sites listed.

1. Select the site to interrogate.
2. Press the Escape key and press the Enter key.
3. Once connection has been made, wait for the timer to count 20 seconds. When 20 seconds have elapsed, press C (or shift C, the C must be in capital.)
4. The data should begin to scroll. Download time takes approximately 15 minutes. The download is done when the data stops scrolling.
5. Once complete quit BITCOM. The file the data is stored in is called bitcom.tra.
6. From the C: prompt, type rename bitcom.tra siteID.sam, where siteID is MESA1 etc.
7. Then at the C: prompt, type del bitcom.tra.
8. Restart BITCOM and repeat the steps until all sites have been interrogated.

900MAX SERIES SIGMA SAMPLERS (PHOENIX SITES)

Download of data from the 900 series samplers requires a program called INSIGHT be installed on a laptop or office computer. INSIGHT allows modem or RS-232 connection to the sampler.

If connecting by modem, click on the Modem button in the Insight program. If connecting directly, click on the 900 MAX button in the program. The appropriate site should be chosen for connection. Once connection has been made, the screens will ask for the operation (in this case "Retrieve Logged Data").

A central computer will be programmed to collect data on a schedule, and assuming it works, 900 series data collection should be automated.

A DTU II can be used with the 900MAX samplers. Simply connect the RS-232 cable from the sampler to DTU II, select a data cell (1 - 20), and press data transfer. Disconnect when complete (display stops flashing and full data cell indicator is on.)

Changes from the previous Edition (v 4.3)

1. Sampler programs have been updated.
2. Each municipality requires different analysis. Sheets are included for each.

3. **Glendale samplers have been added.**

1.0 Priorities

Safety of personnel is the highest priority. Care must be exercised when handling samples and sample containers, and when out on busy streets collecting samples and doing maintenance work. Sample integrity and quality is high priority. Collection, preservation, and delivery of samples to the lab take priority over any other activity, such as cleaning stations.

Please note the following items:

- Always wear latex gloves when handling samples. (Use only latex gloves.) In addition to the threat of dermal exposure to hazardous compounds, contact between skin and samples can introduce contamination to the samples resulting in false results.
- Use caution when entering manholes to service the sampler intake tubing and depth sensors. Proper Standard Operating Procedures must be followed for Confined Space Entry. Hardhats are required in manholes to protect from falling objects.
- Always keep samples as cool as possible. The regulations require samples be kept at 4 degrees Celsius. Actually cooling the samples to that temperature may not be possible. However, keeping the samples iced and as cool as possible shows a good faith effort in following the regulations. Lower temperatures discourage bacterial growth and slow the breakdown process of nutrients and organics in the sample. Always use ice during all phases of sample collection and preservation.
- Collect samples as quickly as possible. No sample should sit more than two hours once sampling has ended.
- Take composite samples to the lab for preservation ASAP or preserve samples at the office ASAP. Once samples are collected and cooled, samples should be transferred to the plastic and glass bottles/jars for delivery to the lab. Preservation of samples inhibits bacterial growth and breakdown of pollutants.
- Follow the Sample Bottle Fill priority sheet located in the Appendix. This will allow the most important parameters to be analyzed when an insufficient sample has been collected by the sampler.
- QC split samples are required for checking laboratory integrity. Split samples will be taken on ten percent of all samples.

2.0 Site Basics

The District has 14 stormwater monitoring sites that it currently maintains. There are five land-based sites in Mesa, four in Phoenix, four in Glendale, and one at South Mountain Park.

The sites are identified as follows:

MESA-1

Horne and Sixth Street

480-644-1691

MESA-2	Broadway and Lindsay	480-644-1998
MESA-3	Falcon Field	480-830-6929
MESA-4	Horne and Grandview	480-644-1455
MESA-5	Dobson and Broadway	480-644-1599
PHX-1	Salt River and 35th Avenue (north bank)	602-278-9457
PHX-2	Salt River and 67th Avenue (north bank)	no phone
PHX-3	Salt River and 40th Street (south bank)	602-470-0127
PHX-4	Indian Bend Wash and 40th Street	602-494-9926
ARROW	Skunk Creek at 79th Avenue	602-809-0277
CITRUS	Grovers at 71st Avenue	623-334-4814
INDPARK	Orangewood alignment west of New River	623-772-0842
BUTLER	Orchid Lane at 56th Drive	623-930-7101
South Mountain	Central Avenue in South Mountain Park	no phone

3.0 Equipment Setup

3.1 Site Specific Equipment

An assortment of equipment is employed in the notification and sampling efforts.

The five sites in Mesa have identical setups. The following equipment is used:

Sigma 800 SL Automatic Sampler with integral flowmeter

8 jar configuration, jar volume = 1900 mL (15.2L total)
Autodialer
Modem
Raingauge

Four sites in Phoenix and four in Glendale have identical setups. The following equipment is used:

Sigma 900 MAX Automatic sampler with integral flowmeter, modem, and dialout alarm.
8 jar configuration, jar volume = 1900 mL (15.2L total)
Raingauge

The site at South Mountain will have the following setup. There will be no phone communications.

Sigma 800 SL Automatic Sampler with integral flowmeter
Raingauge

3.2 Programming of Equipment

Specific programming for each site is included in the Appendix.

4.0 Safety

A number of safety issues need to be considered when sampling. There are concerns of traffic safety and sample/chemical handling safety. Furthermore, when performing routine maintenance involving manhole entry, additional precautions must be taken.

4.1 Traffic Safety

Most of the samplers are not located on busy streets. However, a few samplers are adjacent to busy streets. Care should be exercised so that traffic does not endanger work activities. When working in manholes in major streets, barricades must be set

up to direct traffic away from work activities. This requires coordination with MCDOT Traffic Operation one week before work activities.

4.2 Sample / Chemical Safety

The stormwater samples contain contaminants of unknown composition. In most cases, the concentrations of contaminants in the stormwater are so low as to not be of concern. However, since the make up of the stormwater is unknown at the time of sampling, it is required that latex gloves be worn when handling stormwater. The gloves also prevent contamination from being transferred from hands to the samples. Furthermore, the latex gloves will protect skin from contact with the preservatives in some laboratory sample containers. The preservatives are either acids or bases. Both can burn skin.

If contact between skin and stormwater and/or preservatives occur, wash the affected area with large amounts of water to dilute the contamination.

4.3 Maintenance Safety

Entering manholes may cause exposure to unknown vapors and gases in manholes. Proper Confined Space Entry procedures must be followed prior to entering manholes.

Confined Space Entry is not covered in this manual. A separate manual covers this subject.

5.0 Sampling Procedures

5.1 Sampler Storm Setup

Samplers must be readied for sampling within 3 days after the previous storm event. A number of bottles are necessary for the proper collection and preservation of the samples for analysis. Grab sample bottles will be kept at each site with lids tightly closed. Composite sample bottles will be kept at the District office. Clean sampler jars will be kept at the District office.

Each municipality has different grab sample requirements. The table below gives the requirements for each.

GRAB SAMPLE BOTTLE REQUIREMENTS

GLENDALE	MESA	PHOENIX
1 1-liter plastic, unpreserved	1 1-liter plastic, unpreserved	1 1-liter plastic, unpreserved
2 100mL plastic, Na ₂ SO ₄ preserved	3 100mL plastic, Na ₂ SO ₄ preserved	2 100mL plastic, Na ₂ SO ₄ preserved
4 40mL glass vials, HCl preserved	4 40mL glass vials, HCl preserved	4 40mL glass vials, HCl preserved
1 1-liter amber glass, H ₂ SO ₄ preserved	1 1-liter amber glass, H ₂ SO ₄ preserved	1 1-liter amber glass, H ₂ SO ₄ preserved
		1 1-liter amber glass, HCl preserved
		4 1-liter amber glass, non-preserved

Preservation of the grab bottles is done in the field after each is collected. Amount of preservative to add to each bottle is given in the **GRAB SAMPLE COLLECTION PROCEDURE**, in the front of this manual.

Site identification should be placed on the bottles before filling, and before the storm event. It is difficult to write on wet labels, whether it is from sample spillage or from rainwater. The travel blank bottles should have the site identification listed on them also.

In addition to the grab bottles, fourteen sets of laboratory composite bottles should be on hand at the District office. This allows us to composite and preserve the samples at the office should the contract laboratory not be available.

One full set of composite sample bottles contains the following:

COMPOSITE SAMPLE BOTTLE REQUIREMENTS

GLENDALE	MESA	PHOENIX
2 1-liter plastic, unpreserved	1 500 mL plastic HNO ₃ preserved	1 500 mL plastic HNO ₃ preserved
2 500 mL plastic, H ₂ SO ₄ preserved	4 1-liter amber glass, unpreserved	2 1-liter plastic, unpreserved
1 500 mL plastic HNO ₃ preserved	2 1-liter plastic, unpreserved	2 1-liter plastic, H ₂ SO ₄ preserved

1 500 mL plastic, NaOH preserved	2 1-liter plastic, H2SO4 preserved	1 1-liter amber glass H2SO4 preserved
1 1-liter amber glass H2SO4 preserved		1 500 mL plastic, NaOH preserved
4 1-liter amber glass, unpreserved		
1 1-liter plastic, H2SO4 preserved		

This list is going to be revised to reflect different requirements among the municipalities. A list of the specific requirements is located in the Appendix.

5.2 Sample Event

5.2.1 General

All samplers in Glendale, Mesa, and Phoenix are set to activate when 0.05 inch of rain, and 0.5 inch of water level is reached at the gauge. South Mountain is set to activate on level only because it is likely that there will be many rain events without flow, or rain events may occur before flow begins.

Mesa samplers have an autodialer at each site which, when working, will call the stormwater voice mail number of 602-372-4809 and leave messages which are then forwarded to voice mail boxes of the sampling leader. Glendale and Phoenix samplers have a built-in notification feature. This feature allows the sampler to notify the sampling team via pagers of its status. Furthermore, the FCD ALERT system has rain gauges located near or at some of the sampling sites. The ALERT system will then call the voice mail number and indicate that rainfall has occurred at one or more sampling locations. This is especially useful for the Mesa sampling sites.

5.2.2 Grab Samples

Grab samples are collected from the discharge as near to the sample intake line in the pipe as possible. Temperature and pH are taken at this time and recorded on the Field Data Sheet. If it is apparent that the storm has ended and there is very little flow in the pipe/channel, grab samples should not be collected.

The grab sample apparatus is loaded with bottles. The apparatus is lowered into the pipe/channel for collection. To get as representative a sample as possible, once the apparatus is at the bottom of the channel/pipe, the apparatus is raised slowly through the entire discharge.

The two bacterial samples have a short hold time of six hours. The sample must be transported to the lab within six hours of collection. Proper coordination with the lab must be done to ensure that this six-hour window is met.

As mentioned previously, chilling the samples is extremely important. Ice is to be taken to all of the sites and placed around the jars in the sampler unit to keep the pumped samples as cool as possible. Samples remaining at ambient temperatures run the risk of having their chemical content altered from bacterial action and/or volatilization.

As an artifact of the actual storm sampling program in the Sigma samplers, the Phoenix and Glendale samplers are programmed to automatically collect a first flush grab sample as soon as the sampler has been activated. This first flush sample will not be collected or analyzed. This sample is in the first bottle only and is only 100 mL. The Mesa Sigma sampling equipment does not have this requirement and will not collect any first flush grab sample.

South Mountain

For the South Mountain sampler, a single sample will be distributed into all eight jars. The samples at this site can be collected by the automatic sampler because no bacteria, volatile organic, or oil & grease compounds will be analyzed.

The contents of the eight jars are poured into the laboratory provided sample bottles. Begin the filling from the first jar and progress to jar eight. Put the bottles in a cooler and surround by ice.

5.2.3 Composite Samples

Along with the grab samples, a flow-weighted composite sample is collected. This sample is based on a set quantity of water passing over the flow sensor between each aliquot collection. Each site has a different flow interval, based on site characteristics.

The composite will require from 3 to 16 hours to complete, depending upon the strength and intensity of the storm. In general, sampling is usually complete within a few hours. No sample should sit more than three hours once sampling is complete.

Sigma sampling equipment will indicate on the sampler unit's display if the program is complete. Occasionally, insufficient flow is produced from the storm to complete a sampling routine.

Composite samples will be collected in jars 2 through 8 in the Sigma samplers in the Glendale and Phoenix samplers, and all eight jars in the Mesa samplers. The

method for collecting, compositing, and preserving composite sample is given below.

Once the sampler is complete, or flow has stopped, remove the jars from the automatic sampler. Cap the jars and place them in a carrying case or an ice chest. Note the date, time, and sample number on a chain-of-custody form and in the Field Log Book.

If the contract lab is available, the samples will be transported to and composited by them. If the lab is not available, the samples will be first transported to the Instrumentation Lab for compositing and then to the contract lab for analysis.

To composite, take jars 2 through 8 for a single site and pour the contents into a large vessel. Using a clean glass rod, gently stir the contents. Fill the laboratory provided preserved bottles. If only a small amount of sample is collected, fill the bottles according to the numbering marked on the bottles. After filling all bottles (or as many as possible); clean the vessel and repeat the procedure with the remaining sites. Once complete, transport the samples to the contract lab.

5.2.4 Representative Events

Though we respond to many storms, the municipalities, within their operating permits, have established criteria for types of storms that are acceptable. Actual criteria are not presented here. Nevertheless, in general, rainfall totals must be between 0.20 and 0.75 inches, and there must be more than 72 hours without precipitation. Anything outside these boundaries are automatically rejected and will not require response.

5.2.5 Quality Control Samples

To ensure that the data received from the lab is of highest quality, and to assess the cleanliness of the sample equipment, three types of QC samples will be submitted. Travel blanks, equipment blanks, and split samples will be assessed. Travel blanks have been mentioned previously in the grab sample section.

Travel Blanks

The laboratory furnishes the travel blanks. These are used to assess whether contamination was introduced during transport of volatile organic samples to the lab.

There must be one set (4 bottles) of travel blanks per cooler/container that contain the 40-mL vials sampled.

Split Samples

Split samples will assess the accuracy of the laboratory analyses. One or two sites will be chosen for split samples for a given storm event.

A sample will be collected in the usual manner, but will be brought to the District Instrumentation Lab instead of being taken to the lab for compositing. District personnel will composite the sample using the procedure given above. A special set of laboratory provided bottles will be used. The set will consist of two of each bottle type. Each 'pair' is filled in succession. The sample sets are given different sample identification numbers. The samples are submitted to the lab just as any other samples, with no mention made to the lab that this is a duplicate sample.

Splits will be analyzed for the list required by the municipality in which the split sample originated.

Equipment Blanks

The equipment blank will measure the effectiveness of the cleaning program of the sampling equipment.

One site will be evaluated per year. The equipment is cleaned in the usual manner according to the instructions. After the cleaning, deionized water is pumped through the intake tubing directly into laboratory bottles for analysis.

The equipment blanks will be analyzed for the pollutants required by the municipality in which the samples was taken.

5.3 Post Sample

5.3.1 Flow Data Collection

It is desirable to collect the flow data remotely from the office. However, this is not always possible due to modem problems or lack of a phone line. As required, data will be collected in the field using a DTU. A different DTU is required for the Sigma 800 SL and the Sigma 900 MAX.

5.3.2 Post Event Cleaning

Cleaning of the sample equipment is very important in obtaining high quality samples. The sample jars should be cleaned according to the GLASSWARE CLEANING PROCEDURE, and the intake tubing line should be cleaned according to the EQUIPMENT CLEANING PROCEDURE. The contract lab will clean the sample jars when they are taken to the lab for compositing.

6.0 Periodic Maintenance

6.1 Six Month Maintenance

1. Check and calibrate the depth sensor
2. Check and calibrate the pumped sample volume
3. Check and clean rain gauges of debris
4. Inspect sample intake line, connect cables, connections, pump tubing, distributor tubing, batteries, solar panels, batteries, charging system
5. Make any repairs or replacements as necessary.

6.2 Annual Maintenance

1. Perform the Six Month Maintenance
2. Replace sample intake tubing with new Teflon tubing
3. Replace sampler pump tubing
4. Replace distributor tubing
5. Rinse new intake tubing with deionized water

6.3 As Needed Maintenance

Some of the six-month and annual maintenance may be required more frequently. This is determined on a site-by-site basis.

As equipment ages and fails, equipment should be replaced as quickly as possible. A small inventory of parts should be on-hand to replace failed parts. Replacement of stocked parts should be done within 2 weeks of problem report. Ordered parts should be replaced within a week of being received. As equipment is replaced, calibrations need to be performed.

6.4 Recordkeeping

A maintenance log is kept at each site. The log is part of a larger quality assurance and quality control program.

Maintenance records should include the date, time, personnel doing the service, and a description of the service done. A specific sheet is available for recording maintenance activities.

Copies of all record keeping sheets are in the Appendix.

All records are kept at the District offices.

Appendix

South Mountain Stormwater Sampler Sigma Stormwater Sampler Program

To begin programming the sampler, press the #2 key (change/halt)
Enter 8000 as the access code

Press the * key

- | | | |
|-----|---------------------------------------|---|
| 1. | Advanced Program Features | <u>yes</u> |
| 2. | Number of Sample Bottles | <u>8</u> |
| 3. | Units for Bottle Volume | <u>mL</u> |
| 4. | Bottle Volume | <u>1900</u> mL |
| 5. | Enter Units for Tubing Length | <u>Feet</u> |
| 6. | Length of Intake Tubing
(replaced) | <u>33</u> feet (Change each time tubing is
replaced) |
| 7. | Program Lock? | <u>Yes</u> |
| 8. | Enable Internal Flowmeter? | <u>Yes</u> |
| 9. | Flow Units | <u>CFS</u> |
| 10. | Program Delay? | <u>No</u> |
| 11. | Timed Mode? | <u>Yes</u> |
| 12. | Variable Interval? | <u>No</u> |
| 13. | Interval | <u>5</u> Min |

- | | | |
|-----|---------------------------|--|
| 14. | Discrete Mode? | <u>Yes</u> |
| 15. | Bottles/Sample? | <u>Yes</u> |
| 16. | Number of Bottles/Sample? | <u>4</u> |
| 17. | Change Volume? | <u>No/Yes</u> |
| 18. | Sample Volume | <u>1875 mL</u> |
| 19. | Calibrate Volume? | <u>No/Yes</u> |
| 20. | Intake Rinses? | <u>Yes</u> |
| 21. | Rinse Cycles? | <u>1</u> |
| 22. | Intake Faults? | <u>Yes</u> |
| 23. | Intake Faults | <u>2</u> |
| 24. | Enter ID | <u>0101</u> |
| 25. | Set Up Flowmeter? | <u>Yes</u> |
| 26. | Manning Formula | <u>Yes</u> |
| 27. | Pipe ID | <u>72.00</u> (Be sure to enter 7200) |
| 28. | Roughness= | <u>0.013</u> |
| 29. | Slope= | <u>4.00/100</u> |
| 30. | Flow Recording Interval | <u>1 min</u> |
| 31. | Calibrate Depth Sensor? | <u>No/Yes</u> (Yes during maintenance) |
| 32. | Set Current Water Level | <u>Enter current level if known</u> |

-Ready to Start-
proceed to page 2
 Page 2

Program for storm sampling

Press and hold the clear entry key

- | | | |
|-----|-----------------------|-----------------------|
| 1. | Level control? | <u>Yes</u> |
| 2. | Storm Mode? | <u>Yes</u> |
| 3. | External Start? | <u>No</u> |
| 4. | Start on | <u>Rain and Depth</u> |
| 5. | Rain = | <u>0.05 inch</u> |
| 6. | Rainfall Time Limit = | <u>999 min</u> |
| 7. | Level = | <u>1.0 inch</u> |
| 8. | First Flush Period | <u>0</u> |
| 9. | Sample Time limit? | <u>No</u> |
| 10. | Special Output? | <u>Yes</u> |
| 11. | Sample Output? | <u>No</u> |
| 12. | Event Output? | <u>Yes</u> |

-Ready to start-

Programming is complete. Press the START SAMPLING key to initiate the program/sampler.

Mesa Samplers (Sigma 800 Series) Sigma Stormwater Sampler Program

To begin programming the sampler, press the #2 key (change/halt)
Enter 8000 as the access code, if requested.

Press the * key

- | | | |
|-----|-------------------------------|---------------------|
| 1. | Advanced Program Features | <u>yes</u> |
| 2. | Number of Sample Bottles | <u>8</u> |
| 3. | Units for Bottle Volume | <u>mL</u> |
| 4. | Bottle Volume | <u>1900 mL</u> |
| 5. | Enter Units for Tubing Length | <u>Feet</u> |
| 6. | Length of Intake Tubing | <u>M1 = 50 feet</u> |
| | | <u>M2 = 48 feet</u> |
| | (check field book | <u>M3 = 27 feet</u> |
| | for exact length) | <u>M4 = 75 feet</u> |
| | | <u>M5 = 70 feet</u> |
| 7. | Program Lock? | <u>No</u> |
| 8. | Enable Internal Flowmeter? | <u>Yes</u> |
| 9. | Flow Units | <u>CFS</u> |
| 10. | Program Delay? | <u>No</u> |
| 11. | Flow Mode? | <u>Yes</u> |

12. Variable Interval? No
13. Interval M1 = 500 cu. Ft. (Enter 5)
M2 = 2000 cu. Ft. (Enter 20)
M3 = 4500 cu. Ft. (Enter 45)
M4 = 1500 cu. Ft. (Enter 15)
M5 = 1500 cu. Ft. (Enter 15)
14. Timed Override? No
15. Discrete Mode? Yes
16. Samples/Bottles? Yes
17. Number of Samples/Bottles 4
18. Change Volume? No/Yes
19. Sample Volume 450 mL
20. Calibrate Volume? No/Yes
21. Intake Rinses? Yes
22. Rinse Cycles? 1
23. Intake Faults? Yes
24. Intake Faults 2
-
25. Enter ID 1001 SIXTH
1002 LINDSAY
1003 FALCON
1004 GRANDVIEW
1005 DOBSON
26. Set Up Flowmeter? Yes
27. Manning Formula Yes
28. Pipe ID M1 = 36.00 (Be sure to enter 3 6 0 0)
M2 = 72.00 (Be sure to enter 7 2 0 0)
M3 = 48.00 (Be sure to enter 4 8 0 0)
M4 = 54.00 (Be sure to enter 5 4 0 0)
M1 = 30.00 (Be sure to enter 3 0 0 0)
29. Roughness=0.015
30. Slope=M1 = 0.29/100
M2 = 0.11/100
M3 = 0.14/100
M4 = 0.40/100
M5 = 0.14/100
31. Flow Recording Interval 1 min
32. Calibrate Depth Sensor? No/Yes (Yes during maintenance)
33. Set Current Water Level Enter current level if known

-Ready to Start-

Press and hold the clear entry key

- | | | |
|-----|----------------------|---------------------------------------|
| 1. | Level control? | <u>Yes</u> |
| 2. | Storm Mode? | <u>Yes</u> |
| 3. | External Start? | <u>No</u> |
| 4. | Start on | <u>Rain and Depth (fourth choice)</u> |
| 5. | Rain = | <u>0.05 inch</u> |
| 6. | Rainfall Time Limit= | <u>60 min</u> |
| 7. | Level = | <u>0.5 inch</u> |
| 8. | First Flush Period | <u>0 min</u> |
| 9. | Sample Time limit? | <u>500 summer / 1000 winter</u> |
| 10. | Special Output? | <u>Yes</u> |
| 11. | Sample Output? | <u>No</u> |
| 12. | Event Output? | <u>Yes</u> |

-Ready to start-

Programming is complete. Press the **START SAMPLING** key to initiate the program/sampler.

Phoenix (900MAX series)
Sigma Stormwater Sampler Program

Some Basic Program Notes:

To start sampling: press the **RUN/STOP** key and follow the directions.

To see the current status, Press the **STATUS** key from the **MAIN MENU**.

The **MAIN MENU** key can be pressed at any time to return to that point.

The **password** is **9000**.

To look at data, press **DISPLAY DATA** from the **MAIN MENU** and follow prompts.

1. Press the **MAIN MENU** key.
2. Press the **SETUP** key at the upper right side of the display.
3. Press the **MODIFY ALL ITEMS** key at the upper right side of the display.
4. **Number of bottles: 8**
if **8** is displayed, press **ACCEPT**
if **8** is not displayed, press **CHANGE CHOICE** until **8** appears, then press **ACCEPT**.
5. **Bottle Volume: 1900 mL**
if **1900 mL** is displayed, press **ACCEPT**

if 1900 mL not displayed,
Press **CHANGE UNITS** to change to mL AND
Enter 1900 and press **ACCEPT**.

6. **Intake Tubing Length:**

PHX1	26 ft
PHX2	21 ft
PHX3	19 ft
PHX4	21 ft

if the correct value is displayed, press **ACCEPT**

if the correct value is not displayed, enter the correct value and press **ACCEPT**.

7. **Intake Tubing Type: 3/8" vinyl (tubing is actually Teflon)**

if 3/8" vinyl is displayed, press **ACCEPT**

if 3/8" vinyl is not displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.

8. **Program Lock: Disabled**

if disabled is displayed, press **ACCEPT**

if disabled is displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.

9. **Program Delay: Disabled**

if disabled is displayed, press **ACCEPT**

if enabled is displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.

10. **Sample Collection: Flow Proportional**

if flow proportional is displayed, press **ACCEPT**

if flow proportional is not displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.

11. **Flow Pacing Mode: CONST VOL/VAR TIME**

if Const Vol/Var Time is displayed, press **ACCEPT**

if Const Vol/Var Time is not displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.

12. **Flow Meter: Integral**

if integral is displayed, press **ACCEPT**

if integral is not displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.

13. **Take Sample Every: (PHX 1: 3000 cf, PHX 2: 2000 cf, PHX 3: 300 cf, PHX 4: 2000 cf)**

if xxxx cf appears in the display, press **ACCEPT**

if xxxx cf does not appear in the display,
press **CHANGE UNITS** to get **CF**, AND
enter xxxx and press **ACCEPT**.

14. **Timed Override?: Disabled**

if disabled appears in the display, press **ACCEPT**

- if **enabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
15. **Take First Sample: Immediately**
 if **immediately** appears in the display, press **ACCEPT**
 if **immediately** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 16. **Deliver Each Sample To All Bottles?: No**
 If **no** appears in the display, press **ACCEPT**
 If **yes** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 17. **Choose a Method of Distribution: Samples/Bottle**
 If **Samples/Bottle** appears in the display, press **ACCEPT**.
 If **Bottles/Sample** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 18. **Samples/Bottle: 4**
 If **4** appears in the display, press **ACCEPT**.
 If **4** does not appear in the display, enter **4** and press **ACCEPT**.
 19. **Liquid Sensors: Enabled**
 If **enabled** appears in the display, press **ACCEPT**
 If **disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 20. **Sample Volume: 450 mL**
 If **450 mL** appears in the display, press **ACCEPT**
 If **450 mL** does not appear in the display, enter **450** and press **ACCEPT**.
 21. **Intake Rinses: 2**
 If **2** appears in the display, press **ACCEPT**
 If **2** does not appear in the display, enter **2** and press **ACCEPT**.
 22. **Sample Retries: 2**
 If **2** appears in the display, press **ACCEPT**
 If **2** does not appear in the display, enter **2** and press **ACCEPT**.
 23. **Site ID: ...xxxx**

PHX1 (DURANGO) ...2001	35th Avenue
PHX2 (SALT67TH) ...2002	67th Avenue
PHX3 (SALT40TH) ...2003	40th Street / Salt River
PHX4 (IBW) ...2004	40th Street / IBW

If the correct ID appears in the display, press **ACCEPT**
 If the correct ID does not appear in the display, enter **xxxx** and press **ACCEPT**.
 24. **Do You Wish to Access Advanced Sampling Features?: Yes**
 Press the button for **YES**.
 25. **Use the DOWN arrow key to go to STORMWATER and press SELECT.**
 26. **Storm Water: Enabled**
 If **Enabled** appears in the display, press **ACCEPT**

- If **Enabled** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
27. **Storm Water Start Condition: Rain and Level**
If **Rain and Level** appears in the display, press **ACCEPT**
If **Rain and Level** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 28. **Storm Water Rain Trigger: 0.05 inch**
If **0.05 inch** appears in the display, press **ACCEPT**
If **0.05 inch** does not appear in the display, enter **0.05** and press **ACCEPT**.
 29. **Rainfall Time Interval: 1:00**
If **1:00 (hr:min)** appears in the display, press **ACCEPT**
If **1:00 (hr:min)** does not appear in the display, enter **100** and press **ACCEPT**.
 30. **Storm Water Level Trigger: 0.5 inch**
If **0.5 inch** appears in the display, press **ACCEPT**
If **0.5 inch** does not appear in the display, enter **0.5** and press **ACCEPT**.
 31. **First Flush Number of Bottles: 1**
If **1** appears in the display, press **ACCEPT**
If **1** does not appear in the display, enter **1** and press **ACCEPT**.
 32. **First Flush: Samples to Collect: 1**
If **1** appears in the display, press **ACCEPT**
If **1** does not appear in the display, enter **1** and press **ACCEPT**.
 33. **First Flush Interval 1: 0:05 (hr:min)**
If **0:05 (hr:min)** appears in the display, press **ACCEPT AS FINAL**
If **0:05 (hr:min)** does not appear in the display, enter **005** and press **ACCEPT AS FINAL**.
 34. **First Flush Sample Volume: 100 mL**
If **100 mL** appears in the display, press **ACCEPT**
If **100 mL** does not appear in the display, enter **100** and press **ACCEPT**.
 35. **Program Time Limit: Enabled**
If **Enabled** appears in the display, press **ACCEPT**
If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 36. **Storm Water Program Time Limit: 8:00 (SUMMER) 16:00 (WINTER)**
If **8:00/16:00 (hr:min)** appears in the display, press **ACCEPT**
If **8:00/16:00 (hr:min)** does not appear in the display, enter **800/1600** and press **ACCEPT**.
 37. Press **MAIN MENU** button.
 38. Press **OPTIONS** from the main menu.
 39. Press **ADVANCED OPTIONS**.
 40. Select **ALARMS** and press **SELECT**.
 41. Scroll to **LOW MAIN BATTERY** using the down arrow key, and press **SELECT**.
 42. **Low Main Battery Alarm Condition: Enabled**
If **Enabled** appears in the display, press **ACCEPT**.

- If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
43. **Report Via Modem (be sure arrow is on in front of 'Report via modem')**.
If arrow is present, press **RETURN**.
If arrow is not present, press **SELECT**, and then press **RETURN**.
44. Scroll to **MEMORY BATTERY**.
45. **Memory Battery Alarm Condition: Enabled**
If **Enabled** appears in the display, press **ACCEPT**.
If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
46. **Report Via Modem (be sure arrow is on in front of 'Report via modem')**.
If arrow is present, press **RETURN**.
If arrow is not present, press **SELECT**, and then press **RETURN**.
47. Scroll to **RAINFALL** using the down arrow keys, and press **SELECT**.
48. **Rainfall Alarm Condition: Enabled**
If **Enabled** appears in the display, press **ACCEPT**
If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
49. **Rainfall High Trigger Point: 0.05 inch**
If **0.05 inch** appears in the display, press **ACCEPT**
If **0.05 inch** does not appear in the display, enter **0.05** and press **ACCEPT**.
50. **Rainfall Time Interval: 1:00 (hr:min)**
If **1:00 (hr:min)** appears in the display, press **ACCEPT**
If **1:00 (hr:min)** does not appear in the display, enter **100** and press **ACCEPT**.
51. **Report Via Modem (be sure arrow is on in front of 'Report via modem')**.
If arrow is present, press **RETURN**.
If arrow is not present, press **SELECT**, and then press **RETURN**.
52. Press **RETURN**
53. Scroll to **CALIBRATION** if PT is to be calibrated.
54. Scroll to **COMMUNICATION SETUP** and press **SELECT**.
55. Scroll to **MODEM SETUP** and press **SELECT**.
56. **Modem Power: Enabled**
If **Enabled** appears in the display, press **ACCEPT**
If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears and then press **ACCEPT**.
57. **Dial Method: Tone**
If **Tone** appears in the display, press **ACCEPT**
If **Pulse** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
58. **Phone Number: 4151084**
If **4151084** appears in the display, press **ACCEPT**
If **4151084** does not appear in the display, enter **4151084** and press **ACCEPT**.
59. **Cellular Modem Scheduling: Disabled**
If **Disabled** appears in the display, press **ACCEPT**.

- If **Enabled** appears in the display, press **CHANGE CHOICE** until **Disabled** appears in the display, then press **ACCEPT**.
60. **Pager Option: Enabled**
 If **Enabled** appears in the display, press **ACCEPT**.
 If **Disabled** appears in the display, press **CHANGE CHOICE** until **Disabled** appears in the display, then press **ACCEPT**.
61. **Pager Service Phone Number: 591-6000**
 If **5916000** appears in the display, press **ACCEPT**.
 If not, enter **5916000**, and press **ACCEPT**.
62. **Number of Pagers:3**
 Enter **3** in the display.
63. **Pager #1 Phone Number:**
 Enter **190706**
64. **Pager #2 Phone Number:**
 Enter: **190703**
65. **Pager #3 Phone Number:**
 Enter: **190791**
66. **Reporting Order: Pager Only**
 If **Pager Only** is in the display, press **ACCEPT**.
 If **Pager Only** is not in the display, press **CHANGE CHOICE** until **Pager Only** appears in the display, then press **ACCEPT**.
67. Scroll to **RS-232** setup and press **SELECT**.
68. **RS-232 Baud Rate:9600**
 If **9600** appears in the display, press **SELECT**
 If **9600** does not appear in the display, enter **9600** and press **ACCEPT**.
69. Press **RETURN**
70. Scroll to **DATA LOG** and press **SELECT**.
71. Scroll to **SELECT INPUTS** and press **SELECT**.
72. Scroll to **RAINFALL** and press **SELECT**.
73. **Rainfall Input Data: Logged**
 If **Logged** appears in the display, press **SELECT**
 If **Logged** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
74. **Rainfall Logging Interval: 1 min**
 If **1 min** appears in the display, press **ACCEPT**
 If **1 min** does not appear in the display, enter **1** and press **CHANGE CHOICE** until **minutes** appears in the display, then press **ACCEPT**.
75. Scroll to **LEVEL/FLOW** and press **SELECT**.
76. **Level/Flow Input Data: Logged**
 If **Logged** appears in the display, press **SELECT**
 If **Logged** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
77. **Level/Flow Logging Interval: 1 min**
 If **1 min** appears in the display, press **ACCEPT**

If **1 min** does not appear in the display, enter **1** and press **CHANGE CHOICE** until **minutes** appears in the display, then press **ACCEPT**.

78. Press **RETURN**.

79. Scroll to **EXTENDED POWER MODE** and press **SELECT**.

80. **Extended Power Mode: Disabled**

If **Disabled** appears in the display, press **ACCEPT**

If **Enabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.

81. Press **RETURN**.

82. Scroll to **SET MEMORY MODE** and press **SELECT**.

83. **Memory Mode: Wrap**

If **Wrap** appears in the display, press **ACCEPT**

If **Wrap** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

84. Press **RETURN**.

85. Scroll to **FLOW METER SETUP** and press **SELECT**.

86. **Flow Units: cfs**

If **cfs** appears in the display, press **ACCEPT**

If **cfs** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

87. **Level Units: in**

If **in** appears in the display, press **ACCEPT**

If **in** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

88. **Primary Device: Manning Equation**

If **Manning Equation** appears in the display, press **ACCEPT**

If **Manning Equation** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

89. **Shape: Circular Pipe**

If **Circular Pipe** appears in the display, press **ACCEPT**

If **Circular Pipe** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

90. **Pipe Diameter:**

PHX1 75-inch

PHX2 96-inch

PHX3 54-inch

PHX4 66-inch

If the value in the display is correct, press **ACCEPT**

If the value in the display is incorrect, enter the correct value (**75, 96, 54, 66**), and press **SELECT**.

91. **Pipe Slope:**

PHX1 0.0009

PHX2 0.0024

PHX3 0.0029
PHX4 0.0032

If the value in the display is correct, press **ACCEPT**

If the value in the display is incorrect, enter the correct value (0.0009, 0.0023, etc.), and press **ACCEPT**.

92. **Pipe Roughness: PHX1: 0.015, PHX2: 0.022, PHX3: 0.020, PHX4: 0.020**

If **xxxx** appears in the display, press **SELECT** .

If **xxxx** does not appear in the display, enter **xxxx** and press **ACCEPT**.

93. **Total Flow Units: cf**

If **cf** appears in the display, press **SELECT**

If **cf** does not appear in the display, press **CHANGE CHOICE** until it appears and press **ACCEPT**.

94. Press **RETURN**.

95. Scroll to **FLOW TOTALIZER**, and press **SELECT**.

96. Scroll to **MODIFY SETUP**, and press **SELECT**.

97. **Totalizer Scaling: x 1**

If **x 1** appears in the display, press **ACCEPT**

If **x 1** does not appear in the display, press **CHANGE CHOICE** until it appears, and then press **ACCEPT**.

98. **Total Flow Units: cf**

If **cf** appears in the display, press **ACCEPT**

If **cf** does not appear in the display, press **CHANGE CHOICE** until it appears, and then press **ACCEPT**.

99. Press **RETURN**.

100. Press **RETURN**.

101. Press **MAIN MENU**.

102. Ready to Start, press **RUN/STOP** to begin sampling.

Glendale (900MAX series)
Sigma Stormwater Sampler Program

Some Basic Program Notes:

To start sampling: press the **RUN/STOP** key and follow the directions.

To see the current status, Press the **STATUS** key from the **MAIN MENU**.

The **MAIN MENU** key can be pressed at any time to return to that point.

The **password** is **9000**.

To look at data, press **DISPLAY DATA** from the **MAIN MENU** and follow prompts.

1. Press the **MAIN MENU** key.
2. Press the **SETUP** key at the upper right side of the display.
3. Press the **MODIFY ALL ITEMS** key at the upper right side of the display.
4. **Number of bottles: 8**
if **8** is displayed, press **ACCEPT**
if **8** is not displayed, press **CHANGE CHOICE** until **8** appears, then press **ACCEPT**.
5. **Bottle Volume: 1900 mL**
if **1900 mL** is displayed, press **ACCEPT**
if **1900 mL** not displayed,
Press **CHANGE UNITS** to change to **mL AND**
Enter **1900** and press **ACCEPT**.
6. **Intake Tubing Length:**

CITRUS	40 ft
ARROW	65 ft
INDPARK	26 ft

BUTLER **63 ft**

if the correct value is displayed, press **ACCEPT**

if the correct value is not displayed, enter the correct value and press **ACCEPT**.

7. **Intake Tubing Type: 3/8" vinyl (tubing is actually Teflon)**
if **3/8" Vinyl** is displayed, press **ACCEPT**
if **3/8" Vinyl** is not displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.
8. **Program Lock: Disabled**
if **disabled** is displayed, press **ACCEPT**
if **disabled** is displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.
9. **Program Delay: Disabled**
if **disabled** is displayed, press **ACCEPT**
if **enabled** is displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.
10. **Sample Collection: Flow Proportional**
if **flow proportional** is displayed, press **ACCEPT**
if **flow proportional** is not displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.
11. **Flow Pacing Mode: CONST VOL/VAR TIME**
if **Const Vol/Var Time** is displayed, press **ACCEPT**
if **Const Vol/Var Time** is not displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.
12. **Flow Meter: Integral**
if **integral** is displayed, press **ACCEPT**
if **integral** is not displayed, press **CHANGE CHOICE** until it appears, then press the **ACCEPT** button.
13. **Take Sample Every: (CITRUS: 600 cf, ARROW: 1800 cf, INDPARK: 400 cf, BUTLER: 100 cf)**
if **xxxx cf** appears in the display, press **ACCEPT**
if **xxxx cf** does not appear in the display,
 press **CHANGE UNITS** to get **CF**, AND
 enter **xxxx** and press **ACCEPT**.
14. **Timed Override?: Disabled**
if **disabled** appears in the display, press **ACCEPT**
if **enabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
15. **Take First Sample: Immediately**
if **immediately** appears in the display, press **ACCEPT**
if **immediately** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
16. **Deliver Each Sample To All Bottles?: No**

If **no** appears in the display, press **ACCEPT**
If **yes** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.

17. **Choose a Method of Distribution: Samples/Bottle**
If **Samples/Bottle** appears in the display, press **ACCEPT**.
If **Bottles/Sample** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
18. **Samples/Bottle: 4**
If **4** appears in the display, press **ACCEPT**.
If **4** does not appear in the display, enter **4** and press **ACCEPT**.
19. **Liquid Sensors: Enabled**
If **enabled** appears in the display, press **ACCEPT**
If **disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
20. **Sample Volume: 450 mL**
If **450 mL** appears in the display, press **ACCEPT**
If **450 mL** does not appear in the display, enter **450** and press **ACCEPT**.
21. **Intake Rinses: 2**
If **2** appears in the display, press **ACCEPT**
If **2** does not appear in the display, enter **2** and press **ACCEPT**.
22. **Sample Retries: 2**
If **2** appears in the display, press **ACCEPT**
If **2** does not appear in the display, enter **2** and press **ACCEPT**.
23. **Site ID: ...xxxx**
 CITRUS ...3001
 ARROW ...3002
 INDPARK ...3003
 BUTLER ...3004
If the correct ID appears in the display, press **ACCEPT**
If the correct ID does not appear in the display, enter **xxxx** and press **ACCEPT**.
24. **Do You Wish to Access Advanced Sampling Features?: Yes**
Press the button for **YES**.
25. **Use the DOWN arrow key to go to STORMWATER and press SELECT.**
26. **Storm Water: Enabled**
If **Enabled** appears in the display, press **ACCEPT**
If **Enabled** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
27. **Storm Water Start Condition: Rain and Level**
If **Rain and Level** appears in the display, press **ACCEPT**
If **Rain and Level** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
28. **Storm Water Rain Trigger: 0.05 inch**

- If 0.05 inch appears in the display, press **ACCEPT**
If 0.05 inch does not appear in the display, enter 0.05 and press **ACCEPT**.
29. **Rainfall Time Interval: 1:00**
If 1:00 (hr:min) appears in the display, press **ACCEPT**
If 1:00 (hr:min) does not appear in the display, enter 100 and press **ACCEPT**.
30. **Storm Water Level Trigger: 0.5 inch**
If 0.5 inch appears in the display, press **ACCEPT**
If 0.5 inch does not appear in the display, enter 0.5 and press **ACCEPT**.
31. **First Flush Number of Bottles: 1**
If 1 appears in the display, press **ACCEPT**
If 1 does not appear in the display, enter 1 and press **ACCEPT**.
32. **First Flush: Samples to Collect: 1**
If 1 appears in the display, press **ACCEPT**
If 1 does not appear in the display, enter 1 and press **ACCEPT**.
33. **First Flush Interval 1: 0:05 (hr:min)**
If 0:05 (hr:min) appears in the display, press **ACCEPT AS FINAL**
If 0:05 (hr:min) does not appear in the display, enter 005 and press **ACCEPT AS FINAL**.
34. **First Flush Sample Volume: 100 mL**
If 100 mL appears in the display, press **ACCEPT**
If 100 mL does not appear in the display, enter 100 and press **ACCEPT**.
35. **Program Time Limit: Enabled**
If **Enabled** appears in the display, press **ACCEPT**
If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
36. **Storm Water Program Time Limit: 8:00 (SUMMER) 16:00 (WINTER)**
If 8:00/16:00 (hr:min) appears in the display, press **ACCEPT**
If 8:00/16:00 (hr:min) does not appear in the display, enter 800/1600 and press **ACCEPT**.
37. Press **MAIN MENU** button.
38. Press **OPTIONS** from the main menu.
39. Press **ADVANCED OPTIONS**.
40. Select **ALARMS** and press **SELECT**.
41. Scroll to **LOW MAIN BATTERY** using the down arrow key, and press **SELECT**.
42. **Low Main Battery Alarm Condition: Enabled**
If **Enabled** appears in the display, press **ACCEPT**.
If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
43. **Report Via Modem (be sure arrow is on in front of 'Report via modem')**.
If arrow is present, press **RETURN**.
If arrow is not present, press **SELECT**, and then press **RETURN**.
44. Scroll to **MEMORY BATTERY**.
45. **Memory Battery Alarm Condition: Enabled**
If **Enabled** appears in the display, press **ACCEPT**.

- If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
46. **Report Via Modem (be sure arrow is on in front of 'Report via modem')**.
If arrow is present, press **RETURN**.
If arrow is not present, press **SELECT**, and then press **RETURN**.
47. Scroll to **RAINFALL** using the down arrow keys, and press **SELECT**.
48. **Rainfall Alarm Condition: Enabled**
If **Enabled** appears in the display, press **ACCEPT**
If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
49. **Rainfall High Trigger Point: 0.05 inch**
If **0.05 inch** appears in the display, press **ACCEPT**
If **0.05 inch** does not appear in the display, enter **0.05** and press **ACCEPT**.
50. **Rainfall Time Interval: 1:00 (hr:min)**
If **1:00 (hr:min)** appears in the display, press **ACCEPT**
If **1:00 (hr:min)** does not appear in the display, enter **100** and press **ACCEPT**.
51. **Report Via Modem (be sure arrow is on in front of 'Report via modem')**.
If arrow is present, press **RETURN**.
If arrow is not present, press **SELECT**, and then press **RETURN**.
52. Press **RETURN**
53. Scroll to **CALIBRATION** if PT is to be calibrated.
54. Scroll to **COMMUNICATION SETUP** and press **SELECT**.
55. Scroll to **MODEM SETUP** and press **SELECT**.
56. **Modem Power: Enabled**
If **Enabled** appears in the display, press **ACCEPT**
If **Disabled** appears in the display, press **CHANGE CHOICE** until it appears and then press **ACCEPT**.
57. **Dial Method: Tone**
If **Tone** appears in the display, press **ACCEPT**
If **Pulse** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
58. **Phone Number: 4151084**
If **4151084** appears in the display, press **ACCEPT**.
If **4151084** does not appear in the display, enter **4151084** and press **ACCEPT**.
59. **Cellular Modem Scheduling: Disabled**
If **Disabled** appears in the display, press **ACCEPT**.
If **Enabled** appears in the display, press **CHANGE CHOICE** until **Disabled** appears in the display, then press **ACCEPT**.
60. **Pager Option: Enabled**
If **Enabled** appears in the display, press **ACCEPT**.
If **Disabled** appears in the display, press **CHANGE CHOICE** until **Disabled** appears in the display, then press **ACCEPT**.
61. **Pager Service Phone Number: 591-6000**
If **5916000** appears in the display, press **ACCEPT**.

- If not, enter **5916000**, and press **ACCEPT**.
62. **Number of Pagers:3**
Enter **3** in the display.
 63. **Pager #1 Phone Number:**
Enter **190706**
 64. **Pager #2 Phone Number:**
Enter: **190703**
 65. **Pager #3 Phone Number:**
Enter: **190791**
 66. **Reporting Order: Pager Only**
If **Pager Only** is in the display, press **ACCEPT**.
If **Pager Only** is not in the display, press **CHANGE CHOICE** until **Pager Only** appears in the display, then press **ACCEPT**.
 67. Scroll to **RS-232** setup and press **SELECT**.
 68. **RS-232 Baud Rate:9600**
If **9600** appears in the display, press **SELECT**
If **9600** does not appear in the display, enter **9600** and press **ACCEPT**.
 69. Press **RETURN**
 70. Scroll to **DATA LOG** and press **SELECT**.
 71. Scroll to **SELECT INPUTS** and press **SELECT**.
 72. Scroll to **RAINFALL** and press **SELECT**.
 73. **Rainfall Input Data: Logged**
If **Logged** appears in the display, press **SELECT**
If **Logged** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 74. **Rainfall Logging Interval: 1 min**
If **1 min** appears in the display, press **ACCEPT**
If **1 min** does not appear in the display, enter **1** and press **CHANGE CHOICE** until minutes appears in the display, then press **ACCEPT**.
 75. Scroll to **LEVEL/FLOW** and press **SELECT**.
 76. **Level/Flow Input Data: Logged**
If **Logged** appears in the display, press **SELECT**
If **Logged** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 77. **Level/Flow Logging Interval: 1 min**
If **1 min** appears in the display, press **ACCEPT**
If **1 min** does not appear in the display, enter **1** and press **CHANGE CHOICE** until minutes appears in the display, then press **ACCEPT**.
 78. **Velocity Input Data: Logged**
If **Logged** appears in the display, press **SELECT**
If **Logged** does not appear in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.
 79. **Velocity Logging Interval: 1 min**
If **1 min** appears in the display, press **ACCEPT**

If **1 min** does not appear in the display, enter **1** and press **CHANGE CHOICE** until **minutes** appears in the display, then press **ACCEPT**.

80. Press **RETURN**.

81. Scroll to **EXTENDED POWER MODE** and press **SELECT**.

82. **Extended Power Mode: Disabled**

If **Disabled** appears in the display, press **ACCEPT**

If **Enabled** appears in the display, press **CHANGE CHOICE** until it appears, then press **ACCEPT**.

83. Press **RETURN**.

84. Scroll to **SET MEMORY MODE** and press **SELECT**.

85. **Memory Mode: Wrap**

If **Wrap** appears in the display, press **ACCEPT**

If **Wrap** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

86. Press **RETURN**.

87. Scroll to **FLOW METER SETUP** and press **SELECT**.

88. **Flow Units: cfs**

If **cfs** appears in the display, press **ACCEPT**

If **cfs** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

89. **Level Units: in**

If **in** appears in the display, press **ACCEPT**

If **in** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

90. **Primary Device: Area Velocity (For BUTLER choose HEAD vs FLOW)**

If **Area Velocity** appears in the display, press **ACCEPT**

If **Area Velocity** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

91. **Calculations based on: Geometry**

If **Geometry** appears in the display, press **ACCEPT**

If **Geometry** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

92. **Shape: Circular Pipe**

If **Circular Pipe** appears in the display, press **ACCEPT**

If **Circular Pipe** does not appear in the display, press **CHANGE CHOICE** until it appears then press **ACCEPT**.

93. **Pipe Diameter:**

CITRUS 42-inch

ARROW 96-inch

INDPARK 54-inch

If the value in the display is correct, press **ACCEPT**

If the value in the display is incorrect, enter the correct value and press **SELECT**.

94. **FOR BUTLER SITE**

Use Lookup Table 1

95. Pipe/Channel Slope:

CITRUS	0.0046
ARROW	0.0010
INDPARK	0.0033

If the value in the display is correct, press **ACCEPT**

If the value in the display is incorrect, enter the correct value (0.0009, 0.0023, etc.), and press **ACCEPT**.

96. Pipe Roughness: CITRUS: 0.018, ARROW: 0.020, INDPARK: 0.018, BUTLER: 0.015

If xxxx appears in the display, press **SELECT**

If xxxx does not appear in the display, enter xxxx and press **ACCEPT**.

97. Total Flow Units: cf

If cf appears in the display, press **SELECT**

If cf does not appear in the display, press **CHANGE CHOICE** until it appears and press **ACCEPT**.

98. Press **RETURN**.

99. Scroll to **FLOW TOTALIZER**, and press **SELECT**.

100. Scroll to **MODIFY SETUP**, and press **SELECT**.

101. Totalizer Scaling: x 1

If x 1 appears in the display, press **ACCEPT**

If x 1 does not appear in the display, press **CHANGE CHOICE** until it appears, and then press **ACCEPT**.

102. Total Flow Units: cf

If cf appears in the display, press **ACCEPT**

If cf does not appear in the display, press **CHANGE CHOICE** until it appears, and then press **ACCEPT**.

103. Press **RETURN**.

104. Press **RETURN**.

105. Press **MAIN MENU**.

106. Ready to Start, press **RUN/STOP** to begin sampling.

Appendix C

Dry Weather Sampling Results

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: <u>Circular Pipe</u>	
Outfall Location Code: <u>143-2.90</u> <small>(see manual, pp FCD-1-5)</small>	L.U.Type: <u>Highway</u> <small>(see reverse)</small>
Receiving Water: <u>Old Cross Cut Canal</u> <small>(water of the U.S., USGS map waters, or ADEQ designated waters)</small>	
Access Instructions: <u>Van Buren and SR 143</u> <small>(nearest intersection or landmark)</small>	
For discrepancies or omissions only: Outfall type, shape, material, and dimensions (see manual for codes): <u>Circular concrete pipe, 66" diameter</u>	
Vegetative Growth (circle one): <u>none</u> normal excessive growth inhibited growth <small>(If no flow but excessive or inhibited growth, schedule additional site visit).</small>	
1st Visit Date/Time: <u>9/26/00 7:05am</u> Precipitation <96 hours? Yes / <u>No</u> Flow? Yes / <u>No</u>	2nd Visit (>4 hours and <24 hours later) Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No
pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F	pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F
Attach copy of Chain of Custody Record <small>(see manual for example form)</small>	Attach copy of Chain of Custody Record <small>(see manual for example form)</small>
Physical Observations (1st Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> Deposits: none <u>sediments</u> oily other Odor: <u>none</u> musty sewage rotten eggs solvent chlorine other Biological: <u>none</u> fish algae other Signature: <u>Kathleen M. Hill</u>	Physical Observations (2nd Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> Deposits: none sediments oily other Odor: none musty sewage rotten eggs solvent chlorine other Biological: none fish algae other Signature: _____

1st Visit

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

2nd Visit (>4 hours and <24 hours later)

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

Photograph of Outfall (record roll number and exposure number)

See next page.

Additional Notes (sketch, flow data, observations, specify visit as 1st or 2nd) :

Land Use (L.U.) Type: Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed , unknown

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: <u>Trapezoidal Open Channel</u>	
Outfall Location Code: <u>143-3.33</u> <small>(see manual, pp FCD-1-5)</small>	L.U. Type: <u>Highway</u> <small>(see reverse)</small>
Receiving Water: <u>Old Cross Cut Canal</u> <small>(water of the U.S., USGS map waters, or ADEQ designated waters)</small>	
Access Instructions: <u>Loop 202 and Old Cross Cut Canal</u> <small>(nearest intersection or landmark)</small>	
For discrepancies or omissions only: Outfall type, shape, material, and dimensions (see manual for codes): <u>Trapezoidal open channel, TW = 9', D = 1'</u>	
Vegetative Growth (circle one): <u>none</u> normal excessive growth inhibited growth <small>(If no flow but excessive or inhibited growth, schedule additional site visit).</small>	
1st Visit Date/Time: <u>9/26/00 7:25am</u> Precipitation <96 hours? Yes / <u>(No)</u> Flow? Yes / <u>(No)</u>	2nd Visit (>4 hours and <24 hours later) Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No
pH: _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record (see manual for example form)	pH: _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record (see manual for example form)
Physical Observations (1st Visit): (circle appropriate descriptors, for "other" write in description) Deposits: <u>(none)</u> sediments oily other Odor: <u>(none)</u> musty sewage rotten eggs solvent chlorine other Biological: <u>(none)</u> fish algae other Signature: <u>Kathleen M. Hill</u>	Physical Observations (2nd Visit): (circle appropriate descriptors, for "other" write in description) Deposits: none sediments oily other Odor: none musty sewage rotten eggs solvent chlorine other Biological: none fish algae other Signature: _____

1st Visit

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

2nd Visit (>4 hours and <24 hours later)

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

Photograph of Outfall (record roll number and exposure number)*See next page***Additional Notes** (sketch, flow data, observations, specify visit as 1st or 2nd):**Land Use (L.U.) Type:** Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed, unknown

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: <u>Dual Box Culverts</u>	
Outfall Location Code: <u>202-3.57</u> <small>(see manual, pp FCD-1-5)</small>	L.U.Type <u>Highway</u> <small>(see reverse)</small>
Receiving Water: <u>Old Cross Cut Canal</u> <small>(water of the U.S., USGS map waters, or ADEQ designated waters)</small>	
Access Instructions: <u>SR 143 and Loop 202</u> <small>(nearest intersection or landmark)</small>	
For discrepancies or omissions only: Outfall type, shape, material, and dimensions (see manual for codes): <u>Dual Box Culverts, TW=6', D=4'</u>	
Vegetative Growth (circle one): <u>(none)</u> normal excessive growth inhibited growth <small>(If no flow but excessive or inhibited growth, schedule additional site visit).</small>	
1st Visit Date/Time: <u>9/26/00 7:40am</u> Precipitation <96 hours? Yes / <u>(No)</u> Flow? Yes / <u>(No)</u>	2nd Visit (>4 hours and <24 hours later) Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No
pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record (see manual for example form)	pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record (see manual for example form)
Physical Observations (1st Visit): (circle appropriate descriptors, for "other" write in description) Deposits: none <u>(sediments)</u> oily other Odor: <u>(none)</u> musty sewage rotten eggs solvent chlorine other Biological: <u>(none)</u> fish algae other Signature: <u>Huckson M. Hill</u>	Physical Observations (2nd Visit): (circle appropriate descriptors, for "other" write in description) Deposits: none sediments oily other Odor: none musty sewage rotten eggs solvent chlorine other Biological: none fish algae other Signature: _____

1st Visit

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

2nd Visit (>4 hours and <24 hours later)

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

Photograph of Outfall (record roll number and exposure number)

See next page

Additional Notes (sketch, flow data, observations, specify visit as 1st or 2nd) :

Land Use (L.U.) Type: Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed , unknown

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: <u>Trapezoidal Open Channel</u>	
Outfall Location Code: <u>202-5.14</u> <small>(see manual, pp FCD-1-5)</small>	L.U.Type <u>Highway</u> <small>(see reverse)</small>
Receiving Water: <u>Salt River</u> <small>(water of the U.S., USGS map waters, or ADEQ designated waters)</small>	
Access Instructions: <u>Washington St. and Loop 202</u> <small>(nearest intersection or landmark)</small>	
For discrepancies or omissions only: Outfall type, shape, material, and dimensions (see manual for codes): <u>Trapezoidal</u> <u>Open Channel, TW=60', D=5'</u>	
Vegetative Growth (circle one): <u>none</u> normal excessive growth inhibited growth <small>(If no flow but excessive or inhibited growth, schedule additional site visit).</small>	
1st Visit Date/Time: <u>9/26/00 8:05am</u> Precipitation <96 hours? Yes / <u>No</u> Flow? Yes / <u>No</u>	2nd Visit (>4 hours and <24 hours later) Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No
pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record <small>(see manual for example form)</small>	pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record <small>(see manual for example form)</small>
Physical Observations (1st Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> Deposits: <u>none</u> <u>sediments</u> <u>oily</u> <u>other</u> Odor: <u>none</u> musty sewage rotten eggs solvent chlorine other Biological: <u>none</u> fish algae other Signature: <u>Kathleen M. Neill</u>	Physical Observations (2nd Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> Deposits: none sediments oily other Odor: none musty sewage rotten eggs solvent chlorine other Biological: none fish algae other Signature: _____

<p>1st Visit</p> <p>Use one of the following:</p> <p>A. Free Fall into container: Volume: _____ (gal) Time: _____ (sec)</p> <p>B. Channel/pipe Flow (provide sketch): Depth: _____ (in) Width: _____ (in) Velocity: _____ (ft/sec)</p> <p>Discharge estimate: _____ (gpm)</p>	<p>2nd Visit (>4 hours and <24 hours later)</p> <p>Use one of the following:</p> <p>A. Free Fall into container: Volume: _____ (gal) Time: _____ (sec)</p> <p>B. Channel/pipe Flow (provide sketch): Depth: _____ (in) Width: _____ (in) Velocity: _____ (ft/sec)</p> <p>Discharge estimate: _____ (gpm)</p>
--	---

Photograph of Outfall (record roll number and exposure number)

See next page

Additional Notes (sketch, flow data, observations, specify visit as 1st or 2nd):

The deposits have filled the pipes at the end of the channel. The debris needs to be removed. There is an erosion problem near the pipes.

Land Use (L.U.) Type: Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed, unknown

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: Circular Pipe

Outfall Location Code: 202-5.90 L.U.Type Highway
(see manual, pp FCD-1-5) (see reverse)

Receiving Water: Salt River
(water of the U.S., USGS map waters, or ADEQ designated waters)

Access Instructions: Outfall No Longer Exists - sealed
(nearest intersection or landmark)

For discrepancies or omissions only:

Outfall type, shape, material, and dimensions (see manual for codes): _____

Vegetative Growth (circle one): none normal excessive growth inhibited growth

(If no flow but excessive or inhibited growth, schedule additional site visit).

1st Visit Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No	2nd Visit (>4 hours and <24 hours later) Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No
--	---

pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F	pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F
---	---

Attach copy of Chain of Custody Record
(see manual for example form)

Attach copy of Chain of Custody Record
(see manual for example form)

Physical Observations (1st Visit):
(circle appropriate descriptors, for "other" write in description)

Deposits: none sediments oily other
Odor: none musty sewage rotten eggs
 solvent chlorine other

Biological: none fish algae other

Signature: Kathleen M. Hill

Physical Observations (2nd Visit):
(circle appropriate descriptors, for "other" write in description)

Deposits: none sediments oily other
Odor: none musty sewage rotten eggs
 solvent chlorine other

Biological: none fish algae other

Signature: _____

1st Visit

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

2nd Visit (>4 hours and <24 hours later)

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

Photograph of Outfall (record roll number and exposure number)*See next page.***Additional Notes** (sketch, flow data, observations, specify visit as 1st or 2nd):*This outfall no longer exists. It was filled or removed. It was evident that the outfall existed at a previous time.***Land Use (L.U.) Type:** Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed, unknown

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: <u>Circular Pipe</u>	
Outfall Location Code: <u>202-7.44</u> <small>(see manual, pp FCD-1-5)</small>	L.U. Type: <u>Highway</u> <small>(see reverse)</small>
Receiving Water: <u>Salt River</u> <small>(water of the U.S., USGS map waters, or ADEQ designated waters)</small>	
Access Instructions: <u>Outfall No Longer Exists</u> <small>(nearest intersection or landmark)</small>	
For discrepancies or omissions only: Outfall type, shape, material, and dimensions (see manual for codes): _____	
Vegetative Growth (circle one): none normal excessive growth inhibited growth (If no flow but excessive or inhibited growth, schedule additional site visit).	
1st Visit Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No	2nd Visit (>4 hours and <24 hours later) Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No
pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F	pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F
Attach copy of Chain of Custody Record <small>(see manual for example form)</small>	Attach copy of Chain of Custody Record <small>(see manual for example form)</small>
Physical Observations (1st Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> <u>Deposits:</u> none sediments oily <u>other</u> <u>Odor:</u> none musty sewage rotten eggs solvent chlorine other <u>Biological:</u> none fish algae other Signature: <u>Kathleen M. Hill</u>	Physical Observations (2nd Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> <u>Deposits:</u> none sediments oily other <u>Odor:</u> none musty sewage rotten eggs solvent chlorine other <u>Biological:</u> none fish algae other Signature: _____

1st Visit

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

2nd Visit (>4 hours and <24 hours later)

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

Photograph of Outfall (record roll number and exposure number)*See next page***Additional Notes** (sketch, flow data, observations, specify visit as 1st or 2nd):

This outfall no longer exists. It was filled or removed. Changes to the drainage system may have been made during the construction of Tempe Town Lake (Rio Salado Project). No evidence was found that the outfall existed at a previous time.

Land Use (L.U.) Type: Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed, unknown

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: Dual Box Culverts

Outfall Location Code: 202-7.98 L.U.Type Highway
(see manual, pp FCD-1-5) (see reverse)

Receiving Water: Salt River
(water of the U.S., USGS map waters, or ADEQ designated waters)

Access Instructions: 1100' East of Rural Rd on N. Bank of Salt R.
(nearest intersection or landmark)

For discrepancies or omissions only:

Outfall type, shape, material, and dimensions (see manual for codes): Dual Box Culverts, TW=8', D=8', concrete

Vegetative Growth (circle one): none normal excessive growth inhibited growth

(If no flow but excessive or inhibited growth, schedule additional site visit).

1st Visit	2nd Visit (>4 hours and <24 hours later)
Date/Time: <u>9/26/00 9:42 am</u>	Date/Time: _____
Precipitation <96 hours? Yes / <u>No</u>	Precipitation <96 hours? Yes / No
Flow? Yes / <u>No</u>	Flow? Yes / No

pH: : _____ su	Color: # _____	pH: : _____ su	Color: # _____
Cl2: _____ ppm	Ammonia: _____ ppm	Cl2: _____ ppm	Ammonia: _____ ppm
Cu: _____ ppm	Oil sheen: Y / N	Cu: _____ ppm	Oil sheen: Y / N
Phenols: _____ ppm	Surface scum: Y / N	Phenols: _____ ppm	Surface scum: Y / N
Deterg: _____ ppm	Air Temp: _____ °F	Deterg: _____ ppm	Air Temp: _____ °F
Turbidity: _____ NTU	Water Temp: _____ °F	Turbidity: _____ NTU	Water Temp: _____ °F

Attach copy of Chain of Custody Record
(see manual for example form)

Attach copy of Chain of Custody Record
(see manual for example form)

Physical Observations (1st Visit):
(circle appropriate descriptors, for "other" write in description)

Deposits: none sediments oily other
Odor: none musty sewage rotten eggs
solvent chlorine other

Biological: none fish algae other

Signature: Guthrie M. Hill

Physical Observations (2nd Visit):
(circle appropriate descriptors, for "other" write in description)

Deposits: none sediments oily other
Odor: none musty sewage rotten eggs
solvent chlorine other

Biological: none fish algae other

Signature: _____

<p>1st Visit</p> <p>Use one of the following:</p> <p>A. Free Fall into container: Volume: _____ (gal) Time: _____ (sec)</p> <p>B. Channel/pipe Flow (provide sketch): Depth: _____ (in) Width: _____ (in) Velocity: _____ (ft/sec)</p> <p>Discharge estimate: _____ (gpm)</p>	<p>2nd Visit (>4 hours and <24 hours later)</p> <p>Use one of the following:</p> <p>A. Free Fall into container: Volume: _____ (gal) Time: _____ (sec)</p> <p>B. Channel/pipe Flow (provide sketch): Depth: _____ (in) Width: _____ (in) Velocity: _____ (ft/sec)</p> <p>Discharge estimate: _____ (gpm)</p>
<p>Photograph of Outfall (record roll number and exposure number)</p> <p><i>See next page</i></p>	
<p>Additional Notes (sketch, flow data, observations, <u>specify visit as 1st or 2nd</u>):</p> <p><i>Water from Tempse Town Lake enters the culvert. However, no water was present in the culvert upstream from the lake.</i></p>	
<p>Land Use (L.U.) Type: Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed, unknown</p>	

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: <u>Circular Pipe</u>	
Outfall Location Code: <u>10-260.7</u> <small>(see manual, pp FCD-1-5)</small>	L.U.Type <u>Highway</u> <small>(see reverse)</small>
Receiving Water: <u>Julian Wash</u> <small>(water of the U.S., USGS map waters, or ADEQ designated waters)</small>	
Access Instructions: <u>Julian wash @ 10th Ave and I-10</u> <small>(nearest intersection or landmark)</small>	
For discrepancies or omissions only: Outfall type, shape, material, and dimensions (see manual for codes): <u>Circular pipe, concrete, Diameter = 72"</u>	
Vegetative Growth (circle one): <input checked="" type="radio"/> none normal excessive growth inhibited growth <small>(If no flow but excessive or inhibited growth, schedule additional site visit).</small>	
1st Visit Date/Time: <u>9/25/00 2:25 pm</u> Precipitation <96 hours? Yes / <input checked="" type="radio"/> No Flow? Yes / <input checked="" type="radio"/> No	2nd Visit (>4 hours and <24 hours later) Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No
pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record <small>(see manual for example form)</small>	pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record <small>(see manual for example form)</small>
Physical Observations (1st Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> <u>Deposits:</u> <input checked="" type="radio"/> none sediments oily other <u>Odor:</u> <input checked="" type="radio"/> none musty sewage rotten eggs solvent chlorine other <u>Biological:</u> <input checked="" type="radio"/> none fish algae other Signature: <u>Kathleen M. Hill</u>	Physical Observations (2nd Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> <u>Deposits:</u> none sediments oily other <u>Odor:</u> none musty sewage rotten eggs solvent chlorine other <u>Biological:</u> none fish algae other Signature: _____

<p>1st Visit</p> <p>Use one of the following:</p> <p>A. Free Fall into container: Volume: _____ (gal) Time: _____ (sec)</p> <p>B. Channel/pipe Flow (provide sketch): Depth: _____ (in) Width: _____ (in) Velocity: _____ (ft/sec)</p> <p>Discharge estimate: _____ (gpm)</p>	<p>2nd Visit (>4 hours and <24 hours later)</p> <p>Use one of the following:</p> <p>A. Free Fall into container: Volume: _____ (gal) Time: _____ (sec)</p> <p>B. Channel/pipe Flow (provide sketch): Depth: _____ (in) Width: _____ (in) Velocity: _____ (ft/sec)</p> <p>Discharge estimate: _____ (gpm)</p>
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Photograph of Outfall (record roll number and exposure number)

See next page

Additional Notes (sketch, flow data, observations, specify visit as 1st or 2nd) :

Land Use (L.U.) Type: Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed, unknown

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: <u>Circular Pipe</u>	
Outfall Location Code: <u>10-261.5</u> <small>(see manual, pp FCD-1-5)</small>	L.U.Type <u>Highway</u> <small>(see reverse)</small>
Receiving Water: <u>Julian Wash</u> <small>(water of the U.S., USGS map waters, or ADEQ designated waters)</small>	
Access Instructions: <u>Park Ave and Ajo Way</u> <small>(nearest intersection or landmark)</small>	
For discrepancies or omissions only: Outfall type, shape, material, and dimensions (see manual for codes): <u>Circular pipe, Concrete, Diameter = 78"</u>	
Vegetative Growth (circle one): <u>none</u> normal excessive growth inhibited growth <small>(If no flow but excessive or inhibited growth, schedule additional site visit).</small>	
1st Visit Date/Time: <u>9/25/00 3:05pm</u> Precipitation <96 hours? Yes / <u>No</u> Flow? Yes / <u>No</u>	2nd Visit (>4 hours and <24 hours later) Date/Time: _____ Precipitation <96 hours? Yes / No Flow? Yes / No
pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record <small>(see manual for example form)</small>	pH: : _____ su Color: # _____ Cl2: _____ ppm Ammonia: _____ ppm Cu: _____ ppm Oil sheen: Y / N Phenols: _____ ppm Surface scum: Y / N Deterg: _____ ppm Air Temp: _____ °F Turbidity: _____ NTU Water Temp: _____ °F Attach copy of Chain of Custody Record <small>(see manual for example form)</small>
Physical Observations (1st Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> Deposits: <u>none</u> sediments oily other Odor: <u>none</u> musty sewage rotten eggs solvent chlorine other Biological: <u>none</u> fish algae other Signature: <u>Kathleen M. Hill</u>	Physical Observations (2nd Visit): <small>(circle appropriate descriptors, for "other" write in description)</small> Deposits: none sediments oily other Odor: none musty sewage rotten eggs solvent chlorine other Biological: none fish algae other Signature: _____

1st Visit

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

2nd Visit (>4 hours and <24 hours later)

Use one of the following:

A. Free Fall into container:

Volume: _____ (gal) Time: _____ (sec)

B. Channel/pipe Flow (provide sketch):

Depth: _____ (in) Width: _____ (in)

Velocity: _____ (ft/sec)

Discharge estimate: _____ (gpm)

Photograph of Outfall (record roll number and exposure number)

See next page

Additional Notes (sketch, flow data, observations, specify visit as 1st or 2nd):

Land Use (L.U.) Type: Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed, unknown

**SITE REPORT
DRY WEATHER FIELD SCREEN**

Structure Name: Oval Pipe

Outfall Location Code: 10-264.6 L.U.Type Highway
(see manual, pp FCD-1-5) (see reverse)

Receiving Water: Julian Wash
(water of the U.S., USGS map waters, or ADEQ designated waters)

Access Instructions: _____
(nearest intersection or landmark)

For discrepancies or omissions only:

Outfall type, shape, material, and dimensions (see manual for codes): _____

Vegetative Growth (circle one): none normal excessive growth inhibited growth

(If no flow but excessive or inhibited growth, schedule additional site visit).

1 st Visit	2 nd Visit (>4 hours and <24 hours later)
Date/Time: <u>9/25/00 3:30 pm</u>	Date/Time: _____
Precipitation <96 hours? Yes / <u>No</u>	Precipitation <96 hours? Yes / No
Flow? Yes / <u>No</u>	Flow? Yes / No

pH: : _____ su	Color: # _____	pH: : _____ su	Color: # _____
Cl2: _____ ppm	Ammonia: _____ ppm	Cl2: _____ ppm	Ammonia: _____ ppm
Cu: _____ ppm	Oil sheen: Y / N	Cu: _____ ppm	Oil sheen: Y / N
Phenols: _____ ppm	Surface scum: Y / N	Phenols: _____ ppm	Surface scum: Y / N
Deterg: _____ ppm	Air Temp: _____ °F	Deterg: _____ ppm	Air Temp: _____ °F
Turbidity: _____ NTU	Water Temp: _____ °F	Turbidity: _____ NTU	Water Temp: _____ °F

Attach copy of Chain of Custody Record
(see manual for example form)

Attach copy of Chain of Custody Record
(see manual for example form)

Physical Observations (1st Visit):
(circle appropriate descriptors,
for "other" write in description)

Deposits: none sediments oily other
Odor: none musty sewage rotten eggs
solvent chlorine other

Biological: none fish algae other

Signature: Kathleen M. Hill

Physical Observations (2nd Visit):
(circle appropriate descriptors,
for "other" write in description)

Deposits: none sediments oily other
Odor: none musty sewage rotten eggs
solvent chlorine other

Biological: none fish algae other

Signature: _____

<p>1st Visit</p> <p>Use one of the following:</p> <p>A. Free Fall into container: Volume: _____ (gal) Time: _____ (sec)</p> <p>B. Channel/pipe Flow (provide sketch): Depth: _____ (in) Width: _____ (in) Velocity: _____ (ft/sec)</p> <p>Discharge estimate: _____ (gpm)</p>	<p>2nd Visit (>4 hours and <24 hours later)</p> <p>Use one of the following:</p> <p>A. Free Fall into container: Volume: _____ (gal) Time: _____ (sec)</p> <p>B. Channel/pipe Flow (provide sketch): Depth: _____ (in) Width: _____ (in) Velocity: _____ (ft/sec)</p> <p>Discharge estimate: _____ (gpm)</p>
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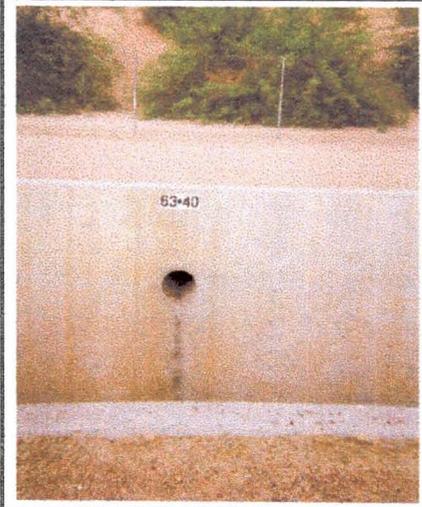
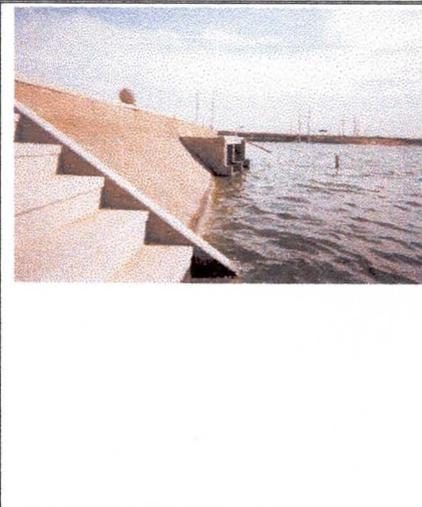
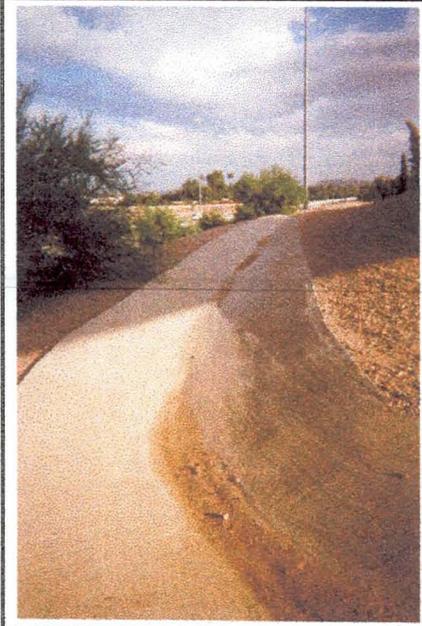
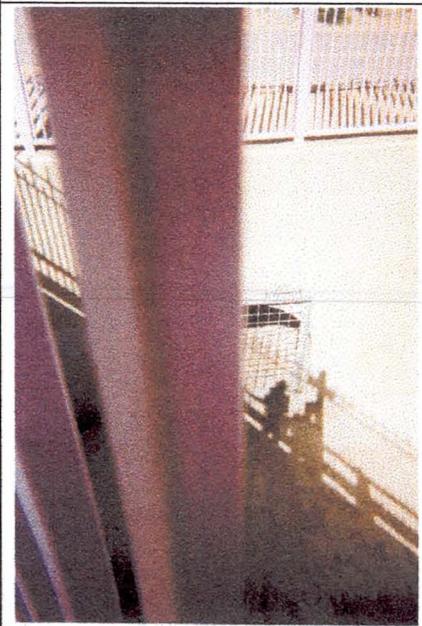
Photograph of Outfall (record roll number and exposure number)

See next page

Additional Notes (sketch, flow data, observations, specify visit as 1st or 2nd) :

Land Use (L.U.) Type: Indicate dominant watershed land use as residential, industrial, commercial, agricultural, mixed, unknown

Dry Weather Screening - Photographs of Outfalls

	<p>Outfall ID: 143-2.90 Type: Circular Pipe Photo #: 23</p> <p>Location: Phoenix Van Buren and SR 143</p> <p>Receiving Water: Old Cross Cut Canal</p>		<p>Outfall ID: 202-7.98 Type: Dual Box Culverts Photo #: 16</p> <p>Location: Phoenix 1100 feet East of Rural Road on North Bank of Salt River</p> <p>Receiving Water: Salt River</p>
	<p>Outfall ID: 143-3.33 Type: Trapezoidal Open Channel Photo #: 19</p> <p>Location: Phoenix Loop 202 and Old Cross Cut Canal</p> <p>Receiving Water: Old Cross Cut Canal</p>		<p>Outfall ID: 10-260.7 Type: Circular Pipe Photo #: 26</p> <p>Location: Tucson 10th Avenue and I-10</p> <p>Receiving Water: Julian Wash</p>

	<p>Outfall ID: 202-3.57 Type: Dual Box Culverts Photo #: 18</p> <p>Location: Phoenix SR 143 and Loop 202</p> <p>Receiving Water: Old Cross Cut Canal</p>		<p>Outfall ID: 10-261.5 Type: Circular Pipe Photo #: 25</p> <p>Location: Tucson Park Avenue and Ajo Way</p> <p>Receiving Water: Julian Wash</p>
	<p>Outfall ID: 202-5.14 Type: Trapezoidal Open Channel Photo #: 17</p> <p>Location: Washington Street and Loop 202</p> <p>Receiving Water: Salt River</p>		<p>Outfall ID: 10-264.6 Type: Oval Pipe Photo #: 24</p> <p>Location: Tucson Palo Verde Road and I-10</p> <p>Receiving Water: Julian Wash</p>

Appendix D

Education and Training Materials



ARIZONA LOCAL TECHNICAL ASSISTANCE PROGRAM
IN PARTNERSHIP WITH
ARIZONA DEPARTMENT OF WATER RESOURCES,
AND GILA COUNTY PRESENTS:

STATE STANDARD 8-99,
"STATE STANDARD FOR STORMWATER
DETENTION/RETENTION"

Bisbee
August 16, 2000

Prescott
September 14, 2000

Phoenix
October 12, 2000

Tucson
November 1, 2000

Description: Training will be provided in use and application of State Standard 8-99, "State Standard for Stormwater Detention/Retention" (8-99). The 6-hour course will present background information with respect to the Arizona Department of Water Resources role in the floodplain management and the development of the standard as well as a discussion of the purpose and use of the standard. The course will cover step-by-step procedures included in the standard and will include workshops covering solution of an example application by the different procedures.

Objectives: Upon completion of the course, the participants should be able to:

- Understand the concept of stormwater detention/retention and its use
- Understand the three-level approach of the standard
- Apply Level 1 procedures to determine stormwater retention volumes
- Apply Level 2 procedures to determine stormwater detention volumes
- Understand the benefits and requirements for Level 3 analysis

What to Bring: Each participant needs to bring an engineering scale and a scientific calculator.

Who Should Attend: Engineers, Hydrologists, Floodplain Administrators, and technicians involved in hydrologic and hydraulic computations for roadway design, land development, floodplain permitting, site plan design (grading and drainage) or design review in both the public and private sectors.

To register, please complete the following form and fax to the Arizona LTAP Center at (602) 712-3007:

Name _____ Agency _____

Address _____ City _____ State _____

Zip _____ Phone _____ Fax _____

Questions call Teresa Lopez at (602) 712-7157

*Local Governments a \$50 "No-Show" fee required
*Private Industry cost is \$50 per day/per person

**Please send check prior to course*

Payable to: Arizona LTAP

Send to: 1130 N. 22nd Ave., Phoenix, AZ 85009

Safety Contacts

ADOT Safety and Health Section
206 South 17th Avenue, Room 176A
Phoenix, Arizona 85007-3213

Phoenix Safford
255-7522 428-5470

Tucson Prescott
620-5452 445-5391

Globe Kingman
425-7638 757-5828

Yuma Flagstaff
317-2115 779-7520

Page Holbrook
645-2412 524-6801

Show Low
537-4343

Adopt-a-Highway Coordinator
255-6880

Central Permits Office
255-8281

Adopt-A-Highway

Safety Requirements

Safety First . . .



Arizona Department of Transportation

Arizona Department of Transportation

Adopt-A-Highway Safety Requirements

The following safety guidelines must be followed when participating in litter removal activities along Arizona's highways. Each volunteer should be provided with a copy of this briefing prior to arrival at the work site. Our combined efforts to keep Arizona beautiful are going a long way toward improving the appearance of our highways.

- All participants in the litter pickup program must receive proper safety training prior to reporting to the job site.
- Participants should assemble in an area away from the designated work site and car pool to reduce the number of cars at the litter pickup site. Vehicles must be parked at least 30 feet from the roadway.
- Safety vests must be worn by all participants at all times during the litter pickup project.
- Supervisors shall be assigned to both adult and youth groups. Participants below the age of 12 are not permitted at the work sites. Supervisors should be assigned before departing for the work site.
- Litter pickup shall be performed only in daylight hours and during good weather conditions.
- Work as a group facing oncoming traffic at all times.
- Do not cross the highway unnecessarily; cross only at designated locations. Designated crossing locations should be determined by supervisor prior to starting work. Remain with the group to which you are assigned.
- Do not pick up litter in the median or on any traveled portion of the highway. Litter should be picked up only on the right-of-way from the edge of the shoulder to the right-of-way fence.
- Do not pick up hazardous materials such as car batteries, animal carcasses, or any other object that appears questionable.
- Know what you are picking up. Discarded chemical containers may sometimes be hazardous.
- Do not pick up litter during hours other than those agreed upon with your ADOT representative.
- Do not distract motorists with horseplay or abrupt erratic movements. Horseplay of any kind is strictly forbidden. The highways are potentially very dangerous.
- Anyone under the influence of alcohol or narcotics must be asked to leave the work site.
- Keep away from any highway construction or maintenance projects. ADOT personnel will clean up those areas.
- Stay out of utility installations, culverts and drainage structures.
- Do not try to pick up heavy objects. Use correct lifting techniques, keeping your back as straight as possible. Keep the object you are trying to lift close to your body and let your legs and arms do the work.
- Use caution when you encounter the following: cactus, animals, steep slopes, sharp rocks, insects, barbed wire, traffic, and other unusual circumstances.
- A first aid kit should be on hand with one person experienced in administering first aid.
- Assure that first aid kits are available and that transportation is available to the nearest medical facility.
- Assure that appropriate beverages are available and are in sufficient quantity to meet your group's needs. Alcoholic beverages are prohibited.
- Wear appropriate attire (comfortable clothes, gloves, hats, boots or hard-soled shoes). Participants should not wear short pants or tank tops.

NOTE: It is the responsibility of the organization to see that all participants have signed a waiver form with this organization.

CONTACTS

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Flagstaff
(520) 779-7520

Holbrook
(520) 524-6801
ext. 201

Arizona Clean & Beautiful
(602) 274-0494

Adopt-a-Highway Coordinator
(602) 255-6584

Central Permits Office
(602) 255-8281



*Adopt a
Highway in
Beautiful
Arizona*



ADOT'S Responsibilities

- Approve sections of highway to be included in the program based on safety considerations including traffic volumes, speeds, curves, and number of intersections.
- Erect signs identifying the name of the organization.
- Provide safety training for organization supervisors.
- Supply ADOT safety vests which must be returned after the work is finished or Adopt-a-Highway vests which are kept by the organization for future pick-up activities.
- Supply litter bags and remove and dispose of the filled bags.
- Send new organizations Certificates of Adoption and newsletters.



Arizona Department of Transportati

Adopt-A-Highway

A Growing Program In Arizona

Civic and community groups, business organizations and even families in Arizona may join the Adopt-a-Highway Program to help the Arizona Department of Transportation (ADOT) reduce its \$1 million annual expenditure to pick up litter along the more than 6000 miles of state highway system.

The Adopt-a-Highway Program allows organizations to make a two year commitment to pick up litter along a two-mile stretch of state highway two times a year. ADOT recognizes the organization's concern for the environment with a sign that identifies the organization responsible for the clean-up of that particular roadway.

Through reports of pick-up activities ADOT documents the manhours volunteered by participants. Adopt-a-Highway volunteers currently save the Arizona taxpayers more than \$250,000 annually in litter pick-up costs.

Adopt-a-Highway organizations also enhance economic development and civic pride for their communities by having a clean environment. The activity of volunteers picking up litter, the bumper stickers, and the sign are reminders to the public not to litter the Arizona highways nor the environment. There are recycling opportunities for the organization in its pick-up activity.

The Adopt-a-Highway Program is fast-growing. Approximately 120 organizations joined the program during the first year after it was begun in 1988. All available mileage was adopted in the metropolitan areas in 1991, which led to the program's expansion to the non-urban freeway and interstate systems. By the Spring of 1998, more than 1900 organizations had adopted over 2400 miles of Arizona highways.

Procedures

Volunteer groups also have the option to beautify their section following clean-up by obtaining a permit to plant native wildflowers.

Organizations interested in the Adopt-a-Highway Program may become involved by contacting a district office of ADOT and by completing an Adopt-a-Highway permit form. This permit allows the group members to pick up litter within the right-of-way. Each organization must designate a member as a coordinator who will complete a one-hour safety training program, inform other workers about the importance of making safety the first consideration while picking up litter, and the coordinator will oversee the work.



Organization's Responsibilities

- Schedule the date and time of each pick-up through an ADOT contact.
- Complete a special event waiver form signed by each person participating in the pickup event.
- Hold a safety briefing before the pickup.
- Carpool to work site and keep vehicles off the right-of-way of state highway.
- Make sure workers wear safety vests provided by ADOT.
- Face oncoming traffic.
- Maintain a working group of six to ten people.
- Avoid overexertion.
- Stop work in inclement weather.
- Do not remove hazardous substances.
- Avoid contact with noxious weeds and areas where herbicides have been applied.
- Do not pick up items on bridges or on the pavement.
- Do not bring children under 12 to the Adopt-a-Highway area.
- Return to ADOT the activity reporting postcard which indicates the hours worked and number of participants.